A Quantitative Means of Comparing Competitive Advantage among Airlines with Heterogeneous Business Models: Analysis of U.S. Airlines

Loren Moir
Griffith University
lmoir@icloud.com

Gui Lohmann
Griffith University
g.lohmann@griffith.edu.au

Abstract

Increasing heterogeneity amongst airline business models makes objectively comparing their competitive advantage increasingly difficult. In this study, we develop an instrument that objectively quantifies the competitive advantage of airlines within a single market, the US. The data sample includes nine US airlines with product and financial data gathered from 2011 to 2013. The consolidated data enable the calculation of a product index and a cost index. The product index incorporates four sub-indices (revenue, connectivity, convenience and comfort), while the cost index incorporates three sub-indices (unit cost, aircraft and labour). The developed model enables the identification of the hybrid business models that are successfully pursuing an integrated cost leadership and differentiation strategy. The results also confirm that competitive heterogeneity exists whilst demonstrating that competitive advantage can be mutually exclusive to the respective airline's strategic proposition.

Keywords: Airline business models; Competitive advantage; Airline strategy; Integrated strategy; Product and organisational architecture

Highlights

- Airline business models have increased in terms of diversification
- Diversification increases the difficulty in understanding competitive advantages

- The proposed model enables the identification of the hybrid business model
- Results confirm competitive heterogeneity amongst airlines in the US

1. Introduction

Academic studies have demonstrated that airline business models are diverging from the two homogeneous strategic archetypes (e.g., Jean & Lohmann, 2016, Lohmann & Koo, 2013). This new level of competitive heterogeneity amongst airlines challenges Porter's (1985) original competitive advantage (CA) theory, which stated that firms could either compete on the basis of cost or differentiation. In the airline context, the Laker Airways example from the 1980s demonstrates the risks of pursuing both a cost and differentiation strategy. Skipping forward three decades, the airline industry is now served by a spectrum of airline business models that compete both regarding cost and differentiation.

For example, JetBlue, an airline identified by academics as presenting a 'hybrid' business model proposition (Doustaler and Flouris, 2006), maintains a mission to offer a differentiated product at a cost-effective price. Their pursuit of an integrated strategy suggests that an airline can compete both regarding product and cost. Firms that pursue an integrated strategy are considered to be more adaptable to shifting macroeconomic and microeconomic conditions.

Competitive heterogeneity has made comparisons between airlines increasingly more difficult. Without distinct cost or product advantages, CA stems from overall value creation, which is achieved primarily through innovations or technology in the supply chain (Holloway, 2008). Comparing traditional key performance indicators (KPIs) such as cost per available seat mile (CASM) and revenue per available seat mile (RASM) in isolation is currently considered ineffective. Instead, a holistic assessment of both the airline and the market is required to identify value created and thus overall CA.

This paper aims to conceptualise an instrument through which CA can be quantified and thus compared among airlines with heterogeneous business models. The conceptual model assumes that competitive heterogeneity exists within the airline industry. An instrument that measures CA is beneficial to airline managers at a strategic level. The paper also considers the hypothesised integrated cost leadership and differentiation strategy (integrated strategy), developing a technique by which the results can be applied to the 'airline realised business strategies' model. This model was originally conceived by Doustaler and Flouris (2006), enabling the identification of successful integrated strategies.

2. Literature Review

Strategic context

Airline business models

Early airline strategy literature recognised that airlines follow Porter's (1985) CA model. The traditional strategy included pursuing either a cost leadership strategy (low-cost carrier – LCC model or 'Southwest model' original proposition) or a differentiation strategy (full-service network carrier – FSNC model). Alamdari and Fagan (2005) noted that LCCs started to diverge from the traditional LCC model by offering additional products and services. Button and Ison (2008) and Button (2012) cast doubt over the sustainability of the pure LCC business model. This divergence from the LCC archetype has been described as hybridisation. Airlines such as JetBlue openly state that their strategy is to pursue a hybrid business model. The 'JetBlue Experience' offers a differentiated product at a cost-effective price (JetBlue Airways Corporation, 2014). Dostaler and Flouris (2006) hypothesised that hybridisation could be considered an integrated cost leadership and differentiation strategy.

The Airlines-within-airlines (AWA) model is a strategic response by FSNCs to combat the rise of LCCs. The AWA model enabled FSNCs to pursue a cost leadership or focus strategy by operating a portfolio of airlines in various market segments (Graham and Vowels, 2006). As discussed by Whyte and Lohmann (2015), the Jetstar portfolio of five airlines, owned mostly in part by Qantas, remains one of the most successful examples of AWA. The AWA model ended in the United States following the discontinuation of Ted in 2009; however, it continues to be successful throughout both Europe and the Asia-Pacific region, which jointly account for over 90 % of worldwide AWAs (Pearson and Merkert, 2014). The vulnerabilities to an FSNC by pursuing an AWA strategy are discussed by Gillen and Gados (2008).

Charter airlines can be defined as an 'airline that provides point-to-point services to popular holiday and leisure destinations, often as part of an inclusive tour (also known as a package tour)' (Whyte & Lohmann, 2017, p. 113). Charter airlines can be considered another business model that tends to conform to the homogeneity of LCCs but operates with a focus strategy.

Of the business models currently in play, hybridisation, AWAs and charter airlines are all strategic responses to the heterogenic competitive landscape within the industry. Although the traditional business models still exist as a benchmark, the degree of

conformity to those archetypes now varies through a phenomenon referred to as business model convergence (Daft and Albers, 2013 & 2015).

Conceptualising airline business model convergence

Alamdari and Fagan (2005) demonstrated that contemporary LCCs were diverging from the traditional LCC archetype. They identified Ryanair and Easyjet as the airlines that conformed most closely to the original LCC model, but even those two maintained only 79 % conformance (Alamdari and Fagan, 2005, p. 384). Tsoukalas, Belobaba and Swelbar (2008) and Belobaba, Odoni and Barnhart (2009) further demonstrated that FSNCs are also diverging from the traditional FSNC archetype. Their studies also demonstrated a narrowing of unit costs between US-based LCCs and FSNCs during the period between 1995 and 2006. This continued divergence from both strategic propositions is now collectively known as 'airline business model convergence' (Daft and Albers, 2013 & 2015). Traditionally, business model convergence represents a weakening in an airlines' strategic position; however, 'convergence also has positive effects if it reflects the diffusion of efficient processes and practices among firms' (Daft and Albers, 2013, p. 47). Airline business model convergence has raised questions regarding the possible existence of an integrated cost leadership/differentiation strategy (see Figure 1).

Figure 1: Business model divergence from homogeneous strategic archetypes. Adapted from Doustaler and Flouris (2006)

Integrated cost leadership/differentiation strategy

Porter's (1985) CA literature considers the risks associated with being 'stuck in the middle' and identifies Laker Airways as the classic example. Dostaler and Flouris (2006) revisited Porter's theory and introduced the concept of an 'integrated cost

leadership/differentiation strategy' in an airline context, or put more simply, the 'best cost-provider'. As described by Dostaler and Flouris (2006), an integrated strategy is achieved by creating value through optimising the trade-off between product and cost. For that reason, this model has also been referred to as the 'trade-off model'. Dostaler and Flouris (2006) draw on the more recent works to create a case for an integrated strategy. They propose a simple, objective method for measuring an airlines' effectiveness with this strategy (referred to as the 'airline realised business strategies' model). Although it proposes a simple method for joint comparison of cost versus differentiation, this model is limited in that it stops short of providing a method of quantifying cost and differentiation for the purposes of comparison.

Although a method to determine cost and differentiation for comparison is not presented by Dostaler and Flouris (2006), other authors have created relevant methods that can be adapted to this model. Pearce and Smyth (2006), Tsoukalas et al. (2008) and Belobaba et al. (2009) all apply the delineated unit cost method for a cost model comparison between airlines. In this method, the unit costs of the respective airlines are corrected for labour costs, fuel costs, distribution costs, transport-related costs and other related infrastructure costs. The actual delineation technique applied by the aforementioned authors is dependent upon the accounting policies of the airlines being compared. Methods for differentiation comparisons have been developed by Lohmann and Koo (2013), building on the work of Mason and Morrison (2008). Currently, holistic methods for comparing airline business models within the literature have been shown to be both qualitative and quantitative.

Academic techniques for comparing airline business models

Qualitative techniques

A qualitative analysis of business model convergence was conducted by Jarach, Zerbini and Miero (2009). Their case study analysed survey results from senior executives from six European airlines. The consensus among the respondents was that all airlines, regardless of their business model, were competing for the same passengers. Business travellers were considered to be the most lucrative client base, and the LCC respondents were willing to offer greater flexibility to secure their business. Therefore, despite their lack of quantitative data, these results are important, as they highlight a series of conscious decisions made by airline managers to strategically shift their business model.

Using O'Connell's (2007) template, Pearson, O'Connell, Pitfield and Ryley (2015) assessed the strategic capability of 22 Asian FSNCs to compete with LCCs. Although using a quantitative approach through the use of mathematical formulae, the data set is qualitative, as it uses senior managers' responses to 74 questions posed by the researchers. This qualitative methodology is endorsed by IATA as an effective tool for measuring strategic capability, as it enables comparisons between airlines with non-homogenised financial reporting practices. Effective comparisons can thus be made between airlines based in different countries as well as airlines owned privately or by the government that choose not to report specific financial data. Where homogenised financial data is available, quantitative methodologies can effectively be employed.

Quantitative techniques

The application of quantitative methodologies for business model comparison mitigates the subjective results that are attained through the aforementioned qualitative survey methods. However, a quantitative business model analysis using financial data is not without risk, as emphasised by Karwowski (2016). Differing accounting policies between airlines can skew the results. The following three quantitative methods, which rely on homogenised financial data, are worthy of note.

Mason and Morrison (2008) examined the product and organisational architecture (POA) of six European LCCs from 2005 to 2006. Product architecture identifies three components of service quality: connectivity, convenience and comfort. Organisational architecture identifies input choices: distribution channels, aircraft, labour and airports. Indices are formed for each of the component/input choices using the 'best in class' methodology. The POA model utilises a total of 37 variables to form 11 indices per sample airline. By applying the POA model, Mason and Morrison (2008) quantified the hybridisation of LCCs, and their study was a precursor for the 'Airline business model spectrum' developed by Lohmann and Koo (2013).

The airline business model spectrum was first conceived by Lohmann and Koo (2013) and subsequently revisited by Jean and Lohmann (2016). The airline business model spectrum focused on 20 of the 37 variables originally adopted by Mason and Morrison (2008); these variables formed six indices (revenue, connectivity, convenience, comfort, aircraft, labour) that were then averaged to measure the index of each airline along the business model spectrum.

Flouris and Walker (2007) developed an effective two-step process for comparing financial performance between different business models. The two steps are financial ratio analysis and stock performance analysis. The comparison undertaken by Flouris and Walker's post-September 11, 2011 between WestJet and Air Canada showed the LCC WestJet outperforming Air Canada due to WestJet's lower cost structure and lower break-even load factor. The limitations of the Flouris and Walker (2007) method is that it only compares financial output; it does not consider the product or cost inputs of the various business models.

Summary of airline business model analyses

The quantitative techniques employed by Mason and Morrison (2008), Lohmann and Koo (2013) and Flouris and Walker (2007) are all adapted to the conceptual CA methodology proposed by this paper. Currently, limited quantitative methodologies exist that exclusively compare CA between business models. Pearson, Pitfield and Ryley (2015) assessed the intangible resources of CA among 49 airlines across three business models. Similar to Pearson, O'Connell, Pitfield and Ryley (2015), this methodology employed personal responses from senior managers, thus making the assessment qualitative and potentially subjective. Therefore, the methodology proposed by this paper is a quantitative approach using financial metrics, enabling a means of objectively comparing CA between heterogeneous business models.

3. Methodology

Conceptualising the competitive advantage model

An airline whose product creates the most customer perceived value is deemed to have the greatest CA (Pearson, Pitfield and Ryley (2015). Thus, the conceptual CA model presented herein identifies which airlines create the greatest value in their product while enabling comparisons between airlines with heterogeneous strategies. The CA model employs product and cost inputs as the genesis for the calculation of product, cost and CA scores. The various scores are then applied to identify which airlines are successful in pursuing an integrated cost leadership/differentiation strategy. The POA originally presented by Mason and Morrison has provided the template for the CA model (both presented in Figure 2).

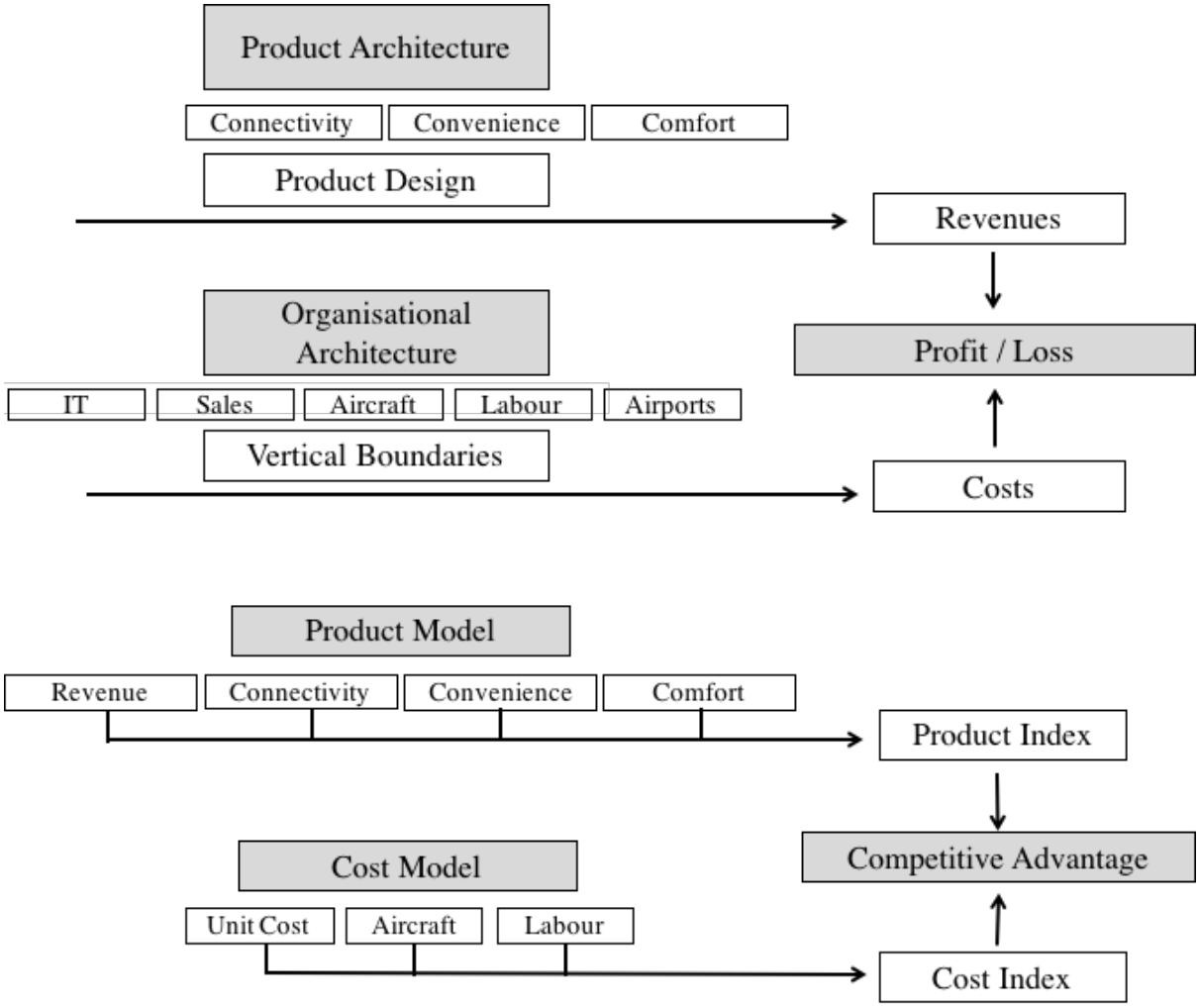


Figure 2: Simplified POA model and the competitive advantage model (adopted from Mason and Morrison, 2008)

3.1. The dataset

The CA model uses 27 product and cost variables (see Table 1), 22 of which are from the original POA model. The product and cost variables are grouped into seven index groups (four product indices, revenue, connectivity, convenience and comfort, and three cost indices, unit cost, aircraft and labour) that then form the basis of the total product and cost index. The revenue index represents pricing strategy and subsequent market power. Connectivity indicates the airlines' network strategy by measuring network size and density; the connectivity index is also a key indicator of market power. The convenience index reflects less tangible product offerings, most of which stem from the diffusion of efficient operational processes. Whereas the comfort index represents tangible offerings (or frills), which require additional investment by the airline. The unit cost is a stand-alone comparison, whereas the aircraft and labour

indices are both measurements of productivity. The sample includes nine US airlines (Alaska Airlines, American Airlines, Delta Air Lines, Frontier Airlines, Hawaiian Airlines, JetBlue Airways, Southwest Airlines, Spirit Airlines and United Airlines) whose financial and product data is taken from fiscal years 2011 through 2013. The sample group was chosen to provide a mix of pre-identified FSNCs, LCCs and hybrid carriers. Of the total 729 variables in the data sample, 720 were successfully populated, giving a completion ratio of over 98.7 %.

The period (2011-2013) was chosen largely due to the availability of homogenised financial reporting, which was challenging to identify due to multiple airline mergers pre-period and post-period. Fuel prices during the period were also relatively consistent with an average price of USD 2.99 per gallon and a monthly standard deviation of only 16c. This contrasts with the three-year period immediately before 2011 and post-2013 during which the monthly standard deviation was 73c and 68c respectively (Index Mundi, 2017). Although the fuel price was characterised as being unusually high, price consistency would ensure a degree of rationality in airline executives' strategic decision making. Frontier Airlines was included in the sample group despite being owned by private equity firm Indigo Partners. A complete data set exists for CA modelling; however, due to the lack of financial reporting, financial comparisons are limited.

Data sources include airline annual reports (SEC Form 10K), Bureau of Transportation Statistics (BTS), the MIT Airline Data Project, Google maps and industry websites SeatGuru, SeatExpert and AIRFLEETS. Other industry reports and media statements have been used to provide a context where required with the applicable citations.

Differences from the Mason and Morrison (2008) POA model

The POA model was chosen because it effectively delineates product and cost inputs for an airline business model. The CA model then uses the delineated data to calculate the total product and cost indices, which can be then compared to other airlines within the airline market. Figure 2 shows the original nine indices that formed the POA model and the conceptual CA model, which has adopted seven of the original nine indices. As highlighted above, five additional variables that were not considered by the POA model have been included in the CA model. The additional variables, along with other specific differences, are presented herein.

Customer Satisfaction

Due to the availability of BTS data, customer complaints, denied boarding, and mishandled baggage were included as components of the convenience index. However, five variables (denied boardings for 2011, 2012 and 2013 and mishandled baggage for 2012 and 2013) remain unfilled for Spirit, as that airline was not required by the DOT to report these data during that period due to their size.

Fuel Efficiency

Fuel KPIs were included in the aircraft index, as fuel efficiency now forms an important component of an airline's cost KPI. In 2013, JetBlue's fuel cost accounted for 37.9 % of their total operating costs (JetBlue Airways Corporation, 2014). In the same year, JetBlue announced they would retrofit their entire A320 family fleet with fuel-saving 'sharklets' as part of a commitment to reducing fuel cost. The 'sharklet' (or winglet) can reduce fuel burn by up to 4 % while also increasing aircraft range, enabling greater commercial opportunities (JetBlue Airways Corporation, 2013; Airbus, 2013). Other fuel-saving initiatives or tangible investments available to airlines include newer aircraft and engines, fuel saving software and fuel saving operating procedures. The fuel variables in the CA model include the following:

- *Fuel cost per gallon* – this variable can be managed at the strategic level through effective hedging, greater buying power and strategic fuel tankering (carrying additional fuel from airports with a lower fuel price);
- *Fuel quantity per available seat mile (ASM)* – this variable can be managed at both the operational and tactical level. Techniques include fuel-saving operating procedures, operating from less congested airports and more direct flight routing where possible;
- *Price per ASM* – the final fuel variable can be managed using similar techniques as the previous two variables.

Stage Length

Stage length was not considered as a variable in the original POA model. However, the airline business model spectrum by Lohmann and Koo (2013) included stage length as a component of connectivity. The CA model has allocated stage length as a component of the aircraft index with longer stage lengths seen as a strategic method for reducing pressure on unit costs. Alamdari and Fagan (2004) suggested that LCCs historically

pursued shorter stage lengths, but emphasised that contemporary LCCs were tending towards longer stages in excess of 1000 nm, similar to those in this particular sample.

Other differences of note

The market structure was considered by Mason and Morrison (2008) to be mutually exclusive to both the product and organisational architectures. However, key indicators of market structure are represented in the product model via both the revenue index (pricing strategy) and connectivity index (network/supply strategy). Sales and distribution indices were excluded due to the lack of available data. Spirit and Alaska were the only airlines to comprehensively report the breakdown of their distribution channels. Differences in the calculation of indices also exist with the CA model (see Table 1) employing a Z-distribution with equal weighting given to each variable (as opposed to the weighted 'best in class' methodology).

Table 1: The 27 product and cost indices that form the CA model

Product Model			Correlation
1	Revenue	Yield RPM ($ cents)	+ve
2		Operating revenue per sector ($)	+ve
3		Average fare paid ($), including ancillary revenues	+ve
4	Connectivity	Network density – average daily domestic departures per airport	+ve
5		Total number of domestic destinations (year end 31 Dec)	+ve
6	Convenience	Average distance from nearest CBD (miles) – top 5 airports	-ve
7		Departure punctuality (within 15 min) (%)	+ve
8		Arrival punctuality (within 15 min) (%)	+ve
9		Customer complaints (per 100,000 pax)	-ve
10		Denied boarding (per 10,000 pax)	-ve
11		Mishandled baggage (per 1000 pax)	-ve
12	Comfort	Load factor (%)	-ve
13		Enplaned pax/flight & cabin crew	-ve
14		Average economy seat pitch (most common type) (inches)	+ve
Cost Model			Correlation
15	Unit Cost	Unit cost (per ASM) ($ cents)	-ve
16	Aircraft	Aircraft hours per day (hours)	+ve
17		Uniformity of fleet (% most popular aircraft) (31 Dec)	+ve
18		Aircraft sectors (departures) per day	+ve
19		Average fuel cost ($ per gal)	-ve
20		Fuel cost/ASM (cents per ASM)	-ve
21		Fuel quantity/ASM (gals per ASM)	-ve
22		Average sector (miles)	+ve

23	Labour	Enplaned pax/total employees	+ve
24		Employees/aircraft	-ve
25		Personnel cost per ASM ($ cents)	-ve
26		Flight & cabin crew/total employee (%)	+ve
27		ASM/employee (000)	+ve

Calculation of indices

A Z-distribution is used as a means to standardise variables with a score from 0 to 1. Unlike the POA model, the conceptual CA methodology does not apply weightings to each of the indices. A future iteration of the study could apply weightings for a more accurate representation of indices, but additional research would initially be required about the suitability of the respective weightings. Product and cost indices are scored from 0 to 1, whilst the CA score (product index plus cost index) is scored from 0 to 2 with 1 being considered the standard score. Herein, we present Alaska Airlines as an example for the calculation of the applicable indices that form the CA model (see Table 2).

Table 2: Alaska Airlines revenue index data. Excerpt from Table 5, Appendix 1

Product Model		AS – 2011	AS – 2012	AS – 2013
Revenue	Yield RPM ($ cents)	13.26	13.45	13.33
	Operating revenue per sector ($)	27,078.19	28,695.21	30,279.85
	Average fare paid ($) including ancillary revenues	212.56	221.10	231.64

$AS\ yield\ RPM\ index$:

$\mu\ (AS, Yield\ RPM) = 13.35$

$\mu\ (All, Yield\ RPM) = 14.46$

$\delta\ (All, Yield\ RPM) = 0.99$

$\therefore\ AS\ Yield\ RPM\ index$

$= Z\ (AS, Yield\ RPM) \sim N(0,1) = \mathbf{0.13}$

$AS\ operating\ revenue\ per\ sector\ index$

$= Z\ (AS, Operating\ revenue) \sim N(0,1)$

$= \mathbf{0.51}$

$AS\ average\ fare\ paid\ index$

$= Z\ (AS, Average\ fare\ paid) \sim N(0,1)$

$= \mathbf{0.67}$

$AS\ revenue\ index$

$= \mu\ (Z\ (AS, Yield\ RPM) \sim N(0,1),$

$Z\ (AS, Operating\ revenue) \sim N(0,1),$

$Z\ (AS, Average\ fare\ paid) \sim N(0,1))$

$= \mu\ (0.13, 0.51, 0.67)$

$= \mathbf{0.44}$

$AS\ total\ product\ index$

$= \mu\ (AS\ Revenue\ Index, Connectivity\ Index, Convenience\ Index$

$= \mu\ (0.44, 0.30, 0.67, 0.55) = \mathbf{0.49}$

$AS\ competitive\ advantage\ score$

$= AS\ Total\ Product\ Index +$

$AS\ Total\ Cost\ Index = 0.49 + 0.59 = \mathbf{1.08}$

Negative correlation

The Alaska Airlines sample represents all variables that make a positive correlation to the total index. In the case of those variables in Table 1 that provide a negative correlation to the total index, the calculated Z-score is then subtracted from 1. The calculation of the Alaska Airlines unit cost index is presented as an example as follows:

Example: Alaska Airlines unit cost index:

$\mu\ (AS, Unit\ Cost) = 11.91$

$\mu\ (All, Unit\ Cost) = \ 12.64$

$\delta\ (All, Unit\ Cost) = 1.43$

$\therefore\ AS\ Unit\ Cost\ index = 1 - [Z\ (AS, Yield\ RPM) \sim N(0,1)] = \ \mathbf{0.70}$

Therefore, by taking unit cost as an example, the lower the unit cost, the higher the unit cost index, and subsequently the higher the total cost index.

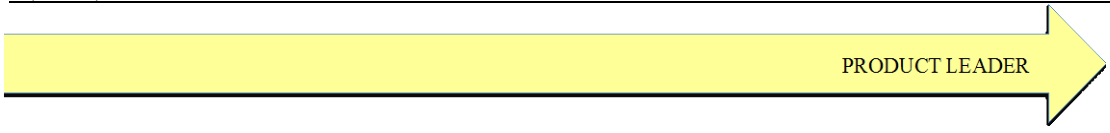
4. Results and Analysis

CA model results

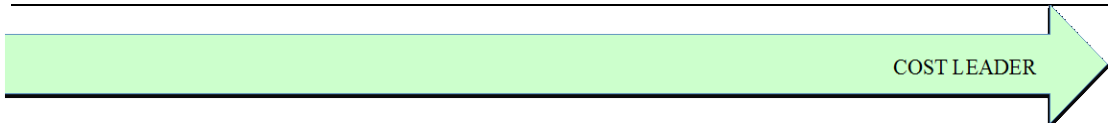
The CA results depicted in Table 3 present four airlines with a score greater than the standard score of 1. Both Spirit and JetBlue scored the highest with 1.10, followed by Alaska and Southwest with a score of 1.09. The lowest CA score recorded was from American with 0.80. Of the five airlines that failed to achieve a score of 1, three of these airlines (America, United and Delta) are FSNC or legacy carriers. Failing to achieve a score of 1 or greater indicates a lack of value creation in their product offering.

Table 3: Product indices, cost indices and competitive advantage scores

Product Model	NK	F9	B6	HA	AS	WN	UA	AA	DL	StDev	Mean
Revenue	0.20	0.26	0.25	0.36	0.44	0.39	0.78	0.75	0.88	0.26	0.48
Connectivity	0.19	0.34	0.37	0.27	0.30	0.79	0.66	0.63	0.75	0.23	0.47
Convenience	0.30	0.40	0.59	0.84	0.67	0.40	0.25	0.36	0.66	0.20	0.50
Comfort	0.22	0.20	0.59	0.40	0.55	0.60	0.70	0.73	0.64	0.20	0.51
StDev	0.05	0.09	0.17	0.26	0.16	0.19	0.24	0.18	0.11		
Product Index (Mean)	0.23	0.30	0.45	0.47	0.49	0.54	0.60	0.62	0.73	0.16	0.49



Cost Model	AA	DL	UA	HA	WN	F9	AS	B6	NK	StDev	Mean
Unit Cost	0.16	0.08	0.20	0.49	0.51	0.52	0.70	0.79	0.97	0.30	0.49
Aircraft	0.23	0.31	0.56	0.46	0.66	0.42	0.55	0.52	0.71	0.15	0.49
Labour	0.16	0.23	0.21	0.55	0.46	0.70	0.55	0.62	0.93	0.25	0.49
StDev	0.04	0.12	0.20	0.04	0.10	0.14	0.09	0.14	0.14		
Cost Index (Mean)	0.19	0.21	0.32	0.50	0.54	0.55	0.60	0.64	0.87	0.22	0.49



Competitive Advantage Model	AA	F9	UA	DL	HA	AS	WN	B6	NK	StDev	Mean
CA Score (Product Index + Cost Index)	0.80	0.85	0.92	0.94	0.97	1.09	1.09	1.10	1.10	0.11	0.98

Figure 3 illustrates the airline strategy spectrum using CA scoring. In the horizontal dimension, it provides a similar representation to that of the airline business model spectrum originally proposed by Lohmann and Koo (2013). However, the advantages of this representation lie in the vertical dimension, whereby value creation and thus CA is readily identifiable across the sample group. To enable plotting, the product index scores from Table 3 are rescaled as a ratio in Figure 3 from 0 to 1 and subsequently plotted on the x-axis. The formula used is as follows:

$$Product\ Index\ Ratio\ (0,1)$$
$$= [1 \div (Revenue\ Index + Cost\ Index)] \times Product\ Index$$
$$\therefore Product\ Index + Cost\ Index = 1$$

The y-axis features the CA scores from Table 3. The results indicate that Spirit is extremely aggressive in their pursuit of a cost leadership strategy, whilst Delta and American very much conform to the differentiation archetype. The benefit of the representation presented in Figure 3 is its ability to compare Southwest and Hawaiian.

Both airlines maintained a similar strategy position with 0.50 and 0.48, respectively, but Southwest creates significantly more value in their product. The negative gradient of the trend line in Figure 3 implies two possibilities. Either airlines that prioritise cost leadership over differentiation are strategically more competitive, or the CA model overemphasises cost indices. Therefore, to validate the results of the CA model, the CA scores were compared with airline financial results for the same period; the results are discussed later in this paper and depicted in Figure 5.

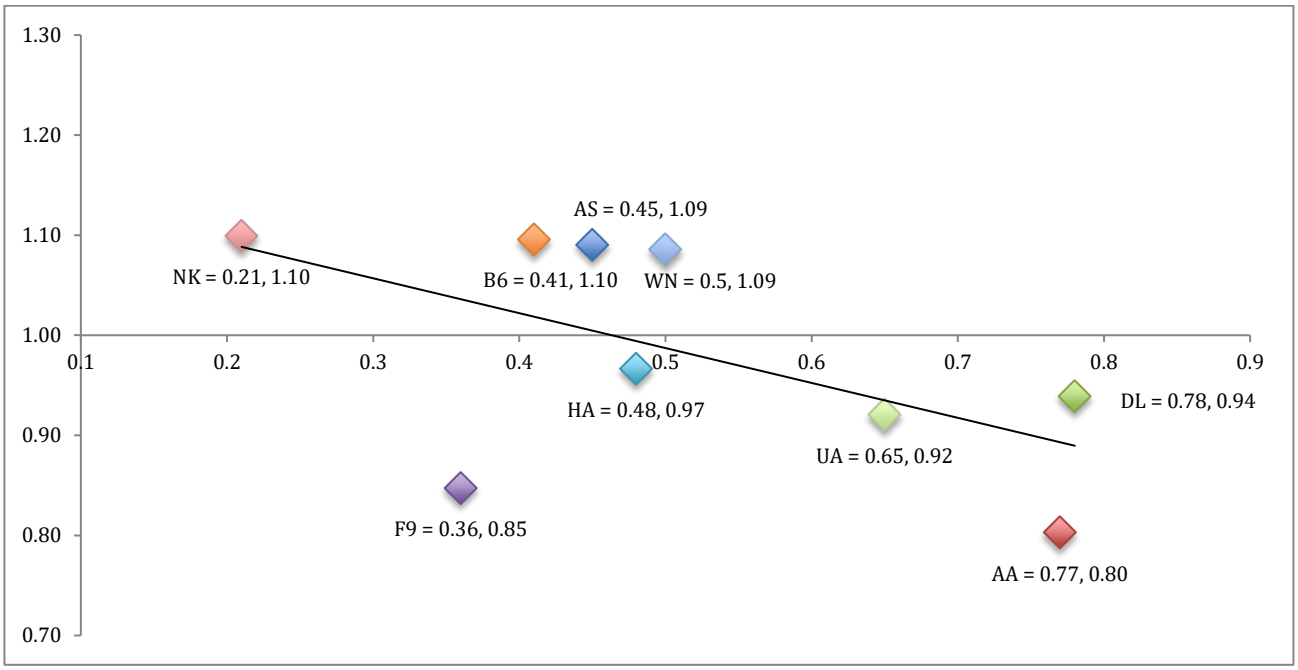


Figure 3: Airline strategy spectrum with competitive advantage scoring

Product model analysis

The data presented in Table 3 reveals Delta, United and American (collectively referred to as 'the big three') all scored the highest in the product index with Delta (0.73) ranked the highest overall. Spirit (0.23) ranked last, and Frontier (0.30) was only marginally better. Delta, Spirit and Frontier all achieved a product index greater than one standard deviation (0.16) from the mean (0.49). The individual product indices are further analysed below.

Revenue index

Delta (0.88) ranked highest in the revenue index, followed closely by United (0.78) and

American (0.75). However, this is to be expected due in large part to Delta's larger aircraft and longer stage lengths, resulting in higher revenue per sector and a higher average fare paid. The distinction between 'the big three' came with yield where Delta achieved 16.35c, followed by Southwest with 15.59c. The lowest score in the revenue index was Spirit (0.20). While the margin was not considered a variable in the revenue model, Spirit clearly had the highest margin out of the sample group. Overall, the revenue index is weighted towards airlines that engage in long-haul operations with larger aircraft, as a strong positive correlation exists between these types of operations and both the average fare paid and the operating revenue per sector.

Connectivity index

Southwest's incredibly high network density led them to be ranked highest (0.79) in the connectivity index. Southwest completed an average of 36.7 daily departures per airport, more than twice that of second-ranked American with 15.93. Achieving market share through network density is essential to the Southwest strategy since migrating from their original LCC proposition. The 2011 connectivity data for Southwest was omitted due to the lack of consolidated reporting for both Southwest and AirTran following their May 2011 merger. Spirit (0.19) ranked the lowest in the connectivity index due to their thin network density and small network. The Spirit network density (5.8 departures per airport per day) was the second lowest, whilst Frontier (2.8 departures per airport per day) registered the lowest. Given that both airlines compete on price (ultra-low-cost carrier (ULCC) model), network density is not a critical strategic component with respect to capturing market share (vis-à-vis Southwest). The connectivity index is limited to only mainline or parent airlines with their regional subsidiaries not included. Given the significant regional networks of the big three, they would expect to rank higher if these data were included.

Convenience index

Hawaiian (0.84), which ranked sixth overall for product index, achieved the highest ranking in the convenience index. The Hawaiian sample is unique when compared to the continental-based airlines, as Hawaiian enjoys the benefits of operating from less congested airports in less congested airspace and lacks rigorous winter weather at Honolulu airport. This is reflected in their superior on-time performance (OTP), which exceeds 90 % for both arrivals and departures. Alaska Airlines ranked second in OTP, also due largely to operating in less congested regions. Additionally, due to the smaller

population centres in which Hawaiian operates, airports tend to be more proximate to the central business district or tourism precinct. The average distance for the top five airports was 4.4 miles; JetBlue was the only other airline with an average distance below 10 miles (9.87 miles).

Of the remaining three customer service KPIs measured by the DOT, the results were varied across the sample group. Spirit received an average of 8.03 customer complaints per 100,000 passengers, more than double of any other airline. Despite their much publicised 'bare fare' product, Spirit still appears to struggle with customer expectations. JetBlue had the lowest denied boarding rate of less than 0.01 per 10,000 passengers due largely to their no overselling policy. The JetBlue guaranteed seat policy positively contributes to the convenience index, but risks increased spoilage and places additional pressure on the airline to increase yields. The average mishandled baggage rate was 2.72 per 1,000 passengers with a standard deviation of 0.59. United (3.62) and Southwest (3.48) were the worst performers, possibly due to logistics congestion at their busy hub airports. JetBlue (2.00) was the best performer in this class.

Comfort index

'The big three' achieved the highest comfort indices with American (0.73) ranking the highest overall. The standout variable for 'the big three' was enplaned passengers per crew. American (3,745 pax per crew) scored greater than one standard deviation from the mean (5,522 pax per crew), whereas, at the negative end of the spectrum, Hawaiian (7796 pax per crew) also exceeded one standard deviation. The average load factor across the sample group was 83.92 % with a standard deviation of 2.47. With a relatively small standard deviation, no significant conclusions can be drawn. The final variable in the comfort index was the average economy seat pitch. Due to the challenges in obtaining a weighted fleet average, the most common aircraft type was chosen with the data obtained from the websites SeatGuru or SeatExpert. In many cases, the pitch size varied across the same fleet. Thus, the most common seat pitch was chosen. JetBlue had the largest economy seat pitch of 33 inches across the sample, whilst ULCCs Frontier and Spirit both registered the lowest at 28 inches. The lower density configuration on JetBlue, similar to their no overselling policy, puts additional pressure on yield. Lastly, the availability of premium classes and their impact on customer perceived value was not included in the model but could be considered for future

iterations.

Cost model analysis

The data in Table 3 show Spirit (0.87) ranked the highest overall in the cost index, having achieved market leadership in 11 of the 13 individual cost indices; these results are indicative of the ULCC business model. Furthermore, their index of 0.87 was more than one standard deviation higher than second-ranked JetBlue (0.64). American (0.18) ranked the lowest overall, followed by other legacy airlines Delta (0.20) and United (0.37), as all three airlines are subject to legacy cost structures. The respective cost indices are further analysed below.

Unit cost index

The unit cost index is the only index that considers a single variable. Unlike Pearce and Smyth (2006), Tsoukalas et al. (2008) and Belobaba et al. (2009) chose to delineate unit costs in their respective analyses. However, it has been shown that there is no distinct advantage in delineating the unit cost in the CA model, as the major components of unit cost are further analysed in the aircraft and labour indices. Spirit, which pursues an aggressive cost leadership strategy, was the market leader with a unit cost of 9.97c per ASM. JetBlue (11.48c) ranked second, which is surprising given that they maintain the lowest density aircraft configuration, placing upward pressure on unit costs. 'The big three' all ranked the lowest for unit costs given their pursuit of a differentiation strategy compounded by their legacy cost structures.

Aircraft index

As initially indicated by their unit cost, Spirit (0.71) ranked the highest in the aircraft index with American (0.23) ranking the lowest. Spirit maintained the highest aircraft utilisation at 12.73 hours per day, followed by JetBlue at 11.80 hours. Both strategies are not without risk, as highly geared aircraft utilisation makes the airline susceptible to rolling delays across the network. Therefore, as hypothesised, both airlines suffered the worst OTP for both arrivals and departures. Three airlines, Alaska, Frontier and Spirit, all maintained 100 % fleet uniformity. 'The big three' all ranked the lowest. Southwest, which traditionally maintained 100 % fleet uniformity, regressed to 88 % following their acquisition of AirTran. JetBlue, which maintained 69 % fleet uniformity in 2013, had announced their intention to migrate back towards a uniform fleet of A320 family aircraft to improve efficiency (JetBlue Airways Corporation, 2013). Southwest maintained the highest level of sectors per day at 5.89, enabled by the shortest average

stage length of 692 miles. Thus, their daily utilisation (hours per day) is slightly lower than Spirit and JetBlue due to the increased ground turnaround time. 'The big three' ranked the lowest in daily sectors, as they pursued longer stage lengths. As previously discussed, stage length was included as a component of the aircraft index with longer stages providing a positive correlation to the cost index. However, unsurprisingly, 'the big three' all achieved the longest stage length due to their expansive global network.

American achieved the lowest fuel cost of $3.02 per gallon. The four airlines with the lowest fuel price per gallon (American, United, Delta and Southwest) also registered the highest ASM output and the highest revenue, thus confirming the benefits of greater buying power. Spirit achieved the lowest fuel cost per ASM along with the lowest quantity per ASM. Spirit's high-density seating configuration assists in reducing fuel burn and fuel cost as a function of ASM. The Spirit ULCC business model, which relies on ancillary charges for checked baggage, may also deter passengers from checking in baggage, thus resulting in an overall reduction in weight. However, further study in consumer behaviour would be required to support this theory. The reduction in gross weight would further reduce fuel liability. Spirit also maintained the youngest fleet of 5.1 years as of December 2013 (Spirit Airways, 2014). In December 2013, American and Delta were the only airlines to still operate aircraft with ages in excess of 20 years. This decision directly impacted their fuel efficiency; both airlines registered the highest fuel cost and fuel burn per ASM (AMR Corporation, 2014; Delta Air Lines, 2014).

Labour index

Spirit (0.93) was the clear market leader in the labour index, ranking first in all five indicators. Frontier (0.70) ranked second for the period based on the three-year moving average. However, significant improvements were noted when comparing Frontier's 2013 data to its 2011 data. Enplaned passengers per employee increased by 26.6 %, employees per aircraft decreased by 9.2 %, and ASMs per employee increased by 17.0 %. All these results are indicative of Frontier's continual transition to a strong cost leadership or ULCC strategy. 'The big three' ranked last in the labour index with American (0.16) ranking the lowest overall. The labour index is not without limitations, as the degree to which an airline outsources various functions is not considered. Airlines that pursue aggressive outsourcing strategies tend to overscore in all five of the labour indicators. However, JetBlue, which ranked third in the labour index, and Spirit, which

ranked first, both registered the highest level of outsourcing for this period with 16.4 % and 15.8 %, respectively (MIT, 2016).

The integrated cost leadership and differentiation strategy

The integrated cost leadership and differentiation strategy, which was revisited by Doustaler and Flouris (2006) and applied to the airline industry, provides the template with which to plot product and cost indices. The 'airline realised business strategies' depicted in Figure 5 demonstrate that Southwest is the only airline to have achieved an integrated strategy. This finding supports the claim by Hitt et al. (2003), who declared that Southwest had succeeded in 'poor economic conditions because of their integrated cost leadership/differentiation strategy' (p. 6). Figure 4 depicts Alaska as the next closest despite still conforming narrowly to the cost leadership archetype. 'The big three' pursue a differentiation strategy. The results indicate that Hawaiian is 'stuck in the middle', as that airline did not conform to any of the three strategic archetypes. However, Hawaiian exhibits many characteristics of a niche carrier with a focus strategy.

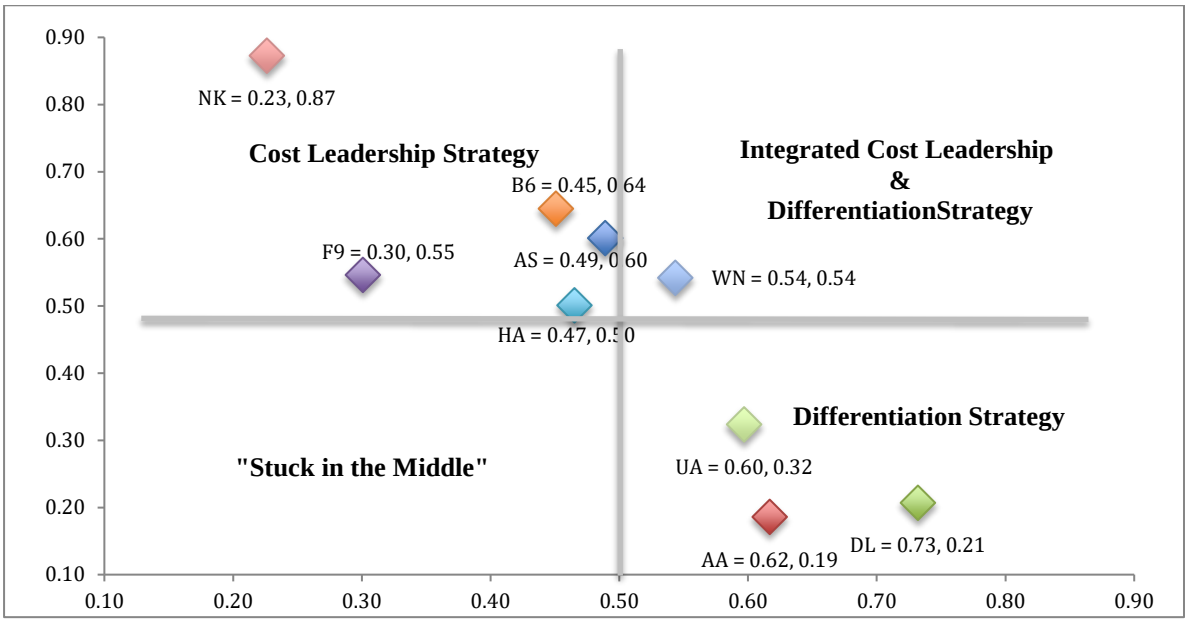


Figure 4: 'Airline realised business strategies'. Adapted from Doustaler and Flouris (2006)

Validating the CA model using financial ratios

A financial performance analysis using the financial ratio method adopted by Flouris and Walker (2007) was also conducted as a means to validate the CA results (refer to Table 3). The Flouris and Walker (2007) method is a two-step process that uses seven financial ratios for comparison followed by a stock performance analysis. However, only the financial ratio method has been adapted in this study. The definitions of the respective ratios are well covered by Flouris and Walker (2007). The seven financial ratios adopted are as follows:

- *Liquidity ratios:* Current Ratio = Current Assets/Current Liabilities
- *Activity ratios:* Total Asset Turnover = Operating Revenue/Total Assets
- *Financing ratios:* Debt Ratio = Total Liabilities/Total Assets; Interest Coverage Ratio = Earnings Before Interest and Taxes (EBIT)/Interest
- *Profitability ratios:* Net Profit Margin = Net Income/Sales; Return on Assets (ROA) = Net Income/Total Assets; Return on Equity (ROE) = Net Income/Stockholders Equity

Table 4: Financial indices based on the data contained in Table 8, Appendix 2

Financial Indices	AS	AA	DL	F9	HA	B6	WN	NK	UA	*St Dev*	*Mean*
Current Ratio	0.61	0.38	0.19	-	0.44	0.31	0.39	0.99	0.33	*0.25*	*0.46*
Total Asset Turnover	0.34	0.39	0.22	-	0.68	0.12	0.41	0.98	0.59	*0.28*	*0.47*
Debt Ratio	0.59	0.16	0.20	-	0.37	0.58	0.76	0.97	0.20	*0.30*	*0.48*
Interest Coverage Ratio	0.37	0.35	0.36	-	0.36	0.36	0.37	0.99	0.36	*0.22*	*0.44*
Net Profit Margin	0.80	0.03	0.91	-	0.37	0.50	0.43	0.84	0.31	*0.30*	*0.52*
Return on Assets (ROA)	0.75	0.05	0.80	-	0.37	0.43	0.43	0.93	0.37	*0.29*	*0.52*
Return on Equity (ROE)	0.77	0.94	0.24	-	0.48	0.48	0.46	0.71	0.04	*0.29*	*0.52*
St Dev	0.19	0.31	0.31	-	0.12	0.15	0.13	0.11	0.17		
Financial Index (Mean)	0.60	0.33	0.42	-	0.44	0.40	0.46	0.92	0.31	*0.20*	*0.49*

Financial indices are formulated using the same Z-distribution method applied to the calculation of the product and cost indices. To enable a comparison between CA scores and the financial ratios, both sets of data were redistributed using a Z-distribution from 0 to 1. The comparative data shown in Figure 5 demonstrates that a positive correlation exists between the CA scores and the financial index. The mean of the index difference is 0.19 with a standard deviation of 0.17. Of the nine airlines, only two airlines had a difference that exceeded the standard deviation of 0.17. Frontier was not included in the comparison; as financial data was not available for the period. Southwest and JetBlue were the exceptions to the model, as they experienced a difference that exceeded two standard deviations. Overall, the comparative results demonstrate that a positive correlation exists between the CA model and financial performance, but further research is required to investigate the case of Southwest and JetBlue. In-depth analyses of the individual financial ratios are outside of the scope of this paper. However, some points of note will be highlighted in the individual airline analysis in the following section.

Individual airline analysis

The individual airline analyses below highlight the salient strengths and weaknesses of the sample airlines, including any limitations with their respective data.

Alaska Airlines (AS) ranked third overall for CA, conforming narrowly to the cost leadership archetype. Alaska's primary strength was convenience (0.67), supported by its strong OTP, which was achieved by operating in less congested airports and airspace. No significant variance was observed in the Alaska data set across the period, suggesting that the airline is stable in their strategic position.

American Airlines (AA), which confirms strongly to the differentiation (FSNC) archetype, ranked last for both CA and cost index due to their legacy cost structures. In 2011, American filed for bankruptcy protection, which enabled cost restructuring. When comparing the 2013 and 2011 data, improvements of greater than 10 % were noted for all five labour indicators as a direct result of Chapter 11 restructuring. The three-year data set excluded US Airways data following the finalisation of their merger in December 2013; consolidated reporting for American Airlines and US Airways began the next year. The economic benefits of the merger would be best analysed in a future iteration of the CA model.

Delta Airlines (DL) was the product leader of the sample group but still failed to achieve a parity CA score due to their cost index (0.21). No significant changes were noted between 2013 and 2011, which suggests the airline is mature in their strategy and any economic benefits stemming from their 2008 merger with Northwest have already been realised. Delta operates a significantly older fleet, which is not considered a variable for customer perceived value but is reflected in their increased fuel quantity per ASM and fuel cost per ASM. As of December 2013, the airline was still operating DC9-50 aircraft with an average age of 34.9 years (Delta Air Lines, 2014). Maintenance, repair and overhaul (MRO) costs were not considered in the CA model, but a correlation would exist between MRO costs and aircraft age.

Frontier Airlines (F9) achieved the second lowest CA score, narrowly conforming to a cost leadership strategy. However, comparisons between 2013 and 2011 show significant improvements with a reduction in unit cost of 9.4 % and an increase in labour productivity with enplaned passengers per employee increasing by 26.6 % and ASMs per employee increasing by 16.0 %. These results reflect Frontier's transition towards a ULCC whilst highlighting the limitations of using a three-year moving average in the CA model. In late 2013, Frontier was acquired by Indigo Partners, an equity firm with a history of managing ULCC start-ups and transitions. Indigo recently had investments in Wizz Air, Spirit and Tiger Airways with all these projects culminating in raising capital through an IPO. A future iteration of the CA model would

likely demonstrate that Frontier pursues an aggressive cost leadership strategy, similar to that of Spirit. Financial comparisons are unavailable for Frontier, as they are a privately-owned airline with no balance sheets publicly available.

Hawaiian Airlines (HA), which ranked sixth in both product and cost indices, was the only airline 'stuck in the middle', having failed to conform to a strategic archetype. However, in the context of the sample group, Hawaiian is very much considered a niche carrier with a focus strategy. The Hawaiian data sample also includes turboprop regional operations, which tends to skew the results towards higher costs and lower productivity. All other airline samples excluded regional operations, as the mainline data available was mutually exclusive to the various regional subsidiaries. As previously stated, Hawaiian is ranked highest in OTP due to their niche network.

JetBlue Airways (B6) tied for first in CA score and ranked second overall for cost index. The airline's strength was in their second-ranked unit cost (11.48c) despite maintaining a two-class lower density configuration. The airline also pursued an aggressive outsourcing strategy, ranking the highest for operational outsourcing at 16.4 %. As a result, the labour index is positively skewed. Additional research is also required with respect to the differences in Z-scores when comparing JetBlue's CA results to their financial performance, as depicted in Figure 5. The current difference is 0.51, but the standard deviation is only 0.17.

Southwest Airlines (WN) was the only airline identified as achieving an integrated strategy based on the CA model. Historically, Southwest conformed to the cost leadership model, but Alamdari and Fagan (2005) identified Southwest's migration away from the LCC archetype and towards identification as a hybrid archetype. The results confirm the earlier claims by Hitt et al. (2003), who had identified Southwest as having a successful integrated cost leadership/differentiation strategy. With regards to the data set, the 2011 total number of destinations was the only variable omitted due to individual reporting of Southwest and AirTran. Their merger was finalised on 2 May 2011, and consolidated financial reporting was available for the remainder of that fiscal year. However, the route network was not harmonised until 2012 (Southwest Airlines, 2012).

Spirit Airlines (NK) was deemed the cost leader with a mean cost index of 0.87. Spirit achieved market leadership in 11 of the 13 individual cost indices. These results are indicative of the Spirit ULCC model, which relies significantly on high aircraft utilisation, high-density aircraft configuration and high employee productivity.

Furthermore, their aggressive pursuit of a cost leadership strategy is also reflected in their product index of 0.23, which was the lowest overall. Spirit maintained the strongest financial position for the period due largely to their 2011 capital raising IPO. Spirit reported 15.77 % operational outsourcing for the data period, the second highest of the data set behind JetBlue (MIT, 2016). Spirit relies heavily on labour outsourcing as a cost reduction strategy. However, outsourcing ratios are not integrated into the CA model. Thus, labour indices may over score, resulting in skewed data.

United Airlines (UA) achieved the best cost index of 'the big three'. However, short-term comparisons between 2013 and 2011 show that despite the anticipated economies of scale and scope following its 2010 merger with Continental, unit costs have increased by 8.8 % and labour indicators have also weakened. Yield improvement was only marginal at 1.9 %. Post-merger consolidated financial reporting commenced for the fiscal year 2011. However, given that Continental maintained their operating certificate for that period, some statistics were reported to the DOT individually. In the case of individual reporting, both airlines' data was retrospectively consolidated with weightings applied based on their respective contribution to the total ASM output. Destination data was the only item that could not be identified due to the overlap in networks in 2011.

Conclusion

Overall, the CA model identified a trend towards airlines with lower cost structures maintaining a greater level of CA within the market sample. As presented, ULCC Spirit was the CA leader, whilst FSNC American was considered the least competitive. However, Frontier, which also conformed strongly to the LCC archetype, achieved the second lowest CA score overall, reconfirming that the creation of value in the product offer is mutually exclusive to the strategic proposition of the airline. Finally, the results demonstrated that based on the three-year snapshot of data, Southwest was the only airline successfully conforming to the proposed integrated strategy. The results, although important, are consistent with earlier work and as such, serve only to validate the effectiveness of the methodology developed in this study.

The aim of this paper was to develop an instrument by which CA could be quantified and thus compared amongst airlines with heterogeneous business models. The POA method by Mason and Morrison (2008) was chosen as the foundation of the CA model.

The CA model demonstrated that competitive heterogeneity exists amongst the sample group of US airlines. Similar to the Lohmann and Koo (2013) method, the model also presents the sample group along a continuum of strategic propositions. However, the advantage of this application is that the results are two dimensional, presenting not only the strategic proposition but also the value created by each airline. The two-dimensional presentation of the CA model further enables the identification of airlines that are successful in pursuing an integrated cost leadership/differentiation strategy by applying the results to the 'airline realised business strategies' conceptualised by Doustaler and Flouris (2006). Despite achieving the aim of developing a methodology, the robustness of the methodology presented herein still comes into question as it utilises only a three-year snap shot of data. A future iteration of the CA model would adopt an extended timeframe, enabling time series analysis to forecast changes in strategy or financial position.

The CA model is also limited in that it relies on homogenised financial reporting from the sample group of airlines; thus, the US airline industry was chosen for the conceptual study. However, challenges may exist for future applications of this model, particularly in different markets where homogenised reporting is not available. Qualitative methods, particularly those employed by Pearson, O'Connell, Pitfield and Ryley (2015) and Pearson, Pitfield and Ryley (2015), can, therefore, be more effective where financial data is not available. Furthermore, the variables contained within the model are in no way exhaustive. Weightings for each of the indices and variables were not considered, as per the original POA by Mason and Morrison (2008). Additional research would be required to determine the level of strategic importance placed on each variable before a suitable weighting could be applied. Outsourcing coefficients were also not included despite the availability of that data from MIT. The CA model, similar to the POA model and 'airline business model spectrum' developed by Lohmann and Koo (2013), applies standardised data for comparison, which assumes a level of mutual dependence in the data set. As highlighted in the analysis, airlines that choose to pursue a focus strategy, such as Hawaiian, may skew the results when applying a standardised data technique.

Regarding future research, other aspects to be considered include the positive correlation between the CA model with other key components of market structure (regional feeders, code-sharing, global alliances and loyalty programmes), as well as other tangible product offerings. Additional areas of academic study include the application of game theory, competitive heterogeneity and integrated strategies.

References

Airbus, 2013. Airbus launches Sharklet retrofit for in-service A320 Family aircraft. http://www.airbus.com/newsevents/news-events-single/detail/airbus-launches-sharklet-retrofit-for-in-service-a320-family-aircraft/

Alamdari, F., Fagan, S., 2005. Impact of the adherence to the original low-cost model on the profitability of low-cost airlines. Transport Reviews, 25(3), 377-392. doi:10.1080/01441640500038748

AMR Corporation, 2014. 2013 Annual Report. http://phx.corporate-ir.net/4p3a.URL

Belobaba, P., Odoni, A. R., Barnhart, C., 2009. The Global Airline Industry. Chichester, West Sussex, U.K: Wiley. doi:10.2514/4.867026

Button, K., 2012. Low-cost airlines: A failed business model? Transportation Journal, 51(2), 197-219. doi:10.5325/transportationj.51.2.0197

Button, K., Ison, S., 2008. The economics of low-cost airlines: Introduction. Research in Transportation Economics, 24(1), 1-4. doi:10.1016/j.retrec.2009.01.008

Daft, J., Albers, S., 2013. A conceptual framework for measuring airline business model convergence. Journal of Air Transport Management, 28, 47-54. doi:10.1016/j.jairtraman.2012.12.010

Daft, J., Albers, S., 2015. An empirical analysis of airline business model convergence. Journal of Air Transport Management, 46, 3-11. doi:10.1016/j.jairtraman.2015.03.008

Delta Air Lines, 2014. 2013 Annual Report. http://ir.delta.com/

Dostaler, I., Flouris, T., 2006. Stuck in the middle revisited: The case of the airline industry. Journal of Aviation/Aerospace Education & Research, 15(2), 33-45.

Flouris, F., Walker, T., 2007. Financial comparisons across different business models in the Canadian airline industry. Journal of Air Transport Management, 12, 25-52.

Gillen, D., Gados, A., 2008. Airlines within airlines: Assessing the vulnerabilities of mixing business models. Research on Transportation Economics, 24, 25-35. doi:10.1016/j.retrec.2009.01.002

Graham, B., Vowles, T. M., 2006. Carriers within carriers: A strategic response to low‐cost airline competition. Transport Reviews, 26(1), 105-126. doi: 10.1080/01441640500179377

Hoskisson, R., Hitt, M.A. and Ireland, R.D., 2003. Administración estratégica. *Internacional Thompson*.

Holloway, S., 2008. Straight and Level – Practical Airline Economics. Surrey, England: Ashgate Publishing Limited.

Index Mundi, 2017. Jet Fuel Prices. http://www.indexmundi.com/

Jarach, D., Zerbini, F., Miniero, G., 2009. When legacy carriers converge with low-cost carriers: Exploring the fusion of European airline business models through a case-based analysis. Journal of Air Transport Management, 15, 287–293. doi:10.1016/j.jairtraman.2009.01.003

Jean, D. A., Lohmann, G., 2016. Revisiting the airline business model spectrum: The influence of post global financial crisis and airline mergers in the US (2011 – 2013). Research in Transportation Business and Management, 21, (2016), 76-83.

JetBlue Airways Corporation, 2013. 2012 Annual Report. http://investor.jetblue.com/

JetBlue Airways Corporation, 2014. 2013 Annual Report. http://investor.jetblue.com/

Karwowski, M., 2016. The risk in using financial reports in the study of airline business models. Journal of Air Transport Management, 55, 185-192. doi:10.1016/j.jairtraman.2016.05.009

Lohmann, G., Koo, T., 2013. The airline business model spectrum. Journal of Air Transport Management, 31, 7-,9. doi:10.1016/j.jairtraman.2012.10.005

Mason, K. J., Morrison, W. G., 2008. Towards a means of consistently comparing airline business models with an application to the 'low cost' airline sector. Research in Transportation Economics, 24(1), 75-84. doi:10.1016/j.retrec.2009.01.006

MIT, 2016. Airline Data Project. http://web.mit.edu/airlinedata/www/default.html

O'Connell, J.F., 2007. The Strategic Response of Full Service Airlines to the Low Cost Carrier: Threat and the Perception of Passengers to Each Type of Carrier (PhD thesis). Cranfield University.

Pearce, B., Smyth, M., 2006. Airline Cost Performance. http://www.iata.org/whatwedo/documents/economics/airline_cost_performance.pdf

Pearson, J., Merkert, R., 2000. Airlines-within-airlines: A business model moving East. Journal of Air Transport Management, 38, (2014) 21-26.

Pearson, J., O'Connell, J., F., Pitfield, D., Ryley, T., 2015. The strategic capability of Asian network airlines to compete with low-cost carriers. Journal of Air Transport Management, 47, (2015) 1-10.

Pearson, J., Pitfield, D., Ryley, T., 2015. Intangible resources of competitive advantage: Analysis of 49 Asian airlines across three business models. Journal of Air Transport Management, 47, (2015) 179-189.

Porter, M. E., 1985. Competitive advantage: Creating and sustaining superior performance. New York & London: Free Press.

Southwest Airlines, 2012. 2011 Annual Report. http://investors.southwest.com/

Spirit Airlines, 2014. 2013 Annual Report. http://ir.spirit.com/

Tsoukalas, G., Belobaba, P., Swelbar, W., 2008. Cost convergence in the US airline industry: An analysis of unit costs 1995–2006. Journal of Air Transport Management, 14(4), 179-187. doi:10.1016/j.jairtraman.2008.04.005

Whyte, R., Lohmann, G., 2015. The carrier-within-a-carrier strategy: An analysis of Jetstar. Journal of Air Transport Management, 42, pp.141-148.

Whyte, R., Lohmann, G., 2017. Airline business models (Chapter 7). In: Budd, L. & Ison, S. (eds.). Air Transport Management: An international perspective. Oxon & New York: Routledge, 107-120.