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An Empirical Analysis of Airline Business Model Convergence

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Contents

An Empirical Analysis of Airline Business Model Convergence[1]

Abstract: Based on a sample of 26 European passenger airlines, this study analyzes the development of airline business models over time. We used various distance measures to calculate concrete differentiation levels among these airlines between 2004 and 2012. The results indicate increasing similarity among these airlines, which lends support to the generally assumed convergence trend. The present paper complements the mostly qualitative and anecdotal literature on convergence in the airline industry, empirically shows actual adaptations in airlines' business models, and provides a platform for further research in the fields of empirical convergence analysis and corresponding strategic airline management.

Keywords: Airline business models; Convergence; Similarity measurement

JEL-Classification: L10, L93, M19

[1] This paper will be published in one of the forthcoming issues of the Journal of Air Transport Management (JATM).

1 Introduction

Air Berlin, a self-proclaimed hybrid carrier, recently joined the Oneworld alliance. The Spanish budget carrier Vueling has started to offer interlining, and easyJet has agreed to publish its fares in a global distribution system. Such adjustments in strategic postures are traditionally seen as atypical of low-cost carriers (LCCs), but have become increasingly common in recent years. Full-service carriers (FSCs) have also taken steps outside their traditional maneuvering space: Germany's former premium FSC Lufthansa axed its business class on decentral (non-hub) European flights by handing over the network to its low-cost subsidiary Germanwings. KLM announced it would charge for checked baggage on its European routes, and Air France is continuously cutting its air cargo segment down to an aircraft belly-only business.

Such observations have led to a convergence trend among airline business models to the "mainstream middle" being occasionally hypothesized (see for example Bell and Lindenau, 2009). The phenomenon of airline business model convergence, along with increasing similarity among airlines, has been subject to discussion among both researchers and airline managers, since growing similarity among airlines can potentially risk a disruptive market development and erode profitability (Dunn, 2012; Lohmann and Koo, 2012; Thornhill and White, 2007). Leading LCC and FSC airline managers met twice recently to discuss the transition of airline business models and its implications for the future management of their airlines (e.g. "Airlines in Transition" Summit 2013 in Dublin). Overall, the significance of business model similarity and its impact on airline performance in the highly competitive and notoriously unprofitable airline industry is substantial and warrants analysis.

However, the potential change of airline business models over time has not been subject to intensive discussion in research. Most of the extant contributions on airline business model components are based on anecdotal accounts rather than being rooted in systematic empirical studies or have a limited scope (e.g. mostly covering the product features or network characteristics of an airline but neglecting further elements of the value architecture). First approaches to more comprehensive and quantitative research settings have been made by Mason and Morrison (2008) and Klophaus et al. (2012). The focus on conceptual and qualitative research designs can, to some extent, be related to the lack of an established, systematic business model concept (e.g. Al-Debei and Avison, 2010; Morris et al., 2005) that enables researchers and analysts to precisely describe and quantify the business model components in the airline industry.

However, Daft and Albers (2013) recently proposed a business model framework that is suitable for empirical analysis and makes it possible to conduct reliable analyses of airline business models and their changes over time. Such reliable and comparable analyses can be seen as key for deriving recommendations to airline managers in a highly competitive environment that emphasizes the decision to find a well-balanced strategy of differentiation and imitation (Norman et al., 2007).

The aim of the present paper is to empirically assess the changes in business models among European airlines by building on Daft and Albers' (2013) framework. The framework (explained in the next section) will be applied to a sample of 26 European passenger airlines between 2004 and 2012. Initial results from calculations of the similarities among airlines indicate a considerable trend of convergence. Even though detailed results are subject to further analyses, our empirical study indicates a movement towards a hybrid model that combines business model characteristics from both the former LCC as well as the established FSC.

Our argumentation proceeds as follows. After introducing the airline business model framework and its underlying method of convergence calculation, we describe our data sample and present the empirical results of our analysis. The paper ends with management implications and an outlook for further research.

2 The Airline Business Model Framework

The term "business model" has become one of the most frequently used expressions in the management-oriented literature (Zott et al., 2011). Irrespective of the industry context, the business model approach is used to systematically describe and assess a particular set of a company's strategic and organizational design parameters at a given point in time by evaluating a number of constitutional components and sub-dimensions (Morris et al., 2005; Shafer et al., 2005; zu Knyphausen-Aufseß and Zollenkop, 2007). The business model concept aims to enable a precise description of a company's value generation system while keeping the framework and the data necessary for its dedicated measurement items manageable.

Following this logic, Daft and Albers (2013) proposed an industry-specific framework for assessing passenger airline business models. Their framework consists of 36 measurement items that are subdivided into the three major components: (1) "Corporate core logic", (2) "Configuration of value chain activities", and (3) "Assets". In order to enhance the structure and clarity of the framework, the three components are subdivided into eight dimensions, each of which consists of either two or three elements. Each of the resulting 18 elements within the three components are then measured by two items.

The framework is suited to the evaluation of airline business models and to ensure a consistent benchmark among different airlines (see also Mason and Morrison, 2008). As multiple airlines, potentially with different business models, can operate within one airline group (for example, quality-oriented Lufthansa Passage (LH) and budget-oriented Germanwings (4U) under the roof of Deutsche Lufthansa AG) the airlines must be assessed individually at the business unit level. Accordingly, the framework is used to individually assess each airline that holds its own air operator's certificate (AOC).

Generally, the proposed airline business model framework uses one of three different types of scale for measuring the items. Where applicable, continuous scales are used (such as traffic numbers). Such data are aggregated for a respective observation period. However, for some items (such as "bundling concept"), continuous scales are either not available or not applicable. For these items, the framework proposes an ordinal scale with given preset values. Finally, the framework also considers items that are expressed by discrete values that cannot be sorted (such as the type of flight operations for the "basic operations design" item). Changes of all discrete item values within one observation period are considered in total, regardless of the exact date of the change within the observation period. The entire framework is illustrated in Figure 1 (item operationalization is displayed in Tables A-1–3 in the appendix).

(1) Corporate core logic

Dimension	Element	Item
Basic offering	Type of air product	Basic operations design
		Basic route design
	Geographic focus	Spatial scope
		National scope
Internal policy choices	Business policy	Executive ownership
		Wage policy
	Input factor policy	Aircraft utilization
		Labor intensity
External value network	Interorga-nizational relationships	Lobbying in associations
		Cooperation policy
	Target product-market combination	Target passenger groups
		Role of air cargo

(2) Configuration of value chain activities

Dimension	Element	Item
Inbound activities	Supply management	MRO sourcing
		Ground services sourcing
	Finance management	Aircraft financing
		Hedging policy
Production	Route network	Routes offered
		Flight frequencies
	Cabin product	Seat pitch
		In-flight entertainment
	Ground product	Lounge access available
		Self-check-in
Marketing activities	Distribution	Online distribution
		Global distribution systems
	Fare structure	One-way fares
		Bundling concept
	Advertising	Brand presentation
		Sales promotion

(3) Assets

Dimension	Element	Item
Tangible	Fleet structure	Fleet uniformity
		Fleet modernity
	Infrastructure	Investments in other companies
		Owning facilities
Intangible	Human capital	Human resources development
		Flight crew skills
	Property capital	Access to primary airports
		Software for major processes

Figure 1: Airline business model framework. Source: Adapted from Daft and Albers (2013).

3 Methodology for Calculating Convergence

The proposed framework can be used to describe an airline business model at a given point in time. According to our research aim of analyzing the development of airline business models over time, we follow a longitudinal research design setting and compare the status quo of such business models in four different years to identify their changes.

For each observation point, we consider one calendar year. Therefore, continuous data are aggregated on a yearly basis (January to December). However, due to different fiscal years of airlines, we have extended the length of the observation periods from October of the previous year to March of the following year, which results in a time windows of 18 months for each observation point.

Because the business model framework we used is based on items with mixed scales, we need to find a similarity measure that can cope with mixed data. Commonly used similarity measures (like the well-known Euclidean distance) are only suitable for data with one single scale type. One of the few available approaches that are applicable to mixed scaled data is the extended similarity coefficient by Gower (Gower, 1971; Podani, 1999). This so called Gower coefficient is based on elementary and commonly used distance measures (in particular in the field of cluster analysis) depending on the item scale in question and is mostly suitable for calculating pairwise (object-to-object) similarities (Podani, 1999). The distance between two objects can be interpreted as a measure of their (spatial) closeness or similarity. Here the value range of the Gower coefficient is [0,1] where 0 denotes maximum similarity among two airlines while 1 would mean that the two considered airlines are completely different regarding the covered business model items.

For continuous items, the Gower coefficient is represented by the City Block Distance. This metric (also called Manhattan Metric) calculates the distance between two objects based on the sum of the absolute difference of the item values (thus it is based on the two sides of a right triangle instead of the hypotenuses as used for the Euclidean distance). In case of ordinal items, the Gower coefficient is represented by the City Block Distance scaled to the item value range. Finally, for nominal scaled items, the Gower coefficient is represented by the Simple Matching Metric, which just counts the cases in which the two compared objects have the same value for the particular nominal item (e.g. airline one and airline two both have the basic operations of a charter carrier).

For our calculation of the combined Gower coefficient, each of the 36 items is assigned equal weight. Even though equal weighting of all items could lead to strongly correlated items being overrated, a common weighting of all items reflects the intended power relation of the initial framework layout without systematic or random bias (Kaufmann and Pape, 1996).

For each given year, the similarity calculation for n airlines in the data sample provides $\binom{n}{2}$ pairwise similarity measures. The overall similarity of the considered airline sample for the given observation point can be captured by calculating the average value among the pairwise similarity measures. Comparing these average similarity measures in our four measurement years enables us to indicate the change of the similarity.

Considering the recent dynamics in the airline market and the booming phase of new LCC entrants, we chose the period from 2004 to 2012 as this timespan falls into the decade of most substantial change within the airline industry. Also, a relatively long period (several years) is necessary in order to identify significant business model changes, because business model adjustments need 3–5 years to become implemented and thus observable (Viellechner, 2010). Thus, we will assess the changes of the airline business models during this period by considering the four years 2004, 2007, 2010 and 2012.

4 Data Sample

To ensure comparable results of the similarity analyses we formulated criteria for building a reasonable data sample out of the vast amount of thousands of commercial passenger airlines around the world. We used the four following main criteria to define such a set of comparable airlines: (1) geography, (2) airline size, (3) airline survival, and (4) airline operating unit (see Table 1). The geography criterion is the most restrictive: We focused our empirical study on European airlines, to ensure homogeneity in the economic market and regulatory contexts (this segmentation is also used by the Association of European Airlines, AEA). The minimum airline size limits our sample to the important national and international players, while small and smallest airlines (with only one or a few number of small and regional aircraft) are neglected. With the airline survival criteria we want to ensure that the data sample remains stable over time for methodological reasons. Moreover, data are hardy available for airline that ceased operations and little management implications can be derived from and for such airlines. The last criteria allows for the consideration of distinct airlines, which are acting within one airline group.

Table 1: Criteria for identifying the relevant airline sample.

Criteria	Reasoning	Comment
(1) EU27 + Switzerland and Norway + EU candidates (Island, Croatia, Macedonia, Montenegro, Serbia, Turkey)	Comparability of legal and geographic environment (Approach also used by AEA)	Consideration of airline registration country
(2) Only airlines with minimum size of 5 Million annual passengers in at least 3 of the 4 measurement years	To improve comparability of airline types	There are hundreds of incomparable small and smallest airlines in Europe
(3) Only airlines that are still operating	Bad data availability and relevance for deriving management implications	Most airlines which ceased operation also did not fulfill size criteria
(4) Consideration of airlines with own AOC	Distinct airline business models within in one airline group possible (e.g. 4U and LH)	All airlines which fulfill size criteria also operate under own AOC

The consideration of all criteria resulted in a data sample of 26 airlines (see Table 2) that transported 586 million passengers in 2012; this figure represents approximately 60 percent of the total European market size. Partners of each of the three global airline alliances (Oneworld, Skyteam, Star Alliance) are also included, as well as the relevant stereotyped business models

(LCC, FSC, CC and RC[2]) in the base year 2004. Finally, the data sample contains the same airlines for the entire observation period. Taking these characteristics into account, the data sample promises widely unbiased analysis results, and is illustrative for the entire industry at the same time. Also, collecting the required data did not overstretch researcher resources.

Table 2: Airline data sample.

No.	Airline	Code	Stereotyped business model in 2004	No.	Airline	Code	Stereotyped business model in 2004
1	Aegean Airlines	A3	RC	14	Germanwings	4U	LCC
2	Aer Lingus	EI	FSC	15	Iberia	IB	FSC
3	Air Berlin	AB	LCC	16	KLM	KL	FSC
4	Air Europa	UX	FSC	17	Monarch Airlines	ZB	CC
5	Air France	AF	FSC	18	Norwegian Air Shuttle	DY	LCC
6	Alitalia	AZ	FSC	19	Ryanair	FR	LCC
7	Austrian Airlines	OS	FSC	20	SAS Scandinavian Airlines	SK	FSC
8	British Airways	BA	FSC	21	Swiss	LX	FSC
9	Condor	DE	CC	22	TAP Portugal	TP	FSC
10	Lufthansa	LH	FSC	23	Transavia	HV	CC
11	Easyjet	U2	LCC	24	Turkish Airlines	TK	FSC
12	Finnair	AY	FSC	25	Virgin Atlantic Airways	VS	FSC
13	Flybe	BE	RC	26	Vueling Airlines	VY	LCC

This data sample of 26 airlines and 36 items for four measurement years required a total of 3,744 data entries. While some data can be extracted from existing databases (such as OAG for route network-related items), most of the entries require manual research, which is based mostly on annual reports and content analysis of the airline-industry-related press. Even though several items are only measured by ordinal items that could possible jeopardize the reliability of the results, this approach seems to be reasonable to approximate real business models by a manageable number of items and data. Such approximations are commonly used in strategic management research and go in line with the general requirements of the business modelling approach. For illustrative purpose we enclose a table containing the year 2012 values of each of the 36 items for the 26 airlines in our sample (see Table A-4 in the appendix).

[2] Charter carriers (CC) such as the German airline Condor and regional carriers (RC) such as the British airline Flybe.

5 Results

Based on our data sample of 26 airlines, the calculation of the distances resulted in 325 pairwise values for each of the four measurement years in the longitudinal research setting. The entire distance data tables are available upon request. A comparison of the average distances among the 26 airlines shows a reduction of almost 19 percent from 0.3800 in 2004 to 0.3095 in 2012. The variance of the pairwise distance measures dropped by almost 54 percent, from 0.0221 in 2004 down to 0.0102 in 2012 (see Table 3). Looking at the intermediate years 2007 and 2010 reveals that the changes of the distances are nearly constantly declining throughout the entire observation period and thus cannot be attributed to random fluctuations.

To check the validity of the results we applied the Wilcoxon Signed Rank Test (Wilcox, 2012) to see whether the distances in 2004 and 2012 are significantly different from each other or not. The Wilcoxon Rank Test is a suitable test for settings such as ours (not normally distributed data; dependent observations). Applying the test to our data reveals that the distance measures in 2004 are significantly different from those in 2012 (for both $p < 0.05$ and $p < 0.01$), thus further supporting the empirical results of the convergence of airline business models.

Table 3: Summary of distance calculation results.

Year	Maximal distance between two airlines	Minimal distance between two airlines	Variance	Average distance among all airlines
2004	0.7083 (LH – VY)	0.1097 (AZ – KL)	0.0221	0.3800
2007	0.5856 (AZ – HV)	0.0933 (BA – LH)	0.0148	0.3375
2010	0.6077 (AZ – FR)	0.0824 (BA – LH)	0.0133	0.3234
2012	0.5950 (AZ – FR)	0.0819 (BA – LH)	0.0102	0.3095

In 2004, Lufthansa and the Spanish low-cost carrier Vueling featured the highest pairwise distance (0.7083), while the Italian FSC Alitalia was mostly similar to its Dutch counterpart KLM (0.1097). The FSC Austrian Airlines had the lowest distance (0.3152) of the airlines in the sample to all other airlines, while Vueling had the highest average distance to all others (0.4868). In the following years Alitalia always featured the maximal distance to one particular other airline (2007 with the Dutch charter carrier Transavia and 2010 and 2012 with Ryanair). Meanwhile, the former national flag carriers British Airways and Lufthansa have shown the minimal distance towards two airlines from 2007 on the 2012.

In 2012, a low-cost carrier (Ryanair) again featured the highest average distance (0.4468) to all other airlines. Moreover, Ryanair was the only airline in the sample to increase its average distance and to become more differentiated from all other competitors, while all other airlines were becoming more similar.

In particular, the former charter carrier Air Berlin clearly moved towards the "middle" of business models; which is in line with the strategic reorientation of Air Berlin and the self-proclaimed hybridization of its business model (Flottau and Buyck, 2013). Similar moves towards less differentiated business models can be observed for the Greek carrier Aegean, the regionally-oriented British carrier Flybe and the growing LCCs Vueling and Germanwings, all of which have started to broadly adopt business model practices that were, for a long time, used exclusively by premium-oriented FSCs.

On the other hand, several of the original FSCs show only minor adaptations as core elements of their business models were kept unchanged. Accordingly, the pairwise distances within the group of FSC are clearly lower than the distances between distinct LCC. Considering the pairwise distances in 2012, Lufthansa and British Airways have the closest business models (0.0819), with all of the other FSCs having similar low values for both the pairwise as well as the average distance to all other airlines. Iberia´s average distance in 2012 was 0.2425 in contrast to Ryanair which featured the highest average distance (0.4468). Even within their peer group, LCCs tend to have higher levels of differentiation among each other than FSCs do.

Overall, our results provide empirical support to existing presumptions of the general airline business model structure. Both the average distance among the airlines, as well as the observable range between the highest and lowest differentiated airlines decreased significantly from 2004 to 2012 (see Figure 2). Considering the trajectories of the distances throughout the observation period (see Figure 3) also show, that the decreasing trend is almost stable, which indicates that the growing similarity seems to be a rather systematic than a random effect. Thus, overall our study shows an actual rapprochement of airline business models.

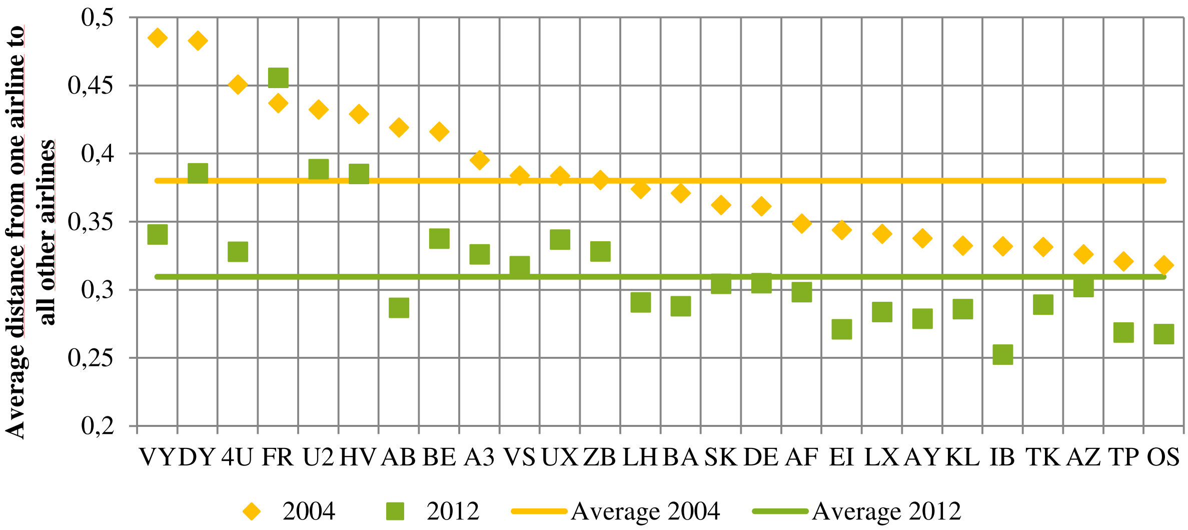

Figure 2: Change of average distance among airlines to all other airlines in the sample.

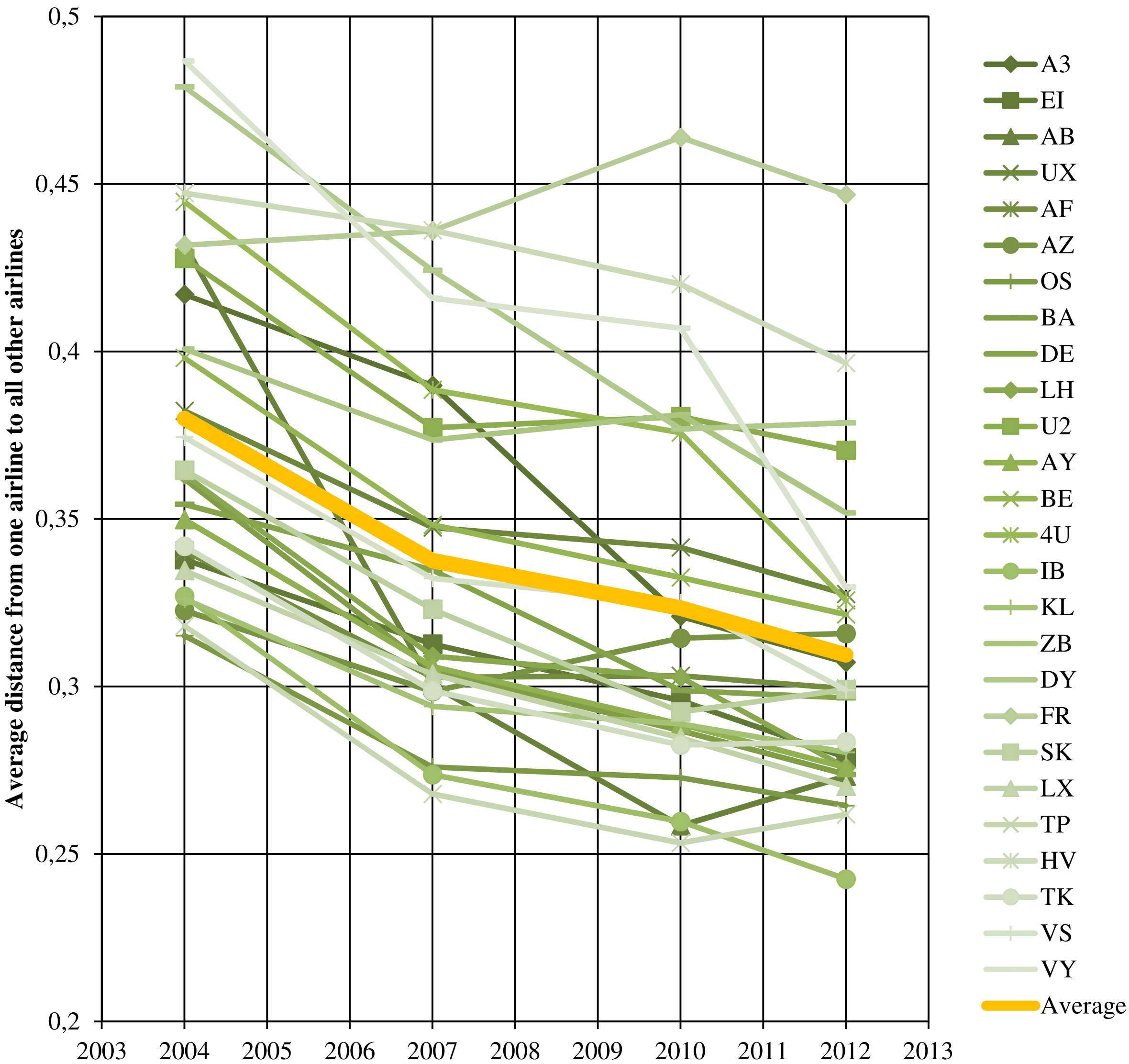

Figure 3: Change trajectories of distances among airlines.

6 Discussion of Results

A comparison of the business models of the 26 airlines in 2004 and 2012 revealed a decrease of distance of nearly 19 percent. This considerable and statistically tested reduction of differentiation is a first empirically grounded indicator of the convergence of airline business models. In particular, our study reveals that, in contrast to extant discussions of business models in transition, the observable business model adjustments refer to all three components of the business model framework. In addition to the usual adjustments of the observable customer product, which are common for mature markets, more fundamental elements such as the input factor policy or the fleet structure are also among the considerable changes.

The results also indicate that the business models of the established FSC are rather stable, while considerable adjustments can be observed for the former LCC and CC. This observation provides support for the predicted trend that LCCs aggressively try to expand their business passengers segment since 2010, which requires more elaborated product features such as high-frequency route patterns to primary airports, frequent flyer programs and more spacious seating in a separated service class. Accordingly, for each of the related items (11, 18 and 35, 28) the data show a trend towards the FSC typical profile.

In contrast, the established FSCs mostly stay with their product features while also trying to adopt the cost-saving structures of the LCC. Overall, several business practices seem to be moving towards a “dominant” specification. While in 2004, for example, 8 out of the 26 airlines in the sample where neglecting all kind of passenger transfers (item 1), in 2012 only 3 airlines remain with pure point-to-point operations.

In the field of the configuration of the value chain activities major changes can be identified regarding the distribution (items 23 and 24). While the FSC invest a lot of capital to increase the online sales, the LCC convert their former online-limited distribution to omni-channel systems with increasing participant in global distribution systems (GDS). In 2012 only Ryanair leaves with a pure online distribution compared to 2004 where four out of the six LCC in the sample were limited to the online channel.

Also with regard to the assets we see a converging trend. For fleet homogeneity (item 29) our data shows that FSCs and RC try to reduce the number of different aircraft types in their fleets, while LCCs, which originally used single-type fleets, add new aircraft types to serve the expanded route networks. As these route networks are also becoming increasingly similar (for example regarding average flight length, see items 3), the necessary mix of different aircraft in the fleets is also becoming more alike. Another example for the converging trend is the infrastructure (item 32). While the FSC try to reduce their owned facilities, the other airline business model types extend their owned infrastructure from 2004 to 2012.

The increasing similarity of all airlines in the sample provides strategic maneuvering space for airlines that maintain their original business model. When all others become more similar, those that remain unchanged passively evolve into differentiators. However, the differentiation factor needs to be “in demand”; that is, valued by the consumer. For example, Ryanair, which is known to be fundamentally focused on its initial cost-saving business model design, is the only airline that was able to even increase the average distance to all other airlines. This could benefit Ryanair, which is clearly positioning itself in the pure low-cost segment, which seems to develop into a niche market, whereas the former LCCs are moving towards hybrid models. By leaving the pure low-cost segment, these airlines are contributing to the rise of a new, clearly separated low-cost market segment. Yet, recent announcements of Ryanair to become customer friendly airline might indicate that the ultra-low-cost business model has become obsolete, thus further facilitating the move towards a rather service oriented dominant design.

However, it remains unclear whether the airlines that are moving towards the middle will be able to establish new market segments based on a sensible mix of low-cost orientation and customer focus. Airlines such as Norwegian Air Shuttle and Vueling are good examples of players that redesign their business models by adding innovative elements and practices (for example, budget-oriented long-haul flights (see also Daft and Albers (2012), and premium-oriented business classes) to their original low-cost models to catch new markets and customers. It also remains unclear whether the established full-service business models will remain the same or whether the FSCs will also try to reinvent their business models to build new market segments that are clearly differentiated from other airlines to protect profitability and long-term sustainability. Hitherto, such trends have barely been observable among FSCs.

7 Conclusion

The aim of this paper was to empirically analyze the actual transition in airlines business models to provide a platform for detailed empirical convergence studies as well as strategic-oriented research on business model imitation and its impact on airline profitability.

We have used a structured business model framework based on 36 items to measure a sample of 26 European airlines at four distinct points in time (2004, 2007, 2010 and 2012) and have analyzed the changes among their business model design during the period. The results have shown that a considerable rapprochement of airlines' business models is underway. While several authors, as well as airline practitioners, have voiced reasonable suspicions about this development, we are able to provide empirical evidence for this convergence. Therefore, our study could help increase the awareness of both researchers and airline managers of a considerable convergence trend of airline business models and help develop suitable strategies with which to adapt to the changing airline business model spectrum. Only if managers are aware of their airline's positioning compared to their competitors will they be able to determine whether they prefer to increase the differentiation again by focusing on their own innovations and niche markets or opt to stay in the mainstream center (Porter, 1985). Investors also have an additional tool with which to evaluate distinct airlines.

Even though we were able to identify such a move towards the mainstream center, it remains unclear whether airline managers intended for this evolution to occur. Based on an increased awareness of this convergence phenomenon, further studies could now focus on investigating the detailed reasons of the decreasing differentiation. Given this contraction of the airlines' competitive field (i.e. competitors becoming more similar), opportunities may arise for new and "other" competitors (e.g. Albers and Heuermann, 2013; Bergen and Peteraf, 2003) in the industry. Therefore, further studies should analyze the actual impact of the recent business model adjustments on airlines' financial performance (see also Alamdari & Fagan, 2005) and the resulting attractiveness of the industry for newcomers. This will help airline managers consciously decide about the (re)positioning of their airlines in the given business model spectrum, or even expand the spectrum by enforcing business model innovations.

Appendix

Table A-1: Operationalizing of items for component (1), "Corporate core logic". Source: Adapted from Daft and Albers (2013).

No.	Item	Scale
1	Basic operations design	[charter, scheduled, on behalf of others, mixed]
2	Basic route design	[point-to-point without passenger transfer, point-to-point with passenger transfer in own network, point-to-point with passenger transfer in other network(s), hub-and-spoke]
3	Spatial scope	Average flight distance
4	National scope	Percentage of available seat kilometers domestic
5	Executive ownership	Percentage of shares held by executive managers
6	Wage policy	Average expenses per employee
7	Aircraft utilization	Average flight hours per aircraft per day
8	Labor intensity	Number of employee per one million available seat kilometers
9	Lobbying in associations	Number of airline memberships in selected associations
10	Cooperation policy	[no cooperation, codeshare agreement(s), alliance membership(s), joint venture(s), joint venture(s) and codeshare agreement(s), joint venture(s) and alliance membership(s)]
11	Target passenger groups	Number of service classes
12	Role of air cargo	[no air cargo, air cargo for affiliated group company, air cargo on own risk]

Table A-2: Operationalizing of items for component (2), "Configuration of value chain activities". Source: Adapted from Daft and Albers (2013).

No.	Item	Scale
13	Maintenance, repair overhaul (MRO) sourcing	[line MRO and heavy MRO outsourced, line MRO done inhouse and heavy MRO outsourced, both done inhouse]
14	Ground services sourcing	[transactional based, middle-term and local oriented, long-term and globally oriented, inhouse]
15	Aircraft financing	Percentage of leased aircraft in the fleet
16	Hedging policy	[no hedging, fuel surcharge, currency hedging, fuel hedging, combinations of policies]
17	Routes offered	Number of routes offered
18	Flight frequencies	Average weekly frequency per route
19	Seat pitch	Seat pitch in lowest service class in cm
20	In-flight entertainment (IFE)	[no IFE, shared music supply, shared video supply, internet on own device, shared video and internet on own device, individual IFE, individual IFE with internet]
21	Lounge access available	[no, only to partner lounge(s), to own and possibly partner lounge(s)]
22	Self-check-in	[not available, optional via kiosks, optional via web or web and kiosks, mandatory]
23	Online distribution	[not in focus, emerging channel, equal channel, in focus, only channel]
24	Global distribution systems (GDS)	Number of contracted GDS
25	One-way fares	[not offered, only for special promotions, fares on pure one-way logic]
26	Bundling concept	[catering and checked baggage not included, checked baggage included, catering included, both included]
27	Brand presentation	[extravagant, rather extravagant, rather conventional, conventional]
28	Sales promotion	[no FFP available, basic FFP offered, comprehensive FFP offered]

Table A-3: Operationalizing of items for component (3), "Assets". Source: Adapted from Daft and Albers (2013).

No.	Item	Scale
29	Fleet uniformity	Hirschman-Herfindahl-Index HHI of aircraft families
30	Fleet modernity	Average age of fleet
31	Investments in other companies	[no long-term investments, investment in other airline(s), investment in (un)related company(ies), both]
32	Owning facilities	[no own facilities, some own facilities (airside and/or landside, functional), some own facilities (airside and/or landside, prestigious), major own facilities (airside and landside, prestigious)]
33	Human resources development	[no development activities, limited development activities, broad range of development activities]
34	Flight crew skills	[no dedicated flight school, using cooperative training facilities, using affiliated training facilities, using own training facilities]
35	Access to primary airports	Percentage of flights at primary airports in Europe
36	Software for major processes	[no individualized software, some individualized software, major investments and individualized software]

Table A-4: Item raw data for each of the 26 airlines in 2012.

Airline	1	2	3 (km)	4 (%)	5 (%)	6 (tsd. € / empl.)	7 (h)	8 (empl. / mil. ASK)	9 (#)	10	11 (#)	12	13	14	15 (%)	16	17 (#)	18 (weekly flights / route)	19 (cm)	20	21	22	23	24 (#)	25	26	27	28	29 (HHI)	30 (years)	31	32	33	34	35 (%)	36
A3	2	4	1404	15,7	61,8	51,9	9,0	0,17	3	3	2	3	2	2	86,2	8	109	9,1	76,2	3	3	3	3	4	2	4	4	3	1	4,99	2	2	1	2	24,7	2
EI	2	4	1524	0,1	0,2	74,8	12,4	0,19	2	2	2	3	2	3	57,4	8	214	9,3	76,2	1	3	3	4	0	2	1	2	3	0,75	7,57	1	3	3	3	32,4	2
AB	2	4	1962	8,1	4,4	52,6	12,5	0,15	3	3	2	3	3	3	78,6	8	812	6,1	81,3	3	3	4	3	4	2	3	3	3	0,35	5,33	4	2	3	3	31,1	3
UX	2	3	2312	28,2	100,0	59,0	10,4	0,14	1	3	2	3	2	4	77,5	4	125	8,7	78,7	3	2	3	2	4	2	2	3	3	0,34	6,5	1	2	2	4	81,1	1
AF	2	4	2216	9,7	0,0	78,6	9,3	0,34	2	6	4	2	3	3	45,2	6	628	16,3	81,3	1	3	3	2	4	1	3	4	3	0,39	10,2	4	4	3	4	54,6	2
AZ	2	4	1966	19,6	75,0	83,0	10,3	0,3	2	6	3	3	1	3	48,9	2	256	15,6	78,7	6	3	3	3	4	1	4	3	3	0,67	8,36	4	3	3	4	81,7	2
OS	2	4	1520	1,3	0,0	70,0	9,2	0,27	2	6	2	2	3	3	20,5	8	296	9,2	76,2	3	3	3	3	4	1	4	3	3	0,59	12,8	4	2	3	3	95,6	1
BA	2	4	3086	2,4	0,1	54,3	11,7	0,27	2	6	4	3	3	3	22,9	8	420	15,7	78,7	1	3	3	3	4	2	4	3	3	0,28	13,4	4	4	3	4	72,2	3
DE	2	3	3164	0,0	0,0	77,7	13,1	0,1	2	2	3	3	2	3	88,0	7	362	2,3	78,7	3	2	3	3	4	3	4	3	3	0,33	15,4	4	2	3	1	42,8	1
LH	2	4	2247	5,0	0,6	70,9	10,7	0,2	2	6	3	2	3	3	2,7	8	825	16,7	76,2	1	3	3	3	4	2	4	4	3	0,32	12,5	4	4	3	4	84,4	3
U2	2	1	1370	4,5	0,0	70,5	13,8	0,11	1	1	1	1	1	3	23,0	7	1032	8,6	73,7	1	2	3	4	3	3	1	2	1	1	4,7	2	2	3	2	29,4	2
AY	2	4	2447	4,7	0,2	62,9	9,9	0,22	3	3	2	2	3	3	28,1	7	119	15,6	78,7	3	3	3	3	4	1	4	2	3	0,28	8,79	4	4	3	4	17,0	1
BE	2	3	513	60,5	6,9	40,1	9,4	0,51	2	2	1	1	3	3	47,8	8	330	11,6	76,2	1	3	3	3	4	2	1	2	2	0,56	5,41	2	2	3	4	4,6	2
4U	2	3	1258	12,7	0,0	63,0	11,1	0,15	0	2	2	2	1	2	45,7	2	290	5,6	76,2	1	2	3	3	4	2	1	3	3	1	6,72	1	2	2	3	27,1	1
IB	2	4	2235	13,2	0,1	65,0	11,2	0,34	2	6	2	3	3	3	54,6	8	273	16,7	78,7	1	3	3	3	4	2	2	3	3	0,51	9,56	4	3	3	3	85,4	2
KL	2	4	3862	0,0	0,0	70,7	10,7	0,33	2	6	3	2	3	3	48,7	8	251	17,4	76,2	1	3	3	2	4	1	3	3	3	0,25	10,1	4	3	3	4	98,9	3
ZB	4	1	2119	0,0	0,0	54,5	10,7	0,12	1	1	2	3	3	3	91,4	8	166	5,0	73,7	1	2	3	4	1	3	1	2	2	0,61	13,4	3	2	3	2	8,6	2
DY	2	2	1638	17,4	25,4	95,9	9,8	0,11	1	1	1	3	2	2	59,5	8	442	6,8	76,2	5	1	2	4	2	3	1	1	2	0,77	4,83	4	2	2	2	6,6	2
FR	2	1	1453	0,0	4,2	48,1	11,6	0,08	1	1	1	1	3	2	17,7	7	2616	4,4	76,2	1	1	4	5	0	3	1	3	1	1	4,65	4	2	1	4	13,4	1
SK	2	4	1524	6,4	0,0	104,3	7,8	0,36	2	6	3	2	2	3	55,8	8	340	16,9	78,7	4	3	3	3	4	2	2	4	3	0,27	12,5	4	3	2	2	14,9	1
LX	2	4	2509	0,5	0,0	74,0	11,1	0,21	2	6	3	3	1	3	35,2	8	170	17,6	78,7	3	3	3	3	4	2	4	4	3	0,24	11,8	4	2	3	4	91,5	3
TP	2	4	2809	5,0	0,0	41,0	13,6	0,19	2	3	2	3	3	3	38,2	8	193	11,5	81,3	3	3	3	3	4	2	4	2	3	0,56	12,1	3	2	3	4	26,8	3
HV	4	3	1725	0,1	0,0	79,0	9,0	0,07	2	2	1	1	2	2	81,8	8	215	3,7	73,7	3	1	3	4	2	3	1	2	1	1	8,26	2	2	1	2	67,4	2
TK	2	4	2175	13,1	0,0	49,5	13,0	0,16	2	3	4	3	3	4	27,1	7	500	12,3	77,5	3	3	3	3	4	3	4	4	3	0,33	5,95	4	3	3	4	83,0	3
VS	2	3	7134	0,0	51,0	55,2	11,8	0,18	2	5	3	3	2	3	82,9	8	64	6,4	81,3	6	3	3	3	4	2	4	3	3	0,31	8,87	3	3	3	2	73,5	2
VY	2	3	1105	34,8	0,2	54,2	9,3	0,1	1	2	2	3	1	3	100,0	7	267	9,1	76,2	1	2	3	3	3	3	1	2	3	1	8,36	1	1	2	2	84,2	3

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