

The evolving low-cost business model: network implications of fare bundling and connecting flights.

1. Introduction

Low-cost travel is becoming the dominant way of flying within Europe and figures of low-cost growth are stunning (Dobruszkes, 2013). However, there are signs of a slowdown in the organic growth of low-cost carriers (LCC) due to decreasing average frequencies and increasing average route distances, which is forcing LCC to adopt other business strategies for growth (de Wit and Zuidberg, 2012), including the possibility of establishing long-haul low-cost operations (Morrell, 2008) and the hybrid low-cost business models (Klophaus et al., 2012). The discussions of these two topics (i.e., long-haul low-cost and hybrid low-cost) have developed relatively independently from each other, but both are related with changes in two fundamental principles of the low-cost business model: fare unbundling and point-to-point operations.

The unbundling of fares is one of the characteristics of the low-cost airline business model, which has developed in recent years. Fare unbundling strategy is aimed at attracting price-sensitive passengers and competing on base ticket fares. This strategy can be traced back to easyJet discounting fares for tickets booked through their preferred channel (direct online tickets were discounted at point-of-sale by £2.50 per sector in 1997), and the introduction of separate fees for various items (by 2005 these included credit card fees, change fees, partner fees, excess baggage and in flight food and beverage). The introduction of charges for checked hold luggage in 2008 significantly increased ancillary revenues for the airline (EasyJet, 2008). These innovations were introduced to customers as a way of aligning the variable costs bourn by the airline to provide such services to the cost of providing them. If a customer does not want to pay for a bag to be carried in the hold, the airline will have lower costs, which will be reflected in a lower base fare for that customer. All passengers paid a similar base fare, but those looking for a better level of service (e.g., larger leg-room) or additional services (e.g., meals on board) could purchase them as an ancillary service (i.e., “à la carte fees”). However, this unbundling strategy is rapidly changing and currently an increasing number of low-cost carriers are providing a fare category system in order to introduce bundles of different services that used to be sold as independent

ancillary products. Bundling services can help airlines standardizing their offering and having a better control on the level of service provided to the customer, which is seen as important for capturing a wider range of passengers and targeting new upmarket segments of the market by the airline.

Another of the fundamental characteristics of the low-cost business model has been point-to-point service, which allowed for lowering the cost structure by providing a simple operation and management model. Offering point-to-point services also lets airlines schedule their services at the right time of the day to compete with other airlines without being subject to the imperatives of a connecting wave-system. In other words, hubbing can have significant negative ramifications in terms of network economics (Doganis, 2013). However, this is also changing as some low-cost carriers are starting to connect some of their flights, feeding other airlines and code sharing (e.g., JetBlue in the US has begun codesharing with Emirates, and Air Berlin codesharing with Etihad). In a market with limited organic growth, such as the European, this has a twofold objective. On the one hand, it allows for capturing the increasing number of passengers already doing self-help hubbing (O'Connell and Williams, 2005), which can help reducing the route density problem (de Wit and Zuidberg, 2012). On the other hand, allows for connecting more distance markets by feeding the longer flights that the low-cost carrier offers. In fact, sector length has been one of the straitjackets of the traditional business models. To take advantage of density economies, the sector distance has ideally been around 1,500 Km., which allows for flying as many sectors as possible and for increasing aircraft utilization. In relation to the previous point on price bundling, a better level of service and comfort could also contribute to withstand the longer travel.

Although these two key changes have significant consequences on the competitiveness of the low-cost airline business, there is a limited number of new research on the recent changes and evolution of this business model (e.g., Francis et al. (2007), Morrell (2008), Mason and Morrison (2008), Pels (2008), Wensveen and Leick (2009), Douglas (2010), Daft and Albers (2012), Klophaus et al. (2012)). In this paper we try to add to the discussion by analysing the network implications of fare bundling and connecting flights in different low-cost carriers models, i.e., pure low-cost and hybrids. We aim to identify the influence of

several route characteristics on the share that pure low-cost and hybrid low-cost carriers have on the routes they operate.

The paper is structured as follows: Section 2 discusses the evolution of the low-cost business model with especial regard to fare bundling and connecting flights, Section 3 introduces the data and the empirical model used for the analysis, Section 4 presents the results of the estimation and, finally, Section 5 discusses the results and their policy implications.

2. Evolving low-cost business models

2.1 Market forces, business models and self-transformation

The airline industry has been losing value consistently over the last 20 to 30 years and some are starting to recognise that the problems of the airline industry are not just due to cyclical exogenous shocks (Mason and Alamdari, 2007; O’Connell, 2011) or other exogenous cost drivers, such as taxes and fuel (Borenstein, 2011), but that the issue is mainly structural since the gap between long-term returns on capital and cost of capital is widening (Button, 2003; Borenstein, 2011; Wojahn, 2012). The long-term financial problems of the airline industry is one of its ‘ugliest’ aspects (Goetz and Vowles, 2009) that leads to a wide range of fundamental changes that take shape in form of bankruptcies, terminations, mergers and acquisitions. According to Button et al. (2011), these can offer some short-term relief by fostering market power, but there is some evidence that competition in any airline market does prevent full cost recovery.

The reaction of airlines to the growing market pressure has been to increase firm’s flexibility by decreasing costs, especially labour. However, these measures did not mean breaking out the existing business development path of LCC firms; on the contrary, they reinforced the low-cost nature of these type of airlines in a sort of never ending race to the bottom.

Yet, the significance of the 2008 financial crisis could have been a definitive event that fostered the emergence of novelty in the low-cost business model. Business model innovation and technology innovation are the main sources of self-transformation for firms. The creative capacity of economic agents (Boschma and Martin, 2007) to evolve accordingly and to adapt to the selective market forces and changing institutional settings is essential for their survival. In this regard, business models represent a new dimension of innovation, which

spans the traditional modes of process, product and organizational innovation, and involves new forms of cooperation and collaboration (Zott et al., 2010). According to Seelos and Mair (2007) the business model is a set of capabilities configured to enable value creation consistent with either economic or social strategic objectives. Hence, business model innovation is a process of mindful deviation by entrepreneurs that, with their judgment and agency, create a new future. This is what Garud and Karnøe (2001) identify as path creation, which requires the ability on the part of the entrepreneurs to shift their emphasis to alternative approaches that may have greater promise. For the area of our concern, one of the alternative approaches to the traditional low-cost business model is the hybrid business model.

2.2 From low-cost to hybrid airline business models

The low-cost airline business model can take a number of forms (Francis et al., 2003) and costs savings can be achieved from different sources (Williams, 2001). While some identify low-cost carriers as those airlines that have a distinctive feature, such as using a single-fare class over their whole network of routes (Fageda and Fernández-Villadangos, 2009), others use other methods, such as the product and organizational architecture (POA) approach, to classify and relate key elements of airline business models (Mason and Morrison, 2008). Be that as it may, the increasing difficulty for defining the low-cost airline business model is, in fact, a sign of the coexistence of several business models that are categorized under the “low-cost carrier” label (Mason and Morrison, 2008). This is an indication of the existence of some level of institutional plasticity (Strambach, 2010), as airlines try to stretch the prevailing institutional agreements and understandings without deviating in excess from the dominant development path of the low-cost carrier business model.

Despite that, the level of deviation from the traditional low-cost business model by some low-cost carriers is starting to be of such a degree that some scholars begin to agree that we might have scope for defining a hybrid low-cost carrier (Franke and John, 2011; Klophaus et al., 2012). Table 1 compares the main practices of the traditional LCC business model and the hybrid LCC business model.

Table 1. Low-cost carriers business model practices.

Source: Authors' own elaboration from Mason and Morrison (2008), Klophaus et al. (2012) and Doganis (2013).

	Traditional LCC	Hybrid LCC
Fleet	Single type	Single type or mix
Aircraft type	Narrow body	Narrow body and wide body for long-haul
Type of airport	Secondary and/or primary	Primary
Code sharing	No	Can provide code sharing
Transfer between flights and feeding services	No	Can provide transfer between flights
Member of global alliance	No	Can be member
Sector length	Ideally from 500 to 1,500 Km.	Can be longer than 2,000 Km.
Long-haul flights	No	Can be long-haul
Single class cabin	Yes	Yes
Fare bundling	No	Yes, different fare bundles offering different levels of service
Sales distribution channel	Mostly internet	Mostly internet, but also GDS
Frequent flyer programme	No	Can offer FFP
Frills*	No frills	Depending on fare bundle

*Frills may include, among others: complimentary in-flight services, free checked baggage, room reserved on the aircraft for hand luggage, food on board, free flight changes, exclusive check-in desks, etc.

One of the business model deviations that has attracted some academic and industry interest is the possibility of low-cost carriers to develop long-haul services.¹ There is not yet a clear agreement on the viability of a pure low-cost operation for a long-haul service, in other words a long-haul service without feeding traffic and increasing levels of comfort seems difficult to realise.

Yet, literature shows some conclusions. On the one hand, Pels (2008) concludes that having enough demand might be determinant in order to set up low-cost services in long-haul markets. Although this could be seen as a self-evident statement, in fact, this is in line with the long-haul service strategy introduced by Norwegian Air Shuttle, which is mainly based in linking the major markets in both sides of the Atlantic –i.e., London and New York– by taking advantage of the newest and more efficient airliners (Airline Business, 2013). On the other hand, Wensveen and Leick (2009) suggest the existence of an increasing need for interlining agreements and feeding among low-cost carriers, which is in

¹ Francis et al. (2007), Morrell (2008) and Moreira et al. (2011) compare the cost advantages of low-cost carriers (LCC), Pels (2008), Wensveen and Leick (2009) and Douglas (2010) assess the suitability of the qualitative features of the LCC business model to the long-haul markets, and Draft and Albers (2012) conduct a profitability analysis.

line with AirAsia's considerations that see feeding as a condition for long-haul low-cost services (GAD, 2013). In this regard, not only low-cost carriers are starting to offer connecting services within themselves, but there are also growing links between low-cost carriers and full-service network carriers, which have been handing over short-haul flights to low-cost carrier subsidiaries.² According to Doganis (2013) the essence of the low-cost business model lays in the point-to-point service, since connecting passengers entails a series of consequences that have ramifications across the airline business competitiveness. For example, airlines might not be able to schedule their services in the most competitive times of the day in order to coordinate inbound and outbound flights in the hub. Nonetheless, the principal driver for implementing transfer services is the increasing number of passengers in a trunk sector, which allows for taking advantage of density economies and helping overcome the increasing density problem of low-cost markets (de Wit and Zuidberg, 2013). In other words, additional demand can transform a non-feasible service into a feasible service.

In addition to the point-to-point component, another major core business element of the low-cost business model has been the use of a single-fare class cabin. Indeed, one of the main reasons behind the original success of low-cost carriers was the simplification and unbundling of fares to take advantage of ancillary revenues (Doganis, 2010). Whilst cabin configurations have remained in single configuration, several low-cost carriers have tended to complicate the fare system by including price bundles differentiating the passenger by ticked price and offering them a different range of airport and on-board services (e.g., access to airport lounges, security fast-track, preferential boarding, checked bags, on-board free catering, room reserved in the cabin for hand luggage, etc.). By bundling services low-cost carriers can target higher yield markets, absorb business demand from full-service network carriers (FSNC), secure revenues upfront and differentiate their product from their competitors. More revenues are translated in a movement of the breakeven curve and more routes become feasible.

² Among some examples of the increasing interaction between LCC and full-service network carriers (FSNC) we can find Delta buying shares in Gol (2011), Air France-KLM and Lufthansa have low-cost subsidiaries (Transavia and Germanwings, respectively), Iberia launched Iberia Express (2012) and is part of the same group as Vueling, and Air Berlin joined oneWorld and is partly owned by Eithad (2012). In this regard, Fageda et al. (2011) show that a successful strategy of FSNC to compete with LCC is to create their own low-cost subsidiaries.

3. Empirical model

The movement towards connecting services and fare unbundling can represent a new development path for the low-cost business model that can change the way competition may take place in the European air transport market. In order to decode the effects of these changes on the network of low-cost carriers, we implement a multivariate analysis to identify the influence of several route characteristics on the share that pure low-cost and hybrid carriers have on the routes of our sample, which includes route-level data for the summer season of 2013. We have data for all routes served by direct flights **for any airline within the Europe Union of 27 countries plus Norway and Switzerland**. Our final sample comprises 6,273 observations.³

We follow a similar methodological approach as in Fageda and Flores-Fillol (2012a, 2012b). The novelty of our analysis is that focuses on the differentiation between pure low-cost and hybrid services, while the mentioned studies focus on low-cost (not differentiating between pure and hybrids), regional and FSNC services.

The hybrid model shares some of the characteristics of the low-cost business model and that of FSNC. From our analysis, we can examine the type of routes where hybrid airlines are offering services according to features like distance, traffic density or the proportion of leisure travellers. Indeed, we can analyse the similarities or differences between hybrid airlines and other type of airlines (i.e., pure low-cost or FSNC) regarding the routes where they offer services. We estimate the following equation for any route k :

$$\begin{aligned} \text{Share_type_airline} = & \alpha + \beta_1 \text{Dist}_k + \beta_2 \text{Seats}_k + \beta_3 \text{Dist Centre}_k + \\ & \beta_4 D_k^{\text{tourism}} + \beta_5 D_k^{\text{hub}} + \beta_6 D_k^{\text{monop}} + \varepsilon_k \end{aligned} \quad (1)$$

Different types of dependent variables are used to account for the proportion of seats that airlines of the considered category (pure low-cost, hybrid) have over the total number of seats in the route.⁴ Data on airline seats at the route level have

³ Note that we do treat airline services in different directions on a given route as separate observations. For example, this means that we consider as separate observations the route Madrid-Amsterdam and Amsterdam-Madrid.

⁴ Alternatively, we could use absolute values for the considered types of airlines. However, our aim is to examine the relative weight of each type of airline operating in the routes of our sample.

been obtained from the Official Airlines Guide (OAG). These are the three dependent variables depending on the low-cost carrier classification described in Table 2:

1. Share of ‘pure’ low cost carriers (group 1); low cost airlines that only offer point-to-point services and have a single-fare class in their whole network of routes.
2. Share of hybrid low-cost carriers (group 2); low cost airlines that offer transfer services and usually fare bundling.
3. Share of hybrid low-cost carriers (group 3); low-cost airlines that only operate point-to-point routes, but offer fare bundling.

Note here that group 1 may be over-influenced by Ryanair, the leading low-cost airline in Europe. While this could be considered a limitation of our data, we would like to remark that any analysis of pure low-cost airlines in Europe will be conditioned upon the strategies followed by Ryanair given their dominant role on this segment of the market.

Table 2. Low-cost carrier classification according to fare bundle and connecting flights.

	Fare bundle (Flexible options for flight changes not considered)	Connecting flights
<i>Group 1: ‘Pure’ low-cost</i>		
Air One	No	No
Blue Air	No	No
Corendon Airlines	No	No
Jet2.com	No	No
Ryanair	No	No
Transavia	No	No
<i>Group 2: Hybrid low-cost carriers offering connecting flights and usually fare bundling</i>		
airBaltic	Basic, Economy, Business	Yes
AirBerlin and Niki	JustFly, FlyDeal, FlyClassic, FlyFlex	Yes
Germanwings	Basic, Smart	Yes
Flybe	Essentials, New Economy, Plus	Yes
Norwegian	-	Yes
Vueling	Basic, Optima, Excellence	Yes
<i>Group 3: Hybrid low-cost carriers offering fare bundling, but not connecting flights</i>		
Easyjet	Economy, Plus	No
Wizz Air	Premium	No

We consider the following exogenous explanatory variables of the share of the considered category of airlines.

1. $Dist_k$: Number of kilometres flown to link the endpoints of the route. We use the great circle distance, which is a proxy of flown distances. These data has been obtained from OAG.

2. $Seats_k$: Total number of seats offered per annum on the route using data provided by OAG. This variable may work as a proxy for route traffic density. The simultaneous determination by airlines of the type of aircraft and the number of seats could imply an endogeneity bias in the estimation. Hence, we apply an instrumental variables procedure to correct for any possible bias. We use the following instruments of the seats variable:

- Pop_k : Weighted average of population in the route's origin and destination regions.
- $GDPC_k$: Weighted average of GDP per capita in the route's origin and destination regions, with weights based on population.

Data for population and gross domestic product per capita of route endpoints refer to the NUTS 3 regions (the statistical unit used by Eurostat) and have been obtained from Cambridge Econometrics (European Regional Database publication). Traffic density should be higher in more populated and wealthier endpoints. Thus, we argue that population and GDP are suitable instruments for the seats variable. Indeed, these two variables are clearly exogenous but, at the same time, they are correlated with the number of seats (correlations are about 20% for both variables).

3. $Dist_centre_k$: Sum of the distances between the origin and the destination city centres and their respective airports. Indeed, we constructed an airport access variable that measures the distance between the airport and the city centre using Google Maps. In most cases, the identity of the relevant city was self-evident. However, for airports between cities, we calculated the distance from the airport to the closest city with more than 100,000 inhabitants.

4. $D^{tourism}_k$: Dummy variable that takes the value of one for those routes where at least one of the endpoints is a major **coastal** tourist destination. All airports on the following islands are considered as tourist destinations: the Balearic and Canary Islands (Spain), Sardinia and Sicily (Italy), Corsica

(France), and the Greek islands, together with the airports of Alicante (ALC), Faro (FAO), Malaga (AGP), Nice (NCE) and Saint Tropez (LTT).

5. D_k^{hub} : Dummy variable that takes the value one for those airports that are a hub airport of a FSNC. Hub airports are defined as those airports where a FSNC (i.e., an airline integrated in one of the international alliances, Oneworld, Star, Skyteam) has a dominant position and move a high amount of connecting traffic from that airport. We have identified the following hub airports: Amsterdam (AMS), Copenhagen (CPH), Frankfurt (FRA), Helsinki (HEL), London (LHR), Lisbon (LIS), Madrid (MAD), Munich (MUC), Paris (CDG and ORY), Prague (PRG), Rome (FCO), Stockholm (ARN), Vienna (VIE), Warsaw (WAW), and Zurich (ZRH).

6. D_k^{monop} : Dummy variable that takes the value of one for those routes where only one airline is offering services.

Table 2 provides the descriptive statistics of the variables used in the empirical analysis. Low-cost carriers (pure or hybrid) have a significant market share in the routes of our sample. It is also remarkable the high number of routes that are monopoly routes (65%), while 21% of routes have a hub airport as an endpoint and 34% of routes have a tourist destination as an endpoint. Finally, the mean route distance is 1,300 kilometres and most of routes can be considered as short-haul routes. This could have an influence on the results for the variable of distance.

Table 2. Descriptive statistics of the variables used in the empirical analysis

	Mean	Standard deviation
Share of pure low cost carriers (group 1)	0.43	0.47
Share of hybrids (group 2)	0.19	0.36
Share of hybrids (group 3)	0.23	0.38
Distance	1,361.16	776.82
Seats per annum	68,245.62	128,913.1
$D^{tourism}$	0.34	0.47
Distance_to_citycenter	45.62	29.23
$D^{monopoly}$	0.65	0.47
D^{hub}	0.21	0.41

It can be anticipated that pure low-cost carriers will tend to dominate routes with a high proportion of leisure travellers. Looking at our variables, we can expect that the proportion of leisure travellers is higher in routes that have tourist destinations as endpoints and on routes where airports are further from the city centre. It is also **expected** that pure low-cost carriers will tend to focus their traffic in non-hub airports.

Fageda and Flores-Fillol (2012a) show that pure low-cost airlines should dominate longer routes because FSNC may prefer to provide an indirect service (via hub airports) in city-pair markets where the route distance is sufficiently high. Furthermore, low-cost carriers in Europe tend to dominate thinner routes as it is analysed in Fageda and Flores-Fillol (2012b).

Given the route traffic density issue, it is less clear, *a priori*, whether pure low-cost carriers will dominate monopoly routes or routes subject to competition. Hence, the dummy variable for monopoly routes should be understood as a control variable.

The estimation is made using the generalized linear model with fractional response variables, taking into account the possible endogeneity of the seats variable.⁵ We use this estimation technique because the dependent variable is a percentage that lies between 0 and 1.⁶

4. Results

The results of the estimation are shown in Table 3. Column 2 shows the results of the estimation when we use as dependent variable the share of pure low-cost carriers. Results are those as expected. In this regard, note that all variables in this regression are statistically significant with the exception of the variable of distance.

The share of pure low-cost carriers tends to be higher in longer and thinner routes. Indeed, the coefficient associated to the variable of distance is positive while the coefficient associated to the variable of seats is negative. Thus, the share

⁵ See Papke and Wooldridge (1996) for details on this econometric method.

⁶ We have also make an estimation for a sub-sample that focuses on routes where low-cost airlines (pure or hybrid) have a market share higher than 50%. This estimation was aimed to identify differences between pure low-cost and hybrid airlines in routes where the share of network airlines is modest or even null. We do not report results for this estimation because they are qualitatively identical to those for the whole sample of routes.

of pure low cost carriers increases in routes with more kilometres flown and less seats offered.

The share of pure low cost carriers also increases in routes with a high proportion of leisure travellers. This result comes from the positive sign of the dummy variable for tourist destinations and the positive sign of the variable that measures the distance from the airport to the city centre. Note here that leisure passengers are less sensitive to time than business passengers so that the former may have a higher willingness to take flights from secondary airports.

The share of pure low cost carriers decreases in routes that do have a hub airport as an endpoint, as the negative sign of the coefficient associated to the dummy variable for hubs shows. Finally, the share of pure low-cost carriers is higher in monopoly routes because the coefficient of the dummy variable for monopoly routes is positive.

Columns 3 and 4 show the results of using the share of hybrid airlines of group 2 and 3, respectively, as the dependent variable. A clear difference between pure low-cost and hybrid airlines (either of group 2 or 3) is that hybrid airlines share is higher in routes that have a hub airport as an endpoint. The sign of the coefficient of the variable of hub airports is negative and statistically significant in the regression that have the share of pure low-cost carriers as dependent variable, while it is positive and statistically significant when the dependent variable is the share of hybrid airlines (either group 2 or 3): i.e., pure low-cost airlines tend not to use hub airports.

In the same vein, hybrid airlines tend to have a higher share in routes that have airports close to the city-centre. Indeed, the sign of the coefficient of the variable for the distance to the city-centre is positive and statistically significant in the regression for pure low-cost carriers (confirming that pure low-cost carriers tend to operate in secondary airports further away from city centres). On the contrary, the sign of the coefficient of this variable is negative in the regressions for hybrid airlines although it is only statistically significant when we consider the share of hybrid airlines of group 2 (offering connecting service) as dependent variable. Thus, hybrid airlines of group 2 are similar to FSNC in the sense that they tend to channel their flights through hub airports and airports close to big cities.

The use of transfer services by group 2 may also explain the results for the variable of distance. The coefficient associated to this variable is negative and statistically significant in the regression for hybrids of category 2. This means that hybrid airlines of group 2 may be offering an indirect service in long city-pair markets. Otherwise, the coefficient of this variable in the regression of hybrids of group 3 (LCC with fare bundling) is positive and statistically significant so that fare bundling in point-to-point routes may be allowing them to operate longer trips.

A significant finding is that the strategy of hybrid airlines of group 3 (LCC with fare bundling) seems to lead them to higher shares in thicker routes because the sign of the coefficient of the variable of seats is positive and statistically significant in the regression for this type of hybrids. Furthermore, fare bundling is likely targeted to attract business passengers because the coefficient for the dummy variable of tourist destinations is negative and statistically significant in the regression for hybrids of group 3. Surprisingly, hybrid airlines of group 2 (LCC offering connecting services) have a higher share in routes with tourist destinations. In fact, this is the only route feature where hybrid airlines of group 2 keep similarities with pure low-cost carriers.

Finally, low-cost airlines (either pure or hybrid) tend to dominate monopoly routes. The coefficient of the dummy for monopoly routes is positive in all regressions although it is not statistically significant in the regression with hybrid airlines of group 2 (LCC offering connecting services).

Table 3. Results of estimates of different categories of low-cost carriers (all sample). Generalized linear model with fractional response variables

	Dependent variable: Share of pure low cost carriers - group 1	Dependent variable: Share of hybrids - group 2 (at least connecting flights)	Dependent variable: Share of hybrids - group 3 (only fare bundling
Distance	5.82e-06 (0.00005)	-0.0004 (0.00005)***	0.0004 (0.00004)***
Seats	-2.13e-06 (1.09e-06)***	-1.48e-06 (1.21e-06)	6.45e-06 (9.80e-07)***
D^{tourism}	0.17 (0.04)***	0.12 (0.04)***	-0.28 (0.04)***
Distance_to_citycentre	0.007 (0.0006)***	-0.016 (0.001)***	-0.00017 (0.0006)
D^{monopoly}	0.72 (0.12)***	0.052 (0.13)	0.81 (0.11)***
D^{hub}	-0.54 (0.06)***	0.13 (0.06)**	0.11 (0.05)***
Constant	-0.84	0.27	-2.26

	(0.19)***	(0.20)	(0.17)***
AIC	1.12	0.84	0.98
BIC	-48334.62	-50033.51	-49372.79
N	6273	6273	6273

Note 1: Standard errors in parenthesis (robust to heteroscedasticity)

Note 2: Statistical significance at 1% (***), 5% (**), 10% (*)

5. Discussion and conclusions

The results show that pure low-cost and hybrid low-cost airlines configure their networks based on different route characteristics. The differences are considerable and suggest that, although there used to be important differences among low-cost carriers (Mason and Morrison, 2008; Graham, 2009), the distance between pure low-cost carriers and hybrid low-cost carriers is starting to widen, after two of the essential features (i.e., fare unbundling and point-to-point operations) of the original low-cost business model have mutated. In fact, our results are in line with other recent studies (Dobruszkes, 2013) that show that the low-cost carrier business is not a single monolithic model.

The evolution of business models is the result of the indispensable realignment of resources after consolidation (Franke, 2007) and of the limits to organic growth (de Wit and Zuidberg, 2013). In this regard, although visits to friends and relatives (VFRs) and holidays have been largely associated with low-cost travel (Dobruszkes, 2013) –because of the role of airfares in travel decision (O’Connell and Williams, 2005)–, business travellers have used low-cost airlines since the early days, especially for the value for money that they provide for short sales visits and for small- and medium-sized companies (Mason, 2001; Mason and Alamdari, 2007). The inclusion of the fare bundling, together with other strategic movements, such as the deal of easyJet to extend the airline’s offerings among corporate travellers through BCD Travel’s Global Network (easyJet, 2014) or the access to VIP lounges across Europe to holders of the Vueling Pass card (Vueling, 2012), shows that hybrid airlines could be able to continue drawing traffic away from traditional FSNC.

Overall, the key matter is that hybrid low-cost carriers are changing the traditional revenue structure, based in ancillary revenues, in order to continue growing and attract new passengers. Although our empirical analysis is a cross-sectional examination, we can deduce that this change translates in different network characteristics for those low-cost carriers offering fare bundling options

(Table 4), which is consistent with Dobruszkes' (2013) findings, who for the period 2004-2014 found an evolution towards a wider range of low-cost networks. By offering a range of onboard bundled services and a higher level of comfort to passengers, these airlines are able to provide longer routes in medium-haul markets that can be sustained by a certain level of demand.

In this regard, connections between flights can also help to overcome the barrier to entry to longer medium-haul flights (Francis et al., 2007), partly solving the route density problem of the point-to-point low-cost carrier (de Wit and Zuidberg, 2013). Indeed, for some hybrid low-cost carriers connecting passengers account for a not inconsiderable amount (e.g., 11% of Vueling's passengers are connecting). Connections within Europe might not be attractive for the business passenger, but can be an option for leisure travelers.

Table 4. Summary of results: low-cost airline business model network characteristics.

	Pure low-cost	Hybrid low-cost carriers offering connecting services	Hybrid low-cost carriers offering fare bundling
Route density (seats per annum)	Thin routes	Thin and thick routes	Thick routes
Route length	Longer routes	Shorter routes	Longer routes
Route competition	Monopoly routes	More exposed to competition	Monopoly routes
Operation at hub airports	No	Yes	Yes
Airport distance to city centre	Far from city centres	Close to city centres	Likely to be close to city centres
Tourist destinations	Yes	Yes	No

The results of this paper are also relevant from an airport policy and strategy point of view. Whilst airport profiles have been quite polarised in three main types (i.e., big hub airports, secondary airports and legacy airports in transition⁷, and regional airports) because of the traditional contrasting airline business models (ultra low-cost, low-cost, and full service), the evolution of the low-cost business model towards more hybrid versions can open new business and growth opportunities for airports. This is especially relevant for secondary airports and legacy airports in transition that could be able to reduce the gap

⁷ A legacy airport in transition is an airport that lost a significant amount of traffic from full service network carriers after the EU air transport market deregulation and that has more than one third of LCC market share (See Jimenez et al. (2013) for a characterization of low-cost airports).

between them and the main hub airports. But it requires of airports to understand that they are not exclusively providers of infrastructure anymore, but that the successful airport will be a network manager. In other words, active airports in the commercial (e.g., route development), management (e.g., airport charges, facilitating self-help hubbing and inter-carrier connections), planning (e.g., terminal design), air traffic management (e.g., gate allocation, facilitate trouble-free transfers), and customer experience (e.g., seamless travel, lounges, etc.) dimensions will be able to cater to hybrid airlines and establish themselves as new strong players in the airport market. This takes us back to the evolutionary idea of self-transformation presented in Section 2.1 and the need for adaptation in order to survive.

A good example of an airport adapting its strategy to the evolving airline market developments is Düsseldorf International, which has even trademarked the term “Next Generation Hub” (Topp, 2012). Instead of relying on mainly one dominant carrier (either full service or low-cost), the airport is trying to capitalise on a mix of carriers (e.g., Lufthansa, Air Berlin, TUIfly, etc.) and also attract other foreign carriers (e.g., Emirates, Etihad, Air China, Orenair, etc.), understanding that connecting passengers are their key growth factor.

Hence, airline market consolidation in Europe will continue in form of efficient airlines surviving by filling capacity gaps. From a strategy point of view, this means that increasing co-evolution and airline-airport collaboration in terms of route development, long-term agreements and revenue sharing arrangements will be needed to ensure future air traffic stability and growth for both airlines and airports.

Further research on hybrid airlines could expand the findings presented in this paper into other areas, such as the revenue and cost structure implications of these business model evolution, the contribution that connecting services can do to long-haul operations and how competition between low-cost and full-service network carriers might be changing.

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