

***Public awareness about prices and rivalry in air transport markets:
a case study in the Canary Islands***

Javier CAMPOS*

Universidad de Las Palmas de Gran Canaria
(ULPGC)

Juan Luis JIMÉNEZ**

Jordi PERDIGUERO***

Universitat Autònoma de Barcelona
(UAB)

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Abstract

This paper studies – both from a theoretical and empirical perspective – an interesting case of monopoly power in the Canary Islands’ domestic air transport market. Contrary to received economic theory, we show how after the exit of its rival in an initially duopolistic market, the remaining airline did not increase its prices; furthermore, after the entry of a new competitor, tariffs were not reduced. According to our analysis, these counterintuitive results can be explained by the public awareness that was created about the incumbent’s behaviour and its attempt of presenting itself as a benevolent monopolist affected by fake competition. We prove our ideas by developing a theoretical multi-route oligopolistic model with differentiated services and by testing its implications using several difference-in-difference econometric techniques on a monthly prices database collected in 2012-2013.

Keywords: air transport, Canary Islands, entry and exit, difference in difference.

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* Corresponding author. Departamento de Análisis Económico Aplicado. javier.campos@ulpgc.es. Mr Campos acknowledges support from the EVA-AIR project, funded by the Spanish Ministry of Economics and Competitiveness, research grant ECO 2012-39277. Phone: +34 928451792. Fax: +34 928458183.

** Departamento de Análisis Económico Aplicado. juanluis.jimenez@ulpgc.es.

*** Departament d’Economia Aplicada. Research Group of “Governs i Mercats” (GiM), and Institut de Recerca en Economia Aplicada (IREA). jordi.perdiguero@uab.cat.

1. INTRODUCTION

Both conventional wisdom and received economic theory suggest that when a firm becomes a monopolist in a market where there used to be competition, this is usually bad news for consumers either in the form of higher prices or lower quality. On the contrary, the entrance of new competitors is often saluted as good news, since it is implicitly presumed that lower prices or quality improvements will follow soon. For these reasons, it is quite intriguing to observe real situations where the opposite occurs and when this happens it quickly arouses the interests of economists.

European air transport market provides an interesting natural laboratory where several examples of these cases can be found. After decades of liberalization, most barriers to entry have been eased, and the sector structure is widely regarded as very dynamic. However, there remain some regional markets where the tensions between competitive and monopolistic forces are still clearly perceived, and where the ties of the airlines with the local society provide new insights for transport economics.

This is the case of the Canary Islands domestic air transport market, where two private competing carriers – *ISLAS AIRWAYS* and *BINTER CANARIAS* – had been operating since 2003, serving almost 3 million passengers per year over a dozen of different routes. In October 2012 and due to its financial problems, *ISLAS AIRWAYS* abandoned the market and for nearly three months the remaining operator became a *de facto* monopolist. Amid huge concerns about this situation, and strong public scrutiny of *BINTER CANARIAS'* price policies, a newcomer charter company, *CANARYFLY*, was quickly prepared to expand its operations and entered the market in December 2012. Since the monopoly did no longer exist (at least, nominally),¹ the pressure was relaxed and the situation achieved an equilibrium where *BINTER CANARIAS* monopolized only a few minor routes and competed with its new rival in the others, announcing that there was competition again.

In fact, contrary to what was expected by everyone, the company claimed that the prices did not increase during the monopoly stage. However they did not decrease

¹ Some observers criticized the fact that both companies had previous code-sharing agreements on certain routes, and that some key stakeholders still hold shares in both airlines.

after the new entrance either, causing great surprise and puzzling some observers. At the end of 2013, once its financial problems seemed to be solved, *Islas Airways* announced its intention to resume flights. In February 2014, it had not yet received a formal authorization to do it.

Literature of air transport have been analyzed in depth different aspects such as: the factors that determine entry (**Reiss and Spiller, 1989; Berry, 1992, and Oliveira, 2008**), the reaction of prices before the change in market structure (either by new entrants (**Morrison, 2001**) or by the existence of mergers and acquisitions (**Merkert and Morell, 2012; or Fageda and Perdiguero, 2014**), or even how companies react to the threat of entry (**Goolsbee and Sverson, 2008**). However, there does not exist in this literature, at least to the best of our knowledge, any paper that analyze how the *public concern* can significantly affect the prices set by the companies, and how this awareness may explain some empirical results that may seem counterintuitive.² This paper tries to fill this gap through a theoretical model and an empirical approximation (using a difference-in-difference estimator) that are built on an interesting case study. This sort of estimator has been used in the past to analyze the effect of mergers and acquisitions, but never to analyze the effect of entry or exit in this market.

After this introduction, the structure of the paper is as follows: **Section 2** develops a theoretical model whose main objective is to identify the effects of public awareness (measured via demand parameters) on the pricing policies of the airlines operating into duopolistic and monopolistic markets. **Section 3** applies this model to the above described Canary Islands case and estimates an empirical model on the pricing behaviour of the existing companies, showing how they responded to different market circumstances. **Section 4** is finally devoted to discuss our theoretical and empirical results and to provide several insights from our analysis.

² We acknowledge that there is not a single and clear definition of the term ‘public concern’. It can be approximately considered as the impact of news coverage of a particular social issue. In the case of the Canary Islands air transport market, the local newspapers published a series of stories related to the potential effects of monopolization and local political leaders demanded tougher price regulation and margin limitations (see, for example, <http://www.laprovincia.es/economia/2012/11/21/rivero-exige-fijar-precios-maximos-transporte-aereo/498686.html>). Several national news agencies (www.efe.com) and many local public opinion polls also echoed the concern.

2. PUBLIC AWARENESS AND COMPETITION: A THEORETICAL APPROACH

This section provides a simple, yet a comprehensive theoretical model that explains why in a context of strategic interaction, entry and exit may yield counterintuitive results under the presence of ‘public concern’ about prices, measured in terms of the travellers’ willingness to pay and other parameters in the demand functions. As a benchmark case we depart from a standard duopolistic setup with strategic interaction in prices, then the market becomes a monopoly, and finally a new entrant comes in but under weak competition conditions.

2.1. A model of air transport competition with differentiated services

Consider a closed air transport market defined by several independent routes initially served by two competing private carriers, **airlines A** and **B**, which provide differentiated services (in terms of frequencies and quality of service) to domestic passengers.³ For any given route, their respective demand functions, in terms of total monthly passengers, are assumed to follow standard linear specifications:

$$q_A(p_A, p_B) = a_A - b_A p_A + p_B \quad q_B(p_A, p_B) = a_B - b_B p_B + p_A \quad (1)$$

with (p_A, p_B) denoting the (final) fares. Note that each airline’s services depend on its own price and the rival’s, thus reflecting the effects of strategic interaction. Parameters a and b are positive and their subscripts implicitly suggest that firms’ demands have specific characteristics. We can assume, for example, that $a_A < a_B$ and $b_A > b_B$, which is compatible with the existence of a larger company (**B**) and a smaller one (**A**): the maximum willingness to pay for airline **B**’s services is higher, but its demand is more inelastic. Consequently, the firms’ cost structures are also different,

$$C(q_A) = c_A q_A + f_A \quad C(q_B) = c_B q_B + f_B \quad (2)$$

and the small airline reasonably has higher marginal costs ($c_A > c_B$) and lower fixed ones, $f_A < f_B$.

³ The simplifying assumption of *independent* routes allows us to analyse each of them separately and is used to keep the model tractable. In real markets, some routes are monopolised and others are subject to oligopolistic competition allowing them to benefit from cross-subsidies in pricing and/or scale and density economies. As discussed in the main text, all the model features seem suitable to describe the Canary Islands’ air transport market.

We finally consider that both private carriers set prices according to a standard one-period profit maximization strategy, whose objectives functions (Π) are respectively defined as the difference between (total) revenues and (total) costs:

$$\Pi_A(p_A, p_B) = p_A q_A(p_A, p_B) - C_A(q_A) \quad \Pi_B(p_A, p_B) = p_B q_B(p_A, p_B) - C_B(q_B) \quad (3)$$

Once the basic setup has been established in this air transport market, we can now compute the initial duopoly equilibrium.

2.1. The initial duopoly equilibrium

Each carrier's price strategy is simultaneously defined by the reaction function that results from the maximization of the profit functions in (3) after plugging into them the demand and cost functions (1) and (2). Therefore, we have:

$$p_A(p_B) = \frac{a_A + b_A c_A + p_B}{2b_A} \quad p_B(p_A) = \frac{a_B + b_B c_B + p_A}{2b_B} \quad (4)$$

and the equilibrium prices are given by:

$$p_A^* = \frac{(2a_A b_B + a_B) + 2b_A b_B c_A + b_B c_B}{4b_A b_B - 1} \quad (5)$$

$$p_B^* = \frac{(2a_B b_A + a_A) + 2b_A b_B c_B + b_A c_A}{4b_A b_B - 1}$$

The economic interpretation of these results is straightforward and suggests that under duopolistic competition each carrier sets different fares in equilibrium for the same route according to their respective demand characteristics and cost structures. It is possible to check that, provided that $b_A b_B > 1/4$, the second order condition is satisfied and each firm's profit-maximizing price is increasing in its own marginal cost ($dp_i^*/dc_i > 0 \quad i = A, B$) and also in the rival's ($dp_i^*/dc_j > 0 \quad i \neq j$). We can also verify that $p_A^* > p_B^*$, as it may be expected. Note also that it is particularly interesting the role played by the a and b parameters ($dp_i^*/da_i > 0 \quad i = A, B; dp_i^*/db_i < 0 \quad i = A, B$); as suggested below, they are crucial in the economic interpretation of the results.

2.2. The weakest rival exits: a monopoly is born

Now consider that the smaller firm abandons the market due to exogenous reasons. After **airline A**'s exit, $q_B(p_B) = a_B - b_B p_B$, and surviving **airline B** becomes a *de facto* monopolist that should set its price by maximizing its profit function, now defined as:

$$\Pi_B(p_B) = p_B q_B(p_B) - C_B(q_B) = (p_B - c_B)(a_B - b_B p_B) - f_B \quad (6)$$

It is easy to check that the corresponding first and second order conditions determine that the monopoly price is given by:

$$p_B^{**} = \frac{a_B + b_B c_B}{2b_B} \quad (7)$$

and the value of the profit function in equilibrium for the surviving airline is simply obtained by plugging (7) into (6):

$$\Pi_B^{**}(p_B^{**}) = \frac{a_B^2 - b_B^2 c_B^2}{4b_B} - f_B \quad (8)$$

How does p_B^* compare with p_B^{**} ? Does the exit of the weakest rival necessarily imply that the prices must increase? Technically speaking, the answer will depend on the relative values of expressions (5) and (7), and how do they affect expression (8) (since the monopolist should find it profitable to depart from its optimal strategy).

In economic terms, we can study this relationship between the equilibrium prices by reinterpreting it with respect to the exogenous parameters that could shift the demand. First, note in (1) that a_B is the travellers' maximum willingness to pay for flying with **airline B**, and $-b_B$ is the (inverse) slope of the demand function. Thus, changes in (a_B, b_B) will result in changes in the position (and slope) of the monopolist's demand. We can particularly define the ratio (a_B/b_B) as a proxy of public pressure on **airline B**'s behaviour or, in other terms as a measurement of the 'public concern' about it. A larger (a_B/b_B) ratio means that the carrier faces a market where travellers' willingness to pay is also large and the demand function is relatively flatter (more elastic). On the contrary, a smaller ratio combines lower willingness to pay and more

inelastic consumers, and therefore, ‘public concern’ will be stricter. Under this reinterpretation, the following results of our model immediately arise.

PROPOSITION 1. *If the ‘public concern’ about the airlines’ behaviour is large enough, then the surviving airline may find it optimal not to increase prices after becoming a monopolist.*

Proof. We have simply to determine under what circumstances is $p_B^* < p_B^{**}$. Thus, according to (5) and (7):

$$4a_B b_A b_B - a_B + 4b_A b_B^2 c_B - b_B c_B < 4a_B b_A b_B + 2a_A b_B + 4b_A b_B^2 c_B + 2b_A b_B c_A,$$

and simplifying we obtain the condition:

$$\frac{a_B}{b_B} > -(2a_A + 2b_A c_A + c_B),$$

which completes the proof and shows that, contrary to intuition, prices do not always increase in equilibrium after a firm becomes a monopolist in a former duopolistic market.

2.3. A fake competitor entry: disguised competition emerges

We now turn to a third scenario. A new carrier, **airline F**, seizes the opportunity and enters the market by offering new services in competition with the monopolistic **airline B**. Neutral observers would expect that prices should change for better and fares should be cheaper as the result of new competition. Alternatively, others might argue that the market is again a duopoly and the equilibrium should return to the initial benchmark defined in **Section 2.1**, with prices given by (5). However, a third case is also possible: that prices do not change at all with respect to the monopolistic situation. This situation may emerge if public concern about the monopoly’s behaviour is relaxed and actual competition between airlines is more apparent than real.

To prove this result we can consider that **carriers B** and **F** behave as in a price leadership setup. Suppose that the demand and cost functions for **firm F** are correspondingly given by

$$q_F(p_B, p_F) = a_F - b_F p_F + p_B \quad C(q_F) = c_F q_F + f_F \quad (9)$$

and, analogously to (4), airline F's reaction function is

$$p_F(p_B) = \frac{a_F + b_F c_F + p_B}{2b_F} \quad (10)$$

Now, instead of assuming that both firms determine their prices by simultaneously solving their reactions functions as in (5), we will consider that the newcomer acts as a price follower, taking as a reference the monopolist equilibrium price p_B^{**} . The result can be summarized as follows:

PROPOSITION 2. *Under relaxed 'public concern' about the airlines' behaviour, the entry on a new rival does not guarantee that prices will fall if there is not enough competition between the new entrant and the incumbent.*

Proof. By plugging into (10) the monopolist's price calculated in (7), we get

$$p_F^{***} = \frac{a_B + b_B(2a_F + 2b_F + c_B)}{4b_B b_F} > p_B^{**}$$

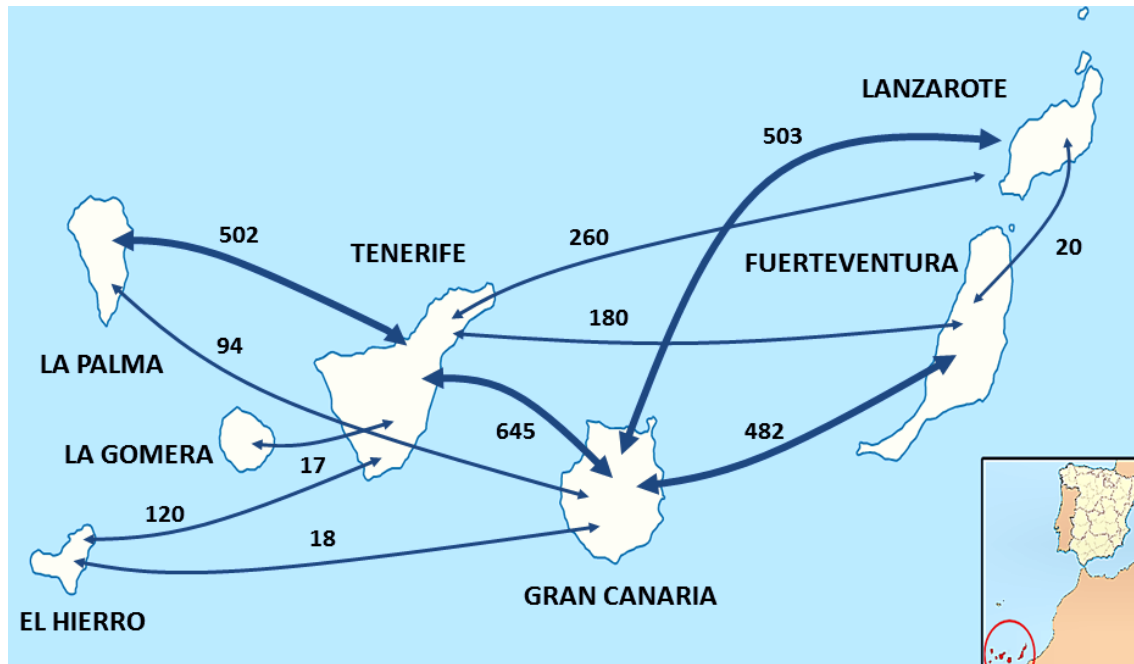
which confirms that prices do not decrease, but the opposite, as a result of fake competition.

3. AN EMPIRICAL EXAMPLE: THE CANARY ISLANDS AIR TRANSPORT MARKET

3.1. The Canary Islands domestic air transport market

The Canary Islands is a Spanish archipelago located in the Atlantic Ocean, about 1,500 kilometres southwest of the Iberian Peninsula. It is composed by seven main islands with a total population of 2.1 million and a GDP per capita of 25,512 USD (2010) (as compared to Spain's 29,810 USD). As shown in **Figure 1**, the islands are relatively close from each other (the largest distance between Lanzarote and El Hierro is 437 kms.), but most of the internal passengers' movements are carried out by air. According to airport statistics, in 2012 the size of the domestic air transport market was above 2.8 million passengers, although most of the traffic was concentrated on the four largest routes (see map).

Figure 1. Canary Islands' domestic air transport market (2012) ['000 passengers]



Source: own elaboration with data from ISTAC (2013).

As it was introduced above, Canary Islands' domestic air transport market had been served by two private competing carriers, *ISLAS AIRWAYS* and *BINTER CANARIAS* since 2003. *BINTER CANARIAS* started its flight operations in 1989, first as a regional subsidiary of *IBERIA*, the Spanish public flag carrier, but was later fully privatized in 1999, bought by a consortium of local entrepreneurs with solid ties with the regional government. *ISLAS AIRWAYS* was established in 2003 with a less solid financial ground, but with the clear purpose to challenge *BINTER CANARIAS'* dominance on the most profitable routes.

However, in October 2012 the company filed for bankruptcy and abruptly exited the market, leaving its rival as the only operator.⁴ In December 2012 a former charter company, *CANARYFLY* entered the market. This company had been created in early 2011 by former employees of a collapsed charter company named *Top Fly* and started its regular operations on a small scale on niche routes between the islands, Morocco and

⁴ The exit process took place in less than one week amid a conflict with the Spanish regulatory body related to irregularities in some subsidies on residents' discounts. On October 16th the company published a note on its website just announcing how passengers could obtain refunds from the sold tickets.

Mauritania. On December 10, 2012 it started operations by launching six weekly scheduled services from Gran Canaria to both Fuerteventura and Lanzarote.

3.2. Data and econometric specification

To study this case and compare it with a contrafactual, we have built a price database that reflects the situation in the Spanish air transport market in three different months: September 2012, November 2013 and April 2013⁵, identified with the main changes that affected flight operations in the Canary Islands. For each of these periods our basic unit of observation is defined by the airlines operating on each route. We have 126 routes, both national and regional ones, linked by non-stop scheduled flights.

Table 1. Main variables in the database and descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
Price per km	0.201	0.271	0.006	1.957
Passengers (t-1)	325,798.7	669,657.4	323	2,909,725
Airline airport share (origin)	0.159	0.156	0	0.975
Airline airport share (destination)	0.211	0.205	0	0.906
Airline share (route)	0.656	0.310	0.036	1
Distance (kms)	853.76	644.38	90.65	2,244.84
Madrid (dummy)	0.272	-	0	1
Island (dummy)	0.466	-	0	1
Treated (dummy)	0.053	-	0	1
After (first stage)	0.342	-	0	1
Treated (second stage)	0.015	-	0	1
After (second stage)	0.289	-	0	1
Low cost airline	0.452	-	0	1
Discounts for residents	0.618	-	0	1
National flight	0.934	-	0	1

Source: Own elaboration.

Table 1 lists the variables included in our database and provide their descriptive statistics by variable, which we explain below. Price data collection was carried out using as the primary and direct source each airline's webpage, according to the

⁵ We collect prices these months for flights one-two months after that time. So, in fact, our prices are for flights in October 12, January 13 and June 13.

following conditions: prices should reflect direct flights between two Spanish cities, not only within mainland Spain but also with the Canary and Balearic islands and within them (regional flights); the information was obtained using a homogeneous sampling procedure selecting prices on the same week for each of the two seasons under consideration. The prices were all referred to return tickets within the same class sold online at least one month before travelling, and always selecting the cheapest fare for the first trip scheduled on that week, with the return being on the following Sunday. We also collected from the airlines information about frequencies and other flight characteristics. Data on the total number of passengers and airlines' market shares at airports were collected from the website of the Spanish airport operator (AENA).

The database includes more than 500 observations, with an average price per kilometre of €0.20. The average size of each route is 325,798 passengers and the values of the airlines' market shares suggest that there is no a general dominant position, although some airlines enjoy it on certain routes and, at the airport level, competition is fiercer. The routes notably differ in their length (between 90 to 2,244 kilometres) and more than a quarter of the flights go to/from Madrid, whereas about 46 per cent of them connect with an island (in the Canaries or the Balearic archipelagos, including regional and with mainland flights). More than 45 per cent of observations correspond to a low-cost airline. Following existing legal provisions on public service obligations, Spain provides several subsidies for some routes (mostly in the form of residents' discounts), both to regional routes and those that connect the islands with the mainland.⁶ These routes account for 61.8 per cent of our observations. Finally, non-regional routes are 93 per cent of flights. Binary variables for treated and two different stages will be explained below.

Our empirical strategy relies on the estimation of a standard pricing equation, where the endogenous variable (*Priceperkm_{ikt}*) is the price per kilometre charged by airline *i* in route *k* in period *t*, obtained from internet, as explained above:

⁶ See **Calzada and Fageda (2012)** for further explanations and a discussion of this scheme.

$$\begin{aligned}
\text{Priceperkm}_{ikt} = & \beta_0 + \beta_1 \text{Passengers}_{kt-1} + \beta_2 \text{Treated}_{kt}^{\text{FirstPeriod}} + \\
& \beta_3 \text{FirstPeriod}_t + \beta_4 \text{DiD}_{kt}^{\text{FirstPeriod}} + \beta_5 \text{Treated}_{kt}^{\text{SecondPeriod}} + \\
& \beta_6 \text{SecondPeriod}_t + \beta_7 \text{DiD}_{kt}^{\text{SecondPeriod}} + \\
& \beta_8 \text{Airlineshare}_{ikt} + \beta_9 \text{Distance}_k + \beta_{10} D_i^{\text{LowCost}} + \\
& \beta_{11} D_k^{\text{Discounts}} + \beta_{12} D_k^{\text{Mainland}} + \varepsilon_{ikt}
\end{aligned} \tag{11}$$

We want to analyse the evolution of the prices charged by Spanish airlines in the most important routes of the domestic market and compare what happened to a group of these in the Canary Islands (affected by changes in their market structure) taking as reference (or control group) the other routes. Although we do not have direct information to preclude that the only cause of the potential changes in price patterns is necessarily associated to the idea of ‘public concern’ (as suggested in section 2 of the paper), we have tried to control in our empirical estimation all the other factors that are typically included in most price equations (geographic factors, competition, institutional design) and used difference-in-difference techniques to suitably identify the exact periods where these effects took place. Thus, the remaining explanatory variables in equation (11) are the following:

1. **Passengers_{kt-1}** is the total number passengers carried by all airlines operating in route k during the previous month ($t - 1$) to current one (t), according to AENA sources. We expect a negative relationship of this variable with the dependent variable; however, since the number of passengers in a route may be affected by other variables, we have instrumented it through the following variables, that we presume not being highly correlated with the endogenous one:
 - (a) **Airline share at origin airport_{it}** represents the market share of airline i at the origin airport and tries to control for any potential dominant position at that airport, as in **Fageda et al (2012)**. The variable **Airline share at destination airport_{it}** has been similarly built.
 - (b) **Madrid_k** is a binary variable with value equal to 1 when the flight goes from/to Madrid, thus capturing the effect of the Spanish airport network,

centralized in Madrid-Barajas, and where the most important airline (*IBERIA*) still has its hub.

(c) ***Island_k*** is another binary variable that takes value 1 if the flight on route *k* in period *t* goes from/to an island. This variable tries to control for potential touristic effects on passengers decisions to fly and the fact that these passengers are not allowed other modal alternatives (rail, road).

2. ***Airlineshare_{ikt}*** is airline *i* frequency share in route *k* at period *t*, as collected in the database. We expect a positive sign in its coefficient aiming at capturing the relevance of the activity of the airline at the route.
3. ***Distance_k*** is defined by the air distance among the airports considered. This is one of the most important factors that affect airline prices and, since we are studying heterogeneous routes, we try to control for potential geographic differences among them. We expect a negative relationship with the endogenous variable.
4. ***D_i^{Low Cost}*** is a dummy variable that takes a value of 1 if airline *i* is a low-cost carrier, namely defined as an airline that offers a single fare class across its network of routes. We expect a negative sign in the coefficient of this variable, as it is standard in the academic literature.
5. ***D_k^{Discounts}*** is a binary variable that takes a value of 1 if the passengers on route *k* are eligible for residents' discounts. **Calzada and Fageda (2012)** and **Fageda et al (2012)** have shown that airlines increase their average prices on these routes, after controlling for several characteristics specific to the airlines and routes.
6. ***D_k^{Mainland}*** is a final dummy variable that takes a value of 1 if route *k* connects the Canary or Balearic Islands with mainland Spain. We use this variable to separate the effects related to regional flights and we expect a negative effect on prices.
7. ***Difference-in-difference variables*** are the most relevant instruments used in our empirical strategy because they capture the effects of any policy

(treatment) in a counterfactual way. The difference-in-difference (DiD) estimator is the difference in the average results (prices) observed in the treated group (in our case, the domestic routes where *ISLAS AIRWAYS* left and where *CANARYFLY* started to operate) before and after the treatment minus the difference in average outcome in the control group (i.e., routes not affected by entry/exit) before and after the ‘treatment’,⁷ which defines then the *first period* as the monopoly situation after the exit, and the *second period* as the new duopoly after the entry. This analysis requires three binary variables:

- (a) **$Treated_{kt}^{Period}$** takes value 1 if it refers to the price of an airline that changed (entered/exited) in route k during period t ; i.e., this covariate differs from zero only *ISLAS AIRWAYS*’s in the first period and for *CANARYFLY*’s prices in the second period. The objective of this variable is to control for a potentially different behaviour between these two airlines and the remaining ones.
- (b) **$First/Second\ Period_t$** is a covariate that controls for possible seasonal effects on prices that affect all routes included. It takes value 1 for all airlines in the first or second period.
- (c) **DiD_{kt}^{Period}** is the double difference, the actual difference-in-difference estimator and takes value 1 for the treatment group in the first/second period. This variable shows how prices change for the routes affected by the entry/exit processes as compared to those not affected by them.

Finally, it is important to highlight that one of the most relevant assumptions in differences-in-differences models is that the temporal effect in the two groups of routes is always the same in the absence of any other change in the market. This ‘identifying assumption’ (i.e., whether both treatment and control group show the same price trend before the event) can be tested by estimating an equation similar to **(11)**, but replacing the ***DiD*** estimator by separate binary variables that take value 1 for the previous period for treatment and control routes (see **Albalade, 2008**, for further explanation of this empirical strategy). The econometric result indicates that we

⁷ There are other applications of this methodology in **Kim and Singal (1993)** for the North American air travel market

cannot reject that affected group and the control group behaves in the same way before the event, as expected.⁸

3.3. Empirical findings

This section includes the estimation results of our model and the explanation of how the difference-in-difference estimates reflect price changes in routes where entry and exit occurred (as compared to those where it did not happen). **Table 2** shows the parameters estimates of the two-stage least square estimation (2OLS) of equation (11). Our final sample size included 527 observations and our model explains more than 45 per cent of variance. Two tests for instrumental variables have been passed; the *F*-test allows us to confirm the soundness of our approach and almost all the variables included in the model are significant.

Table 2. Instrumental variables two-stage LS results⁹

Explanatory variables	Coefficient	Robust Std. Err.	P> z
Passengers (t-1)	-2.3e-7	9e-8	0.012**
Treated (first stage)	0.085	0.111	0.441
First Stage	0.173	0.081	0.033**
DiD (first stage)	-0.244	0.065	0.000***
Treated (second stage)	-0.195	0.102	0.055*
Second Stage	0.036	0.020	0.074*
DiD (second stage)	0.266	0.070	0.000***
Airline share (route)	0.036	0.028	0.203
Distance	-0.00014	1e-5	0.000***
Low cost airline	-0.153	0.017	0.000***
Discounts residents	0.055	0.033	0.100*
Island-Mainland flight	-0.475	0.072	0.000***
Observations		527	
R ²		0.4559	
F-statistic		354.56***	
K.-P. LM statistic (Underidentification test)		28.628***	
Hansen J statistic (Overidentification test)		3.096	

Note: ***1%, **5%, *10% significance test. Instruments for passengers are *airline share in airport* (origin and destination, separately), *Madrid* and *Island* (see above).

⁸ Estimates of this test are available from authors upon request.

⁹ In addition, we have separately estimated the difference-in-difference parameter for each of the two periods considered and the results (available upon request) remain.

Firstly note, as expected, the negative relationship between the number of passengers and the price per km. However, the airline's share in the route (the market power effect) does not appear to significantly affect our endogenous variable, although it shows a positive coefficient. The negative coefficient for distance (although it is quite small) suggests some form of economies of scale in airline activities (price per kilometre is lower when distance increase), also common in the literature.

The negative sign of the binary variable that identifies low-cost carriers implies, not surprisingly, that these airlines offer lower prices and that their effects on the level of competition are relevant. This confirms, for example, well-known results such as **Windle and Dresner (1999)**, who studied how *Valujet* triggered a significant reduction in the prices fixed by *Delta*; or **Dresner et al (1996)**, showing that the entry of Southwest generated an average rate reduction of 38%, which was translated into savings worth USD12.9 billion, according to **Morrison (2001)**, calculated as 3.4 billion for *Southwest* passengers and 9.5 as a result of lower rates of other competing companies. In the Spanish market, **Fageda and Perdiguero (2014)** have provided evidence of how the presence of *Ryanair* on a route induces significantly lower prices.

Our results also confirm that, on average, routes that benefitted from a scheme of resident's discounts have higher prices than other that do not. The positive coefficient for this binary variable coefficient yields the same conclusion that in **Calzada and Fageda (2012)** and **Fageda et al (2012)**. Note also that non-regional flights have lower prices than regional ones due, not only to the different characteristics of routes but also to the use of smaller planes for these services.

Finally, the interpretation of the results with respect to the difference-in-difference variables seems to confirm some of our working hypothesis. First of all, the routes that where initially operated by the *BINTER CANARIAS - ISLAS AIRWAYS* duopoly and later monopolised by *BINTER CANARIAS* did not exhibit price patterns that differ from those of the other routes, i.e. the monopolization did not imply a significant price increase, possibly as response to the 'public concern' that emerged during this period.

Furthermore, it is quite important to highlight that, even controlling by all the above described factors, the prices in the routes that were abandoned by *ISLAS AIRWAYS* just

decreased by 24 cents per kilometer on average regarding to the rest of routes. This counterintuitive negative relationship (an increase in market concentration yields a relative price decrease) is not new in the air transport market literature, but it had been previously observed mostly in the case of mergers or acquisitions, never with respect to straight entry/exit processes.¹⁰

Secondly, with respect to the second stage, our results show that in the routes where the newcomer *CANARY FLY* entered to compete with *BINTER CANARIAS* the initial price was lower than the remaining routes and in this second period, fares increased after entry. Again, a counterintuitive result that seems to confirm that once the pressure on *BINTER CANARIAS* monopolistic position was relaxed, the company felt less compelled to maintain low fares. This significant finding is fully confirmed by the sign of the *DiD* coefficient, that shows that the price per km in the routes where the new carrier entered clearly increased as a result of entry regarding to the rest of routes.

At this final point, it is quite necessary to question ourselves about the existence of alternative explanations for the empirical relationships that we have found. One of them could be placed on the demand side and the potential seasonal effects of tourism (winter months coincide with the peak-demand in the Canaries touristic season and travel patterns in Spain notably differ in January, June and October). However, this idea is discarded because the seasonal effect seems to affect all the routes in a similar fashion: the fares for *all* the airlines are higher on peak months.

A second alternative explanation could be attributed to airlines' exploitation of economies of scale by increasing the size of operations, as **Merkert and Morrell (2012)** point out. If, acting as a monopolist, *BINTER CANARIAS* increases the number of flights and benefits from economies of scale, then it is possible that it may offer lower prices. However, our data show that *BINTER CANARIAS* does not appear to be increasing the

¹⁰ The acquisition of *Ozark Airlines* by *Trans World Airlines* caused a price decrease of between 12.3 % (**Borenstein, 1990**) and 15.3% (**Morrison, 1996**). **Zhang and Round (2009)** found reductions of 3-4% in several airline concentration processes in China. In the European market, **Dobson and Piga (2013)** pointed out that the acquisition of *Go Fly* by *Easyjet* generated a reduction between 12 and 27 pounds per fly, while the acquisition of *Buzz* by *Ryanair* caused a decrease of up to 29 pounds on some routes. Finally, **Veldhuis (2011)** noted that the KLM-Air France merger generated price reductions that would go between 12 and 14 euros on certain routes.

number of its frequencies or the size of operations, so it seems unlikely to assume that this is the right explanation.

A third possibility to consider would be the existence of economies of density (**Brueckner et al., 1992**). If *BINTER CANARIAS*, as a result of being alone in the market, had reorganized their activities by creating a hub in one of the busiest islands (Gran Canaria or Tenerife), the resulting economies of density could explain the observed pricing strategy. However, as already discussed (see map), point to point flights dominate the domestic market in the Canary Islands, and *BINTER CANARIAS* network was not altered in 2012-2013.

Finally, following **Huse and Oliveira (2012)**, we could think that product differentiation could explain the incumbent's counterintuitive reaction before and after the entry of the new competitor. In our case study, the services offered by the airlines are very similar (point to point flights, similar frequencies and time schedule, no-frills, no premium services, similar planes, etc.), so it is difficult to argue that product differentiation, if any, plays a significant role in the results.

4. DISCUSSION AND FINAL CONCLUSIONS

Challenging received economic theory with counterexamples is a wonderful way to understand how economics work in real markets. In this paper, we have provided a case study built from a natural experiment in a closed transport market that questions, with theoretical and empirical foundations, how prices react after exit and entry processes.

We have studied what happened with air fares in the Canary Islands domestic market between 2012 and 2013, a period when its structure was dramatically altered in the course of a few months. Thus, from a stable and long-established duopolistic situation, with a reasonable level of competition between two regional carriers (*BINTER CANARIAS* and *ISLAS AIRWAYS*), the market become, first a monopoly, and later a duopoly with a new, weaker, competitor (*CANARY FLY*). Our empirical results show that, on average, prices did not increase after the exit and did not decrease after the entry.

These results are obtained from estimating a price equation where all the standard explanatory variables are included (market size, competition, geographical and institutional factors) and explicitly referring to those routes affected by the changes as compared to a control group defined by other Spanish domestic routes within the same period.

Our explanation for these results is related to the idea of 'public concern', which suggests that the social uproar and political pressure that accompanied the monopolization of the market – illustrated both in the form of an unusual news coverage and many public opinion polls – served as tempering factors for the monopolist's pricing strategy. In fact, it was only when the pressure was relaxed (after the entrance of a weaker rival) when price increases were observed. These ideas were also modelled in a simple theoretic framework where 'public concern' is introduced through demand parameters and whose results also confirm our working hypothesis.

The main lesson that can be learnt from our work is that examining market power and its consequences is becoming a trickier exercise, and straightforward conclusions are no longer valid. The reason is that monopolies are increasingly under scrutiny, not only from competition authorities, but also from the public, in general. They have, therefore, all the incentives to disguise their behaviour, or to postpone unpopular decisions until most favourable circumstances. We hope that this case can be used as an example in the future, preferably not by monopolists.

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