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How do incumbents react to the exit of a potential competitor?

Evidence from the airline sector

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Keywords: threat. potential competition. exit. Bankruptcy. airline companies. tariffs airlines.

JEL Codes: L13, L93, L43

How do incumbents react to the exit of a potential competitor? Evidence from the airline sector*

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July 10, 2023

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[*] Authors would like to thank comments to previous versions of this paper. All remaining errors/ommissions are ours.

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1 Introduction

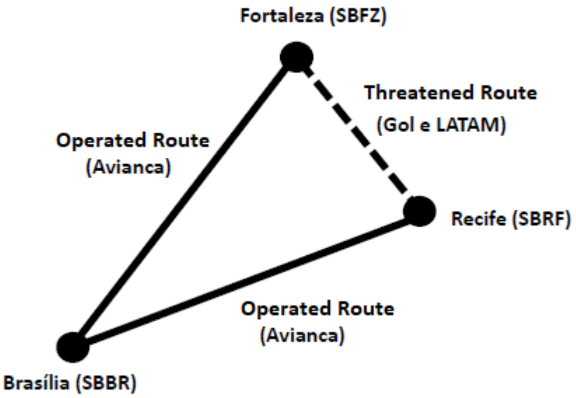
The objective of this work is to evaluate the response of incumbent companies to the exit of a potential competitor, both in terms of price and quantity supplied(number of flights and number of seats offered). Although there are papers that analyze the actions taken by incumbent companies against an entry threat, as well as the behavior of companies in markets directly affected by the departure of a competitor, little attention has been paid to the intersection of these two topics, that is, the incumbent companies' actions against the removal of a threat of entry.

There is no a priori reason to expect the response of incumbent companies to a threat of entry, as studied in previous papers, to be the exact opposite of the exit of a threat. Since the exit involves by definition the prior operation of a company, it supposedly sends a stronger signal as to the viability of operating in threatening routes. This reason by itself makes the present study even more relevant

Adopting the strategy developed by Goolsbee and Syverson (2008) it was assessed the response of incumbent companies to the removal of a market entry threat as a result of the departure of Avianca Brasil[1]

An example of a route threatened by Avianca Brasil can be seen in Figure 1, in which Avianca operates a route involving Fortaleza airport (Brasília-Fortaleza) and route involving Recife airport(Brasilia-Recife). However, it does not operate the Fortaleza-Recife route (operated by the incumbents Gol and LATAM), the latter being considered, therefore, a route threatened by Avianca. To identify the removal of entry threat, the exit of the market of Avianca Brasil, the 4th largest airline in the sector, which had its request for judicial recovery in December 2018 and its certificate suspended in May 2019.

Figure 1: Identification of a Threatened Route



Prior to the bankruptcy request in November 2018, Avianca operated at 27 airports, serving 75 routes with regular flights and threatening 136 routes of the incumbent airlines Gol and LATAM corresponding to about a third of the total seats sold by them. The results point out to a price increase of incumbent companies in response to Avianca ceasing to be a threat. When Avianca first stops operating a route and then stops threatening, it was possible to distinguish the impacts from these two events, and the largest was from the threat removal. On these routes, the price increase at the time of threat withdrawal by part of a competitor is of the order of 30.73% in relation to the base period and remains high even at the end of the period analyzed (26.36%).

In contrast, the price increase when Avianca stopped operating a route was 12.3% in relation to the base period. Even in routes in which Avianca did not operate and just threatened incumbent companies, there was also

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[1] According to Goolsbee and Syverson (2008), the threat of entry comes into being when the competitor announces or begins to operate at both airports on a route offered by the incumbent4. That is, the incoming has flights originating or terminating at the two airports on the route operated by the incumbent, but it still does not offer flights on the threatened route itself.

a significant price increase. At the time of threat withdrawal, this increase is 11.29% in relation to the baseline period, and after nine months is 12.75%.

Goolsbee and Syverson (2008) obtains in response to the threat of entry a price reduction by the incumbents of 17% in relation to the base period, with this value representing a large part of the 21% reduction observed when the entry happens and 29% at the end of the period after entry (both in relation to the base period). However, even if the results seem to be in line with part of the theoretical literature, such as using lower prices to signal cost in a context of asymmetric information Milgrom and Roberts (1982), a formal test of strategic behavior theories is beyond the scope of the present paper.

A similar exercise was carried out for the response of companies in terms of the quantity offered (number of flights and number of seats offered), with no evidence of a change in the number of flights supplied in response to the threat withdrawal. This could be interpreted as evidence against theories which suggest investments in excess capacity as threat deterrence (as in the models of Spence (1977); Dixit (1979, 1980). Another point is the number of seats analysis results were very similar to the number of flights, indicating no significant change in the size of the aircraft in the period analyzed.

As for the structure of the work, after this introduction, Section 2 analyzes literature related to the threat of entry and the impacts of a competitor's exit, as well as the context of the departure of Avianca Brasil. Section 3 lists the data used and describes econometric models. Section 4 presents the effect on the price of threat withdrawal, while in Section 5, the results for quantity are presented. Finally, in Section 6 are the conclusions.

2 Literature Review

This paper is about a subject in the intersection of two different strands of literature, the response of incumbent companies to the threat of entry and the behavior of companies in markets directly affected by the departure of a competitor. The paper closest to our approach here is Kwoka and Shumilkina (2010), work that will be covered at the end of this section.

Several theoretical papers have been written on the topic of how incumbents react to entry of competitors, such as Spence (1977); Dixit (1979, 1980) about capacity investments, Spence (1981) with the learning curve, Milgrom and Roberts (1982) on cost signaling as a deterrent, Aghion and Bolton (1987) with long-term contracts and Klemperer (1987) on replacement costs.

The empirical literature on the topic is more recent. Among these, we highlight Morrison (2001); Goolsbee and Syverson (2008); Brueckner, Lee and Singer (2013); Bettini, Silveira and Oliveira (2018) which focus on the airline market and its effects on price or quantity supplied. In all of these papers, evidence is found that the incumbent companies respond to the threat of entry with a price reduction. However, the magnitude of the effect varies between these papers. In the case of Morrison (2001), of the five cases studied of potential competition, the highest effect was when Southwest (the potential competitor) operated in both route endpoints, with a price reduction of about 33%. Where direct competition occurred, the effect was 46%. Goolsbee and Syverson (2008) incorporate temporal dynamics into their model. Their results indicate that incumbent companies respond to the threat of entry by reducing prices by about 17% over their baseline period.

Brueckner, Lee and Singer (2013), on routes where there are direct flights, the effect of the potential competition exerted by Southwest is in the order of 8%, while that of other low-cost companies was not significant. To Bettini, Silveira and Oliveira (2018), when analyzing the yield as a proxy for the average price per kilometer, they find a reduction of around 20% as a response from the incumbent companies to the threat of entry.

Of these authors, the only ones who analyze the incumbent response in terms of quantity supplied are Goolsbee and Syverson (2008); Bettini, Silveira and Oliveira (2018), and find different results. Goolsbee and Syverson (2008) find no evidence of increased capacity as a deterrent strategy, but Bettini, Silveira and Oliveira (2018) find in response to the threat of entry an increase of around 30% in the number of flights. To explain the difference, they point out the good financial health of incumbents and the expanding market in the period and routes as reasons.

Regarding the behavior of companies in markets affected markets by the departure of a competitor, much of the literature is related to the behavior of companies in markets directly affected by a competitor in financial distress or in bankruptcy (not necessarily leading to the competitor leaving the market, though).

Theoretical works on how financial aspects are related to strategic market competition variables include Brander and Lewis (1986); Bolton and Scharfstein (1990); Hendel (1996); Dasgupta and Titman (1998). Much of this literature also focuses on the market effects of mergers and acquisitions on the exit of a company. Related to these themes, another considerable part of the theoretical work sought to rationalize the practice of predatory competition, with papers by Scharfstein (1984); Roberts (1986); Saloner (1987). Empirical studies on the subject, which analyze the behavior of companies in terms of price or quantity supplied in the air transport market [2], do not involve markets in which there was a threat of entry. de Oliveira and Oliveira (2021) find to a price reduction in the period before and during the request for judicial receivership but vary for periods later. Lee (2010); Ciliberto and Schenone (2012) also point to a capacity reduction beginning before the firm files for bankruptcy, kept lower during the period of recovery. Barla and Koo (1999); Lee (2010) find a reduction in tariffs, Borenstein and Rose (1995); Bock et al. (2020) find an increase. Lee (2010) points out that as companies that are not low-cost also reduce the quantity supplied on routes affected by the company in recovery, low-cost companies do increase. In cases of mergers and acquisitions, as summarized by de Oliveira and Oliveira (2021), the results found in the literature consistently point to a price increase.

The literature shows price increases do accompany the liquidation of airline companies. In Hüschelrath and Müller (2013), the results show that when a company stops operating a route due to its liquidation, the price increase (of around 12%) is persistent. This increase is substantially higher than in the case of merger/acquisition operations (about 6% when the routes overlapped and 3% when there is just a change in a company operating the route).

In Fageda et al. (2017), the bankruptcy of Spanair led to a price increase when it was replaced by other companies. However, it led to a price decrease on routes which was replaced by other low-cost airlines. The authors do not find clear evidence of a reduction in flight frequency. Thus, given this extensive literature, even though there is no clear evidence of different behavior of competitors in periods when a company experiences financial problems and judicial reorganization, a price increase is to be expected soon after a competitor exits the market.

Besides the Goolsbee and Syverson (2008) paper, another one close to what is done in the present paper is the one by Kwoka and Shumilkina (2010). The impact of the merger between the US air transport companies USAir and Piedmont is analyzed in that paper to measure the increase in market power when companies were only potential competitors. Using as an empirical strategy the differences-in-differences (DiD) method, they compare the average airfare of the four quarters prior to the merger (fourth quarter of 1986 and the first three quarters of 1987) with the average airfare for the four quarters after the completion of the merger (fourth quarter 1989 and the first three quarters of 1990). As a result, they highlight that the elimination of potential competitors should be a focus of concern by antitrust authorities, having found a 5 to 6% airfare increase on routes where a of the companies operated and the other was a potential competitor. This is more than half of the airfare increase in routes on which the two companies competed directly.

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[2] References include Joskow, Werden and Johnson (1994); Daraban and Fournier (2008) involving operational output and Hofer, Dresner and Windle (2005, 2009); Hofer (2012); Phillips and Sertsios (2013); de Oliveira and Oliveira (2021) about companies with financial problems (some of these also address requests for judicial recovery and merger/acquisition) include also Borenstein and Rose (1995); Barla and Koo (1999); Lee (2010); Ciliberto and Schenone (2012); Bock et al. (2020), which analyze requests for judicial recovery, Hüschelrath and Müller (2013); Fageda et al. (2017) that verify bankruptcy/liquidation (and mergers/acquisitions in the case of the first paper), and Borenstein (1990); Werden, Joskow and Johnson (1991); Kim and Singal (1993); Singal (1996); Morrison (1996); Luo (2014); Fageda and Perdiguero (2014); Hüschelrath and Müller (2013); Zhang (2015); Shen (2017) involving cases of mergers and acquisitions.

3 Institutional Details and the exit of Avianca Brasil

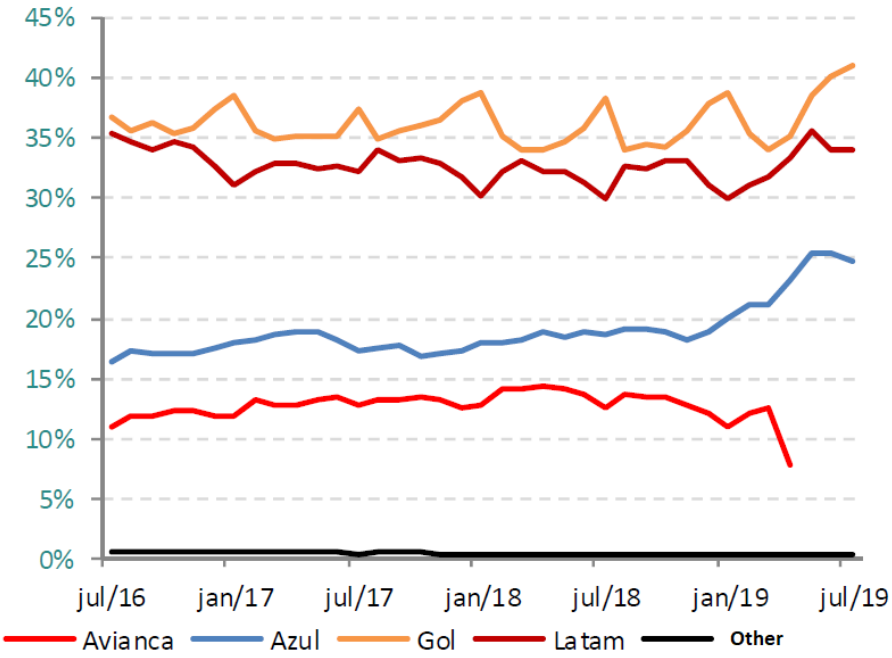
Cases of airlines exiting the market are frequent, and Brazil is not an exception. In the 2000s, the three largest Brazilian airlines of the prior decade left the market, Transbrasil, Vasp and Varig. Webjet and Trip joined the list in the 2010s, and the exit of Avianca Brasil was the most recent.

The main difference between Avianca's case and the others was how fast it happened. The request for judicial recovery occurred on December 10, 2018, one week after being sued for nonpayment of aircraft leases. Before that date, no news story was published about a possible request for judicial reorganization or bankruptcy procedure, not even on cases of flight cancellations or delays. Cancellations and delays of Avianca flights became frequent after that until May 24, 2019, when Avianca Brasil had its certificate for operation suspended by the Brazilian regulatory agency, the National Civil Aviation Agency (ANAC).

Despite the certificate being suspended in May, there is no record of ticket sales by Avianca from April 2019. A news article published at the time highlighted the airfare increases after Avianca exited the market (Borges, 2019). Comparing April 2019 with April of the previous year, the news story reported the average price on the routes on which Avianca stopped operating had suffered an average increase of 39.9%. In contrast, on routes where Avianca did not operate the average price increase had been 18%.

As for sectoral competition, in the period before the request for recovery, Avianca's market share was quite stable in terms of paid passenger-kilometer transported (RPK). However, such participation started falling down after the judicial recovery request, as can be seen in Figure 2 below.

Figure 2: Domestic Market Share (RPK)



Avianca operated in 27 airports in November 2018, serving 75 routes with regular flights. Almost all routes operated by Avianca overlapped with routes operated by Gol and LATAM, the two largest incumbent airlines, so Avianca threatened 136 incumbent routes, accounting for around 33% of the total seats sold by the incumbents.

Figure 3 presents a map with Avianca routes in 2018. The large coverage of Avianca's routes and its market share, combined with its abrupt exit ended up favoring the identification of the removal of a threat of entry.

Figure 3: Routes of Avianca Brasil – (2018)

4 Data

The main dataset used in the empirical analysis is composed of information on air fares, tickets sold, and flight availability, constructed from data made available by the Brazilian airline regulator, ANAC (*Agência Nacional de Aviação Civil*) [3].

For the ticket sales data, we had information on airlines, airports of origin and destination, fare value, and the number of seats sold for a random sample of all tickets sold in Brazil from July 2017 to February 2020. We did not have information on the ticket purchase date [4].

We also assume a minimum of 300 seats sold each month per route and month during each season (summer and winter) to define a route to be served by a given airline, and we defined a route as threatened in a given period if the company (Avianca) sells tickets involving both airports of a route served by the incumbent airlines, but does not sell tickets to the route itself. This number (300 seats) corresponds to the existence of a round-trip flight en route by month, considering the minimum capacity of the aircraft operated by Brazilian airlines. Robustness analyses

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[3] The main data of interest are derived of Domestic Air Fares and Air Transport Statistical Data two. All monetary values were deflated using the Broad National Consumer Price Index (IPCA), available by the Brazilian Institute of Geography and Statistics (IBGE)

[4] Selecting the starting period as July 2017 took into account the regulatory change authorizing the collection of checked baggage, adopted by Gol and LATAM in mid-June 2017. The end of our time frame was chosen so as not to include the early effects of the COVID-19 epidemic.

will be carried out in which this number of tickets is reduced to 200 [5].

The resulting dataset included 521 routes of the incumbent Gol and LATAM airlines. Of these, in 71, Avianca first stops operating first and then stops threatening. In the other 103 routes, Avianca stops threatening without any previous operation. The total number of (company-route-month) observations was 16,905, 7,904 from Gol, and 9,001 from LATAM. We were able to match the flight data for only 5,824 (approximately 1/3). However, these observations represent around 76% of the number of tickets sold [6] [7].

Thus, the econometric analysis for the effect in quantity supplied was performed on a set of 231 routes of the incumbent Gol and LATAM. Of these, in the period analyzed, in 42 routes Avianca withdraws the operation first and then threatens. In another 53 routes to Avianca, withdraws the threat without an operation beforehand. As mentioned, the total number of observations was 5,824, with 3,159 from Gol and 2,665 from LATAM.

5 Model

We had two baseline specifications. The first one, a simpler one is (1), described below:

$$Y_{ri,t} = \gamma_{ri} + \mu_{it} + \beta_O (AVIo)_{r,t} + \beta_A (AVIt)_{r,t} + \epsilon_{ri,t} \tag{1}$$

- $Y_{ri,t}$ is the logarithm of tariff for incumbent firm i flying route r in time t;
- $(AVIt)_{r,t}$ is a dummy variable indicating whether Avianca was a threat in route r in time period t;
- $(AVIo)_{r,t}$ is a dummy variable indicating whether Avianca operated route r in time period t; and
- γ_{ri} e μ_{it} are route-firm and firm-time period fixed effects.

The next model, (2), largely follows Goolsbee and Syverson (2008). This model measures the impact on rivals Gol and LATAM airlines from the removal of threat from Avianca Brasil, as shown below:

$$Y_{ri,t} = \gamma_{ri} + \mu_{it} + \sum_{\tau=-9}^{9+} \omega_\tau (AVIo)_{r,t_o+\tau} + \sum_{\tau=-9}^{9+} \beta_\tau (AVIt)_{r,t_a+\tau} + X_{ri,t}\alpha + \epsilon_{ri,t} \tag{2}$$

- $Y_{ri,t}$ is the logarithm of tariff for incumbent firm i flying route r in time t;
- $(AVIt)_{r,t_o-\tau}$ is a dummy variable indicating whether Avianca ceased being a threat in route r in time period t;
- $(AVIo)_{r,to-\tau}$ is a dummy variable indicating whether Avianca stopped operated route r in time period t;
- γ_{ri} e μ_{it} are route-firm and firm-time period fixed effects.
- $X_{ri,t}$ is a set of control variables.

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[5] For routes that showed oscillation between the existence of operation and threat, only the withdrawal event at the moment closest to Avianca's departure was evaluated. This is because only in the final event does the subsequent withdrawal of threat occur, an interesting main part of this work for the measurement of results. In this sense, the withdrawal of threat is considered to exist only when, in the month following the existence of the threat, there is neither operation nor threat, that is, the transition from threat to operation is not considered as a threat withdrawal.

[6] While price data is available according to the itinerary of the passenger (origin and destination, regardless of stopover or connection), quantity data offered, which include the number of flights and the number of seats offered, are made available as per the basic steps (ie any flight connecting two airports, independently from the place of embarkation or disembarkation).

[7] In addition to the number of flights and the number of seats offered, other information is available. These data were used to exclude observations that appeared to be inconsistent, such as the number of passengers paid greater than the number of seats offered and the number of passengers paid equal to zero.

After Avianca stops operating in a route, the dummy variables $(AVIo)_{r,to-\tau}$ take a value of one only if Avianca is still threatening the route (it still operates in both airports of the route), and operate the route between these airports. Similarly, the dummies $(AVIt)_{r,to-\tau}$ only take the value of one if Avianca threatens the route but does not operate on the route.

The estimated coefficients show the percentage changes compared to the mean of the dependent variable in the baseline period (from July 2017 until the tenth month prior to the withdrawal of operation - or threat to routes where there was no operation).

In a third model, the effect of the threat removal was analyzed separately for the cases in which Avianca operated the route previously (using dummy variables $(AVIo1)_{r,t_t+\tau}$) and for the cases it did not (using dummy variables $(AVIo2)_{r,t_t+\tau}$), using two different sets of dummy variables. The resulting model is presented in equation (3):

$$Y_{ri,t} = \gamma_{ri} + \mu_{it} + \sum_{\tau=-9}^{9+} \omega_\tau (AVIo)_{r,t_o+\tau} + \sum_{\tau=0}^{9+} \theta_\tau (AVIt1)_{r,t_a+\tau} + \sum_{\tau=-9}^{9+} \delta_\tau (AVIt2)_{r,t_a+\tau} + X_{ri,t}\alpha + \epsilon_{ri,t} \qquad (3)$$

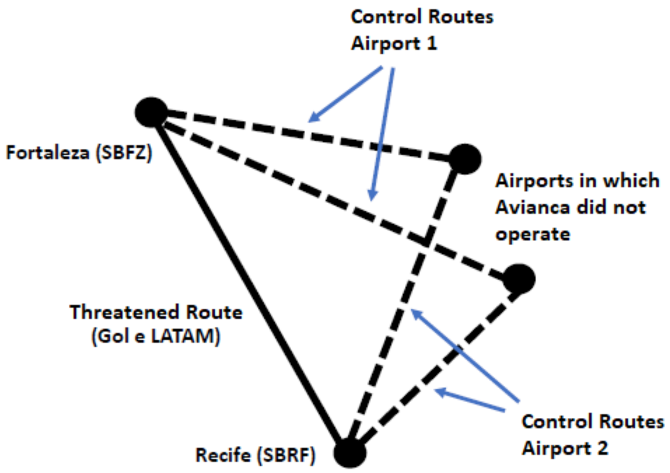
In which:

- $(AVIt1)_{r,t_t+\tau}$ are dummy variables which take the value of one if Avianca stopped being a threat in routes it operated at some point in the past
- $(AVIt2)_{r,t_t+\tau}$ are dummy variables which take the value of one if Avianca stopped being a threat in routes it did not operate at some point in the past

The first set of control variables used follows the ones proposed by Goolsbee and Syverson (2008). The authors discuss the possibility that cost shocks are an alternative explanation for the incumbents' price response, which may lead to spurious correlation between threat of entry and tariff changes. If Avianca's decision to stop operating certain routes is driven by an increase in operating costs in related airports, we will also have an endogeneity problem in which our explanatory variable would be positively correlated with the econometric error term.

Thus, to control for possible cost shocks, we used the same control variables proposed by Goolsbee and Syverson (2008). These are the log of incumbents' average tariff[8] weighted by the number of passengers, on other routes involving the same airports at one end, and in which Avianca did not have operation at the other end.

Figure 4: Control Routes



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[8] Normalized by distance.

An example of how this control variable was constructed is shown in Figure 4, for the case of the route Fortaleza (SBFZ) - Recife (SBRF). The control variable for this route is given by the log of the average route fare of the incumbents involving the Fortaleza airport (SBFZ) and airports where Avianca did not operate.

Another identification threat is from the demand side, with a correlation of demand shocks and Avianca's decision to exit specific markets. To address this issue, we extend the complete model proposed by Goolsbee and Syverson (2008) to incorporate additional control variables used by Ciliberto and Schenone (2012) in a similar context. These authors include in their regression, in addition to firm-market and year-quarter fixed effects, interactions between a time trend and airport fixed effects. Such variables are here defined as $(ardm_1 \times time\_trend)$ and $(ardm_2 \times time\_trend)$, where $ardm_1$ and $ardm_2$ are dummy variables for the aerodromes that make up the route, and $time\_trend$ is a time trend variable. Such variables are intended to control for correlations between the variables of interest and market-specific unobservables over time.

6 Results

Baseline Model - Fares Model (1) was used to analyze the effect on incumbent airline fares of Avianca either competing or threatening them. Table 1 presents the results of this model, and there are indications that both the existence of operation or threat by Avianca leads to an airfare reduction by incumbent companies GOL and TAM[9].

If we assume 200 seats in sold in a given route to establish operation or threat, the existence of an operation generates a fare reduction of approximately 12.8% [10] when compared to periods when there is neither operation nor threat, while the existence of threat generates a fare reduction of approximately 9.8%. If we assume 300 seats sold to establish an operation the existence of an operation generates a fare reduction of 13.5% and a threat a fare decrease of 9.1%.

Table 1: Regression Results - Eq. 1

	(1) Op >200		Robust Std. Err.	(2) Op >300		Robust Std. Err.
AVIo	-0.137	***	(0.012)	-0.145	***	(0.013)
AVIt	-0.103	***	(0.012)	-0.095	***	(0.012)
Adj. R^2	0.7852			0.7917		
N	24,750			20,274		

Note: The coefficients in column (1) refer to the adoption of the minimum value of 200 seats sold on average per route and month during the season to consider operation, while the coefficients in column (2) refer to the adoption of the value minimum of 300 seats. The robust standard error is clustered by company route.*** denotes significance at the 1% level.

Figures 5a and 5b show the coefficient estimates of the proposed baseline model (2), which aims to assess the effects related to threat/operation removal from a competitor on the incumbent's tariff (these results are also presented in column (1) of table 2).

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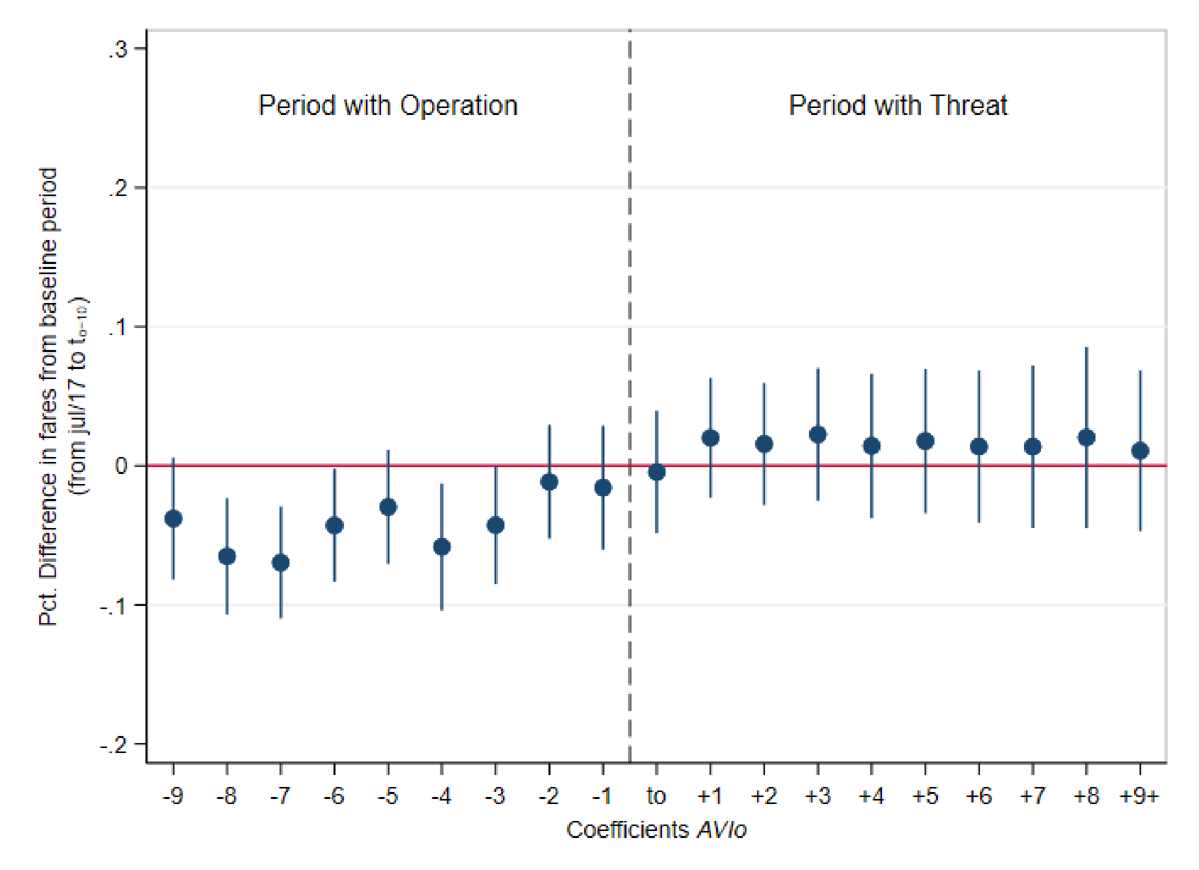
[9] This result is independent of the minimum criterion of 200 or 300 seats sold per month on average in the season, to define if there is an operation on a certain route.

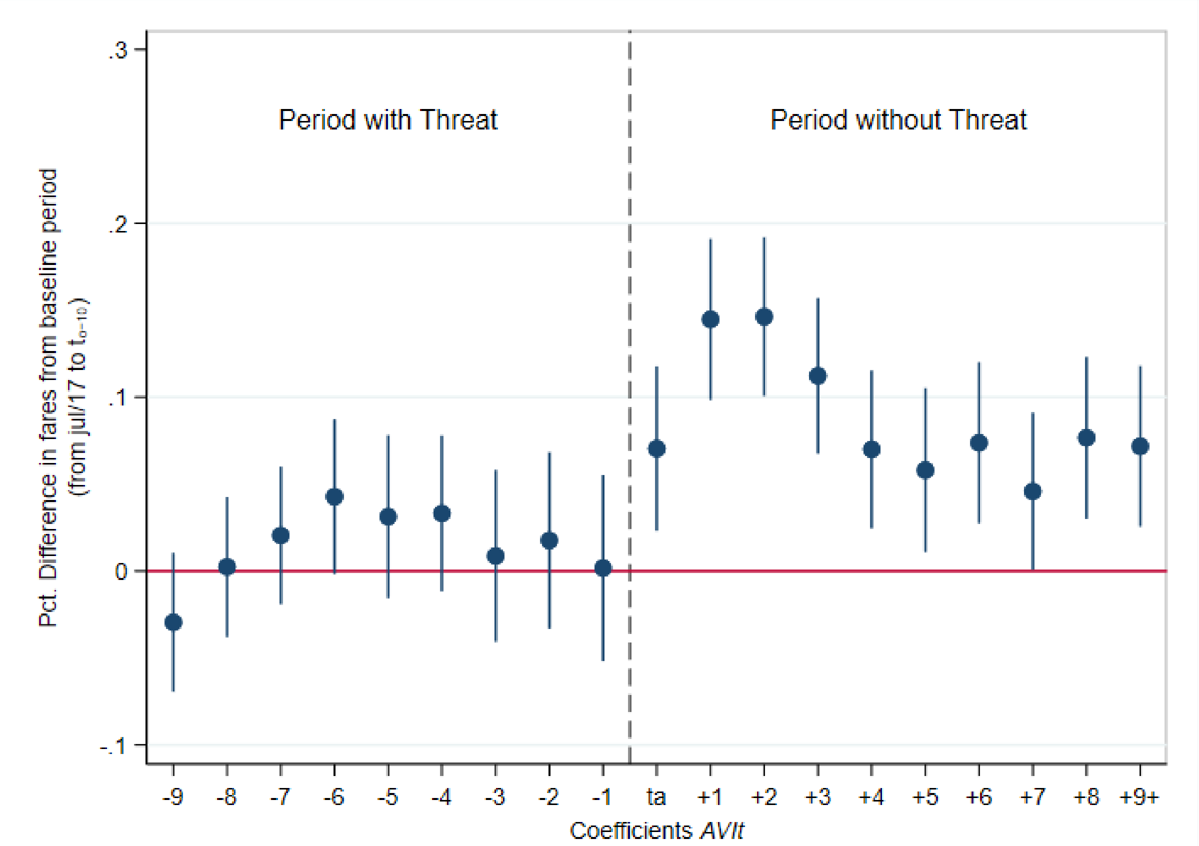
[10] $(\exp^{-0.137} - 1 = -0,1280)$

Figure 5: Coefficient and Standard Errors (baseline model)

(a) Stops Operating



(b) Stops Threatening



Note: to = time when Avianca stops operating; ta = time when Avianca stops threatening; IC = 95%.

As for the effects of Avianca threatening incumbent airlines (Figure 5b), the prices of the incumbents GOL and TAM are significantly higher in the month after Avianca stopped being a threat (period t_a). They are about 7.25% higher than in the baseline period. In the following months, the prices remain higher and statistically significant, with a maximum of 15.72% two months after Avianca stopped threatening. After the 9th month of withdrawal of the threat by Avianca Brasil, the price increase in relation to the base period is still 7.47%.

In column (2) of table 2, in the Appendix, following the work of Goolsbee and Syverson (2008), an attempt was made to verify the effect of the threat or operation withdrawal on the number of incumbent passengers (number of tickets sold). Just as found by these authors, the estimates are imprecise and generally not statistically significant, with large standard errors.

We also investigated what happens to routes where it is not possible to distinguish between when operation and threat stops at the same time. The results are in column (3) of the table 2 in the appendix and the estimates do not change much in relation to those obtained in column (1).

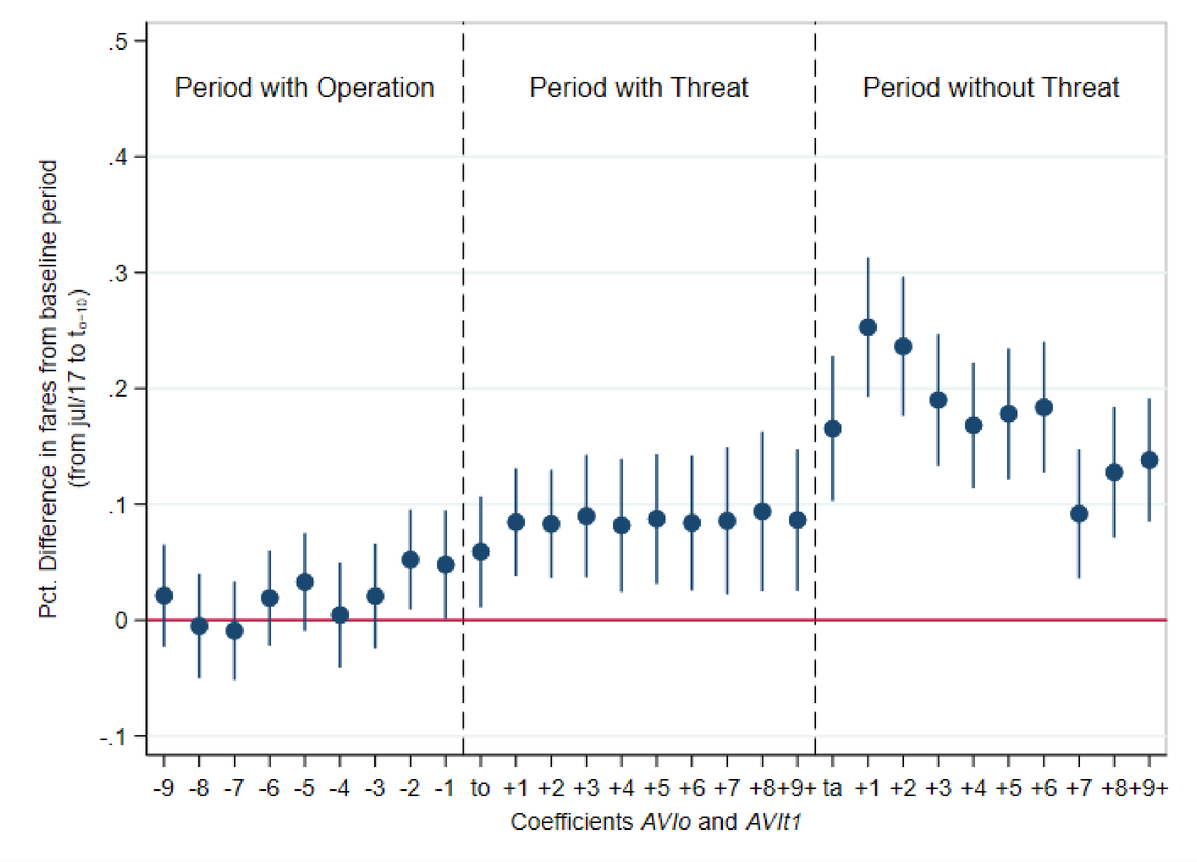
In order to assess the heterogeneity of the threat withdrawal effect, table 3, also in the appendix, presents the results of the same regressions performed using the base model (2) and presented in table 2, but using model (3). This includes variables distinct dummy for cases in which the threat withdrawal occurred after the withdrawal operation on the route (variable dummy $(AVIt1)_{r,t_a+\tau}$), and cases in which there was no operation on the route from which the threat was removed (dummy variables $(AVIt2)_{r,t_a+\tau}$).

The graphs of the results obtained in column (1) of Table 3, in the appendix and are also shown in Figures 6a and 6b. As can be seen in Figure 6a, there is an indication in this model of a price increase by incumbent companies also in response to Avianca not operating.

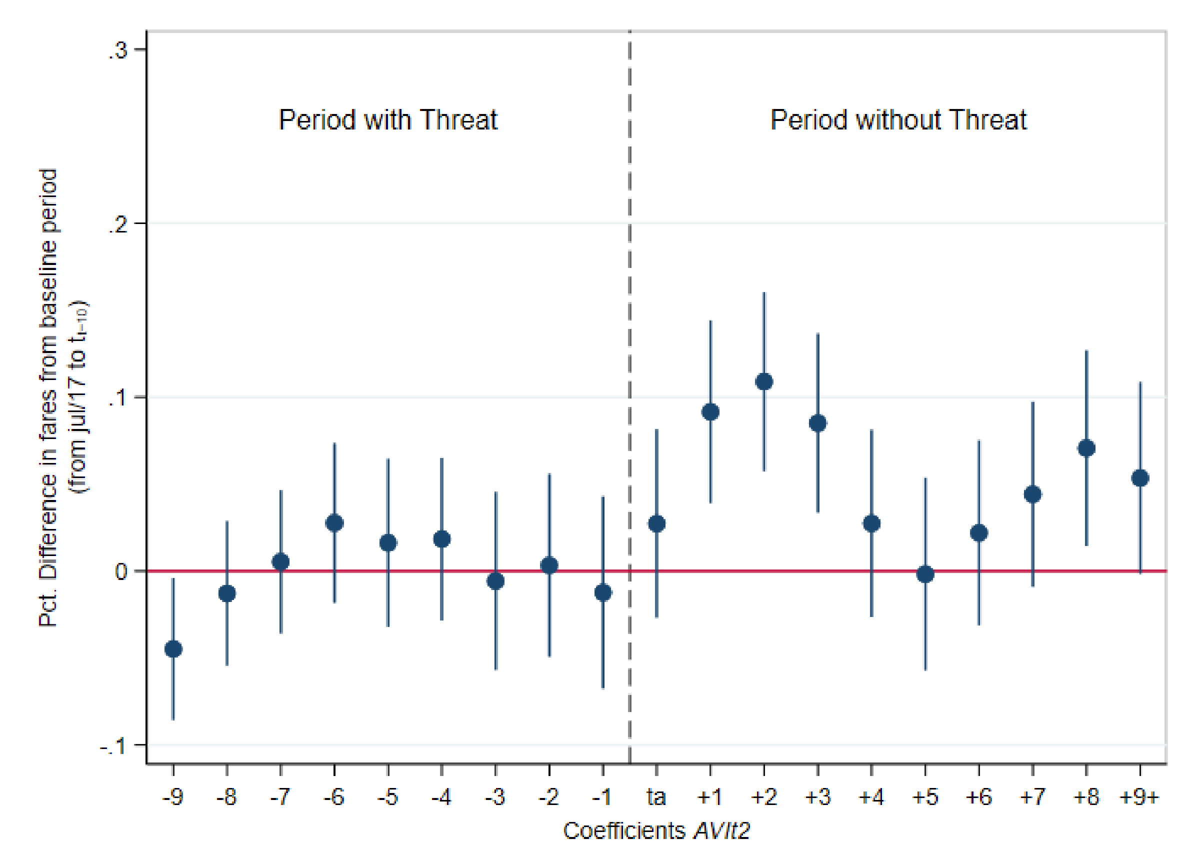
The coefficients start to become positive and statistically significant values from the second month prior to when operation stopped until the end of the period analyzed, with an increase in the order of 6.08% in the event month.

Figure 6: Results of model 2 with the dependent variable price (column (1) of table 3)

(a) Routes where Avianca first withdraws operation and then withdraws threat



(b) Routes where Avianca did not operate prior to the threat withdrawal



Source: Own elaboration based on ANAC data. *Notes:* to = period in which Avianca withdraws operation; ta = period in which Avianca withdraws threat; IC = 95%.

On these routes where Avianca first stops operating and then stops threatening, Figure 6a shows the most significant price increase happens when Avianca stops being a threat. These prices are 17.94% higher than for the base period in the event date, and in the following months, the values remain relatively high. For routes where there was no operation prior to the removal of the threat, in Figure 6b, the increase reaches a maximum of 11.52% two periods after the threat withdrawal. However, the values are not statistically significant.

The effect of threat or operation removal on the number of passengers of the incumbents can be seen in column (2) of table 3 in the appendix. On routes where the Avianca first stops operating the route and then stops threatening altogether, most of the coefficients are statistically significant and, as expected, indicate a reduction in the number of passengers in periods with price increases. On routes where there was no operation of Avianca prior to the removal of the threat, the results are not statistically significant.

The difference between the results obtained with the baseline model and model 2 points out the relevance of considering the heterogeneity of the effect of threat withdrawal between the cases broken down in model 2. Thus, in the endogeneity and robustness analyses, as well as in the analyzes for quantity supplied, the results are presented using model 2.

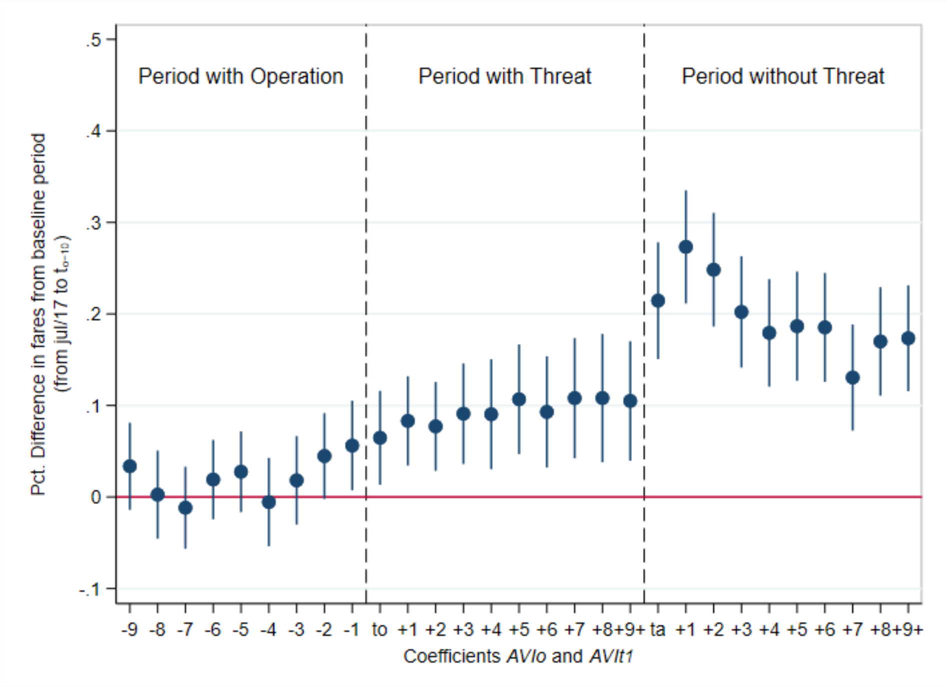
6.1 Results with control variables

As described in section 5, a possible problem with the previous results is that the explanatory variables can be endogenous, making our estimates biased and inconsistent.

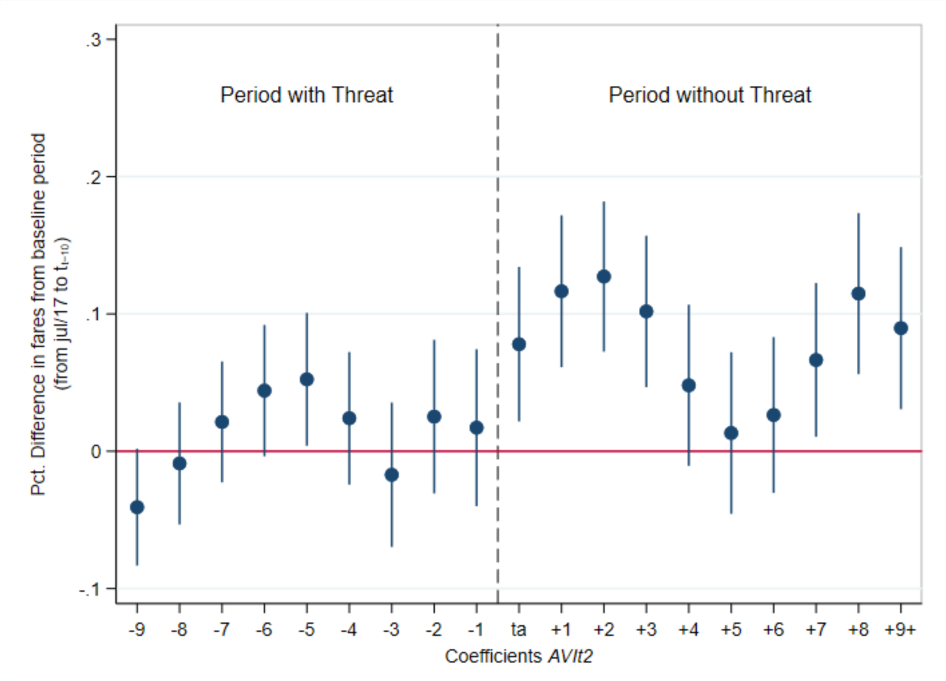
We will follow the work of Goolsbee and Syverson (2008) adopting the same set of explanatory variables to control for airport cost shocks to deal with possible endogeneity concerns. The results are shown in Figures 7a and 7b, as well as in column (2) of table 4 in the appendix (the values from column (1) of table 3 were replicated in column (1) of table 4 to facilitate comparison).

Figure 7: Result of the coefficients of the withdrawal and threat variables using model 2 with cost shock control and dependent variable price (column (2) of table 4 4)

(a) Routes where Avianca first withdraws operation and then withdraws threat



(b) Routes where Avianca did not operate prior to the threat withdrawal



Source: Own elaboration based on ANAC data. *Notes:* to = period in which Avianca withdraws operation; ta = period in which Avianca withdraws threat; IC = 95%.

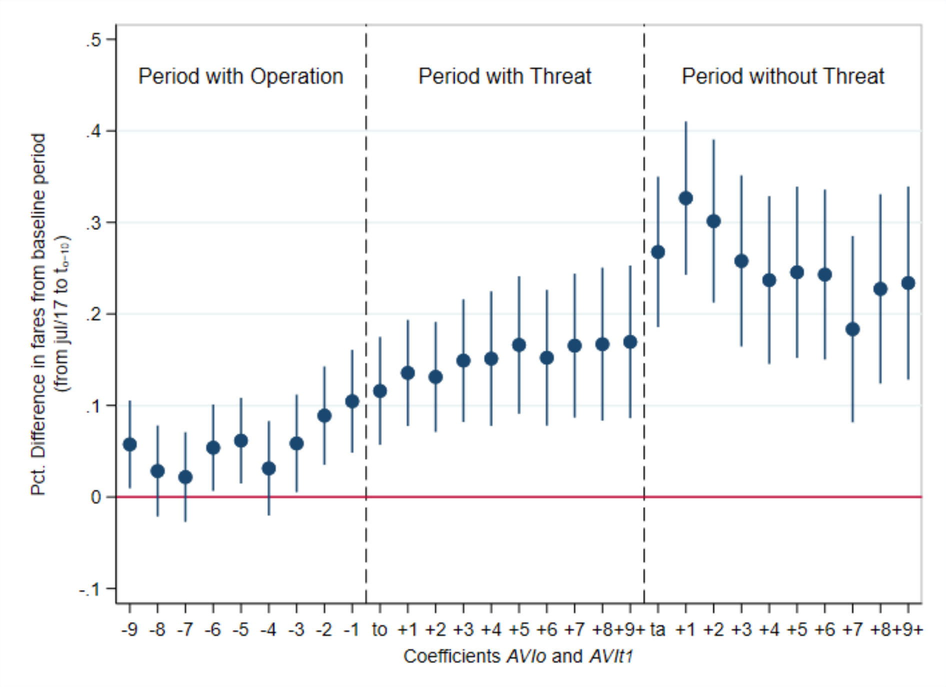
In general, by including the cost shock controls there is an increase in the effect of threat withdrawal on airfares. For routes where the threat withdrawal occurred after the withdrawal of operation (Figure 7a), the price increase was initially 17.94% compared to the base period, is now 23.86% with the inclusion of such controls.

In the same way, on routes where Avianca Brasil did not previously operate (Figure 7b), the price increase becomes statistically significant in the month in which Avianca stops threatening, with an increase of 8.11% in relation to the base period. It is also worth noting that both included controls are statistically significant.

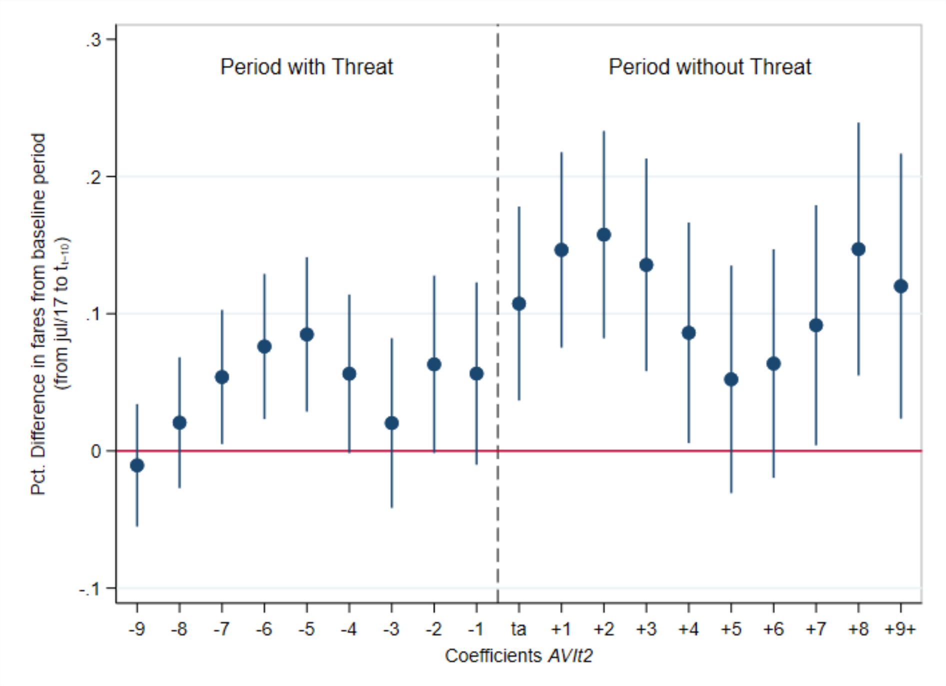
In the second regression, in addition to controlling for the cost shocks, we also added a trend variable of the airports that make up the route following the work of Ciliberto and Schenone (2012). The results are shown in Figures 8a and 8b (and in column (3) of the table 4 in the appendix). As found and highlighted by the authors, the inclusion of these variables leads to a significant change in the results obtained from price effect, indicating that the persistent correlation of unobserved, current, and negative demand changes specific expectations of the market, is an important concern.

Figure 8: Result of the coefficients of the withdrawal and threat variables using model 2 with cost shock and trend control of airports and price dependent variable (column (3) of table 4 4)

(a) Routes where Avianca first withdraws operation and then withdraws threat



(b) Routes where Avianca did not operate prior to the threat withdrawal



Source: Own elaboration based on ANAC data. *Notes:* to = period in which Avianca withdraws operation; ta = period in which Avianca withdraws threat; IC = 95%.

For cases where the threat withdrawal occurred after the operation stopped (Figure 8a), the price effect when Avianca withdraws the threat is 30.73% above the base period. In contrast, the effect when the operation stops remains considerably lower, at 12.3% in relation to the base period. For cases where there was no operation prior to the threat withdrawal (Figure 8b), the effect on price is around 11.29%. The price increase after 9 periods of threat withdrawal remains high. in the first case of threat withdrawal, this price increase is 26.36% compared to the base period, while in the second case, it is 12.75%.

By controlling for cost shocks and airport-specific trends, we can note the estimated effects are significantly larger. In view of the analysis presented above, we will consider as our main result in terms of the price effects the estimates in column 3 of table 4 in the appendix (Figures 8a and 8b).

Our results are similar to those found in the empirical literature involving a threat of entry, even though they are of a lower magnitude than the ones found by Morrison (2001), where the effect on prices due to direct competition of Southwest is 46%, and that of potential competition is 33%. It is also lower than the 20% yield impact estimate due to the threat found by Bettini, Silveira and Oliveira (2018) in the Brazilian case (involving incumbents GOL and TAM).

The estimated effects are closer to those found by Goolsbee and Syverson (2008), in which the price reduction in response to the threat of entry is 17% in comparison to their baseline period. It is worth noting that, also in the results obtained by Kwoka and Shumilkina (2010), the effect of the entry threat accounts for more than half the direct competition effect.

As to the reasons for adopting such behavior of keeping prices lower during a period under threat, several different models point to the same results. However, there is no simple way to determine which theoretical model is the most suited to this situation.

6.2 Robustness analyses - airfares

We carried out three different sets of robustness checks. First, new competition-related controls were added. Then, a different criterion was adopted for the definition of airline operation in a given route. And finally, more coefficients prior to the removal of operation/threat were included in the model, with a consequent change in the baseline period. In table 5 in the appendix we include these new results, and the values obtained in column 3 of Table 4 are replicated in column 1 for comparison purposes.

In column 2 of Table 5 we add variables to the regression in order to control the competitive structure of the market. The variables included GLO_TAMo and $AZUo$, the first indicating whether the main rival is also operating on the route in a given period (that is, GOL and LATAM operate on the route) and the second indicating whether on that particular route and period, Azul would also be operating. Even though these variables might be seen as endogenous, we chose not to do any instrumental variables procedure here.

These variables are similar to those used by Morrison (2001) and Brueckner, Lee and Singer (2013) in the analysis of the price effects of different forms of the competitor presence in a given market (including potential competition). Although they recognize the potential endogeneity of such variables, they do not address this issue in their models. They say the model includes a wide range of explanatory variables and that the existing bias would not be substantial. Furthermore, the inclusion of these market competition variables in our model occurs after we've added controls that also apply to these. The inclusion of these variables, although statistically significant, does not change the previous results.

In column 3 of table 5 in the appendix, we changed the definition of whether a route is operated. In previous regressions, we were using an average amount per season of at least 300 passengers per month to define an operation on a given route; now, we will assume an average minimum quantity per season of 200 passengers. As we can see, estimates of the effects of the variables of interest (threat removal) considering the new criteria adopted remain similar.

As for the results related to the withdrawal from operation, the corresponding variable at the time of withdrawal (with a subsequent threat) it did not change much. Considering what was discussed, regardless of the criterion adopted definition of operation on a route, we found evidence of significant effect for the variables of interest to the work.

In column 4 of table 5 in the appendix, six additional time periods were included prior to the removal of operation/threat in the model, with a consequent change in the base period. As we can see, the estimates of the effects of threat withdrawal variables are very similar to those found in the main result of the work (replicated in column (1) of the table5 5).

Therefore, considering this section's results, no evidence that the variables of interest are being affected by structural issues competitive in the market, by the criterion adopted for the definition of operation on a route, or by the number of coefficients prior to removal from operation/threat specified in the model, with a consequent change in the base period.

7 Effects on quantity supplied

In order to shed light on the different channels through which the incumbents respond to the threat withdrawal, we present here an analysis of the incumbent's response in terms of the quantity offered (number of flights). As mentioned above, in view of the relevance of heterogeneity of estimated effects found in the analysis of the incumbents' response in terms of quantity supplied part from the model (3) to a threat removal.

In Figures 9a and 9b, we estimate a model just as in model (3) with the number of flights as a dependent variable. These same results are also presented in column (1) of table 6 in the appendix.

As can be seen in Figure 9a, on routes where Avianca first stops operating and then stops threatening there is an indication of a drop in the number of incumbent airline flights. However, the results are not statistically significant.

Another analysis was carried out using Azul's flights. Supposing quantity as a strategic substitute, it expected the quantity supplied by Azul to increase when Avianca stops flying. An additional regression was performed considering how dependent variable the number of flights by the Azul company (which now has a position of being highlighted as a competitor), but the results are not significant as well.

In the same way, as performed in the analysis for the airfare, explanatory variables were added to model 2 to control for airport cost shocks. According to Figure 12a in the appendix, there is no break in behavior related to events withdrawal from operation and threat, indicating the incumbent's lack of response in terms of quantity supplied.

For cases where there was no operation before the threat was removed (Figure 12b), the coefficients remain closer to zero, with no indication of a change in the number of flights or breach of behavior related to threat withdrawal.

In the second regression, in addition to controlling for the cost shock, they have also added trend variables of the airports that make up the route. On routes in that Avianca withdraws the operation and subsequently withdraws the threat (Figure 11a), the main finding remains the absence of behavior breaks, especially in relation to threat withdrawal.

On routes where there was no operation by Avianca before the withdrawal of threat (Figure 11b), despite the increase in the value of the coefficients, their standard errors are larger, making the coefficients not significant. As before, there is no indication of behavior change related to threat withdrawal.

Thus, taking into account the analyzes performed here, there is no indication of response by the incumbent companies in terms of quantity offered in response to threat withdrawal. So the reason why if there was a significant airfare increase, it would not be related to the maintenance of higher capacity during the period under threat, as a way to deter or accommodate possible entry.

8 Conclusion

This work tried to analyze the response of incumbent companies (GOL and TAM) to the exit of a potential competitor, Avianca Brasil, both in terms of airfares and quantity offered. To the identification of a threat of entry, the presence at both airports on a route served by the incumbent was used.

In terms of airfares, the results indicate there was a stronger price increase in the first few months after the threat removal, and remained high throughout the whole period. In routes where the operation in a given route stops first, and then Avianca stops threatening, it is possible to distinguish the impacts arising from each of these two events. In the main specification, the price increase at the time of threat withdrawal by a competitor is of the order of 30.73% in relation to the base period. This price increase reaches a maximum of 38.68% one month after and, after 9 months, the price increase, in relation to the base period, is 26.36%. In contrast, the airfare increase on these routes when Avianca stops operating is around 12.3% with respect to the baseline period.

On routes where there was no operation prior to the threat removal, there was also a significant price increase. The airfare increase at that time is 11.29% in relation to the base period, with a maximum of 17.12% two months after and, after 9 months, the airfare increase is 12.75%.

Aiming to understand the different channels through which the response of the incumbents facing the threat withdrawal, a similar analysis for the incumbent's response in terms of the number of flights was developed. With regard to the incumbent's response to when a potential competitor leaves, there are no signs of change in the quantity offered by companies in direct response to this event.

Likewise, for routes where there was no operation prior to the withdrawal of threat, there is no evidence of response from the incumbent companies in terms of the number of flights for threat withdrawal.

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A Full Model Results

Table 2: Baseline model results

		(1) P Op >300		Robust Std. Err.	(2) Q Op >300		Robust Std. Err.	(3) P Op >300		Robust Std. Err.
AVIot	$t_o - 09$							-0.061	***	(0.019)
AVIot	$t_o - 08$							-0.009		(0.019)
AVIot	$t_o - 07$							0.051	**	(0.02)
AVIot	$t_o - 06$							0.104	***	(0.021)
AVIot	$t_o - 05$							0.098	***	(0.021)
AVIot	$t_o - 04$							0.097	***	(0.023)
AVIot	$t_o - 03$							0.078	***	(0.026)
AVIot	$t_o - 02$							0.114	***	(0.027)
AVIot	$t_o - 01$							0.089	***	(0.027)
AVIot	t_o							0.278	***	(0.03)
AVIot	$t_o + 01$							0.345	***	(0.028)
AVIot	$t_o + 02$							0.262	***	(0.027)
AVIot	$t_o + 03$							0.161	***	(0.024)
AVIot	$t_o + 04$							0.133	***	(0.025)
AVIot	$t_o + 05$							0.087	***	(0.029)
AVIot	$t_o + 06$							0.187	***	(0.028)
AVIot	$t_o + 07$							0.138	***	(0.027)
AVIot	$t_o + 08$							0.123	***	(0.028)
AVIot	$t_o + 09+$							0.114	***	(0.028)
AVIo	$t_o - 09$	-0.038	*	(0.022)	0.027		(0.058)	-0.035		(0.022)
AVIo	$t_o - 08$	-0.065	***	(0.021)	0.047		(0.056)	-0.063	***	(0.021)
AVIo	$t_o - 07$	-0.070	***	(0.02)	0.044		(0.059)	-0.068	***	(0.021)
AVIo	$t_o - 06$	-0.043	**	(0.021)	0.012		(0.067)	-0.042	**	(0.021)
AVIo	$t_o - 05$	-0.030		(0.021)	0.010		(0.06)	-0.027		(0.021)
AVIo	$t_o - 04$	-0.058	**	(0.023)	0.066		(0.058)	-0.056	**	(0.023)
AVIo	$t_o - 03$	-0.043	**	(0.022)	0.019		(0.06)	-0.039	*	(0.021)
AVIo	$t_o - 02$	-0.012		(0.021)	-0.088		(0.061)	-0.008		(0.021)
AVIo	$t_o - 01$	-0.016		(0.023)	-0.065		(0.061)	-0.014		(0.023)
AVIo	t_o	-0.004		(0.022)	-0.015		(0.061)	-0.002		(0.022)
AVIo	$t_o + 01$	0.020		(0.022)	-0.052		(0.059)	0.023		(0.022)
AVIo	$t_o + 02$	0.016		(0.022)	-0.022		(0.06)	0.019		(0.022)
AVIo	$t_o + 03$	0.023		(0.024)	-0.009		(0.067)	0.025		(0.024)
AVIo	$t_o + 04$	0.014		(0.026)	0.030		(0.065)	0.017		(0.026)
AVIo	$t_o + 05$	0.018		(0.026)	0.056		(0.071)	0.020		(0.026)
AVIo	$t_o + 06$	0.014		(0.028)	-0.019		(0.068)	0.017		(0.028)
AVIo	$t_o + 07$	0.014		(0.03)	-0.078		(0.067)	0.017		(0.03)
AVIo	$t_o + 08$	0.020		(0.033)	-0.058		(0.085)	0.023		(0.033)
AVIo	$t_o + 09+$	0.011		(0.029)	-0.075		(0.077)	0.013		(0.029)
ONE_retira_ameaca	$t_a - 09$	-0.029		(0.02)	0.062		(0.051)	-0.029		(0.02)
ONE_retira_ameaca	$t_a - 08$	0.002		(0.021)	0.011		(0.052)	0.004		(0.02)
ONE_retira_ameaca	$t_a - 07$	0.021		(0.02)	-0.013		(0.052)	0.022		(0.02)
ONE_retira_ameaca	$t_a - 06$	0.043	*	(0.023)	-0.077		(0.053)	0.044	*	(0.023)
ONE_retira_ameaca	$t_a - 05$	0.031		(0.024)	-0.096	*	(0.055)	0.033		(0.024)
ONE_retira_ameaca	$t_a - 04$	0.033		(0.023)	-0.075		(0.058)	0.033		(0.023)
ONE_retira_ameaca	$t_a - 03$	0.009		(0.025)	-0.051		(0.063)	0.010		(0.025)
ONE_retira_ameaca	$t_a - 02$	0.018		(0.026)	-0.027		(0.063)	0.019		(0.026)
ONE_retira_ameaca	$t_a - 01$	0.002		(0.027)	0.010		(0.064)	0.003		(0.027)
ONE_retira_ameaca	t_a	0.070	***	(0.024)	-0.061		(0.056)	0.071	***	(0.024)
ONE_retira_ameaca	$t_a + 01$	0.145	***	(0.024)	-0.176	***	(0.061)	0.146	***	(0.024)
ONE_retira_ameaca	$t_a + 02$	0.146	***	(0.023)	-0.065		(0.057)	0.146	***	(0.023)
ONE_retira_ameaca	$t_a + 03$	0.112	***	(0.023)	-0.044		(0.057)	0.114	***	(0.023)
ONE_retira_ameaca	$t_a + 04$	0.070	***	(0.023)	-0.057		(0.059)	0.072	***	(0.023)
ONE_retira_ameaca	$t_a + 05$	0.058	**	(0.024)	-0.047		(0.061)	0.060	**	(0.024)
ONE_retira_ameaca	$t_a + 06$	0.074	***	(0.024)	-0.024		(0.058)	0.076	***	(0.024)
ONE_retira_ameaca	$t_a + 07$	0.046	**	(0.023)	0.012		(0.061)	0.048	**	(0.023)
ONE_retira_ameaca	$t_a + 08$	0.077	***	(0.024)	-0.058		(0.063)	0.078	***	(0.024)
ONE_retira_ameaca	$t_a + 09+$	0.072	***	(0.024)	-0.061		(0.061)	0.073	***	(0.023)
Adj. R^2		0.7963			0.8300			0.7933		
N		16,898			16,898			20,274		

Notes: The coefficients in columns (1) to (3) refer to the use of model 2 without control variables and the adoption of a minimum value of 300seats sold on average per route and month during the season to consider operation. The dependent variable in columns (1) and (3) is logof the fare and in column (2) is the log of the number of passengers. Column (3) differs from column (1) by adding

Table 3: Model 2 regression (price)

		(1) P Op >300		Robust Std. Err.	(2) Q Op >300		Robust Std. Err.	(3) P Op >300		Robust Std. Err.
AVIot	$t_o - 09$							-0.059	***	(0.019)
AVIot	$t_o - 08$							-0.007		(0.019)
AVIot	$t_o - 07$							0.053	***	(0.02)
AVIot	$t_o - 06$							0.106	***	(0.021)
AVIot	$t_o - 05$							0.101	***	(0.021)
AVIot	$t_o - 04$							0.100	***	(0.023)
AVIot	$t_o - 03$							0.081	***	(0.026)
AVIot	$t_o - 02$							0.118	***	(0.027)
AVIot	$t_o - 01$							0.092	***	(0.027)
AVIot	t_o							0.279	***	(0.03)
AVIot	$t_o + 01$							0.347	***	(0.028)
AVIot	$t_o + 02$							0.263	***	(0.027)
AVIot	$t_o + 03$							0.162	***	(0.024)
AVIot	$t_o + 04$							0.135	***	(0.025)
AVIot	$t_o + 05$							0.088	***	(0.029)
AVIot	$t_o + 06$							0.188	***	(0.028)
AVIot	$t_o + 07$							0.139	***	(0.027)
AVIot	$t_o + 08$							0.125	***	(0.028)
AVIot	$t_o + 09+$							0.116	***	(0.028)
AVIo	$t_o - 09$	0.021		(0.022)	-0.041		(0.055)	0.025		(0.022)
AVIo	$t_o - 08$	-0.005		(0.023)	-0.022		(0.053)	-0.002		(0.023)
AVIo	$t_o - 07$	-0.009		(0.022)	-0.026		(0.055)	-0.007		(0.022)
AVIo	$t_o - 06$	0.019		(0.021)	-0.059		(0.063)	0.021		(0.021)
AVIo	$t_o - 05$	0.033		(0.022)	-0.062		(0.063)	0.037	*	(0.022)
AVIo	$t_o - 04$	0.005		(0.023)	-0.006		(0.066)	0.008		(0.023)
AVIo	$t_o - 03$	0.021		(0.023)	-0.054		(0.068)	0.025		(0.023)
AVIo	$t_o - 02$	0.052	**	(0.022)	-0.162	**	(0.068)	0.057	***	(0.022)
AVIo	$t_o - 01$	0.048	**	(0.024)	-0.138	**	(0.07)	0.050	**	(0.024)
AVIo	t_o	0.059	**	(0.024)	-0.089		(0.072)	0.063	***	(0.024)
AVIo	$t_o + 01$	0.085	***	(0.024)	-0.126	*	(0.069)	0.088	***	(0.023)
AVIo	$t_o + 02$	0.083	***	(0.024)	-0.100		(0.069)	0.087	***	(0.024)
AVIo	$t_o + 03$	0.090	***	(0.027)	-0.087		(0.075)	0.093	***	(0.027)
AVIo	$t_o + 04$	0.082	***	(0.029)	-0.049		(0.075)	0.085	***	(0.029)
AVIo	$t_o + 05$	0.087	***	(0.029)	-0.024		(0.08)	0.091	***	(0.028)
AVIo	$t_o + 06$	0.084	***	(0.03)	-0.100		(0.077)	0.088	***	(0.03)
AVIo	$t_o + 07$	0.086	***	(0.032)	-0.162	**	(0.077)	0.090	***	(0.032)
AVIo	$t_o + 08$	0.094	***	(0.035)	-0.143		(0.095)	0.097	***	(0.035)
AVIo	$t_o + 09+$	0.086	***	(0.031)	-0.163	*	(0.088)	0.090	***	(0.031)
AVIt1	t_a	0.165	***	(0.032)	-0.218	***	(0.076)	0.168	***	(0.032)
AVIt1	$t_a + 01$	0.253	***	(0.031)	-0.313	***	(0.082)	0.255	***	(0.031)
AVIt1	$t_a + 02$	0.236	***	(0.031)	-0.182	**	(0.083)	0.238	***	(0.031)
AVIt1	$t_a + 03$	0.190	***	(0.029)	-0.155	*	(0.082)	0.193	***	(0.029)
AVIt1	$t_a + 04$	0.168	***	(0.028)	-0.136	*	(0.081)	0.171	***	(0.027)
AVIt1	$t_a + 05$	0.178	***	(0.029)	-0.181	*	(0.093)	0.182	***	(0.029)
AVIt1	$t_a + 06$	0.184	***	(0.029)	-0.125		(0.087)	0.187	***	(0.029)
AVIt1	$t_a + 07$	0.092	***	(0.028)	-0.014		(0.09)	0.095	***	(0.028)
AVIt1	$t_a + 08$	0.128	***	(0.029)	-0.098		(0.091)	0.130	***	(0.029)
AVIt1	$t_a + 09+$	0.138	***	(0.027)	-0.150	*	(0.086)	0.141	***	(0.027)
AVIt2	$t_a - 09$	-0.045	**	(0.021)	0.080		(0.053)	-0.044	**	(0.021)
AVIt2	$t_a - 08$	-0.013		(0.021)	0.028		(0.053)	-0.012		(0.021)
AVIt2	$t_a - 07$	0.005		(0.021)	0.004		(0.054)	0.006		(0.021)
AVIt2	$t_a - 06$	0.028		(0.023)	-0.059		(0.056)	0.029		(0.023)
AVIt2	$t_a - 05$	0.016		(0.025)	-0.079		(0.058)	0.017		(0.025)
AVIt2	$t_a - 04$	0.018		(0.024)	-0.058		(0.06)	0.018		(0.024)
AVIt2	$t_a - 03$	-0.006		(0.026)	-0.034		(0.065)	-0.005		(0.026)
AVIt2	$t_a - 02$	0.003		(0.027)	-0.011		(0.066)	0.004		(0.027)
AVIt2	$t_a - 01$	-0.012		(0.028)	0.026		(0.066)	-0.012		(0.028)
AVIt2	t_a	0.027		(0.028)	0.029		(0.064)	0.027		(0.028)
AVIt2	$t_a + 01$	0.092	***	(0.027)	-0.103		(0.072)	0.091	***	(0.027)
AVIt2	$t_a + 02$	0.109	***	(0.026)	-0.012		(0.065)	0.108	***	(0.026)
AVIt2	$t_a + 03$	0.085	***	(0.026)	0.003		(0.067)	0.085	***	(0.026)
AVIt2	$t_a + 04$	0.027		(0.027)	-0.034		(0.071)	0.028		(0.027)
AVIt2	$t_a + 05$	-0.002		(0.028)	0.018		(0.07)	-0.001		(0.028)
AVIt2	$t_a + 06$	0.022		(0.027)	0.016		(0.068)	0.023		(0.027)
AVIt2	$t_a + 07$	0.044		(0.027)	-0.008		(0.071)	0.045	*	(0.027)
AVIt2	$t_a + 08$	0.071	**	(0.029)	-0.066		(0.073)	0.071	**	(0.029)
AVIt2	$t_a + 09+$	0.054	*	(0.028)	-0.031		(0.071)	0.054	*	(0.028)
Adj. R^2		0.7978			0.8303			0.7946		
N		16,898			16,898			20,274		

Notes: The coefficients in columns (1) to (3) refer to the use of model 2 without control

Table 4: Endogeneity regression (price)

		(1) P Op >300		Robust Std. Err.	(2) P Op >300		Robust Std. Err.	(3) P Op >300		Robust Std. Err.
AVIo	$t_o - 09$	0.021		(0.022)	0.034		(0.024)	0.057	**	(0.024)
AVIo	$t_o - 08$	-0.005		(0.023)	0.003		(0.025)	0.028		(0.025)
AVIo	$t_o - 07$	-0.009		(0.022)	-0.012		(0.023)	0.022		(0.025)
AVIo	$t_o - 06$	0.019		(0.021)	0.019		(0.022)	0.054	**	(0.024)
AVIo	$t_o - 05$	0.033		(0.022)	0.028		(0.022)	0.062	***	(0.024)
AVIo	$t_o - 04$	0.005		(0.023)	-0.006		(0.025)	0.031		(0.026)
AVIo	$t_o - 03$	0.021		(0.023)	0.018		(0.025)	0.059	**	(0.027)
AVIo	$t_o - 02$	0.052	**	(0.022)	0.045	*	(0.024)	0.089	***	(0.027)
AVIo	$t_o - 01$	0.048	**	(0.024)	0.056	**	(0.025)	0.105	***	(0.029)
AVIo	t_o	0.059	**	(0.024)	0.065	**	(0.026)	0.116	***	(0.03)
AVIo	$t_o + 01$	0.085	***	(0.024)	0.083	***	(0.025)	0.136	***	(0.03)
AVIo	$t_o + 02$	0.083	***	(0.024)	0.077	***	(0.025)	0.131	***	(0.031)
AVIo	$t_o + 03$	0.090	***	(0.027)	0.091	***	(0.028)	0.149	***	(0.034)
AVIo	$t_o + 04$	0.082	***	(0.029)	0.090	***	(0.031)	0.151	***	(0.037)
AVIo	$t_o + 05$	0.087	***	(0.029)	0.107	***	(0.031)	0.166	***	(0.038)
AVIo	$t_o + 06$	0.084	***	(0.03)	0.093	***	(0.031)	0.152	***	(0.038)
AVIo	$t_o + 07$	0.086	***	(0.032)	0.108	***	(0.033)	0.165	***	(0.04)
AVIo	$t_o + 08$	0.094	***	(0.035)	0.108	***	(0.036)	0.167	***	(0.043)
AVIo	$t_o + 09+$	0.086	***	(0.031)	0.105	***	(0.033)	0.169	***	(0.042)
AVIt1	t_a	0.165	***	(0.032)	0.214	***	(0.032)	0.268	***	(0.042)
AVIt1	$t_a + 01$	0.253	***	(0.031)	0.273	***	(0.031)	0.327	***	(0.043)
AVIt1	$t_a + 02$	0.236	***	(0.031)	0.248	***	(0.032)	0.301	***	(0.045)
AVIt1	$t_a + 03$	0.190	***	(0.029)	0.202	***	(0.031)	0.258	***	(0.048)
AVIt1	$t_a + 04$	0.168	***	(0.028)	0.179	***	(0.03)	0.237	***	(0.047)
AVIt1	$t_a + 05$	0.178	***	(0.029)	0.187	***	(0.03)	0.246	***	(0.048)
AVIt1	$t_a + 06$	0.184	***	(0.029)	0.185	***	(0.03)	0.243	***	(0.047)
AVIt1	$t_a + 07$	0.092	***	(0.028)	0.131	***	(0.03)	0.183	***	(0.052)
AVIt1	$t_a + 08$	0.128	***	(0.029)	0.170	***	(0.03)	0.227	***	(0.053)
AVIt1	$t_a + 09+$	0.138	***	(0.027)	0.173	***	(0.029)	0.234	***	(0.054)
AVIt2	$t_a - 09$	-0.045	**	(0.021)	-0.041	*	(0.022)	-0.011		(0.023)
AVIt2	$t_a - 08$	-0.013		(0.021)	-0.009		(0.023)	0.021		(0.024)
AVIt2	$t_a - 07$	0.005		(0.021)	0.021		(0.022)	0.054	**	(0.025)
AVIt2	$t_a - 06$	0.028		(0.023)	0.044	*	(0.024)	0.076	***	(0.027)
AVIt2	$t_a - 05$	0.016		(0.025)	0.052	**	(0.025)	0.085	***	(0.029)
AVIt2	$t_a - 04$	0.018		(0.024)	0.024		(0.025)	0.056	*	(0.029)
AVIt2	$t_a - 03$	-0.006		(0.026)	-0.017		(0.027)	0.020		(0.032)
AVIt2	$t_a - 02$	0.003		(0.027)	0.025		(0.028)	0.063	*	(0.033)
AVIt2	$t_a - 01$	-0.012		(0.028)	0.017		(0.029)	0.056	*	(0.034)
AVIt2	t_a	0.027		(0.028)	0.078	***	(0.029)	0.107	***	(0.036)
AVIt2	$t_a + 01$	0.092	***	(0.027)	0.116	***	(0.028)	0.146	***	(0.036)
AVIt2	$t_a + 02$	0.109	***	(0.026)	0.127	***	(0.028)	0.158	***	(0.039)
AVIt2	$t_a + 03$	0.085	***	(0.026)	0.102	***	(0.028)	0.136	***	(0.039)
AVIt2	$t_a + 04$	0.027		(0.027)	0.048		(0.03)	0.086	**	(0.041)
AVIt2	$t_a + 05$	-0.002		(0.028)	0.013		(0.03)	0.052		(0.042)
AVIt2	$t_a + 06$	0.022		(0.027)	0.026		(0.029)	0.064		(0.042)
AVIt2	$t_a + 07$	0.044		(0.027)	0.066	**	(0.029)	0.092	**	(0.045)
AVIt2	$t_a + 08$	0.071	**	(0.029)	0.115	***	(0.03)	0.147	***	(0.047)
AVIt2	$t_a + 09+$	0.054	*	(0.028)	0.090	***	(0.03)	0.120	**	(0.049)
Cost Airp1					0.178	***	(0.023)	0.185	***	(0.024)
Cost Airp2					0.151	***	(0.019)	0.194	***	(0.019)
$(ardm_1 \times time\_trend)$								X		
$(ardm_2 \times time\_trend)$								X		
Adj. R^2		0.7978			0.8114			0.8209		
N		16,898			13,098			13,098		

Notes: The coefficients in columns (1) to (3) refer to the adoption of the minimum value of 300 seats sold on average per route and month during the season to consider operation. The dependent variable in columns (1) to (3) is the tariff log. Column (1) corresponds to the estimation of model 2 without control variables (already performed previously in column (1) of table 3 3). In column (2) we include the model two variables representing the cost shock. Finally, in column (3) we add to the model of column (2) variables from the trend of the airports that make up the route. The robust standard error is clustered by company-route. * denotes significance at the level of 10%. ** denotes significance at the 5% level. *** denotes significance at the 1% level.

Table 5: Robustness analysis (price)

		(1) P Op >300		Robust Std. Err.	(2) P Op >300		Robust Std. Err.	(3) P Op >200		Robust Std. Err.	(4) P Op >300		Robust Std. Err.
AVIo	$t_o - 15$										-0.015		(0.031)
AVIo	$t_o - 14$										-0.050		(0.041)
AVIo	$t_o - 13$										-0.088	*	(0.046)
AVIo	$t_o - 12$										0.004		(0.047)
AVIo	$t_o - 11$										0.014		(0.044)
AVIo	$t_o - 10$										0.006		(0.044)
AVIo	$t_o - 09$	0.057	**	(0.024)	0.058	**	(0.025)	0.012		(0.021)	0.044		(0.046)
AVIo	$t_o - 08$	0.028		(0.025)	0.028		(0.026)	0.017		(0.02)	0.017		(0.045)
AVIo	$t_o - 07$	0.022		(0.025)	0.023		(0.025)	0.046	**	(0.021)	0.010		(0.044)
AVIo	$t_o - 06$	0.054	**	(0.024)	0.055	**	(0.024)	0.038	*	(0.021)	0.042		(0.044)
AVIo	$t_o - 05$	0.062	***	(0.024)	0.062	***	(0.024)	0.034		(0.021)	0.050		(0.045)
AVIo	$t_o - 04$	0.031		(0.026)	0.033		(0.026)	0.068	***	(0.021)	0.021		(0.046)
AVIo	$t_o - 03$	0.059	**	(0.027)	0.061	**	(0.027)	0.091	***	(0.023)	0.046		(0.045)
AVIo	$t_o - 02$	0.089	***	(0.027)	0.090	***	(0.028)	0.101	***	(0.024)	0.076	*	(0.045)
AVIo	$t_o - 01$	0.105	***	(0.029)	0.106	***	(0.029)	0.100	***	(0.025)	0.095	**	(0.046)
AVIo	t_o	0.116	***	(0.03)	0.119	***	(0.03)	0.111	***	(0.026)	0.107	**	(0.047)
AVIo	$t_o + 01$	0.136	***	(0.03)	0.137	***	(0.029)	0.121	***	(0.026)	0.127	***	(0.047)
AVIo	$t_o + 02$	0.131	***	(0.031)	0.134	***	(0.03)	0.112	***	(0.028)	0.120	**	(0.048)
AVIo	$t_o + 03$	0.149	***	(0.034)	0.153	***	(0.034)	0.114	***	(0.031)	0.139	***	(0.049)
AVIo	$t_o + 04$	0.151	***	(0.037)	0.156	***	(0.037)	0.131	***	(0.032)	0.142	***	(0.052)
AVIo	$t_o + 05$	0.166	***	(0.038)	0.172	***	(0.038)	0.110	***	(0.032)	0.158	***	(0.053)
AVIo	$t_o + 06$	0.152	***	(0.038)	0.159	***	(0.038)	0.126	***	(0.032)	0.144	***	(0.053)
AVIo	$t_o + 07$	0.165	***	(0.04)	0.172	***	(0.04)	0.114	***	(0.036)	0.156	***	(0.054)
AVIo	$t_o + 08$	0.167	***	(0.043)	0.177	***	(0.043)	0.128	***	(0.041)	0.158	***	(0.056)
AVIo	$t_o + 09+$	0.169	***	(0.042)	0.181	***	(0.042)	0.122	***	(0.045)	0.161	***	(0.056)
AVIt1	t_a	0.268	***	(0.042)	0.271	***	(0.042)	0.220	***	(0.037)	0.259	***	(0.054)
AVIt1	$t_a + 01$	0.327	***	(0.043)	0.330	***	(0.042)	0.265	***	(0.037)	0.318	***	(0.056)
AVIt1	$t_a + 02$	0.301	***	(0.045)	0.305	***	(0.045)	0.281	***	(0.04)	0.294	***	(0.059)
AVIt1	$t_a + 03$	0.258	***	(0.048)	0.261	***	(0.047)	0.256	***	(0.041)	0.250	***	(0.059)
AVIt1	$t_a + 04$	0.237	***	(0.047)	0.240	***	(0.046)	0.250	***	(0.041)	0.230	***	(0.059)
AVIt1	$t_a + 05$	0.246	***	(0.048)	0.250	***	(0.048)	0.254	***	(0.041)	0.238	***	(0.061)
AVIt1	$t_a + 06$	0.243	***	(0.047)	0.246	***	(0.047)	0.248	***	(0.042)	0.236	***	(0.061)
AVIt1	$t_a + 07$	0.183	***	(0.052)	0.190	***	(0.051)	0.191	***	(0.045)	0.177	***	(0.064)
AVIt1	$t_a + 08$	0.227	***	(0.053)	0.234	***	(0.052)	0.247	***	(0.047)	0.221	***	(0.066)
AVIt1	$t_a + 09+$	0.234	***	(0.054)	0.241	***	(0.053)	0.245	***	(0.048)	0.228	***	(0.068)
AVIt2	$t_a - 15$										-0.013		(0.021)
AVIt2	$t_a - 14$										-0.013		(0.026)
AVIt2	$t_a - 13$										0.046	*	(0.028)
AVIt2	$t_a - 12$										0.027		(0.028)
AVIt2	$t_a - 11$										0.021		(0.03)
AVIt2	$t_a - 10$										-0.018		(0.029)
AVIt2	$t_a - 09$	-0.011		(0.023)	-0.012		(0.023)	-0.037		(0.024)	-0.005		(0.032)
AVIt2	$t_a - 08$	0.021		(0.024)	0.020		(0.024)	0.013		(0.025)	0.026		(0.033)
AVIt2	$t_a - 07$	0.054	**	(0.025)	0.055	**	(0.025)	0.055	**	(0.026)	0.059	*	(0.034)
AVIt2	$t_a - 06$	0.076	***	(0.027)	0.078	***	(0.027)	0.099	***	(0.028)	0.082	**	(0.036)
AVIt2	$t_a - 05$	0.085	***	(0.029)	0.085	***	(0.029)	0.078	***	(0.029)	0.091	**	(0.036)
AVIt2	$t_a - 04$	0.056	*	(0.029)	0.058	**	(0.029)	0.049	*	(0.029)	0.063	*	(0.037)
AVIt2	$t_a - 03$	0.020		(0.032)	0.022		(0.031)	0.027		(0.031)	0.027		(0.04)
AVIt2	$t_a - 02$	0.063	*	(0.033)	0.065	**	(0.033)	0.071	**	(0.031)	0.070	*	(0.041)
AVIt2	$t_a - 01$	0.056	*	(0.034)	0.059	*	(0.034)	0.067	**	(0.033)	0.064		(0.043)
AVIt2	t_a	0.107	***	(0.036)	0.107	***	(0.036)	0.145	***	(0.035)	0.115	**	(0.045)
AVIt2	$t_a + 01$	0.146	***	(0.036)	0.150	***	(0.036)	0.167	***	(0.036)	0.154	***	(0.046)
AVIt2	$t_a + 02$	0.158	***	(0.039)	0.160	***	(0.038)	0.174	***	(0.037)	0.166	***	(0.049)
AVIt2	$t_a + 03$	0.136	***	(0.039)	0.139	***	(0.039)	0.141	***	(0.038)	0.144	***	(0.05)
AVIt2	$t_a + 04$	0.086	**	(0.041)	0.091	**	(0.041)	0.100	**	(0.04)	0.095	*	(0.052)
AVIt2	$t_a + 05$	0.052		(0.042)	0.056		(0.042)	0.073	*	(0.041)	0.061		(0.054)
AVIt2	$t_a + 06$	0.064		(0.042)	0.069		(0.042)	0.106	***	(0.041)	0.073		(0.054)
AVIt2	$t_a + 07$	0.092	**	(0.045)	0.095	**	(0.044)	0.119	***	(0.042)	0.101	*	(0.055)
AVIt2	$t_a + 08$	0.147	***	(0.047)	0.151	***	(0.046)	0.167	***	(0.043)	0.157	***	(0.058)
AVIt2	$t_a + 09+$	0.120	**	(0.049)	0.123	**	(0.049)	0.139	***	(0.045)	0.130	**	(0.06)
Cost Airp1		0.185	***	(0.024)	0.184	***	(0.023)	0.264	***	(0.023)	0.185	***	(0.023)
Cost Airp2		0.194	***	(0.019)	0.193	***	(0.019)	0.223	***	(0.016)	0.194	***	(0.019)
GLO_TAM_operacao					-0.032	***	(0.011)						
AZU_operacao					-0.034	***	(0.01)						
$(ardm_1 \times time\_trend)$		X			X			X			X		
$(ardm_2 \times time\_trend)$		X			X			X			X		
Adj. R^2		0.8209			0.8216			0.8129			0.8211		
N		13,098			13,098			17,906			13,098		

Notes: The coefficients in columns (1), (2) and (4) refer to the adoption of the minimum value of 300 seats sold on average per route and month during the season for consider operation, while the coefficients in column (3) refer to the adoption of the minimum value of 200 seats. The dependent variable in columns (1) to (4) is the tariff log. Column (2) corresponds to the estimation of the model in column (1) with the inclusion of market competitive structure variables. The column (4) corresponds to the estimation of the model in column (1) with the inclusion of 6 more coefficients prior to the removal of operation/threat, with consequent change in the base period. The robust standard error is clustered by company-route. * denotes significance at the 10% level. ** denotes significance at the 5% level. *** denotes significance at the 1% level.

Table 6: Effects on number of flights

		(1) Nº Voos Op >300		Robust Std. Err.	(2) Nº Voos Op >300		Robust Std. Err.	(3) Nº Voos Op >300		Robust Std. Err.
AVIo	$t_o - 09$	-0.049		(0.064)	-0.072		(0.076)	-0.103		(0.075)
AVIo	$t_o - 08$	-0.039		(0.064)	-0.037		(0.07)	-0.066		(0.077)
AVIo	$t_o - 07$	-0.036		(0.06)	-0.083		(0.065)	-0.140	**	(0.07)
AVIo	$t_o - 06$	-0.109		(0.089)	-0.144		(0.098)	-0.194	*	(0.117)
AVIo	$t_o - 05$	-0.196	*	(0.119)	-0.278	**	(0.135)	-0.348	**	(0.146)
AVIo	$t_o - 04$	-0.135		(0.108)	-0.182		(0.121)	-0.247	*	(0.13)
AVIo	$t_o - 03$	-0.169		(0.115)	-0.217	*	(0.13)	-0.272	*	(0.139)
AVIo	$t_o - 02$	-0.168		(0.113)	-0.232	*	(0.126)	-0.302	**	(0.142)
AVIo	$t_o - 01$	-0.181		(0.112)	-0.240	*	(0.127)	-0.314	**	(0.148)
AVIo	t_o	-0.203		(0.129)	-0.255	*	(0.145)	-0.317	*	(0.168)
AVIo	$t_o + 01$	-0.121		(0.127)	-0.173		(0.144)	-0.235		(0.166)
AVIo	$t_o + 02$	-0.152		(0.119)	-0.218		(0.137)	-0.291	*	(0.168)
AVIo	$t_o + 03$	-0.191		(0.138)	-0.261	*	(0.158)	-0.318	*	(0.19)
AVIo	$t_o + 04$	-0.144		(0.122)	-0.219		(0.14)	-0.273		(0.176)
AVIo	$t_o + 05$	-0.149		(0.121)	-0.210		(0.14)	-0.253		(0.178)
AVIo	$t_o + 06$	-0.083		(0.114)	-0.158		(0.135)	-0.230		(0.185)
AVIo	$t_o + 07$	-0.096		(0.118)	-0.158		(0.143)	-0.192		(0.206)
AVIo	$t_o + 08$	-0.178		(0.128)	-0.274	*	(0.148)	-0.334	*	(0.194)
AVIo	$t_o + 09+$	-0.188		(0.129)	-0.253	*	(0.153)	-0.321		(0.209)
AVIt1	t_a	-0.166		(0.133)	-0.261	*	(0.145)	-0.291		(0.209)
AVIt1	$t_a + 01$	-0.250	*	(0.129)	-0.223		(0.151)	-0.264		(0.223)
AVIt1	$t_a + 02$	-0.219	*	(0.126)	-0.226		(0.14)	-0.267		(0.221)
AVIt1	$t_a + 03$	-0.258	*	(0.139)	-0.320	**	(0.149)	-0.315		(0.227)
AVIt1	$t_a + 04$	-0.262	*	(0.135)	-0.225		(0.155)	-0.224		(0.256)
AVIt1	$t_a + 05$	-0.294		(0.197)	-0.236		(0.222)	-0.246		(0.326)
AVIt1	$t_a + 06$	-0.221		(0.157)	-0.172		(0.19)	-0.191		(0.276)
AVIt1	$t_a + 07$	-0.410	**	(0.208)	-0.369	*	(0.215)	-0.382		(0.313)
AVIt1	$t_a + 08$	-0.329		(0.208)	-0.393		(0.248)	-0.396		(0.321)
AVIt1	$t_a + 09+$	-0.270		(0.167)	-0.386	*	(0.198)	-0.388		(0.307)
AVIt2	$t_a - 09$	-0.157	*	(0.095)	-0.188	*	(0.098)	-0.104		(0.106)
AVIt2	$t_a - 08$	-0.091		(0.083)	-0.122		(0.088)	-0.029		(0.093)
AVIt2	$t_a - 07$	-0.052		(0.066)	-0.060		(0.071)	0.062		(0.099)
AVIt2	$t_a - 06$	-0.057		(0.09)	-0.100		(0.093)	0.019		(0.11)
AVIt2	$t_a - 05$	-0.113		(0.098)	-0.130		(0.104)	0.025		(0.13)
AVIt2	$t_a - 04$	0.030		(0.084)	-0.048		(0.086)	0.105		(0.128)
AVIt2	$t_a - 03$	-0.164		(0.129)	-0.194		(0.138)	-0.031		(0.17)
AVIt2	$t_a - 02$	-0.059		(0.098)	-0.097		(0.11)	0.084		(0.156)
AVIt2	$t_a - 01$	-0.044		(0.085)	-0.071		(0.103)	0.132		(0.155)
AVIt2	t_a	-0.084		(0.117)	-0.124		(0.121)	0.109		(0.178)
AVIt2	$t_a + 01$	-0.065		(0.089)	-0.003		(0.111)	0.239		(0.187)
AVIt2	$t_a + 02$	-0.151		(0.116)	-0.128		(0.123)	0.143		(0.193)
AVIt2	$t_a + 03$	-0.046		(0.092)	-0.079		(0.089)	0.209		(0.195)
AVIt2	$t_a + 04$	-0.052		(0.081)	0.013		(0.097)	0.342	*	(0.207)
AVIt2	$t_a + 05$	-0.137		(0.119)	-0.040		(0.137)	0.280		(0.241)
AVIt2	$t_a + 06$	-0.143		(0.172)	-0.060		(0.194)	0.246		(0.265)
AVIt2	$t_a + 07$	-0.003		(0.091)	0.007		(0.102)	0.305		(0.244)
AVIt2	$t_a + 08$	-0.106		(0.149)	-0.074		(0.163)	0.282		(0.272)
AVIt2	$t_a + 09+$	0.010		(0.112)	0.014		(0.109)	0.342		(0.267)
Cost Airp1					-0.080		(0.08)	-0.064		(0.076)
Cost Airp2					-0.024		(0.091)	0.141		(0.091)
$(ardm_1 \times time\_trend)$								X		
$(ardm_2 \times time\_trend)$								X		
Adj. R^2		0.8774			0.8848			0.8952		
N		5,778			4,381			4,381		

Notes: The coefficients in columns (1) to (3) refer to the adoption of the minimum value of 300 seats sold on average per route and month during the season to consider operation. The dependent variable in columns (1) to (3) is the log of the number of flights. The column (1) corresponds to the estimation of model 2 without control variables. In column (2) we include two variables in the model representing the cost shock. Finally, in column (3) we add to the model in column (2) two trend variables of the airports. The robust standard error is clustered by company-route. * denotes significance at the 10% level. ** denotes significance at the 5% level. *** denotes significance at the 1% level.

Table 7: Effects on number of seats

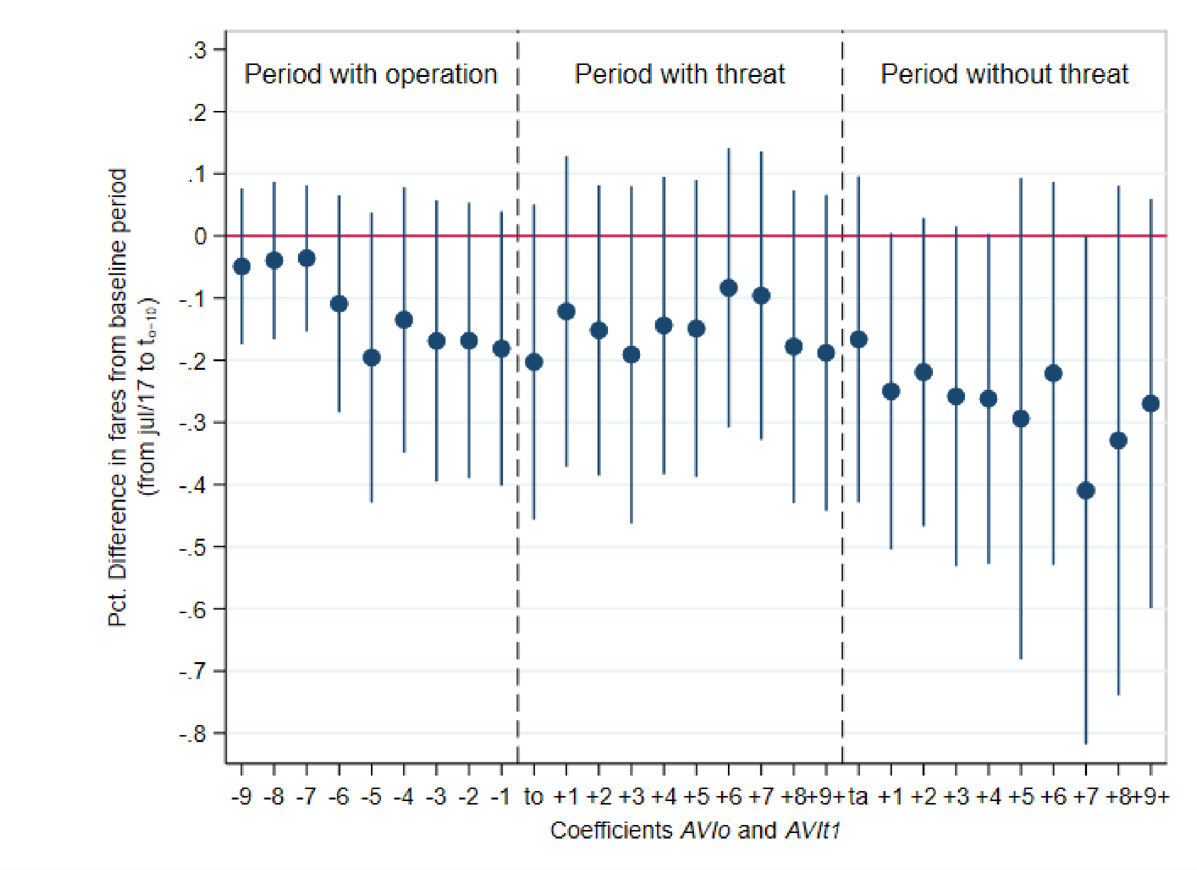
		(1) Nº Assentos Op >300		Robust Std. Err.	(2) Nº Assentos Op >300		Robust Std. Err.	(3) Nº Assentos Op >300		Robust Std. Err.
AVIo	$t_o - 09$	-0.027		(0.064)	-0.051		(0.076)	-0.085		(0.078)
AVIo	$t_o - 08$	-0.021		(0.063)	-0.017		(0.069)	-0.049		(0.081)
AVIo	$t_o - 07$	-0.017		(0.058)	-0.060		(0.063)	-0.119		(0.074)
AVIo	$t_o - 06$	-0.090		(0.091)	-0.120		(0.1)	-0.171		(0.124)
AVIo	$t_o - 05$	-0.176		(0.12)	-0.253	*	(0.135)	-0.324	**	(0.152)
AVIo	$t_o - 04$	-0.128		(0.108)	-0.173		(0.12)	-0.239	*	(0.136)
AVIo	$t_o - 03$	-0.155		(0.114)	-0.201		(0.129)	-0.257	*	(0.146)
AVIo	$t_o - 02$	-0.169		(0.113)	-0.229	*	(0.125)	-0.301	**	(0.149)
AVIo	$t_o - 01$	-0.190	*	(0.112)	-0.245	*	(0.126)	-0.320	**	(0.157)
AVIo	t_o	-0.193		(0.129)	-0.240	*	(0.145)	-0.304	*	(0.176)
AVIo	$t_o + 01$	-0.116		(0.131)	-0.162		(0.148)	-0.227		(0.177)
AVIo	$t_o + 02$	-0.151		(0.124)	-0.215		(0.142)	-0.291		(0.177)
AVIo	$t_o + 03$	-0.197		(0.143)	-0.265		(0.163)	-0.324		(0.198)
AVIo	$t_o + 04$	-0.147		(0.126)	-0.218		(0.145)	-0.275		(0.185)
AVIo	$t_o + 05$	-0.160		(0.125)	-0.216		(0.143)	-0.260		(0.185)
AVIo	$t_o + 06$	-0.093		(0.117)	-0.163		(0.138)	-0.235		(0.193)
AVIo	$t_o + 07$	-0.108		(0.121)	-0.168		(0.145)	-0.202		(0.212)
AVIo	$t_o + 08$	-0.194		(0.132)	-0.288	*	(0.15)	-0.348	*	(0.203)
AVIo	$t_o + 09+$	-0.219		(0.135)	-0.282	*	(0.159)	-0.350		(0.221)
AVIt1	t_a	-0.169		(0.136)	-0.256	*	(0.148)	-0.285		(0.22)
AVIt1	$t_a + 01$	-0.252	*	(0.133)	-0.213		(0.154)	-0.252		(0.235)
AVIt1	$t_a + 02$	-0.228	*	(0.129)	-0.225		(0.142)	-0.263		(0.233)
AVIt1	$t_a + 03$	-0.270	*	(0.139)	-0.320	**	(0.148)	-0.312		(0.239)
AVIt1	$t_a + 04$	-0.271	**	(0.137)	-0.223		(0.156)	-0.219		(0.269)
AVIt1	$t_a + 05$	-0.302		(0.198)	-0.234		(0.222)	-0.241		(0.338)
AVIt1	$t_a + 06$	-0.232		(0.159)	-0.175		(0.19)	-0.186		(0.288)
AVIt1	$t_a + 07$	-0.430	**	(0.211)	-0.392	*	(0.222)	-0.403		(0.325)
AVIt1	$t_a + 08$	-0.329		(0.209)	-0.375		(0.249)	-0.374		(0.332)
AVIt1	$t_a + 09+$	-0.272		(0.17)	-0.372	*	(0.202)	-0.373		(0.32)
AVIt2	$t_a - 09$	-0.168	*	(0.091)	-0.194	**	(0.095)	-0.117		(0.103)
AVIt2	$t_a - 08$	-0.106		(0.082)	-0.135		(0.086)	-0.045		(0.093)
AVIt2	$t_a - 07$	-0.061		(0.067)	-0.070		(0.072)	0.049		(0.1)
AVIt2	$t_a - 06$	-0.076		(0.091)	-0.120		(0.094)	-0.005		(0.111)
AVIt2	$t_a - 05$	-0.116		(0.097)	-0.135		(0.103)	0.014		(0.13)
AVIt2	$t_a - 04$	0.017		(0.083)	-0.062		(0.085)	0.084		(0.128)
AVIt2	$t_a - 03$	-0.171		(0.127)	-0.196		(0.137)	-0.039		(0.169)
AVIt2	$t_a - 02$	-0.068		(0.097)	-0.101		(0.11)	0.075		(0.155)
AVIt2	$t_a - 01$	-0.035		(0.085)	-0.053		(0.104)	0.144		(0.156)
AVIt2	t_a	-0.084		(0.116)	-0.122		(0.121)	0.108		(0.179)
AVIt2	$t_a + 01$	-0.068		(0.09)	0.002		(0.111)	0.240		(0.189)
AVIt2	$t_a + 02$	-0.162		(0.116)	-0.133		(0.124)	0.135		(0.195)
AVIt2	$t_a + 03$	-0.037		(0.093)	-0.061		(0.089)	0.224		(0.197)
AVIt2	$t_a + 04$	-0.052		(0.08)	0.021		(0.095)	0.348	*	(0.209)
AVIt2	$t_a + 05$	-0.133		(0.116)	-0.030		(0.135)	0.288		(0.242)
AVIt2	$t_a + 06$	-0.140		(0.174)	-0.050		(0.195)	0.254		(0.267)
AVIt2	$t_a + 07$	-0.004		(0.091)	0.016		(0.102)	0.308		(0.247)
AVIt2	$t_a + 08$	-0.131		(0.151)	-0.091		(0.165)	0.261		(0.276)
AVIt2	$t_a + 09+$	-0.001		(0.111)	0.008		(0.109)	0.331		(0.271)
Cost Airp1					-0.103		(0.08)	-0.091		(0.076)
Zost Airp2					-0.040		(0.091)	0.135		(0.091)
$(ardm_1 \times time\_trend)$								X		
$(ardm_2 \times time\_trend)$								X		
Adj. R^2		0.8757			0.8821			0.8931		
N		5,778			4,381			4,381		

Notes: The coefficients in columns (1) to (3) refer to the adoption of the minimum value of 300 seats sold on average per route and month during the season to consider operation. The dependent variable in columns (1) to (3) is the log of the number of seats offered. Column (1) corresponds to the estimation of model 2 without control variables. In column (2) we include two variables in the model representing the cost shock. Finally, in column (3) we add to the model in column (2) two trend variables of the airports. The robust standard error is clustered by company-route. * denotes significance at the 10% level. ** denotes significance to the 5% level. *** denotes significance at the 1% level.

B Robustness Models - Quantity

Figure 9: Result of the coefficients of the withdrawal and threat variables using model 2 with the dependent variable number of flights (column (1) from table 6 6)

(a) Routes where Avianca first withdraws operation and then withdraws threat



(b) Routes where Avianca did not operate prior to the threat withdrawal

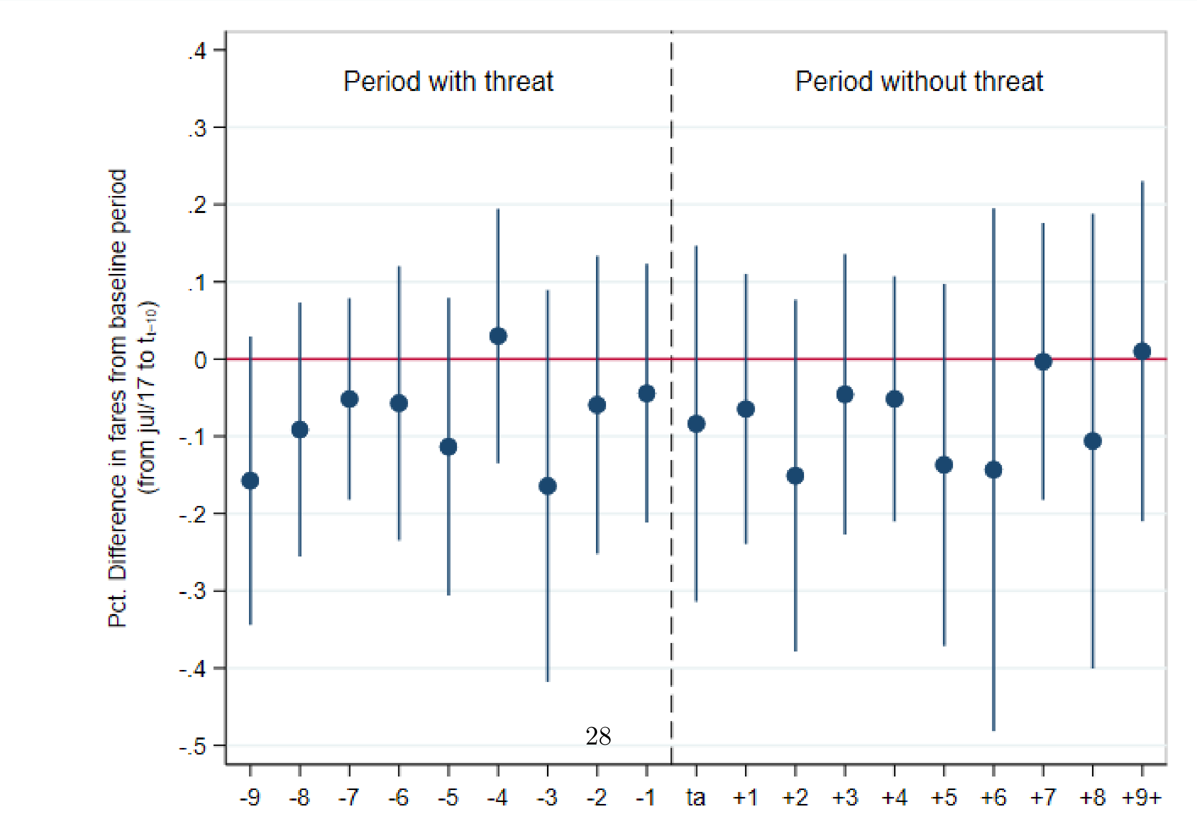
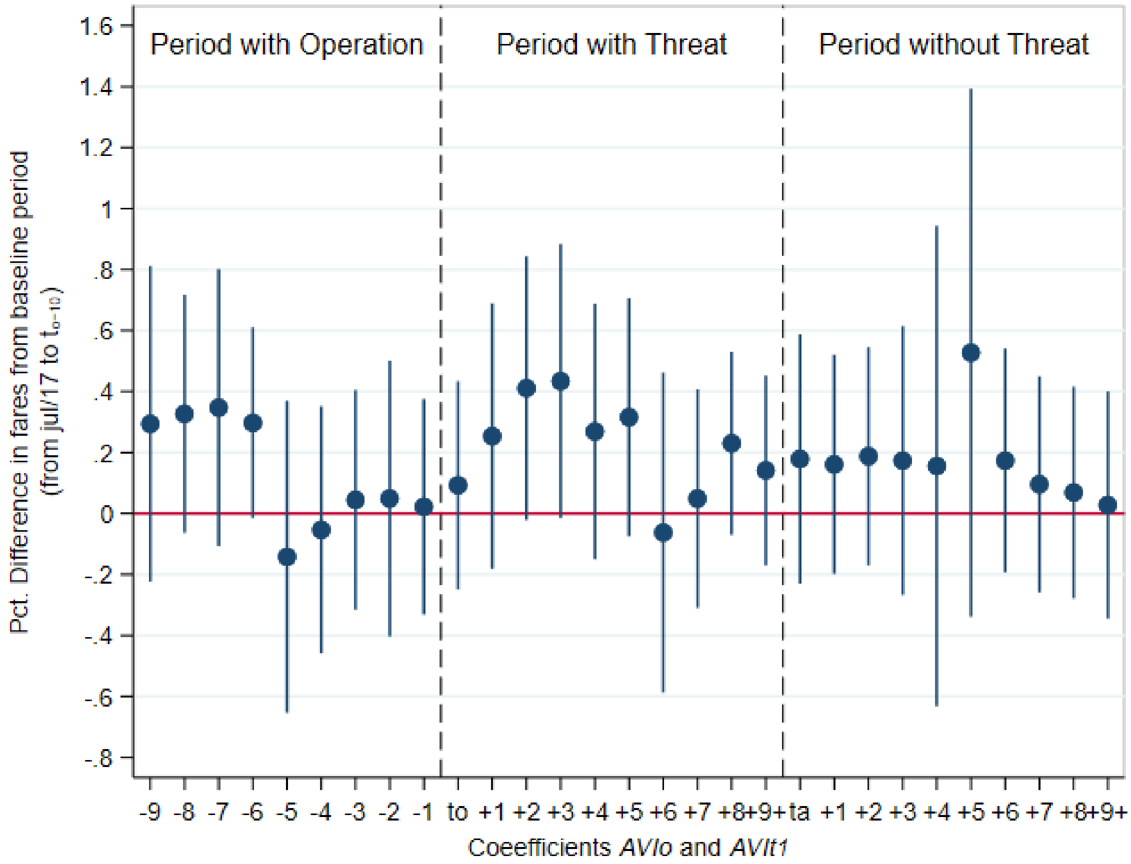


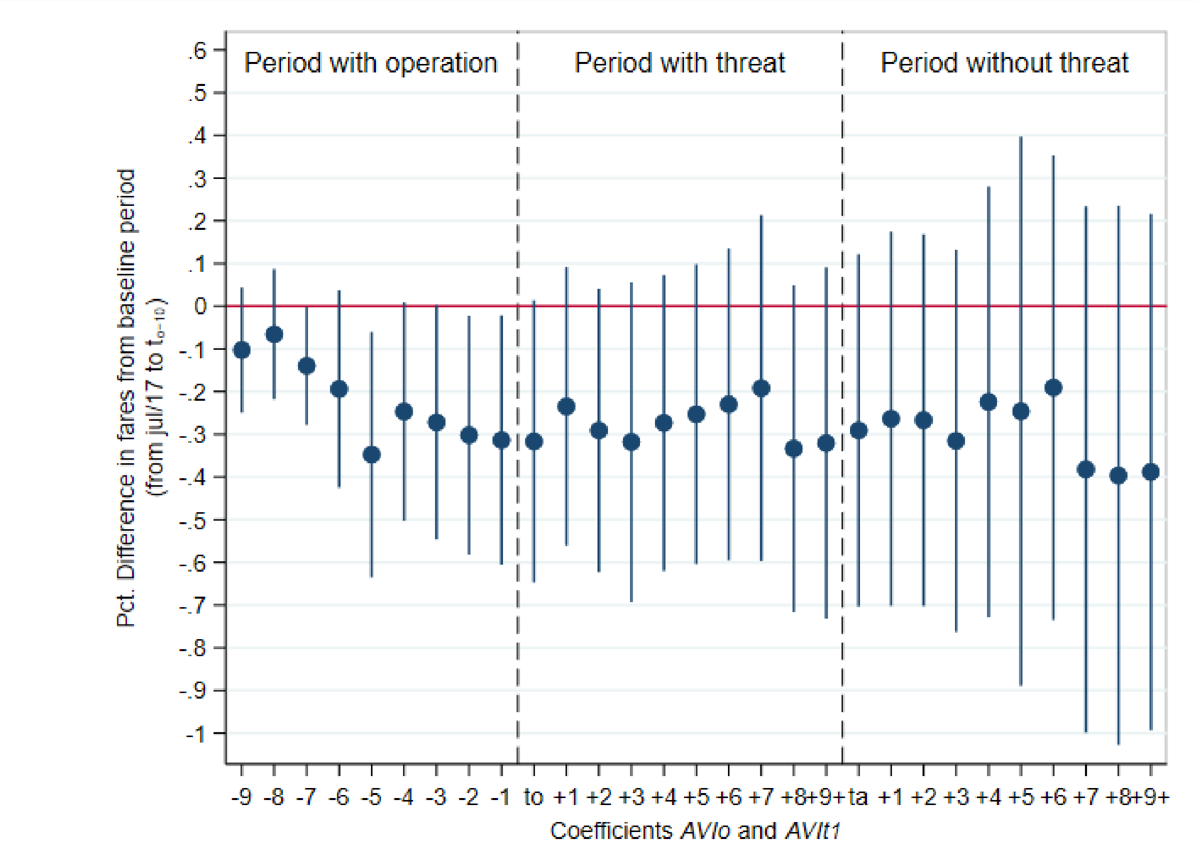
Figure 10: Result of the coefficients of the withdrawal and threat variables using model 2 with the dependent variable number of Azul flights



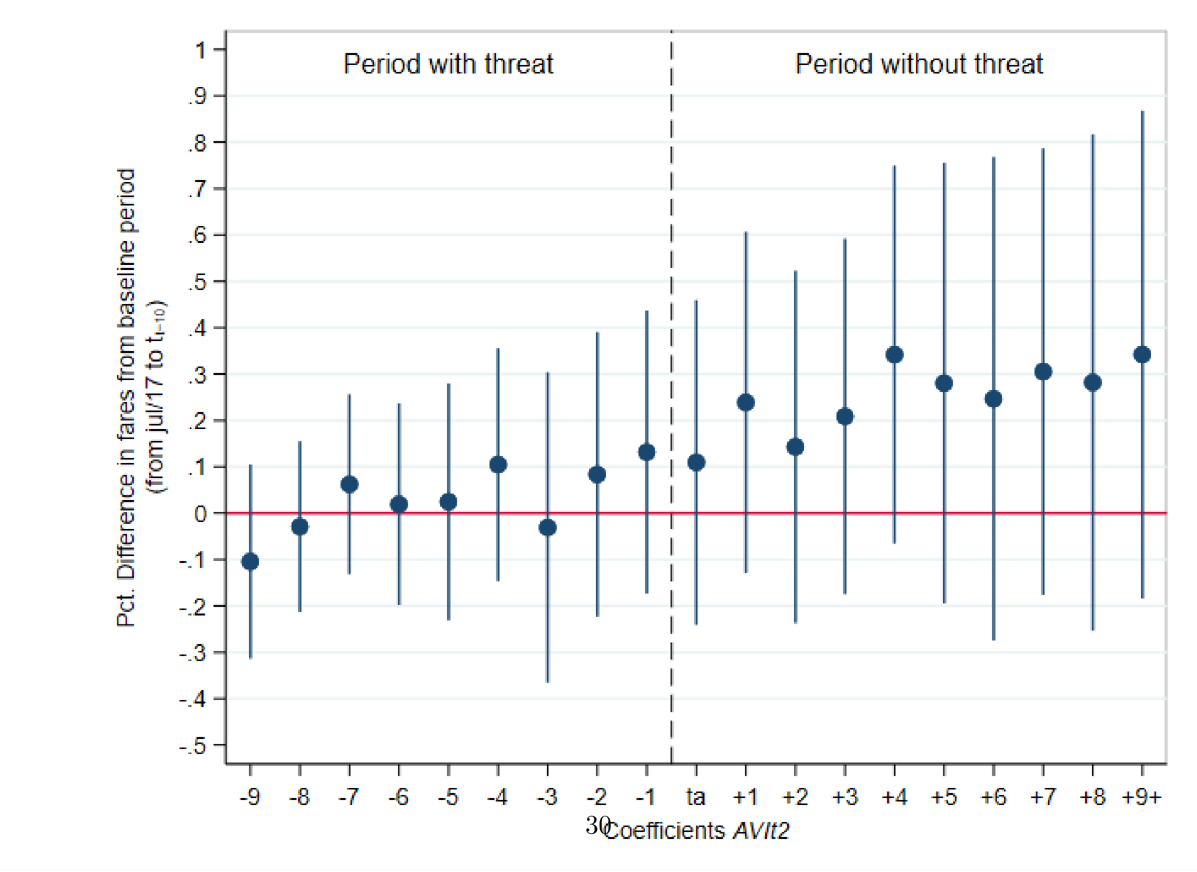
Source: Own elaboration based on ANAC data. *Notes:* to = period in which Avianca withdraws operation; ta = period in which Avianca withdraws threat; IC = 95%.

Figure 11: Result of the coefficients of the withdrawal and threat variables using model 2 with cost shock and trend control of airports and dependent variable number of flights (column (3) of table 6 6)

(a) Routes where Avianca first withdraws operation and then withdraws threat



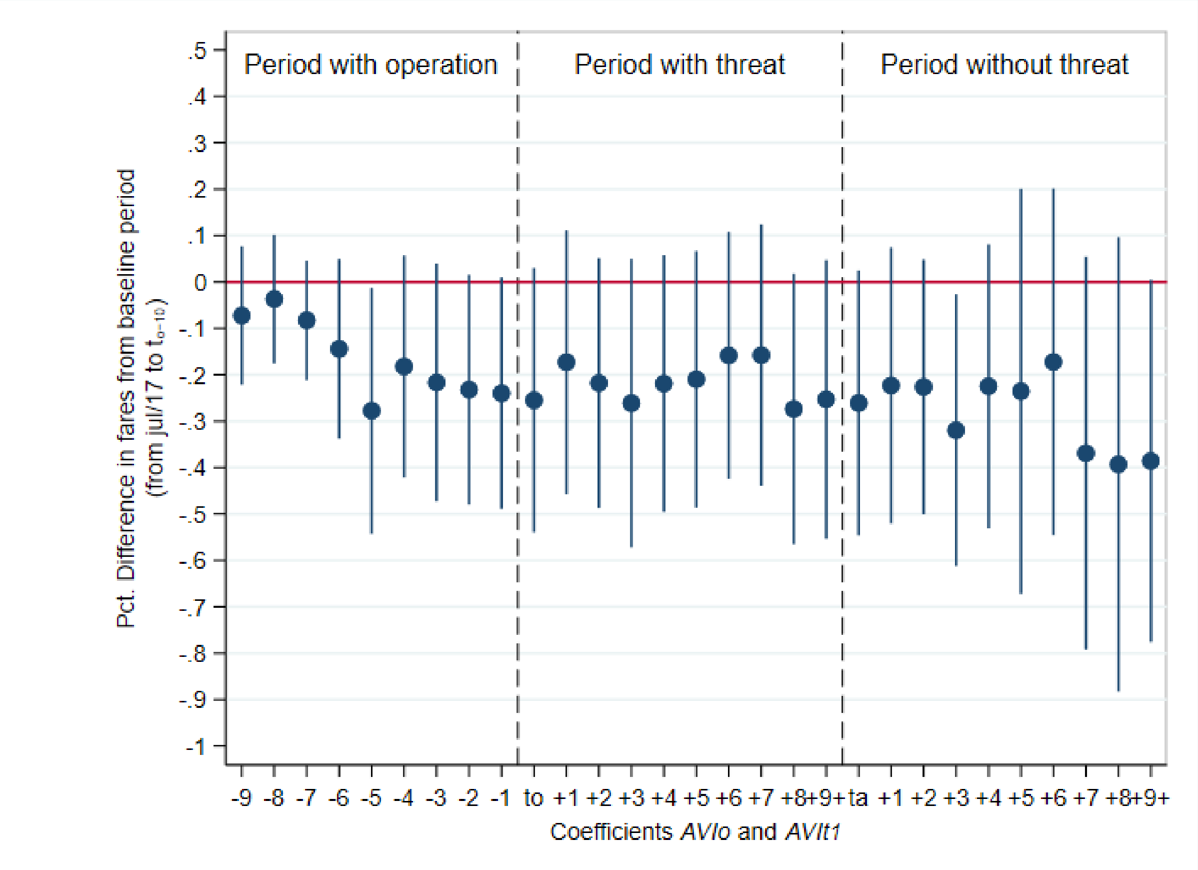
(b) Routes where Avianca did not operate prior to the threat withdrawal



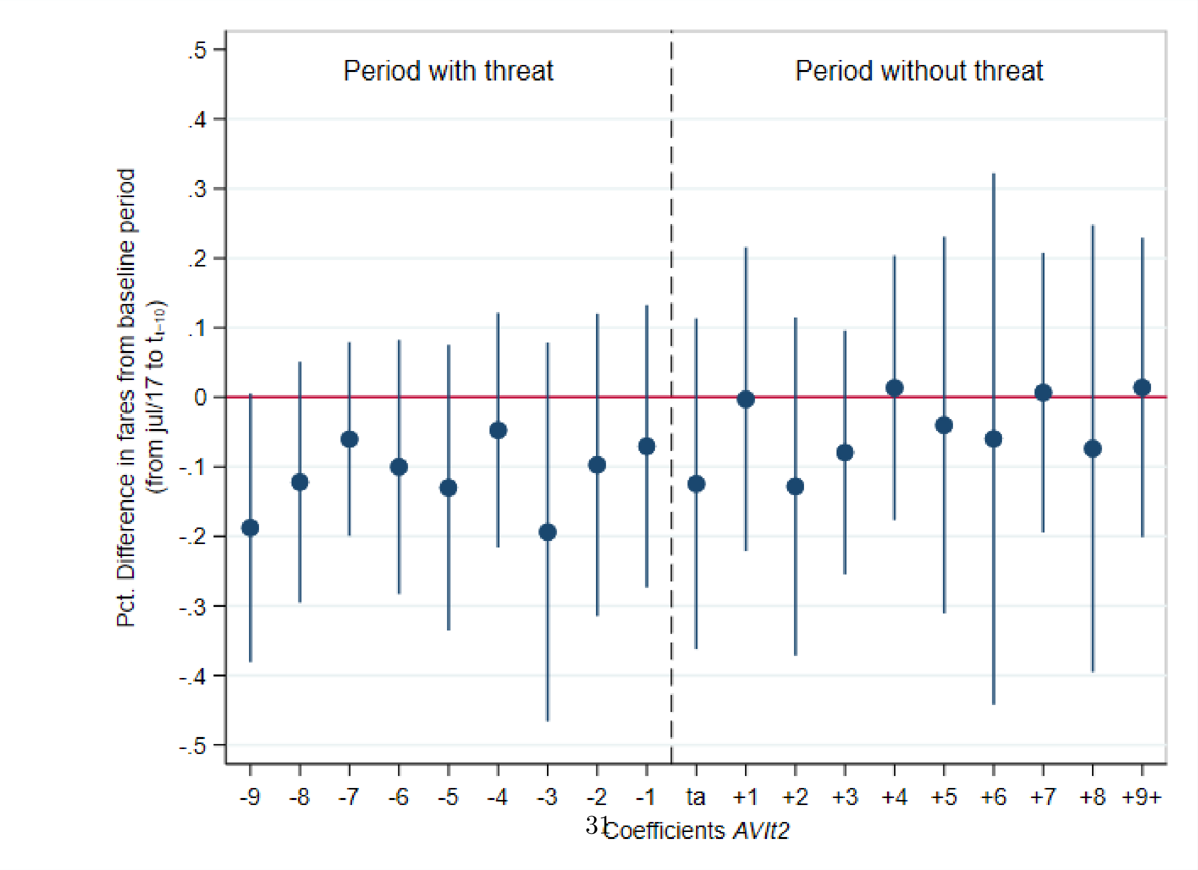
Source: Own elaboration based on ANAC data. *Notes:* to = period in which Avianca withdraws operation; ta = period in which

Figure 12: Result of the coefficients of the withdrawal and threat variables using model 2 with cost shock control and dependent variable number of flights (column (2) of table 6 6)

(a) Routes where Avianca first withdraws operation and then withdraws threat



(b) Routes where Avianca did not operate prior to the threat withdrawal



Source: Own elaboration based on ANAC data. *Notes:* to = period in which Avianca withdraws operation; ta = period in which