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Evolution of the number of airlines on Brazilian routes: estimating the drivers of entry and competition

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Abstract

The present paper presents an empirical investigation on the evolution of the number of air carriers operating in Brazilian routes. We develop an econometric model to estimate the main factors that influence the entry of new carriers on existing domestic markets. Our major finding is that there is a ceteris paribus effect of a downward long-run trend in the route-level number of competing scheduled air carriers. We estimate that the trend effect has the most prominent effect on medium to long haul routes irrespective of market density. We suggest that economic entry barriers may be the primary source of such trend. We also inspect a set of trend-moderation and trend-intensification effects and find evidence that episodes of airline codeshare agreement and bankruptcy had estimated intensification effects whereas a low cost carrier entry produced an estimated moderation effect. Regarding the factors that directly affect the number of companies, we found that demand, GDP per capita and credit per capita has a positive effect of the number of carriers while income concentration (measured by Gini index), unit cost of fuel and the presence of hubs on the route discourage entrants.

Keywords: Airlines, Competition, Air Transport, Entry Strategies, Econometrics.

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Introduction

The present paper develops an empirical model to understand the evolution in the number of Brazilian air companies and which are the mechanisms to induce entrance of new companies. Therefore, we used an econometric model of regression to identify the trend of number of companies on the routes and how the period or route features influence it. Furthermore, the model also investigates financial, operational and demand aspects that could directly affect the interests of carriers, either attracting them or deterring them from entry.

The Brazilian airline market has experienced a sharp growth after the full economic deregulation of 2001 particularly during the late 2000s[1], although the downward trend in the number of air companies, as found by this work. The recent financial crisis the country is facing is affecting the economy of airlines, compromising the stability of the sector. As a mitigation measure, the Brazilian government has supported the entry of foreign capital in order to attract investment to the resumption of growth and such a measure would help bring more companies to compete with the current ones. Therefore, it is important to conduct studies that help in understanding the strategic measures of new company's entry into the country.

Thus, we investigate how is the evolution of the number of air carriers operating in Brazilian routes. The answer of this work aims to determine which factors most encourage / discourage newcomers from entering the routes and also how is the Brazilian trend in the number of companies and which factors has influences on this trend. Considering our major finding that there is a ceteris paribus effect of a downward long-run in the route-level number of competing scheduled air carriers, we suggest that economic entry barriers may be the primary source of such trend. We agree that the public authority must act more actively to reverse this loss of airlines operating in Brazilian routes scenario in order to avoid a legacy carriers' monopoly.

They were not identified academic papers that had as main purpose the understanding of the process of entry of new airlines to Brazilian routes. However, there are plenty studies that collaborate with some points on the subject. Some studies agree in saying that fledgling airlines are more successful in operations in higher density routes (Brueckner and Spiller, 1992; Boguslaski *et al*., 2004; Fu *et al*., 2015) and short and medium-length routes (Boguslaski *et al.*, 2004). Moreover, it is also said that there is a major impact on competition in the presence of low-cost airlines, compared to competition without them, and this generate strong influence on the domestic air transport prices (Dresner *et al.*, 1996; Morrison, 2001; Brueckner *et al.*, 2013). Another contribution was that it was found that companies operating hub-and-spoke routes are willing to lose profit on certain routes in order to reduce competition by discouraging the newcomers entry (Aguirregabiria and Ho, 2012).

We present a framework to analyze both the evolution in the number of companies operating regularly in Brazil and the factors that directly affect the interests of those companies in a single econometric model. Another contribution of the paper lies in the extraction of the trend of number of companies on the routes and how the period or route features influence it.

This article is divided as follows: Section 1 presents a theoretical framework, with a literature review and our conceptual model; Section 2 presents the empirical model development, and econometric model; Section 3 presents the results and some limitations of our work; Section 4 contains the concluding remarks.

[1] Source: Statistical Yearbook of Department of Civil Aviation, 2016

1. Theoretical framework

Our study intends to clarify the evolution of the number of companies operating Brazilian routes and define some mechanisms that could be used to attract newcomers. Among some explored factors for studies analyzing airlines entry strategies there are the routes features demand, distance, presence of hubs, and also financial characteristics of cities served.

1.1. Literature review

The firms' competition on air transport market is a largely explored theme in literature and has a rising academic, business and policy interests once it proposes an understanding on alternative airline network models. Some studies had evolved analyzing airlines entry strategies (Brueckner and Spiller, 1992; Brueckner and Spiller, 1994; Boguslaski *et al.*, 2004; Aguirregabiria and Ho; 2012; Brueckner *et al.*, 2013; Fu *et al.*, 2015).

The characteristics of the routes to be operated are one of the factors most observed by airlines to seek new markets. Observing U.S. airline industry, the authors Boguslaski *et al.* (2004) found that passenger density, flight length, the hubs of its competitors, and income of the population at the cities of a market have been important factors in determining which city-pairs Southwest Airlines, the largest low cost company in North America, chooses to enter (Boguslaski *et al.*,2004).

Besides the route characteristics, it is also observed the idiosyncrasies of the cities to be operated, as income per capita, credit per capita, income concentration (measured by Gini index) and the airport features to be operated. As an example, Aguirregabiria and Ho (2012) discuss the contribution of demand, cost and strategic factors to the adoption of hub-and-spoke network by companies in the US airline industry. They found that the effects of hub-size on entry costs are very substantial, supporting their hypothesis that, for some of larger carriers, the hub-and-spoke network can deter entry of competitors in spoke markets (Aguirregabiria and Ho, 2012).

Observing the Brazilian airline industry, the entry of the first low cost carrier in the country (and also in Latin American), Gol Intelligent Airlines, was made with a very careful choice of markets, as marked by Oliveira (2008). The author has made a framework of discrete choice with random utility to analyze the patterns of entry decisions of the company within the period between 2001 - 2002, with Gol as the decision maker. As alternatives in the route-choice problem, it was used the set of decisions "to enter a route" and "not to enter a route". Among the results, he found that most variables related to density and distance were significant at 5% level. As expected, it was shown that the more is a give route's density of traffic the more it is attractive for LCC entry. About the analyzes of the flight length, the study proved the consistency of Gol's decision making with the pattern of entry classically established by Southwest Airlines with preference for short-haul routes for the start-up year (Oliveira, 2008).

Therefore, we can notice that by looking for understanding the entry behavior of companies in airline industry, there are various factors that have effect on decisions. Our study proposes to estimate, in this line of thinking, what are the variables that makes influences on firms entry on Brazilian air market and how do they interfere on decisions of route choice.

On the other hand, to understand the downward long-run trend in the number of carriers operating Brazilian routes, we consider the airport barriers to entry affecting entry decisions, as studied by Dresner *et al.* (2002). The authors found that the gate constraints due to exclusive leasing arrangements, slot controls, and high utilization of gates during peak operating times contribute to higher yields on routes. And so, it affects directly by an expressive lowering on probabilities of entry (Dresner *et al.*, 2002).

Although there are already studies that have developed theories about the patterns of choice of airlines, including in Brazil with Gol's analyzes made by Oliveira (2008), this paper will focus pioneeringly on the definition of the factors that affect the evolution of the number of operant companies in Brazilian routes, in general. Thus, it intends to fill the gap of literature in this subject.

1.2. Conceptual model

The econometric model for the proposed research is essentially a supply model measured by the number of airlines operating on the route, dependent variable in the equation. As independent variables they were included in the model: the passenger density on the route, the Gross Domestic Product (GDP) averaged of the two cities through gravity model, credit rates granted to the population, coefficient of income concentration, the presence of hubs in route, unit cost of aviation fuel, a trend variable to extract the entry barriers effect and dummies for the period of codeshare Varig-TAM, the period from Varig's bankruptcy, the period from the entry of Azul Linhas Aéreas, Brazilian low cost company, and the strongest period of global financial crisis in Brazil. Moreover, they were also tested dummies of interaction in route distance and density of the route.

As a major contribution of this work we have the definition of ceteris paribus trend of the number of airlines on the routes. If negative trend coefficient, it follows that the number of companies is decreasing on the routes and the propensity is monopoly on the routes for a few or a single operating company. If positive, then the number of companies grows on routes and also increasing the inherent competition.

Regarding the characteristics of the route, and following the thought already addressed by Boguslaski *et al.* (2004) and Oliveira (2008), this paper hypothesizes that there is a greater propensity for operation in high density short routes (**H1**). This goal will be achieved by observing the trend in the interactions between route distance and density.

The conceptual model in Figure 1 shows the number of companies as influenced by Gini index, GDP, Credit, Hubs on route, Demand (endogenous factor as influenced by the other variables), Fuel unit cost and it is also insert the Entry Barriers to find the trend of evolution of the companies in routes. The hypothesis H1 is inside the analysis of entry barriers.

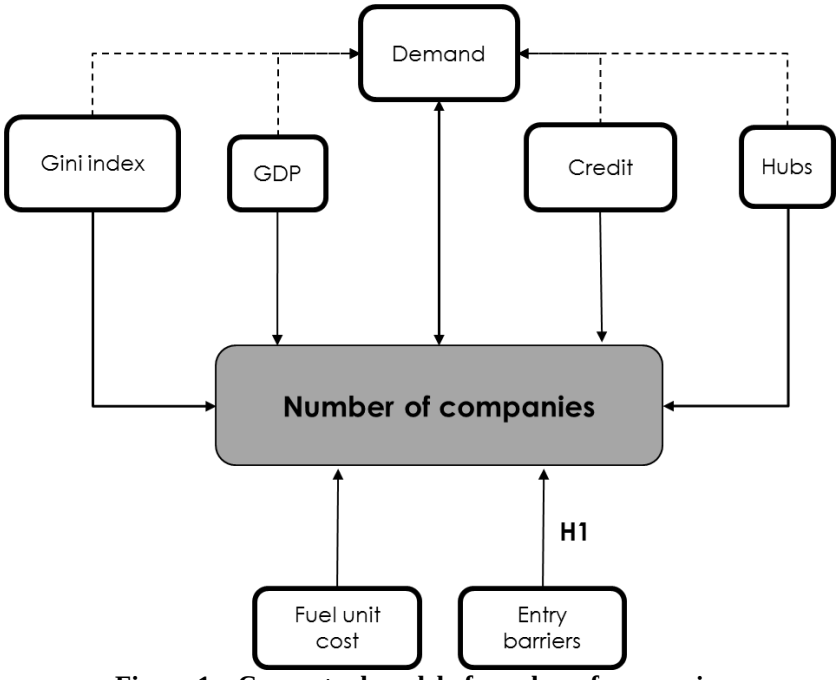

Figure 1 – Conceptual model of number of companies

2. Empirical model development

2.1. Application

Since the birth of the Brazilian civil aviation in 1927 with the founding of the Viação Aérea Rio-Grandense (VARIG), until today, various airlines have gone through the panorama of Brazilian commercial aviation. Some companies ended activities, some were successful and certainly some will arise in this scenario.

The removal of regulatory barriers in the Brazilian airline industry, since the beginning of the 1990s, was of great importance in the process of entry of new airlines, which would lead to the entry of so-called low cost companies in the country. After the VARIG's purchase by Gol, the Brazilian airline market was basically divided between two companies: TAM and Gol, which held a duopoly of routes in the country. With Azul's entry into the scene, there is an increase in competition in air transport.

Since the process of deregulation in the Brazilian airline industry, in 2001, the country has experienced a sharp growth in demand for air transport, particularly during the late 2000s and early 2010s, as shown by Rolim *et al.* (2016) in the above, at Table 1. In contrast, the number of airlines operating on Brazilian routes in same period, shown at Figure 2, had presented an intense variation along the years with a visible downward trend in the last 5 years observed, as marked.

Table 1 – Air travel evolution in Brazil

Year	Total domestic Brazil	International gateway (GRU)	Domestic hub (BSB)	Secondary airport (VCP)	Other airports
Average year-over-year growth (%)					
2000–2005	6.2%	–1.8%	8.9%	5.8%	8.0%
2005–2010	13.2%	22.7%	14.3%	44.1%	8.2%
2010–2011	18.8%	16.4%	8.2%	43.6%	20.5%
2011–2012	8.1%	12.7%	5.8%	18.5%	5.1%
2012–2013	0.5%	8.0%	0.2%	8.2%	–4.2%

Source: National Civil Aviation Agency, Route Traffic Report, consolidated by Rolim *et al.* (2016)

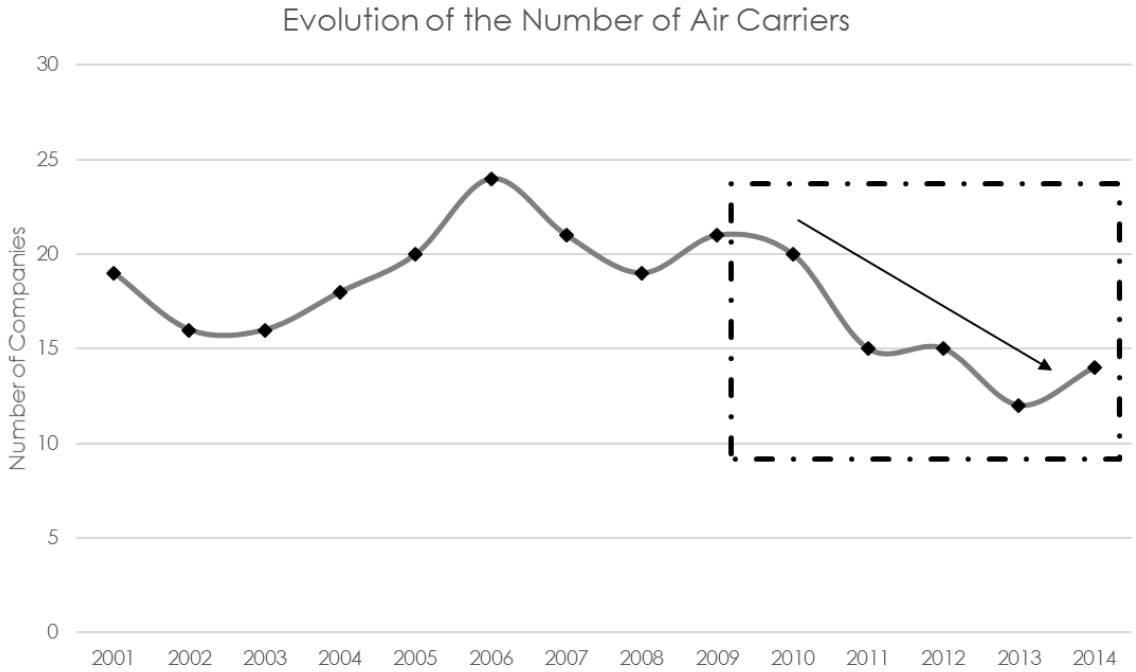

Figure 2: Graph of the number or airlines between 2001 and 2014.
Source: Statistical Yearbook of National Civil Aviation Agency, 2016

The recent financial crisis that Brazil is facing affects the economy of airlines, compromising the stability of the sector. As a mitigation measure, the Brazilian government has supported the entry of foreign capital in order to attract investment to the resumption of growth and such a measure would help bring more companies to compete with the current ones. Therefore, it is important to conduct studies to help in understanding the strategic measures of new companies into the country. So, the present paper develops an empirical model to understand the evolution in the number of Brazilian air companies and which are the mechanisms to induce entrance of new companies.

2.2. Data

The used database is a data panel in that the group of individuals are the routes that exist between pairs of origin and destination, furnished by National Civil Aviation Agency (ANAC). In the multiple airports regions, the routes have been grouped for the metropolitan region, as is the case of MRSP - grouping routes serving the Metropolitan Region of São Paulo. The base time interval begins in January 2002 and ending in December 2012. In this way, the database to be worked has 41,460 observations. The econometric model is an offer of regression of log-log type whose returning is the number of airlines.

2.3. Empirical model

Equation (1) shows the proposed empirical model of number of companies in Brazilian airline market:

$$\begin{aligned}\ln(\mathrm{n}) = {} & \beta_0 + \beta_1 \ln(\mathrm{demand}) + \beta_2 \ln(\mathrm{GDP_{gr}}) + \beta_3 \ln(\mathrm{Credit_{gr}}) + \beta_4 \ln(\mathrm{Gini_{gr}}) \\ & + \beta_5 \ln(\mathrm{c_{fueh}}) + \beta_6 \ln(\mathrm{Hub}) + \beta_7 \ln(\mathrm{trend}) + \\ & \beta_8 \mathrm{t\_cshare} + \beta_9 \mathrm{t\_posvr} + \beta_{10} \mathrm{t\_fincrisis} + \beta_{11} \mathrm{t\_posazu} \\ & + \sum_{i=12}^{20} \beta_i \, \mathrm{t\_dkm\_} * \mathrm{\_pdew\_} * + \varepsilon_t \end{aligned} \quad (1)$$

where:

- y or n is the number of carriers operating in Brazilian routes;
- x_1 or demand is the diary number of passengers in each way of the route;
- x_2 or $\mathrm{GDP_{gr}}$ is the gravitational value of Gross Domestic Product per capita of route;
- x_3 or $\mathrm{Credit_{gr}}$ is the gravitational value of Credit per capita of route;
- x_4 or $\mathrm{Gini_{gr}}$ is the gravitational value of Gini index of route;
- x_5 or $\mathrm{c_{fueh}}$ is the unitary cost of jet fuel;
- x_6 or Hub is the presence of hubs on route;
- x_7 or trend is a variable of tendency, that extract the effect of entry barriers;
- x_8 or t_cshare is a dummy variable for period in which the codeshare agreement between the major carriers TAM and Varig had operations;
- x_9 or t_posvr is a dummy variable for period in which the major Varig had bankrupt;

- x_{10} or t_fincrisis is a dummy variable for period of global financial crisis;
- x_{11} or t_posazu is a dummy variable for period in which the LCC carrier Azul Linhas Aéreas had started its operations;
- x_8 or t_dkm_ ∗ _pdew_ ∗ is a set of dummies variables of haul and density of routes;
- $\beta_0, \ldots, \beta_{20}$ are unknown parameters;
- ε_t is the disturbances term.

Inside the set of dummies variables of haul and density routes, it will be tested our hypothesis that airlines are willing to operate in dense and short/medium haul. That would be achieved by observing the coefficients of those relative dummies. If trend were negative, it is expected that the value of dense and short/medium haul coefficients to be inferior comparing to the other routes. If positive trend, otherwise, the opposite.

Table 2 shows the descriptive statistics of the main variables. The Pearson correlation coefficient shows the correlation between the variables in a range from 1 to -1, where the unit means perfect correlation (positive or negative) and the closer to zero, the minor are the dependency of each other. It can be said that the correlation between the model regressors are low, with the exception only of Credit and GDP variables, whose correlation is above 0.75.

Table 2 – Pearson Correlation and descriptive statistics of continuous variables

Variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pearson Correlation									
ln(n)	(1)	1							
ln(demand)	(2)	0.5990	1						
ln(GDP_{gr})	(3)	0.0878	0.4303	1					
ln($Credit_{gr}$)	(4)	0.1954	0.5403	0.7722	1				
ln($Gini_{gr}$)	(5)	0.0685	-0.1164	-0.2407	-0.3142	1			
ln(c_{fueh})	(6)	0.3063	0.2676	-0.0011	0.0435	0.2186	1		
ln(Hub)	(7)	0.1550	0.2810	0.4664	0.3894	0.3391	0.1265	1	
trend	(8)	-0.0824	0.2164	0.3393	0.2499	-0.5133	-0.0975	-0.0269	1
Univariate statistics									
Mean		0.94	5.28	15.11	13.35	-1.24	8.70	-1.99	70.88
SD		0.46	1.16	0.75	1.92	0.12	0.48	0.76	37.69
Min		0.00	3.40	12.39	4.21	-1.72	4.85	-10.22	1.00
Max		2.08	9.38	17.10	18.35	-0.88	10.50	-0.56	132.00

2.4. Estimation strategy

2.4.1. Stationarity and cointegration

In order to detect the existence of a spurious relationship in the regression analysis, it is tested the presence of unit root for every continuous variable in the dataset, namely demand, GDPgr, Creditgr, Ginigr, cfueh and Hub. To accomplish that, we used the Augmented Dickey-Fuller test (ADF). We performed the test with a deterministic trend, and with a number of lagged first differences suggested by the most commonly used criteria[2]. The calculated ADF statistics for GDPgr, Creditgr and Ginigr exceeded the critical value at the 10% level significance, with unit root not rejected and therefore meaning they are nonstationary. However, we can prove the existence of one or more linear combinations among them, that is stationarity, whether we find that these variables may be cointegrated. If these variables are cointegrated, then there is a stable long run or equilibrium linear relationship among them. A formal test for cointegration was therefore performed, using Johansen's maximum likelihood method. We implemented the Johansen procedure with a linear deterministic trend, an intercept included in the cointegrating equation, and the selected lag order of 2, suggested by the majority of a range of selection criteria[3]. At the 5% level significance, we rejected the null hypothesis of no cointegration for all variables.

2.4.2. Multicolinearity, heteroskedasticity, autocorrelation

To define the degree to which the variance of estimates was inflated by multicollinearity phenomenon, we use a formal detection-tolerance by calculating the variance inflation factor (VIF). The mean VIF was greater than unity (4.22) and, the trend and t_posvrg had calculated VIF figures greater than ten[4]. This is indicative of multicolinearity that may inflate the estimation of standard errors of some of these estimates and therefore results on the statistical insignificance of some regressors must be interpreted with caution.

We tested for heteroskedasticity and autocorrelation in the residuals. First, we implemented the Pagan-Hall, White/Koenker and Breusch-Pagan/Godfrey/Cook-Weisberg heteroskedasticity tests using alternative specifications of levels, squares, cross products of regressors and also fitted values of the regressand. The application of these tests suggested the rejection of the null of homoskedastic disturbances. We also implemented a Cumby-Huizinga test of autocorrelation (once accounting for heteroskedasticity and endogeneity[5]) for several order specifications. These tests suggested the presence of autocorrelation. We therefore employed the procedure of Newey-West to adjust the standard error estimates.

2.4.3. Estimator

The estimation method employed is, the fixed-effect with statistics robust to arbitrary heteroskedasticity and autocorrelation, there are both time (periods) and section (route haul and density) fixed effects.

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[2] Namely, Ng–Perron sequential t (STNP), minimum Schwarz information criterion (SIC) and Ng–Perron modified Akaike information criterion (MAIC).

[3] The criteria used were: Final Prediction Error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC), and the Hannan and Quinn information criterion (HQIC).

[4] Respectively, 20.76 and 15.86.

[5] On the issue of endogeneity, see the discussion below.

3. Results

Table 3 presents the estimation results of the empirical model of number of companies operating in Brazilian routes.

Table 3 - Estimation results[6]

	(1) ln(n)	(2) ln(n)
ln demand	0.2740***	0.2734***
ln GDP_{gr}	0.2631***	0.2831***
ln $Credit_{gr}$	0.0606***	0.0579***
ln $Gini_{gr}$	-0.2513***	-0.1770***
ln c_{fueh}	-0.0267***	-0.0227***
ln Hub	-0.0218***	-0.0218***
trend	-0.0060***	
t x codeshare		-0.0025***
t x post leg bankr		-0.0017***
t x global fin cris		-0.0008***
t x post lcc compet		0.0005**
t x sho hau, low den		-0.0041***
t x sho hau, med den		-0.0041***
t x sho hau, hig den		-0.0040***
t x med hau, low den		-0.0053***
t x med hau, med den		-0.0047***
t x med hau, hig den		-0.0040***
t x hig hau, low den		-0.0049***
t x hig hau, med den		-0.0052***
t x hig hau, hig den		-0.0055***
Adj_R2	0.1515	0.1598
RMSE	0.2718	0.2705
F	59.194	57.687
N_Obs	41269	41269

Here we generated two models, whose results are presented in those two columns of Table 3. Both models initially present the coefficients of the factors that may affect directly the entry decisions of airlines, then it is presented the results of trend. In the first model we introduced the trend variable only to extract the behavior of the number of airlines, considering everything else constant. In the second model are made trend interactions with period and route dummies in order to detect the influence of temporal occurrences and the influence of routes features, the distance and density, in the attraction / repulsion of newcomers.

The models show similar results for the factors that act directly in companies' decisions. From the first model, we can extract our major finding that there is a ceteris paribus effect of the downward trend in the number of air carriers operating on Brazilian routes, as it has a negative signal. We infer that this fall can be due to entry barriers, as congestion made by high utilization of airport facilities during peak operating times and the dominance of legacy at the airports, agreeing with Dresner *et al.* (2002). To reverse this loss of airlines operating in Brazilian routes scenario, the public authority must act more actively in order to avoid a legacy carriers monopoly. In order to understand all other variables, it will be used the second model, since it has all results about trend interactions.

[6] statistics robust and efficient to arbitrary heteroskedasticity and autocorrelation; figures are representative of the estimated elasticities calculated at the sample mean; P-value representations: ***p<0.01, ** p<0.05, * p<0.10.

Since our regression analysis is a log-log type, we can extract directly the elasticities of the variables. About the factors that positively interact with the number of companies on routes, and thus could induce new companies' entrance, we found that: 1% in increase of demand on the route influences the entry of newcomers in 0.27%, converging with other studies (Boguslaski *et al,* 2004; Fu *et al*, 2015); 1% on the increase in GDP per capita influences the entry in 0.26%; and 1% increase in the Credit per capita influences the entry in 0.06%. Here draws the conclusion that the demand on the route and GDP are the factors that influence more strongly on increasing the number of carriers on Brazilian routes

About the factors that interact in negative way with the number of companies, and thus could repel possible newcomers, we have that: 1% increase in the Gini coefficient (income concentration coefficient on route) discourages the entry of new companies by 0.25%; 1% increase in the unit cost of fuel discourages the entry in 0.03%; and 1% in the increased presence of hubs in Brazilian routes discourages the entry of newcomers companies at 0.02%, what converges with the analysis of Aguirregabiria and Ho (2012). From this analysis it is concluded that the main factor that discourages the entry of airlines in Brazilian routes is the income concentration of cities served by the route.

Concerning the downward trend found in the first model, the second shows us that in the periods of codeshare Varig-TAM, Varig's bankruptcy and the global financial crisis had intensification in the fall, whereas those periods could be related to market instability. Differently, in the period of Azul's entry there was a moderation of this behavior, inducing newcomers, since this period can be seen as a secure market's moment. About the routes features, it has evidences in the results that dense flights with short and medium haul the fall is less pronounced than in longer routes, and this moderation tendency is even more pronounced in high density routes. These results converge with Boguslaski *et al.* (2004) e Oliveira (2008), as analyzed before. The falling intensification of tendency in long routes could be interpreted by the dominance of legacy carriers on those routes as they usually have aircrafts of longer-range, as an example of entry barriers of those kind of routes.

A limitation of this work, so far is the endogeneity of demand variable. Since it will be instrumented, the robustness check and further analysis can be made. Furthermore, we have still variables that could discourage newcomers which were not possible to insert in the analysis as tributes and risks inherent at the carriers' operation.

4. Conclusion

The present work presents an investigation about how is the evolution of the number of air carriers operating in Brazilian routes and which factors influence the entry of new companies on existing domestic routes. To achieve this goal, we used the fixed-effect estimation controlling period and route features. Here, our principal contribution was the detection a falling trend on number of companies operating on Brazilian routes, that could be due to entry barriers, as discussed by Dresner *et al.* (2002), as congestion made by high utilization of airport facilities during peak operating times and the dominance of legacy at the airports. Besides that, the migration of a regulated market to a deregulated could also be an important factor to comprehend this falling since we can hypothesize that the previous number of companies operating on Brazilian routes were artificial. As a mitigation measures to revert the scenario of losing of firms in the sector, several public policies could be applied by authorities: as the adoption of slot controls favoring newcomers and minor carriers, investments in airports, tax cuts, reform of the Brazilian Code of Aeronautics and permission the entry of foreign capital, among others.

As factors that could induce newcomers it was also founded that demand on the route (Boguslaski *et al*, 2004; Fu *et al,* 2015) and GDP are the factors most attractive to entrance of new carriers and that the income concentration is the most repulsing factor to companies. Moreover, concerning the

historical events, we found that periods of codeshare between Varig-TAM, Varig's bankruptcy and the global financial crisis had intensification in the fall, while in the period of Azul's entry there was a moderation of this behavior. So, we can conclude that since the market shows instability, the entry is discouraged. On the other hand, since one new company has started its operations, it is shown a secure market and it is a mechanism that induces newcomers.

Furthermore, about the routes features, it has evidences that dense and flights with short and medium haul are preferred by newcomers, as seen in other studies (Boguslaski *et al.*, 2004 e Oliveira,2008). We conclude that the falling intensification of tendency in long routes could be interpreted by the dominance of legacy carriers on those routes as they usually have aircrafts of longer-range, as an example of entry barriers of those kind of routes.

Lastly, we have the limitation in endogenous behavior of demand and it is necessary instrumentation in order to achieve concrete results. Also, we have still variables that could discourage newcomers which were not possible to insert in the analysis as tributes and risks inherent at the carriers' operation.

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