Does Multipoint Competition amongst European Airlines lead to a reduction of competitive pressure? An empirical test of the Mutual Forbearance Hypothesis.

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Multipoint competition refers to situations in which firms meet the same rivals in many markets, which may lead to a reduction of competitive pressure. Indeed, a high number of multipoint contacts between two rivals provides many footholds in each other's strategic territories – called spheres of influence - increasing the deterrents to attack.,This situation is known under Mutual Forbearance (MF) Hypothesis, which proposes that firms wich are multipoint competitors will compete less intensively with one another.

The aim of the paper is neither to provide a forecasting analysis of European airlines competitive behaviour. The current research work tries to investigate and to explain, based on past observations, one particular aspect of airlines competitive behaviour – namely deciding to compete less intensely with rivals - in a multipoint competition context. While MF hypothesis has been validated in most empirical and quantitative studies for the US airlines industry, no such in-depth analysis has been performed so far for the European market.

Our empirical results aim to answer the following problematic: **Does multipoint competition among European airlines, with reciprocal spheres of influence, lead to mutual forebearance strategies (reduction in competitive pressure) as it has been shown for the US airlines industry in the late 90s?**

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1. Theoretical background

1.1. Multipoint Competition and Mutual Forbearance

Multipoint competition refers to situations in which firms meet the same rivals in many geographical territories and/or products (Jayachadran et al. 1999). The Airline Industry is an ideal candidate to test hypotheses in a multipoint competition context, mainly because, each market can be clearly delimited by a connection between city pairs. The theory of multipoint competition suggests that the phenomenon of MF may reduce the market level intensity of competition between two firms when the multimarket contacts between them (the number of markets in which they compete) increases. In fact, there is a large consensus in the Strategic Management litterature (Karnani and Wernerfelt, 1985; Evans et Kessides,1994; Chen, 1996; Gimeno, 1999), arguing that, under certain conditions, multipoint competition leads to mutual forbearance (Edwards, 1955) and to greater performance. Evidence has been found within the US airlines industry but also within the banking and the telecommunications industries. The current research proposes to test the MF hypothesis using data from the European airline industry.

The MF, a form of tacit collusion in which airlines avoid competitive attacks against rivals they meet in multiple city pairs markets, may occur because multipoint competition increases the familiarity between airlines and their ability to deter each other (Jayachadran et al. 1999). We can expect that airlines achieving MF strategies, will keep constant their competitive commitment on the route over time (no increase in market share, no change in flight frequency).

America West, a US base Regional airline, started flights from Houston, Texas, with low introductory fares. In November 1989, Continental Airlines, the dominant airline in Houston, retaliated against this "attack" by lowering prices. However, instead of lowering prices from flight originating from Houston, Continental Airlines lowered prices from flights out of Phoenix, Arizona, America West's Hub and dominant served market. Furthermore, Continental Airlines, in posting the lower fares on computerized reservation systems, used a fare code intended to communicate its displeasure with and response to America West's low priced entry into Houston. Subsequently, America West withdrew its low fare promotion in the Phoenix market.

Continental Airlines and America West subsequently entered into a code sharing arrangement, an alliance in which they coordinate their flight schedules on certain routes and feed passengers into each others's connecting flights. Extracted from Wall Street Journal (1990)

Indeed, a high number of multipoint contacts between two rivals provides many footholds in each other's strategic territories, increasing the deterrents to attack. As the resources required for response already exist, each potential attack faces the possibility of a rapid retaliation and a potential escalation in the future. Under such conditions, the reduction of competitive pressure allows the maintenance of a high price level and the avoidance of costly dyadic interactions, attacks and responses (Smith et al. 1992). There are strong arguments in support of a positive correlation between mutual forbearance and performance (Gimeno and Woo, 1999). Research performed with data about US airlines indicates that multipoint competition allows those airlines to achieve a greater performance through offering a higher level of fares and through reducing competitive pressure; hence ensuring sustainable market positions over time.

However, not all multipoint competition situations lead to successfull mutual forbearance strategies (Karnani and Wernerfelt, 1985). Indeed, an airline can meet a rival in multiple markets, but if there exists no credible potential for competitive retaliation in those markets, a reduction of competitive pressure could never occur.

1.2. Airlines' Spheres of Influence

The main condition identified in the literature concerns the mutual recognition of each other's spheres of influence (Bernheim and Winston, 1990; Evans and Kessides, 1994; Gimeno, 1999).

While multipoint competition implies that a set of airlines have some similarity in their city pair market scope, it certainly doesn't imply that airlines assign the same strategic importance to those markets in which they overlap. A given airline may assign different degrees of strategic importance to its different positions across mulitple markets. Moreover, competitors within a given city pair market may assign different strategic importance to their position in that market, leading to a situation of asymmetric territorial interests (Gimeno, 1999). **Multipoint competition lead to mutual forbearance when there is a mutual recognition of each other's strategic markets between multipoint competitors.**

1.3. Multimarket Contacts with Reciprocal Spheres of Influence

Multipoint competitors can develop a tacit agreement by which each firm recognises the most important territories of their competitors since all territories served by a firm do not necessarily have the same strategic character. This phenomenon can lead to a tacit creation of spheres of influence. In this situation, each airline tacitly avoids expanding into the rivals' territories, and focuses instead on exploiting its owns. In the extreme case, airlines may even partially or totally pull out from their rivals' territories, in the expectation that their rivals will reciprocate in kind. However, the multipoint competition theory suggests that leaders (for instance, the company with highest market share) in a multipoint competition context, have an interest in keeping footholds in their rivals' sphere of influence in order to maintain an higher equilibrium to deter them.

The downside is that multipoint competition literature has not clearly determined which dimension best describes the importance of the strategic interest of a firm in a market, or which dimensions are used by firms to outline spheres of influence (Gimeno, 1999).

2.Empirical results of previous studies on US Airlines Industry

If Sandler (1988) has found that a multimarket contact is related positively to rivalry, most of empirical studies done later, showed consistently opposite results. Sadler's results may be related to the fact his study has considered each multimarket as 'equal', assuming that all territories had the same strategic interest for airlines. Singal (1993), first showed that multimarket contact has a significant positive effect on US airlines performance, measured in terms of yield per mile. Airlines have a clear interest to establish footholds in rivals' main markets, to perform higher fares in their own markets. Based on a more robust methodology, Evans and Kessides (1994) showed that multimarket contact has a strong positive effect on fares charged by US airlines. Using the same database, Gimeno (1999) found that multimarket contacts with reciprocity of dominant position decrease rivalry and increase leader's market share sustainability more than would be the case with non reciprocal multimarket contacts. Based on a different measure of US airlines' competitive behavior – namely the rate of airlines' market entry and market exit considered as the aggregate measure of interfirm rivalry -,,Baum and Korn (1996 and 1999) showed that multimarket contacts and their interactions with spheres of influence are related significantly to lower entry and exit, according to the Mutual Forebearance hypothesis.

As mentioned in the introduction, our purpose in this paper is to investigate the impacts of multimarket contacts on firm behavior. Two approaches can be used to proxy airline's intensity of rivalry. Papers frequently use price-costs margins or prices levels. Some more recent research work uses a more direct evaluation of rivalry through observation of competitive behaviour undertaken by airlines. The current research work is based on the second approach and uses information about airlines' entry market, exit market and airline's changing position in market commitment (such as change in route flight frequency, change in route seats capacity and its change in route market share), when the number of carriers opertaing on a city pair remains constant over periods.

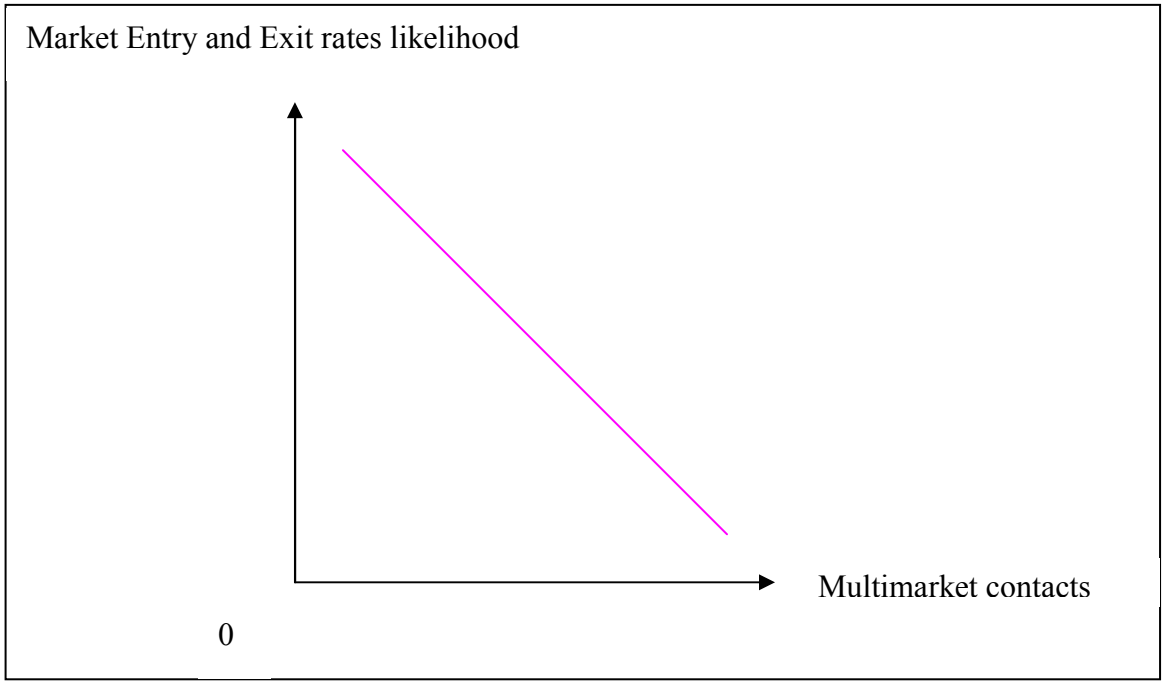
3. Multimarket contacts and the dynamics of market entry and exit.

The mutual forbearance hypothesis implies that rivalry will be weaker among multimarket competitors. As multimarket contacts between a focal firm i and another firm j increase, the likelihood that i and j will will behave agressively towards one another decreases. Thus, multimarket contacts has an important implication for patterns of competitive and counter competitive market entry and exit moves.

In markets in which the number of multipoint contacts is low, each firm has an incentive to establish a foothold in at least some of the same markets of their rivals in order to signal its ability to engage effectively in a multimarket retaliation, should the rival decide to attack. However, as multimarket contact increases, and firms recognise their competitive interdependance, each company has an incentive to avoid entering a new market that is currently occupied by firms that it already meets in multiple markets, to discourage multimarket retaliation but also to honor any tacit agreement. At the same time, as multimarket contact increases, each multimarket firm has an incentive to remain in markets occupied by firms it meets in mulitple markets in order to signal its ability to respond to rivalrous actions in a given market as well as to impose multimarket retaliation in response to aggressive actions in other markets. The likelihood of a firm exiting a market may also decline, as an increase in multimarket contacts with its competitors in that market diminishes the agressiveness of its competitors. Conversely, as a result of mutual forbearance behaviour, multimarket firms may tend to behave agressively toward firms they meet in one or only a

few markets. If multimarket firms forbear from agressive behavior towards one another, their competitive resources may be directed towards those rivals they meet in one or a few markets. Thus, multimarket firms can have low multimarket contacts with others firms, and when they do, they may be fierce rivals. Figure 1 summarizes the arguments.

Figure 1 : theoretical relationship between market entry and market exit rates and multimarket contacts



4. Hypotheses and Research Model

The current research study – in particular the empirical part - aims to answer the following problematic: Does multipoint competition among European airlines, with reciprocal spheres of influence, lead to mutual forebearance strategies (reduction in competitive pressure) as it has been shown for the US airlines industry?

In order to do so, the following hypotheses will be researched and tested:

Hypothesis 1a (H1a)*: The likelihood of a focal firm to enter a market occupied by a rival is higher if it has low multimarket contacts with that rival than if it has high level of multimarket contacts with it.*

Hypothesis 1b (H1b)*: The likelihood of a focal firm to exit a market occupied by a rival is higher if it has low multimarket contacts with that rival than if it has high level of multimarket contacts with it.*

Hypotheses 1a, 1b assume that all multimarket contacts effects are 'equals', i.e. without taking into account the strategic importance for respective companies. We reviewed in the theoretical background, that the most effective multimarket contacts to achieve a mutual forbearance, are those with a reciprocity of airlines spheres of influence.

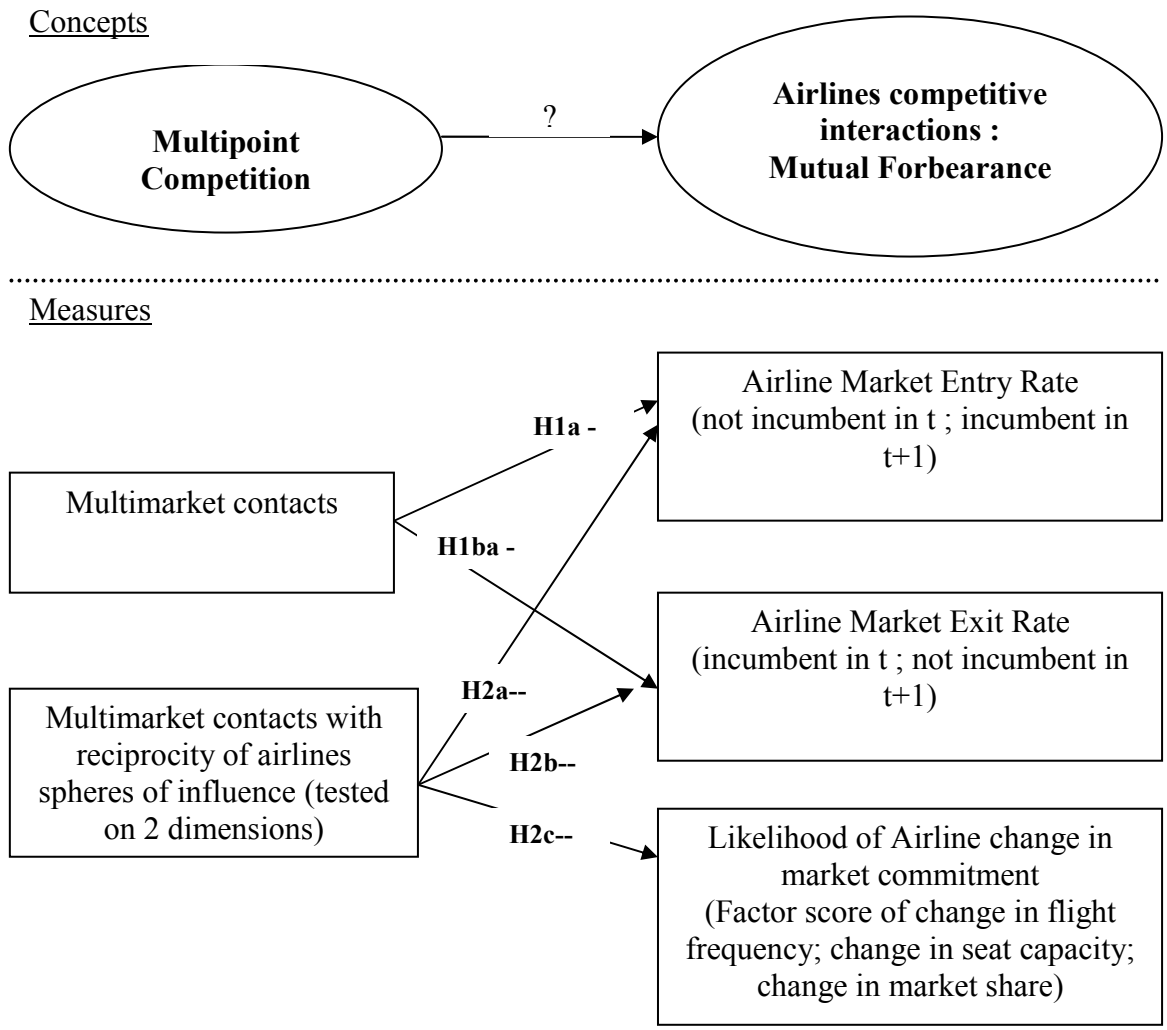
Hypothesis 2a (H2a)*: The likelihood of a focal firm to enter a market occupied by a rival is higher if it has multimarket contacts without reciprocity of their dominant position with that rival than if it has reciprocal multimarket contacts with it.*

Hypothesis 2b (H2b)*: The likelihood of a focal firm to exit a market occupied by a rival is higher if it has multimarket contacts without reciprocity of their dominant position with that rival than if it has reciprocal multimarket contacts with it.*

In the case of an airline, which remains incumbent in a market, its competitive behaviour can not be reflected by entry and exit moves. Here, we pragmatically choose to use an index of change in flight frequency, seats capacity and airline market share by an airline on a route on a time period related to the previous period, in order to assess the airline route change in its competitive behavior in a time period (Baum and Korn, 1996). Given the emphasis on entry rivalry in the strategic management literature, we think airline's change in market commitment provides a usefull theoretical proxy for the competitive strategic choice– *the higher the change in airline market commitment, the more intense the rivalry will be*.
The higher the multimarket contacts degree with a rival, the higher the likelihood to observe a stability of its competitive commitment on the route.

Hypothesis 2c (H2c)*: The likelihood of a focal firm to change its market competitive commitment in market occupied by a rivalis higher if it has non reciprocal multimarket contacts with that rival than if it has reciprocal multimarket contacts with it.*

Figure 2: Research Model



5. Methodology

5.1. Sample

We use OAG data base in order to extract a longitudinal sample (2002-2006) of each regular and scheduled flight within Geographic Europe (15 countries then 25 countries since 2004). In order to determine a sample of direct city pair routes in the 'European Union (plus Norway and Switzerland) area of scheduled passengers airline industry', we have selected 10 periods reflecting the months of March and July for each of the following years: 2002, 2003, 2004, 2005 and 2006.

Since the research study focuses on multipoint competition, observation of monopoly routes has been deleted from the sample. We have obtained a panel of data describing the activities of approximately 130 airline companies operating across 724 City Pairs for the above-

mentioned periods. The total sample on which the research is based includes 724 airline-routes for the above-mentioned ten periods, which yields 17199 observations.

The airline route is defined as the unit of analysis. We have identified for each city pair market, which airline has the highest territorial interest. Based on two dimensions, we have determined which airline has the highest market share (in terms of seats capacity) and which is the most dependant of the market.
Such firm is considered as the "Leader" in terms of those two dimensions, while the remaining incumbents are considered to be "Challengers". Four created dummy variables are, at a later stage, incorporated into the definition of the count of multimarket contacts as independent variables.

54.9% of our observations are related to airlines encoutering only one rival on the route (duopoly), 29.2% are related to airlines encoutering two rivals on the route and 16% of our observations, covers airlines encoutering three or more rivals.

5.2. Measures

5.2.1. Dependant Variables

We proxy the airline competitive behaviour, by observing their competitive moves on city pair markets. We have defined three types of events: specific airline Entry Market from t to t+1, specific airline Exit Market from t to t+1, and specific airline change in market commitment (in the case in which the airline is remaining incumbent in the route from t to t+1).
If the analysis of Entry and exit moves is quite easy to determine, the airline change in market commitment is obtained through a data reduction process.

Airlines Entry rate

For each airline route observation on a period t, we have determined if the airline was already serving the city pair on the previous period t-1. When it was the case, we have considered the carrier to be the "incumbent"; when it was not, we have defined the carrier as the "new entrant". Then, we have determined the number of city pairs entered by each airline for which it meets the same incumbent. We have divided this value by the total number of city pairs entered by the airlines in order to obtain the airline rate of entry.

Airlines Exit rate

For each airline route observation on a period t, we have observed if airlines are still serving the city pair for the t+1 period. When it was the case, we consider the carrier as "incumbent", when it was not, we define it as an "exiting carrier". Then, we determine the number of city pairs exited by each airline for which it met the same incumbent, we divide this value by the total number of city pairs served by the airlines. We obtain the airline rate of exit.

Airlines route change of competitive commitment

In order to determine the change of airlines route change of competitive commitment, we compute an index by means of the Principal Components Analysis. We have combined, through a weighted scheme, data from the three variables mentioned below in order to reflect the change in airline's competitive behavior:

-The change in the airline route flight frequencies (relative values) from t to t+1.
-The change in the airline route seats capacity from t to t+1
-The change in the airline route market share

In order to validate the fact that these variables represent effectively a change in competitive behavior, we have used the observations in which the number of carriers operating on city pair remains constant from t to t+1. Indeed, let's take the example of a change in airline market share which is related to the exit of one carrier, and not to a change in the airline competitive behaviour.

As shown by the enclosed correlation matrix (Figure 3), these three variables are positively correlated and allow a data reduction process through the Principal Components Analysis.

Figure 3: Correlation Matrix of 3 indicators of Airline change in competitive commitment

Correlation Matrix[a]

		Change in flight frequncy	Change in seat capacity	Change in market share
Change in flight frequency	Correlation	1.000	.608	.425
	Sig. (1-taile		.000	.000
Change in seats capacity	Correlation	.608	1.000	.340
	Sig. (1-taile	.000		.000
Change in marke share	Correlation	.425	.340	1.000
	Sig. (1-taile	.000	.000	

a. Determinant = .510

Reliability Statistics

Cronbach's Alpha	N of Items
.717	3

We obtain a value of Cronbach's Alpha, representing the internal validity of the reduction of these three variables, of 0.717 (0.7, is traditionally the minimum value to achieve such a methodology).

The factor score obtained for each observation proxies the change of competitive bevahior displayed by a carrier on the route. Positive values reflect a greater competitive comitment of the airline on the route from t to t+1. Negative values reflect a reduction of the airline competitive commitment on the route. Thus, central values (around 0), represent a stability of the airline competitive commitment on the route from t to t+1.

5.2.2. Independent Variable Mulimarket contacts

Concerning the measurement of the main independent variables - namely the multimarket contacts, we have chosen to use the most common and simple method: the count measure. It adds up the number of routes in which the airline in the focal route competes outside the focal route. The average multimarket contacts of the airline with each of its focal route rivals is used when the focal airline competes with multiple rivals in the focal routes. Since an airline faces different rivals in different markets, multimarket contact differs across airlines and routes. We then compute the number of multimarket contacts with reciprocity of spheres of influence and the number of multimarket contacts without reciprocity of spheres of influence.

For example, Reciprocal multimarket contacts of a challenger with the leader, is the number of routes in which the focal market challenger meets the focal market leader and in which the focal market challenger is leader.
Similarly, non reciprocal multimarket contacts for a challenger with the leader, is the number of routes in wich it meets this leader and in which the focal market leader is also leader.

As defined previously, we obtain two measures of multimarket contacts (reciprocal and non reciprocal contacts) on each of the four subsamples. The aim is to validate (or not) the hypotheses, and to test which of the two dimensions of airlines' spheres of influence best predicts the mutual forebearance strategies.

6. Results of preliminary statistical analysis

We present here, the preliminary results of our empirical statistical analysis, by providing descriptive statistics (means, standard deviation) of multiples multimarket contacts measurements in the different situations of airlines' competitive behaviors, namely Market entry, Market exit, change or stability in competitive commitment.

6.1. Impact of multimarket contacts on airlines market entry decision

Descriptive Statistics

Entrée		N	Minimum	Maximum	Mean	Std. Deviation
Entry	number of carrier	2552	2	5	2.58	.799
	average mulimarket contacts with rivals	2552	1.00	72.00	11.7865	11.05076
	multimarket contacts with leader market share	1862	1.00	72.00	12.4968	12.23181
	reciprocal multimarket contact with leader market share	1862	.00	36.00	2.4839	4.81785
	multimarket contact with leader market dependance	1226	1	72	10.24	11.239
	reciprocal multimarket contacts with leader market dependance	1226	0	26	1.50	3.556
Incumbent	number of carrier	14647	2	6	2.57	.767
	average mulimarket contacts with rivals	14647	1.00	72.00	15.1303	12.73796
	multimarket contacts with leader market share	8136	1.00	72.00	16.3510	15.27071
	reciprocal multimarket contact with leader market share	8136	.00	42.00	4.3572	6.39466
	multimarket contact with leader market dependance	8784	1	72	13.62	13.175
	reciprocal multimarket contacts with leader market dependance	8784	0	28	1.44	3.274

Figure 4: Descriptive statistics of multimarket contacts measures within Entry and incumbent subsample

In our overall sample of 17199 observations of airlines route presence over the different periods analysed, 2552 are related to airlines entering a new market for a particular period. Our analysis consists in comparing the average level of multimarket contacts between airlines serving those city pairs. We observe that for markets in which a new airline is entering, there is an average number of multimarket contacts between airlines serving that market of 11,7 multimarket contacts. Whereas, the number of average multimarket contacts between airlines competing in a market in which there is no new airline entering is higher, with a score of 15,1 contacts. This is suggesting that hypothesis 1a is here supported. The likelihood of an airline entering a new market is higher when it has low multimarket contacts with its rivals.

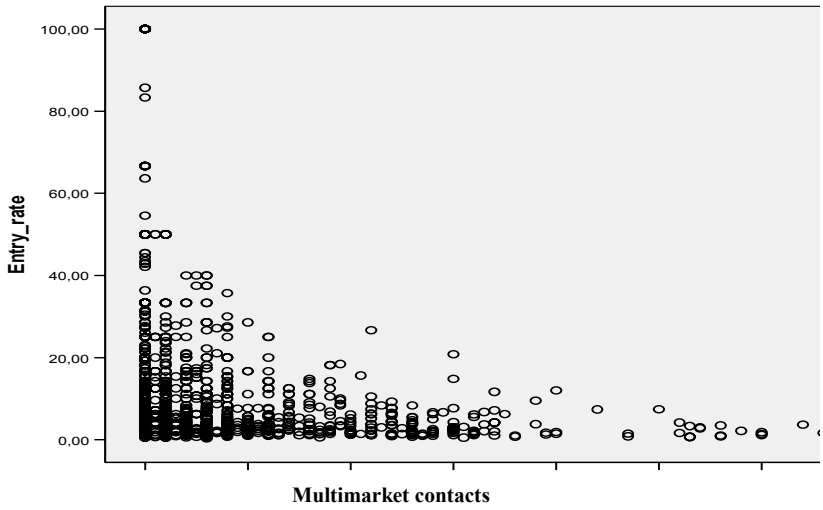


Figure 5: Scatter graph of relationship between multimarket contacts and entry rate

The scatter graph clearly shows a negative relationship between the airlines entry rate into a specific rival's market and the number of multimarket contacts between them.

Correlations

		Entry Rate	multimarket contact
Entry rate	Pearson Correlation	1	-.239**
	Sig. (2-tailed)		.000
	N	1437	1437
Multimarket contact	Pearson Correlation	-.239**	1
	Sig. (2-tailed)	.000	
	N	1437	1437

**. Correlation is significant at the 0.01 level (2-tailed).

This graphical observation is confirmed by a negative correlation (-.239), supporting hypo these 1a, between the number of multimarket contacts for two rivals and the rate of entry. It seems quite clear, that airlines don not enter new markets served by rivals they already meet in other markets in the previous period.

Multimarket contacts with reciprocity of spheres of influence on the market share dimension

If we consider the airlines asymetric territorial interest (H2), we observe that for markets in which a new airline is entering, the average number of multimarkets contacts with reciprocity of spheres of influence of the entering airline with the airline route leader, on the market share dimension, is low (2,48), while this average number is closed to be 2 times greater for markets in which there is no airline entering (4,35).

Furthermore, it seems that there exists no critical differences between the number of multimarkets contacts without reciprocity of spheres of influence observed in a market in

which a new airline is entering (12,4 – 2,4= 10 contacts) and in those markets in which there is not a new airline entering (16,35 – 4,35= 12 contacts). This suggests that multimarket contacts with reciprocity of spheres on influence on the market share dimension, tends to provide credible potential for competitive escalation; airlines may avoid to enter new markets dominated by a rival, thus supporting hypothesis H2a.

Multimarket contacts with reciprocity of spheres of influence on the market dependance dimension

We do not observe significant differences between the level of multimarket contacts with reciprocity of spheres of influence on the market dependance dimension, in markets in which is entering (1,50 contacts) a new airline and in markets in which no new airline is entering (1,44). The consideration to know which airline is the most dependant upon the market does not seem to affect airlines in their choice to enter or not a new market. This can be due to the fact that the most dependant airlines of one or few markets, are often the smallest airlines, not involved in many city pair markets, and for which mutual forbearance derived from multipoint competition is not relevant. Thus, we reject hypothesis H2a for the market dependance dimension.

6.2. Impact of multimarket contacts on airlines market exit decision

In our overall sample of 17199 observations of airlines route presence over periods, 1856 are related to airlines entering a new market for a period (11,5%).

When an airline is remaining on a city pair market, it has an average number of multimarket contacts with rivals of 14,34 contacts, while when an airline is exiting a city pair market it has only an average multimarket contacts with rivals of 10,8 contacts. These figures may support hypothesis H2a, saying that the likelihood of exiting a market for an airline is higher when it has a lower number of multimarket contacts.

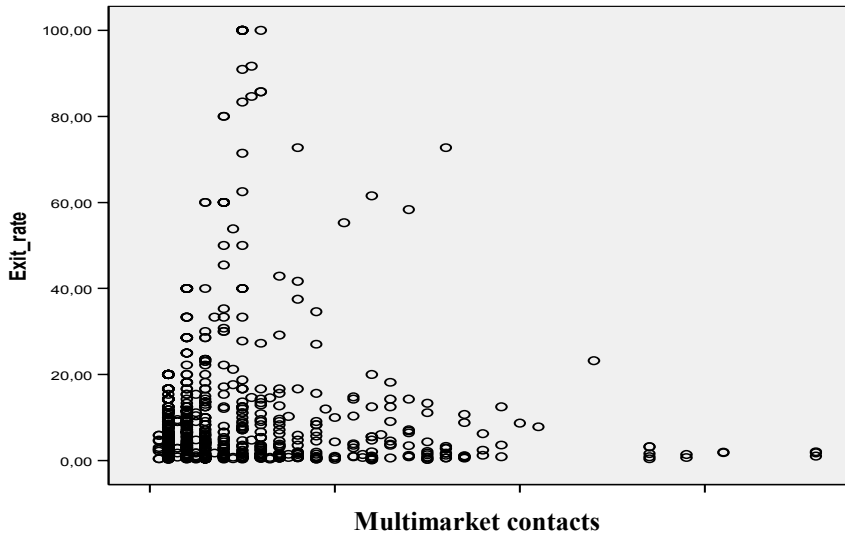
Descriptive Statistics

Sortie		N	Minimum	Maximum	Mean	Std. Deviation
Incumbent	average multimarket contacts with rivals	14459	1.00	72.00	14.3483	11.91590
	Multimarket contacts with leader Market Share	8038	1.00	72.00	15.4835	14.29891
	Reciprocal multimarket contacts with leader Market share	8038	.00	42.00	4.0263	6.00169
	Multimarket contacts with leader Market Dependance	8548	1	72	12.98	12.369
	Reciprocal Multimarket contacts with Leader Market Dependance	8548	0	28	1.44	3.278
Exit	average multimarket contacts with rivals	1856	1.00	72.00	10.8659	9.84918
	Multimarket contacts with leader Market Share	1398	1.00	72.00	11.6888	11.08048
	Reciprocal multimarket contacts with leader Market share	1398	.00	36.00	2.5443	4.64955
	Multimarket contacts with leader Market Dependance	905	1	72	10.34	10.694
	Reciprocal Multimarket contacts with Leader Market Dependance	905	0	20	1.41	3.197

Figure 6: Descriptive statistics of multimarket contacts measures within Exit and incumbent subsamples

The analysis of the link between the airlines exit rate and the multimarket contacts between two airlines tends to show that this relation is not as clear as it was the case for the relation between the airlines Entry rate and multimarket contacts.

Figure 7: Scatter graph of relationship between multimarket contacts and exit rate



Correlations

		Exit_rate	Multimarket_ contact
Exit_rate	Pearson Correlation	1	-.041
	Sig. (2-tailed)		.237
	N	832	832
Multimarket_contact	Pearson Correlation	-.041	1
	Sig. (2-tailed)	.237	
	N	832	832

Indeed, we observe in figure 7, a lower correlation between the airline exit rate and the number of multimarket contacts. We can conclude that this correlation is not significant. Hence, Hypothesis H1b is here rejected.

Multimarket contacts with reciprocity of spheres of influence on the market share dimension

When an airline decides to exit a city pair market, we observe that it has only an average multimarket contact with reciprocity of spheres of influence with the leader of 2,5. Whereas, a value of 4 (closed to 2 times more) is observed for airlines who decide to maitain their position in markets. It clearly reflects, that exiting a market is not likely when it exists reciprocal multimarket contacts with the leader on the market share dimension. The aim for an airline to remain in that market, can be to keep a foothold in rival's territory in order to signal its ability to enter in a competitive escalation, in the case of an attack. Non reciprocal multimarket contacts don not present such a difference between airline remaining (15,4 – 4= 11,4) in a market and airline exiting a market (11,5 – 2,5= 9). It seems to confirm H2b, saying that the most effective multimarket contacts in order to achieve mutual forbearance strategies are reciprocal ones.

Multimarket contacts with reciprocity of spheres of influence on the market dependance dimension

Regarding the impact of multimarket contacts on entry market decision, the airlines' spheres of influences operationalised through market depedance is not conclusive for the airline market exit analysis. Reciprocal multimarket contacts on market depedance dimension can not explain airlines market exit decision. Thus, H2b is rejected for that dimension of airlines spheres of influence.

6.3. Impact of multimarket contacts on airlines' change in market commitment

Statistics

Airlines_change_comp_commitment

N	Valid	11896
	Missing	0
Mean		-.0412678
Std. Deviation		.82205544
Skewness		.343
Std. Error of Skewness		.022
Kurtosis		3.099
Std. Error of Kurtosis		.045
Minimum		-3.28384
Maximum		3.28838

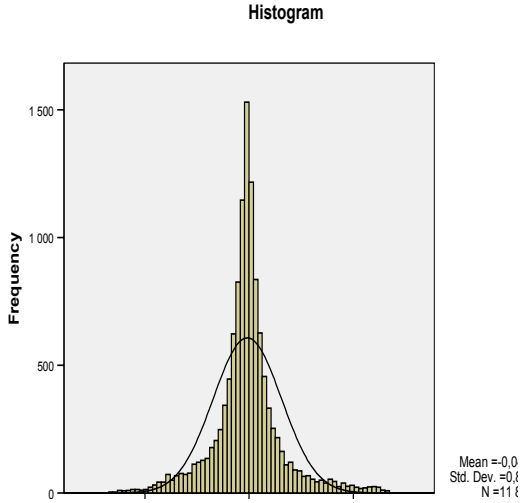


Figure 8: Univariate analysis of Airline change of competitive commitment

Figure 8 indicates that the distribution of the change in airlines' route competitive commitment, has a high peak on central distribution (stability of commitment over periods), and a quite symetric distribution amongst negative and positive values. Most of the airlines in our sample have chosen to keep constant their competitive commitment on their routes.
Can we draw the conclusion that the observed stablity may be explained by multimarket competition?

Effect of challengers reciprocal multimarkets contacts on market share dimension with leaders, on the change in airline's route commitment. (H2c)

In order to achieve our objective of investigating the relationship between, the number of multimarket contacts and the likelihood of the airline route competitive commitment change over two periods, two complementary methods have been used, both analysing the variance or the standard deviation of the airline route competitive commitment change, for low values of multimarket contacts and for high values of multimarket contacts.

In a first instance, we propose, by means of a graph, to observe for each value of the multimarket contacts presented on the abscissas axis, the variance or the range of the change of the airline route commitment on the ordinate axis. A smaller variance of the dependent variable with a mean of 0, for high value of multimarket contacts, than the variance observed

for low value of multimarket contacts, should indicate the effectiveness of mutual forebearance strategies.

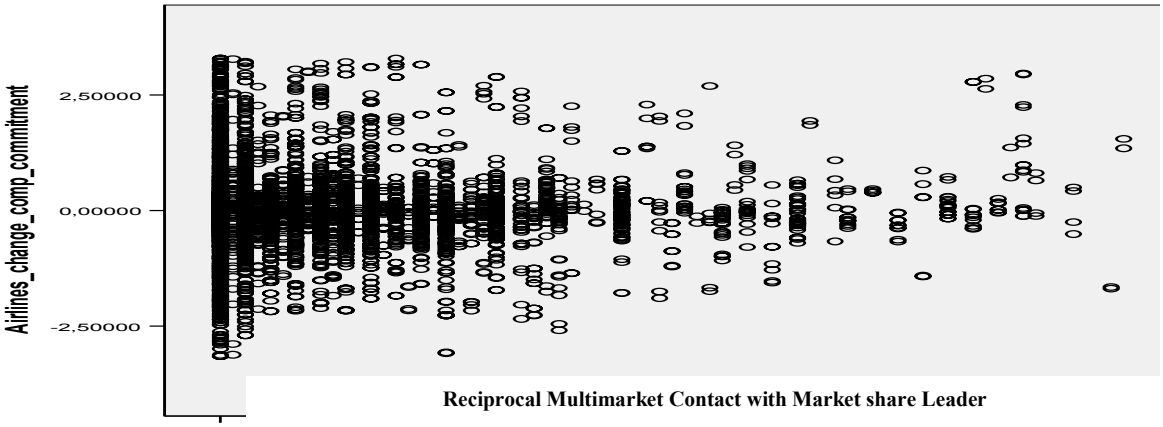


Figure 9: scatter graph of the relationship of the airline route change in compeitive commitment and the number of reciprocal multimarket contacts with the market share leader.

While low level of reciprocal challenger multimarket contacts with leader can not explain the change of its market commitment, high level of reciprocal multimarket contacts, seem to predict stability of airline market commitment. This result partially supports H2c. As Change in airline market commitment proxies the airline competitive behaviour on the city pair market, it is not surprising that airlines tend to avoid implementing big competitive moves (as a high increase of flight frequency over two periods), when they meet their rivals in a high number of different markets.

Then, a mathematical computation of change of airline routes competitive commitment's standard deviation for each level of multimarket contacts, is necessary in order to assess the preliminary validation of hypothesis H2c.

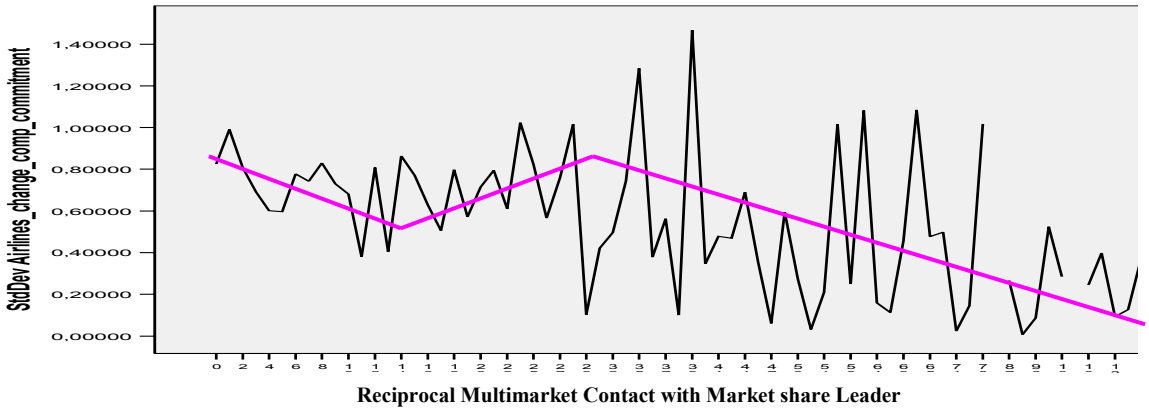


Figure 10: Airline route change in competitive commitment Standard deviation for each value of reciprocal multimarket contacts with market share leader.

The standard deviation of the airline route competitive commitment change, seems effectively to decrease while the value of the number of market share challenger multimarket contacts with leader with reciprocity of competitive position increases. We observe an increase of the standard deviation for the average level of reciprocal multimarket contacts. These observations seem to be in agreement with Baum and Korn (1996) conclusions which explain that the level of entry and exit (here interpreted as a change in airlines competitive commitment) of an airline follows an inverted U shaped curve with the number of multimarket contacts.

7. Conclusions

The current research paper presents exploratory results of empirical results testing the link between multimarket contacts and European Airlines competitive behaviours and strategic interactions. If, no final conclusions can be drawn at this stage of the research work nor considered as evidences, some results show clearly the existence of multimarket interactions between airlines partially explaining their competitive behavior (entry and exit decisions, and change in market commitment).

Further investigations are required in order to draw final conclusions. One of the next steps in the process will be to incorporate some variable controls, such as market concentration, airline size and type, in order to moderate the relationship between multimarket contacts and airlines competitive behaviour. A global statistical model will be used, in order to integrate these parameters, and to allow comparisons with former empirical studies.

We also need to test statistically the impacts of each measure of reciprocal multimarket contacts on Airlines Entry Rates, on Airlines Exit rates and on airlines route change in a competitive commitment, in order to validate or not hypotheses 2a; 2b and 2c, on each dimension of the airlines spheres of influence.

Some operationnalization problems remain unsolved for the moment, namely what is the best way to assess the airlines entry and exit rates. As multimarket competition refers to airlines competitive global strategies, the actual definition computing the proportion of the airlines' entries or exits number on a specific rival's markets on all the airlines' entries or exits seems to be the most appropriate. But all these competitive moves can not be clearly

linked to the Mutual Forbearance Strategy's purpose of reducing competition. Some of them, may also be explained by hazard, imitative behavior between airlines and also by airports slots restrictions on the mains European airports.

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