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MSc in Tourism Transport and Environmental Economics

**REVENUE MANAGEMENT IN THE FLIGHT INDUSTRY.
EVIDENCE OF SOME TOURIST MARKETS TO GRAN CANARIA.**

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1. INTRODUCTION

In the past, the airline industry was characterized by government regulations and a high growth rate (Teichert, 2008) but after 1978 for the U.S. and 1993 for the E.U. the airline industry has seen a growth in competition thanks to the liberalization of the market.

Low Cost Carriers entered the market and had a great penetration in it, this led to a strong competition in the airline industry as those Low Cost companies offered cheaper flights than Traditional Airlines, helping them to capture significant market shares.

According to Garrigos-Simon et al. (2010) after the events of September 11th, the volatility in jet fuel prices and the development of Internet and other information technologies, along with the massive entry of Low Cost Carriers, have led to changes in the recent years.

Beside the fact that Airline companies started to use restricted discount fares in the 1970s, what is known as Revenue Management or Yield Management, the factors described before helped the airline industry to evolve and had the necessity of reducing costs and improve benefits. To reach this goal they improved their pricing techniques and made an extended use of it, with the Revenue Management techniques they looked into selling their products, in this case flight seats, to each client at the maximum price each of them would be willing to pay, and in this way they could get more revenues for a fixed demand.

In the case of the Canary Islands the evolution of the airline industry helped to improve the number of tourists that visit them each year which, along with different economical and geographical factors, have helped to break records in the last years. According to the Airport statistics given by ISTAC in the FRONTUR annual statistics, the number of foreign tourists has grown up from 8,608,676 tourists in 2010 to 11,473,600 in 2014. Watching the numbers of foreign tourists visiting Gran Canaria we can see the same growing trend during the last years (Figure 1).

Table 1. Number of foreign tourists visiting Gran Canaria by country of origin.

	2014 (p) Gran Canaria	2013 Gran Canaria	2012 Gran Canaria	2011 Gran Canaria	2010 Gran Canaria
TOTAL NON-RESIDENTS	3.131.638	2.970.895	2.819.605	2.847.730	2.462.871
Germany	829.254	750.514	715.903	691.709	651.021
Austria	42.891	34.761	39.792	35.538	38.848
Belgium	83.828	76.208	68.121	71.075	69.414
France	58.900	31.619	39.944	31.665	22.038
Holland	186.130	194.557	210.084	228.520	174.701
Ireland	71.199	76.442	83.402	88.658	75.561
Italy	65.233	56.141	51.586	51.706	38.205
United Kingdom	560.926	521.463	504.314	534.379	493.150
Denmark	140.263	149.032	139.624	139.417	127.856
Finland	147.921	146.175	139.841	140.544	123.377
Norway	356.126	373.529	320.638	302.537	249.951
Poland	32.841	34.742	29.909	48.616	24.274
Sweden	348.254	333.139	288.833	281.567	220.241
Switzerland	90.622	84.582	78.863	79.831	57.103
Other countries	117.249	107.990	108.748	121.972	97.128

Source: ISTAC (05/12/2015). Numbers expressed in units.

Those numbers prove the importance of the airline industry for the islands as it is mainly the only transport mode that allow tourists to come to the destination, even if the cruises sector has seen some growth during the last years too. And is this factor, the airplane as the only way to enter or exit the islands in a quick way, the main factor of the prices to travel to them.

The prices are one of the main factors for tourists to choose whether they go, when they have to choose between one destination or the other, and, even if the flight is not the only expenditure, as accommodation, food and other expenditures as souvenirs and excursions are also an important part of the final price of the package. The "total expenditure" statistic published by ISTAC confirms that the flight ticket is a very important part of the total price of the package (Table 2). If we take as an example those tourists that just buy the flight in origin, and then pay the accommodation in the destination or stay with the family or friends we can see that just the flight is approximately the 40% of the total cost of the package.

Table 2. Total average expenditure versus average flight price per tourist.

	2014	2013	2012	2011	2010
TOTAL AVERAGE EXPENDITURE PER TOURIST					
Flight	€ 858,87	€ 893,40	€ 855,15	€ 859,14	€ 797,02
AVERAGE EXPENDITURE IN ORIGIN PER TOURIST					
Flight	€ 331,27	€ 367,36	€ 325,09	€ 300,49	€ 295,67
Flight cost / Total expenditure	39%	41%	38%	35%	37%

Source: ISTAC (05/12/2015).

The importance of the flight price in the total package expenditure accentuates the need of tourists to understand how the airlines' pricing techniques work. If tourists can understand the different factors that affect the flight prices they will be able to buy tickets at the cheapest price.

This essay will try to explain to anyone that reads it what Revenue Management is and the different pricing techniques that Yield Managers and Yield Management Systems use to change the prices so they offer the best price to each client aiming at maximizing revenues once the routes have been scheduled.

During the next pages a brief introduction to Revenue Management and its applications to the airline industry will be presented, followed by a quick review on some other Revenue Management studies for the airline industry, then a study done in the European Airline market looking at the prices given by some Airlines for their flights to Gran Canaria with origin in four of the main emitting markets is presented, with the purpose of finding evidences, similarities and differences in the Revenue Management practices in relation with the days in advance the flight tickets are bought. This will help travelers and tourists to better understand the flights market and aid them to take better decisions on when is the best moment to buy their flight tickets.

2. REVENUE MANAGEMENT

Kimes and Wirtz (2003) defined Revenue Management or Yield Management as *"the application of information systems and pricing strategies to allocate the right capacity to the right customer at the right price at the right time"*. Heo and Lee (2011) referred to it as selling perishable services or products to the correct customer at the correct price with the objective of maximizing revenue. González and Sule (1994) described Yield Management as a method to manage capacity with the objective of maximizing the company's global incomes helping it to sell each capacity unit to correct client at the right price and season period.

"Correct" and "right" are two key-words used to define Revenue Management as it is the point where the customer gets the greatest value or utility from the product and service while the company gets the optimal revenue, they can get from each client.

Bharill and Rangaraj (2008) stated that companies can apply one of two types of Revenue Management techniques, price-based or quantity-based, or a mix of both. Talluri and Van Ryzin (2004) defined both techniques as:

- Quantity-based Revenue Management: is based on rationing the quantities sold to different products or customers segments, which leads to limiting supply.
- Price-based Revenue Management: In exchange of limiting supply this practice looks into increasing price, what it really does is rationing but in a more profitable way as it will limit sales but with more income.

What type of Revenue Management to apply is, in practice, dictated by business constraints which can lead to the use of one of them or a combination of both.

According to Sun et al. (2011), Revenue Management practices have all a set of common characteristics that should be met in order to apply this technique. These characteristics are ability to segment the market, a relatively fixed capacity, the inventory must be perishable, products must be able to be sold in advance, the demand fluctuates over time, and the product or service has a low marginal sale cost but a high marginal production cost.

The airline companies, hotel industry and other tourist related companies have common characteristics that are ideal to apply Revenue Management. They have limited capacity, their demand can be segmented in different groups and they fluctuate by seasons, they have a perishable inventory and products that can be sold in advance.

But simply meeting those characteristics is not enough to implement a good Revenue Management System, Bobb and Emre Veral (2008) stated some specific issues of the service industries that must be looked at to get the benefits from the use of Revenue Management. The system must be able to work with dynamic changes as cancelations and no-shows, address real-time interdependencies between components and try to track down the competitors real-time decisions.

To get the best of the Revenue Management system, Boob and Emre Veral (2008) listed three critical components of those systems that should be implemented. The first one is forecasting which is critical and directly related with the capacity limits to determine the profitability. The Revenue Management system should take historical recorded data of past transactions to determine future demand, the most used forecasting tools are regression analysis, exponential smoothing methods, Box-Jenkins Auto Regressive Integrated Moving Average models and the Pickup methods.

A second component of the system must be the overbooking policy which can be applied to revenue management system with a basic economic model where the limit is the point where marginal revenue and marginal cost are equal or with the Level of Service model which is similar to safety stock for inventory management. To help in the decision the airline overbooking practice should be founded in two elements, the net reduction of bookings from the historical peak to the moment when the check-in starts and the no-show rate after the check-in starts.

The third component is the market segmentation, which is very similar to the Pareto Principle as the 80% of revenue comes from 20% of the customers. So implementing a good market segmentation system is vital to get the most revenue.

According to Denizci Guillet and Elsie Xu (2013), and following the last point above, a well implemented Revenue Management strategy should be able to let the market segment itself once the strategy is applied. The rate fences method is one of the best options to let the

market segment itself. Rate fences are restrictions categories based on customers' needs, behavior and willingness to pay.

Rate fences have two categories, physical and nonphysical. Physical ones are more feasible in the lodging industry as it include room type, view and location, but airlines apply them too as customer can choose window seat or corridor seat, a seat in the first rows or in the later, business class or economy class seat. Nonphysical ones are more related to the consumers' characteristics (special discounts to organizations or employees), transaction characteristics which include time of purchase, place of purchase, refundable ticket or not, and consumption characteristics as quantity or frequency.

If rate fences are not well design and applied the Revenue Management system can fail as customers could move from one category to another causing a loss in profitability.

2.1 Revenue Management in the Airline Industry

According to Heo and Lee (2011) the airline industry was the initial implementer of Revenue Management practices and it was accepted by other service industries with similar characteristics later on. In the 1970s, airlines offered restricted discounts fare products mixing discounted and high fare passengers in the same aircraft to maximize profit (Sun et al. 2011). But Revenue Management has evolved with the pass of time and its evolution can be seen in the set of mechanisms to discriminate customers with different willingness to pay by price airlines use nowadays.

At the beginning, airlines segmented customers in business and economy passengers and designed the products to be more flexible for business travelers and cheaper for the economy passengers. Once the Low Cost Carriers entered the market, the competitive landscape changed drastically and to optimize the product a market-oriented approach was needed (Teichert, 2008). The extended use of Internet gave more information and power to customers as they had more options to get flight tickets at better prices, but airline companies benefit from this too as it reduced distribution costs and gave them information about customer behavior.

This gathered information helped to improve the Revenue Management systems for the airline industry and create heterogeneity in the product offer to adapt to the heterogeneity of the demand which couldn't just be classified with the Business Class and Economy Class model.

Some of the Revenue Management practices applied to help the market to segment itself in this heterogeneous market are advance purchase restrictions, non-refundable tickets, a minimum of days to stay at destination or requiring a Saturday night stay for the customer (Puller and Taylor, 2012). With those mechanism customers can be segmented by their value of time or be price discriminated.

Evidences on different Revenue Management mechanism in the airline industry have been studied by different authors and have shown some of the common practices applied by airline companies.

3. REVIEW ON REVENUE MANAGEMENT PRACTICES IN THE AIRLINE INDUSTRY

During the last years some studies about Yield Management were published with the aim of understand and explain better how the different techniques are applied to the different tourist

companies. The flight industry is one of the companies that more advantage has taken from the Revenue Management practices and it has evolved a lot in the last decades.

In 2004 Pels and Rietveld studied how low cost carriers were reacting to the conventional carriers' pricing decisions and vice versa, they focused on price adjustments done by carriers in the London-Paris market.

They studied the prices of return flights for trips starting the 23rd September 2002 and returning the 29th September 2002 starting four month prior departure, observing price changes each week for the first three month and each day for the last month.

The hypothesis they presented was that airline companies where responding to fare changes of their competitors in a daily basis taking in consideration the price of the competitors the day before as well as their own price in the preceding day.

During their investigation they discovered that, once the airline companies reached a minimum revenue, they started to change their fares into two directions, to maximize profits or market shares.

From their statistical analysis, they got that the prices were increasing over time for most of the airlines, that the lowest price was found between 35 and 21 days before departure, that some of the airlines just respond to the price changes of concrete airlines so if that concrete airline didn't change their price but the rest do the other airline doesn't respond to the changes. In the case of the traditional airlines they don't respond to low cost carriers' price changes neither they do when other traditional airlines change their prices.

They concluded their study relating the over-capacity created in some markets by the low cost carriers with their strategy of investing in new aircraft with the unexpected reaction to competitors' price changes. This was observed in the reaction of one of the low cost carriers to other low cost carrier when the last one started to increase their price the first one started to lower them, the authors explained this as if the first carrier had seen in the price increases of the last carrier that this one has filled his airplane so the first one had to lower prices to fill his own airplane too.

Bilotkach et al. (2010) wanted to understand how firms compete so he studied airlines' day by day pricing decisions. They studied more than 70,000 fare quotes for one way flights from New York to London during the 60 days before their departure between September and November 2005 using Expedia.com. They analyzed only economy class fares for non-stop flights.

Having the analyzed route a large number of competitors allowed them not only to observe the general trend in fares as they moved to the departure date but they could also observe the similarities and differences between the price-setting practices across the different airlines.

To get some evidences they subject their data to regression analysis with the objective of getting a summary of the airlines' pricing dynamics. This analysis led them to the conclusion that the fares were "U" shaped and the lowest fare would have been found around 65 days prior departure.

They found out that fares presented in the first screen of the web page were approximately $5-$10 lower than in following pages. Other result they got was that the average difference in price between buying the flight ticket 60 days before departure and 1 day before departure was in the neighborhood 32$, but the standard deviation went from 239.9$ to 380.7$. They justified this across-time variation because they were using just one-way flights.

Further analysis lead them to find that morning flights were 6$ more expensive, and buying on weekends was cheaper. Their reasoning behind the later was that travel agents make their arrangements during the week days.

With a pair-wise comparisons of the relevant coefficients they discovered that the pricing strategies' differences across airlines are hardly random. Also they found that there was no fundamental change in the results when their range of data collection fell on major holidays as Thanksgiving week or winter holidays.

They didn't find a link between the carrier's market share and the pricing strategy but they noticed that even if the three major players of the market had different strategies, they seemed to be more similar between them in comparison with minor firms. And, even if some of the companies were in the same alliance or had codeshare flights in the analyzed route, they had clearly different pricing strategies.

They concluded that, as the airlines employed different pricing strategies, it was impossible for them to give an answer to which model of strategic interaction is consistent with the results.

Mantin and Koo (2010) analyzed the effect of the day of week in which the flight ticket is purchased to find if there is really a difference between buying the flight tickets during the weekdays or the weekends. They gathered data from return flights from 1000 US domestic origin-destination pairs during 90 days looking at each itinerary departing on Wednesdays and returning 7 days later between February and April using Farecast.com, then they were able to gather approximately 540,000 observations.

They assume that as during weekends the websites traffic is lower than on weekdays, because most business-driven shopping occurs during the weekdays, the airlines employ a day-dependent price discrimination. But even though it would not be possible for airlines to lower the prices of the flight tickets on weekends as that would shift the demand from the weekdays to the weekends. So, they suggest that airlines will offer discounted fares in some weekends and higher fares in other weekends so that they can capture the demand of price-sensitive consumers with the first strategy without shifting the demand with the second. Thus, they contended that even if there was a larger average price dispersion during the weekends, the average price during weekends remained similar to the one of the weekdays.

In their study, they discovered that the prices were lowering from the 90 days before departure until 2-3 weeks before departure were they rapidly increased. They justified the increase of the price as the departure approaches as a price discriminating strategy that differentiates between the early buyers as price sensitive leisure passengers and the late buyers as business passengers.

During the study they found that as the departure approaches not only the average price but the average price dispersion increases and the rate of these also increases. This increase is justified by the changes in the demand patterns.

What they also found was that the price dispersion was bigger from Friday to Sunday than from Monday to Thursday because on the weekends the types of customers were more different than during the weekdays. On weekends, lower prices could be found but the average of prices was the same as during the weekdays, they justified this by stating that the airline company offered a wider range of prices on weekends to satisfy all the different types of customers while during the weekdays they had to offer a shorter range of prices as the customers were more similar.

At the route level they discovered that routes with thinner markets, connecting small cities to larger hubs within a shorter distance were more likely to reflect a significant price dispersion on the weekends.

Garrigos-Simon et al. (2010) investigated one-way flights from Alicante to London during 33 days before departure using prices offered in the web pages of the different airlines. To compare and contrast price evolution they gathered information for two periods, a low season (April 2008) and a high season (August 2008) period. They also included different airline types as low cost carrier, traditional and charter ones. Their study helped them to observe how different variables as type of airline, arrival airport and the timetable affect the price.

Their findings were that traditional companies had higher prices than low cost and charter carriers, justified by the difference in quality, destination airports and other operational factors. Traditional carriers had two pricing policies depending on the airport of destination, being more restrictive and expensive the ones to Heathrow, and in low season this pricing policy was more evident because the competition with low cost carriers during low season is higher. Finally they found that, during low season, there is just a 20% variation in the number of flights compared to high season and that the price incremental the last weeks before departure is more accentuated for low cost carriers and charter carriers than during high season because of a greater rivalry between airlines.

With their regression analysis they discovered that all the traditional companies that belong to the same international alliance had a close competitive reaction or tacit agreement. The seasonality had importance too, as one traditional carrier did not react to competition in August which made the other one react to low cost carriers. The low season data indicated that there was a "leader" which other companies would follow in their pricing policies.

Even if the pricing policies differs according to the peaks of demand, they found that the low cost carriers reacted competitively against the price changes of other airlines, in particular, in the high season scenario they discovered that at less attractive timetables, the reaction to competition was greater as the airline companies were looking to fill their airplanes.

They concluded their study revealing that they could find differences in pricing policies between flights arriving at Heathrow Airport and flight arriving to others, but not among those others. The fuel variable was not relevant in any of the models except in one and just during low season, they justified this case as if the airlines were acting in future markets. And they could confirm with their model that the prices would increase as take-off approaches.

Puller and Taylor (2012) studied how airline companies applied Revenue Management systems to change prices daily. Day of week of purchase was proven to be possible as the sophisticated reservation systems had the ability to change the prices daily.

To accomplish their study they observed the ticket's price for different flights maintaining the days before of departure unchanged, the flights analyzed belong to the six major legacy carriers in 2004, and then they focused in a set of 85 round-trip non-stop domestic routes. Their data is composed by individual tickets transaction for large domestic flights in the U.S. during the last quarter of 2004. After the data collection they merged the itineraries with the dataset of a travel agency's reservation system to get information about travel restrictions, booking class, advance purchase requirements, penalties for changes and stay restrictions.

During their investigation, they found that tickets purchased during weekends were 12% cheaper than those purchased during weekdays if they just focused on the price, but this price difference was shorter once they found that weekend purchases were more restricted or empty flights. They found that not only the day of purchase matter but the day of travel, with this last factor they were able to create a 35 day-timeslot of fixed effects.

When they took into account different factors as the timing of travel, the days in advance the ticket was purchased and the week of year in which the travel was going to be done, the above percentage was reduced from 12% to 8% price difference between purchasing on weekends against weekdays.

In a third step they added even more price affecting factors such as, penalties for changes, restrictions on the day of week of travel or a minimum or maximum days of stay and, if a Saturday night stay was required. With all the factors taken into account the price difference between weekend purchases and weekday purchases was reduced from 8% to 5%. Some of the more common factors observed in the weekend purchases were advanced purchase restriction, non-refundable tickets, travel and stay restrictions, and Saturday night stay, which revealed that weekend purchasers were more likely to buy restrictive tickets than weekday purchasers.

Their study continued separating the routes in two classes, one just for leisure routes which were those where leisure travelers were the only buyers, and mixed routes which were referred to the flights shared by business and leisure travelers. This segmentation was justified by the different elasticity between leisure and business travelers, which would explain that on leisure routes there would not be necessary to lower prices on weekends as the market of demand was formed by the same type of customers. The result was that on leisure routes the prices on weekends were just 2% lower than on weekdays, meanwhile on the mixed routes the price difference was 7% lower on weekends than on weekdays. In those mixed routes they found that the weekend purchase effect was more accentuated too.

The authors conclude their research by affirming that even if they cannot really assure that the weekend effect reflects price discrimination practices, the variation in the size of its effect do, and that this price discrimination lowering flight tickets' price on weekends have a notable effect on airline profits as they are able to catch part of the demand that would never have bought a ticket at the weekday price and probably the airplane would have departure with more empty seats.

4. DATA

With the purpose of finding evidences of revenue management practices in flight industry, data from different European airlines were gathered from their web pages. Twenty-four return flights were observed starting 90 days before departure until the day of departure. Twelve of them during the tourist low season in Gran Canaria and twelve belonging to the tourist high season. Four of the flights belong to low-cost carriers, other 4 to traditional airlines and the last 4 to tour operator charter flights for each season, distributed in four countries United Kingdom, Germany, The Netherlands and Norway, being one flight for each of the three types in each of the four countries. These countries were chosen for being four of the top 10 tourism emitting countries to Gran Canaria according to Promotur 2013 and to the statistics reflected in Table 1 shown above.

All flights had as destination the island of Gran Canaria and the return flight was seven days later. The low season flight had their departure from its country of origin between the 17th and the 21st of May 2015. Meanwhile the high season flight had their departure from its country between the 7th and 11th of November, except for the low cost carrier flight for the United Kingdom's market which departure from United Kingdom was the 26th of October as no data was found for this company's flight for the month of November with at least 90 days in advance from the day of departure.

In Table 3, the different flights can be observed distributed by country, name of the airline chosen, type of airline, date of departure from origin, if the flight belongs to the high or the low season and the nomenclature with which each of the flights will be referred in the following pages, tables and graphics.

Table 3. Flights' characteristics.

Origin	Airline Company	Type of Airline	Date of departure	Season	Nomenclature
United Kingdom	British Airways	Traditional	18 May 2015	Low	BA1(UK)
United Kingdom	British Airways	Traditional	09-nov-15	High	BA2(UK)
United Kingdom	Ryanair	Low Cost	18-may-15	Low	RY1(UK)
United Kingdom	Ryanair	Low Cost	26-oct-15	High	RY2(UK)
United Kingdom	Thomas Cook	Tour Operator	18-may-15	Low	TC1(UK)
United Kingdom	Thomas Cook	Tour Operator	09-nov-15	High	TC2(UK)
Germany	Condor	Traditional	17-may-15	Low	CO1(GE)
Germany	Condor	Traditional	07-nov-15	High	CO2(GE)
Germany	Ryanair	Low Cost	18-may-15	Low	RY1(GE)
Germany	Ryanair	Low Cost	09-nov-15	High	RY2(GE)
Germany	TUI	Tour Operator	18-may-15	Low	TU1(GE)
Germany	TUI	Tour Operator	11-nov-15	High	TU2(GE)
The Netherlands	KLM Royal Dutch	Traditional	18-may-15	Low	KL1(NE)
The Netherlands	KLM Royal Dutch	Traditional	11-nov-15	High	KL2(NE)
The Netherlands	Ryanair	Low Cost	21-may-15	Low	RY1(NE)
The Netherlands	Ryanair	Low Cost	11-nov-15	High	RY2(NE)
The Netherlands	Arke	Tour Operator	18-may-15	Low	AR1(NE)
The Netherlands	Arke	Tour Operator	09-nov-15	High	AR2(NE)
Norway	Iberia	Traditional	18-may-15	Low	IB1(NO)
Norway	Iberia	Traditional	09-nov-15	High	IB2(NO)
Norway	Norwegian Airlines	Low Cost	18-may-15	Low	NA1(NO)
Norway	Norwegian Airlines	Low Cost	09-nov-15	High	NA2(NO)
Norway	Apollo	Tour Operator	20-may-15	Low	AP1(NO)
Norway	Apollo	Tour Operator	11-nov-15	High	AP2(NO)

In the following pages the flights will be described one by one with the different characteristics each flight has, supported with a graphic which will represent the different prices shown by the airlines' web pages each day.

4.1 United Kingdom - Gran Canaria

The traditional airline chosen was British Airways. For the low season period, it departed from London Heathrow the 18th of May at 17:05 and landed in Gran Canaria at 21:30. The return flight departed the 25th May at 11:20 and arrived in London Heathrow at 15:45. The high season flight departed from London Heathrow the 9th November at 19:10 arriving in Gran Canaria at 23:30, and returned the 16th November at 14:00 landing in London Heathrow airport at 18:20. Some characteristics of the flights were non-stop flight, with hand luggage, seat selection and meal included in the price. To identify this flight in the graphic (Figure 1) the nomenclature BA1(UK) for the low season flight and BA2(UK) for the high season flight will be used.
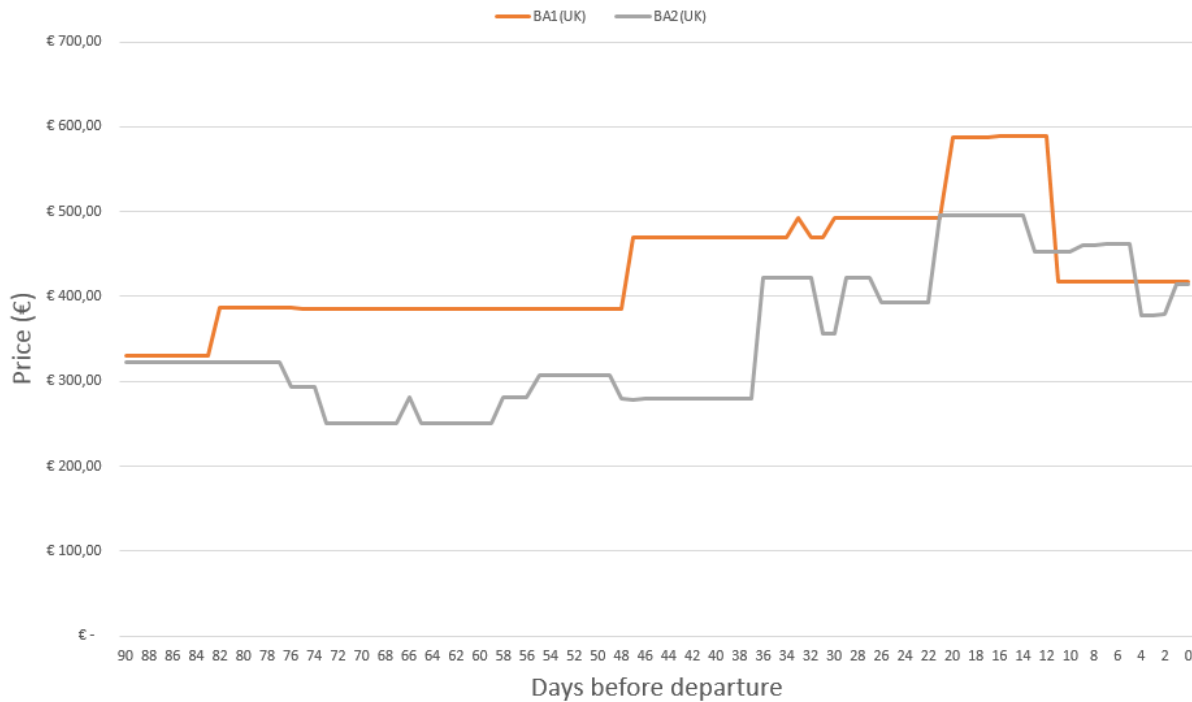
Figure 1. British Airlines' prices United Kingdom-Gran Canaria

As low cost carrier, Ryanair was picked for the study in this route. The low season flight departed the 18th of May at 6:30 from London Luton airport and arrived at 11:00 in Gran Canaria airport. The return flight was scheduled to depart the 25th May at 11:35 arriving in London Luton airport at 16:00. In the high season the departure was the 26th October from London Luton at 12:15 arriving in Gran Canaria at 16:45, and returned the 2nd November 2015 at 07:25 landing in London Luton airport at 11:50. As usual with Ryanair flights they were non-stop and the price ticket just included hand-luggage, any other option had to be paid. To identify these flights in the next graphic (Figure 2) they will have the nomenclature RY1(UK) in the case of the low season flight and RY2(UK) for the high season flight.
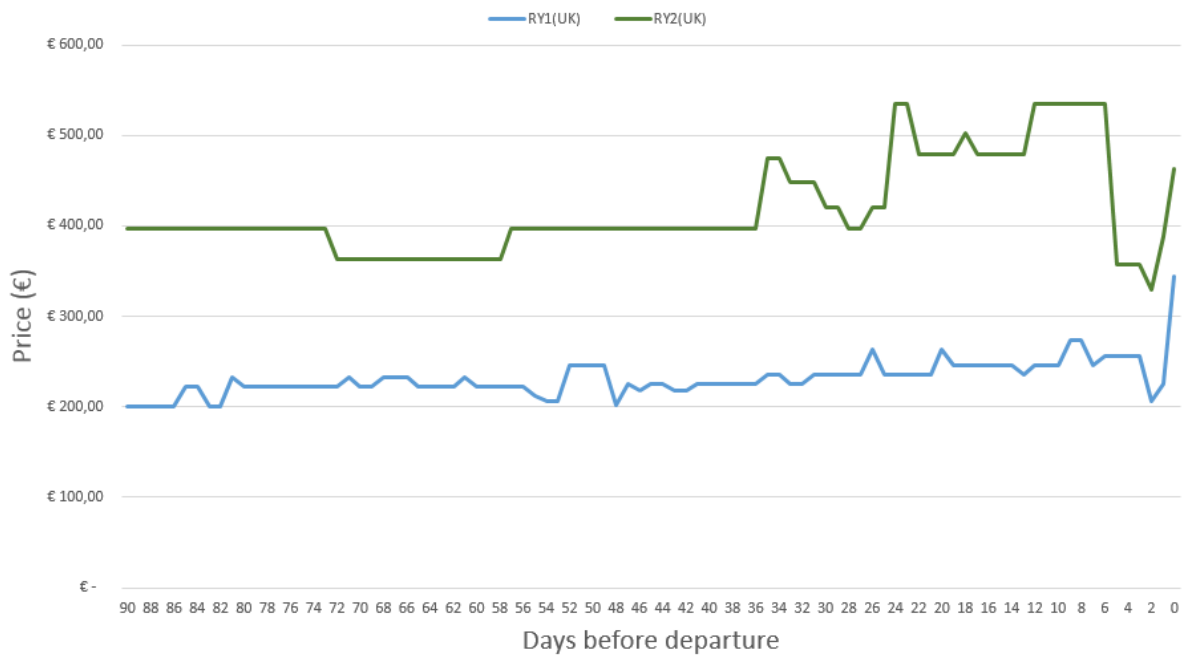

Figure 2. Ryanair's prices United Kingdom-Gran Canaria

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The tour operator flight is operated by Thomas Cook and its low season flight's departure was the 18th May at 8:45 from London Gatwick and arrived in Gran Canaria at 13:15, returning the 25th May at 21:00 and landing in London Gatwick airport at 1:10 of the 26th May. The high season flight had its departure the 9th November 2015 at 8:30 and arrived in Gran Canaria at 13:10, its return flight was the 16th November at 14:25 landing in London Gatwick at 18:50. As the flights described above, non-stop flight and only hand luggage were the characteristics of the observed flight ticket's price. In the following graphic (Figure 3) these flights will be identified as TC1(UK) for the low season flight and TC2(UK) for the high season one.
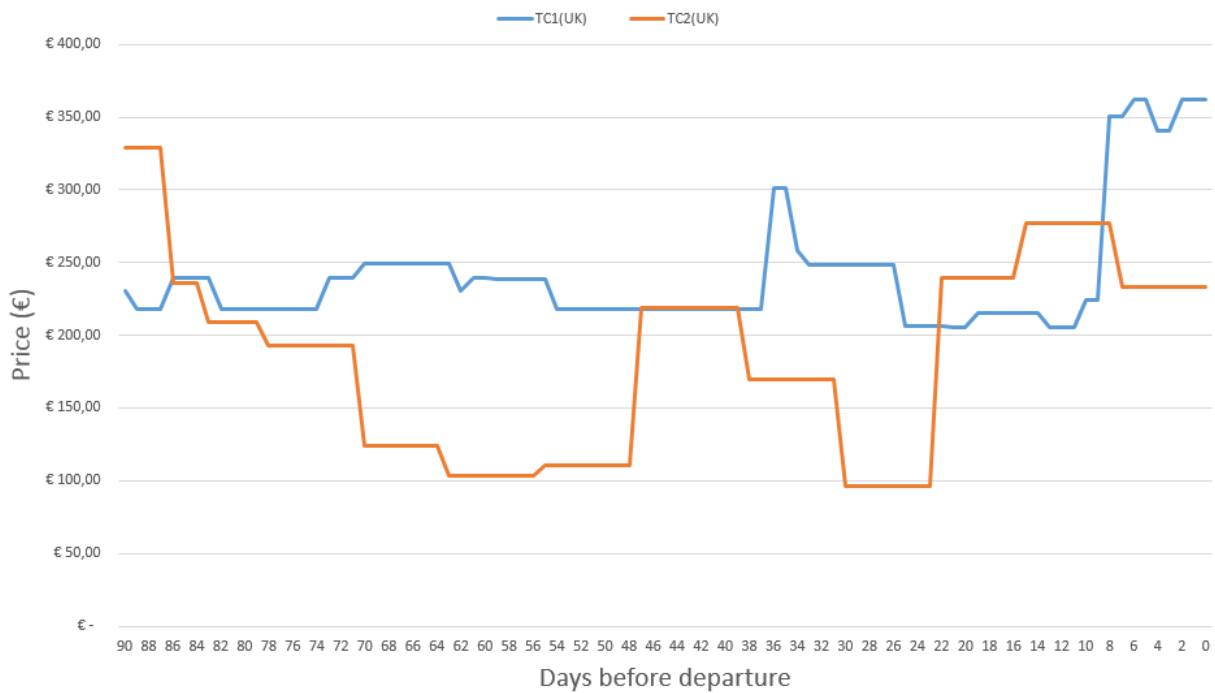

Figure 3. Thomas Cook's prices United Kingdom-Gran Canaria

4.2 Germany - Gran Canaria

Condor was chosen as the traditional airline for the non-stop Germany-Gran Canaria connection, the low season flight was scheduled to depart from the Düsseldorf Airport the 17th May at 12:40 arriving in Gran Canaria at 16:25 and returning the 24th May at 17:25 to land in Düsseldorf at 22:50. The high season flight departed the 7th November at 6:15 landing in Gran Canaria at 9:55 and returned to Germany the 14th November at 11:05, arriving Düsseldorf at 16:45. The details of both tickets included just hand luggage. The nomenclature in the following graphic (Figure 4) for these flights is CO1(GE) for the low season flight and CO2(GE) for the high season flight.
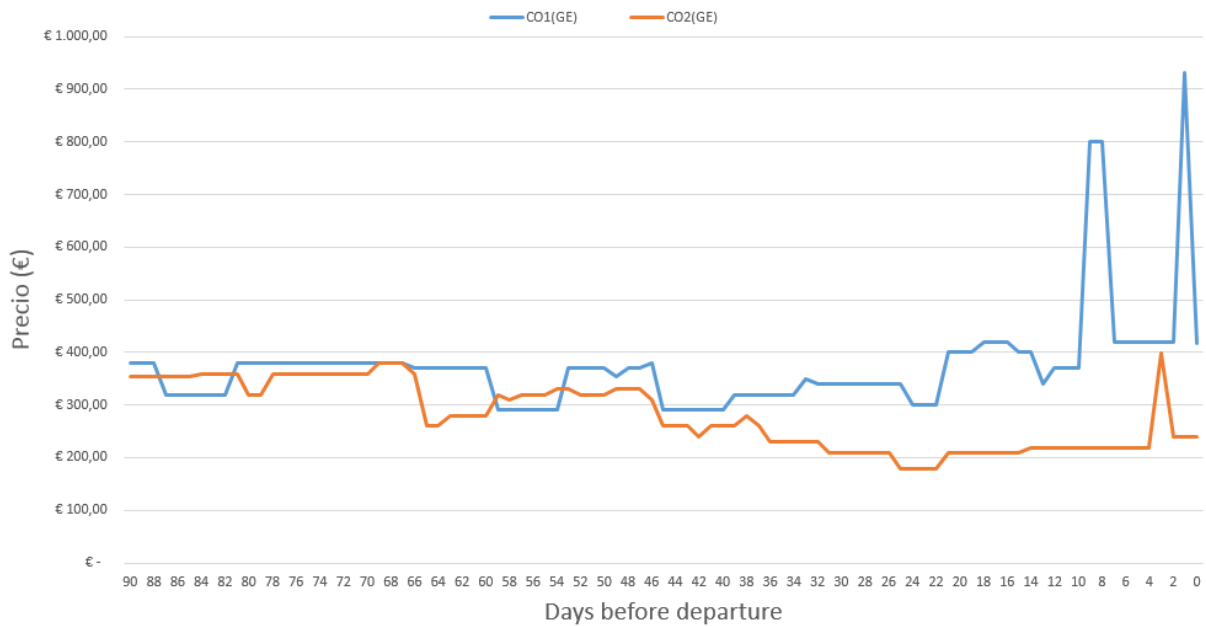
Figure 4. Condor's prices Germany-Gran Canaria

As low cost carrier Ryanair was chosen for Germany too, the low season flight's details were departure from Düsseldorf Weeze the 18th May at 12:35 landing in Gran Canaria at 16:15 and the return flight departed at 6:45 the 25th May to arrive in Düsseldorf at 12:10. The high season flight departed the 9th November at 7:00 landing at 10:45 in Gran Canaria and its return flight was the 16th November at 11:20 with arrival in Düsseldorf Weeze airport at 17:00. Only hand luggage was included in the ticket's price. RY1(GE) for the low season flight and RY2(GE) for the high season flight were the nomenclature used to identify these flights in the following graphic (Figure 5).
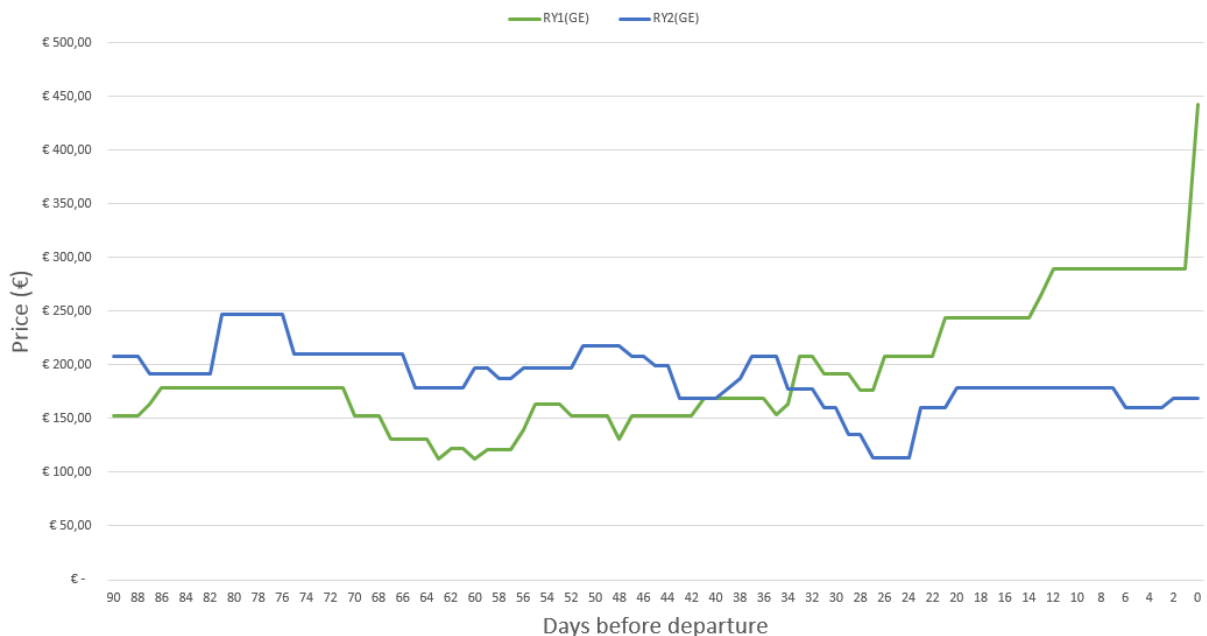

Figure 5. Ryanair's prices Germany-Gran Canaria

Lastly, the tour operator chosen for the German market was TUI which non-stop low season flight departed from Düsseldorf Airport the 18th May at 12:35 arriving at 16:20 in Gran Canaria. The return flight departed the 25th May at 17:25 and arrived in Düsseldorf at 22:55. The high season flight had its departure the 11th November at 6:00 arriving in Gran Canaria at 9:45 and returning the 18th November at 10:45 landing in Düsseldorf at 16:20. Hand luggage is the only special characteristic included in the price. This flight will be named TU1(GE) for the low season data and TU2(GE) for the high season ones in the following graphic (Figure 6).
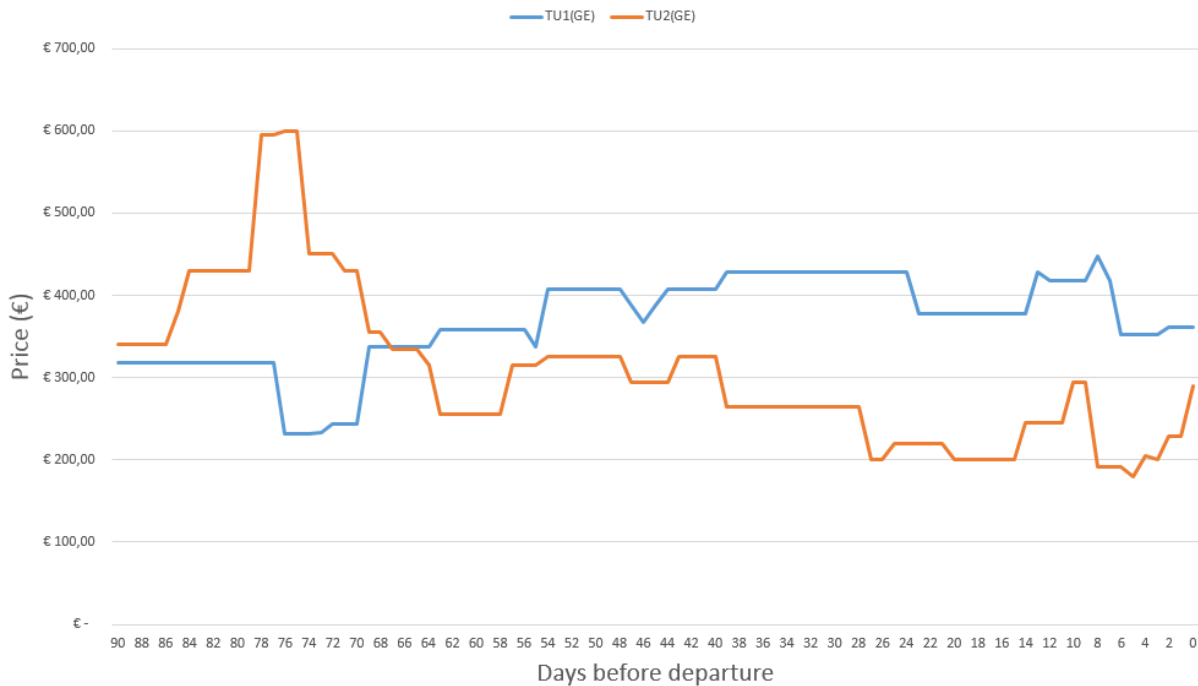

Figure 6. TUI's prices Germany-Gram Canaria

4.3 The Netherlands - Gran Canaria

The traditional airline for The Netherlands is KLM Royal Dutch and its flights have 1 stop in France before continuing to Gran Canaria. The low season flight departed the 18th May from Amsterdam at 7:00 to arrive at 13:40 in Gran Canaria. The return flight left Gran Canaria at 10:00 the 25th May and arrives in Amsterdam at 19:50. The high season flight had its departure the 11th November at 7:35 and its arrival in Gran Canaria at 13:40, meanwhile the return flight was the 18th November at 14:30 having its landing in Amsterdam at 22:45. The booking price for Economy Class ticket included hand luggage, additional luggage, seat selection and a snack that is given before each landing. To identify this flight in the graphic (Figure 7) the nomenclature KL1(NE) is used for the low season flight and KL2(NE) for the high season flight.
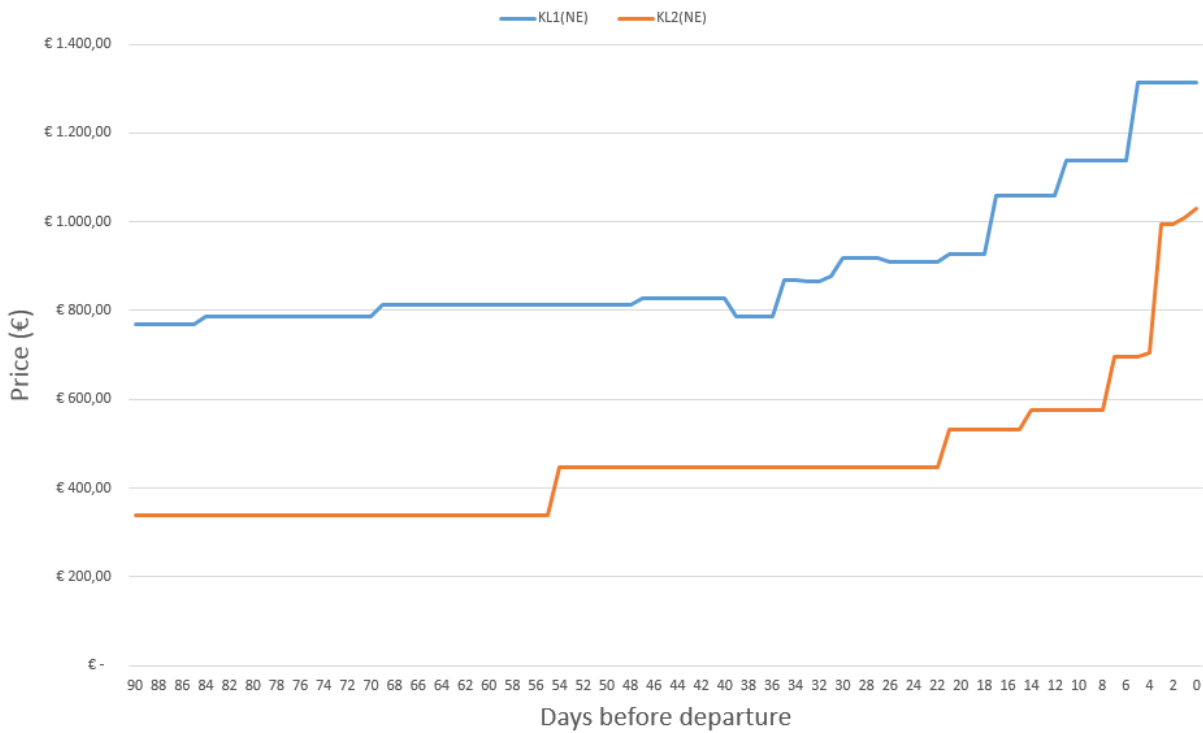
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Figure 7. KLM Royal Dutch's prices The Netherlands-Gran Canaria

Ryanair is once again the low cost carrier chosen, departing in its low season flight from Eindhoven the 21st May at 13:10 and arriving in Gran Canaria at 16:50, which return flight was scheduled to depart the 28th May at 7:15 and arriving back in Eindhoven at 12:45. The high season flight had its departure from Eindhoven the 11th November at 12:25 and arrived Gran Canaria at 16:05, the return flight departed the 18th November at 6:15 arriving in Eindhoven at 12:00. As previously the flight ticket just includes hand luggage, having to price for any extra. The nomenclature used to identify these flights in the graphic (Figure 8) will be RY1(NE) for the low season flight and RY2(NE) for the high season one.
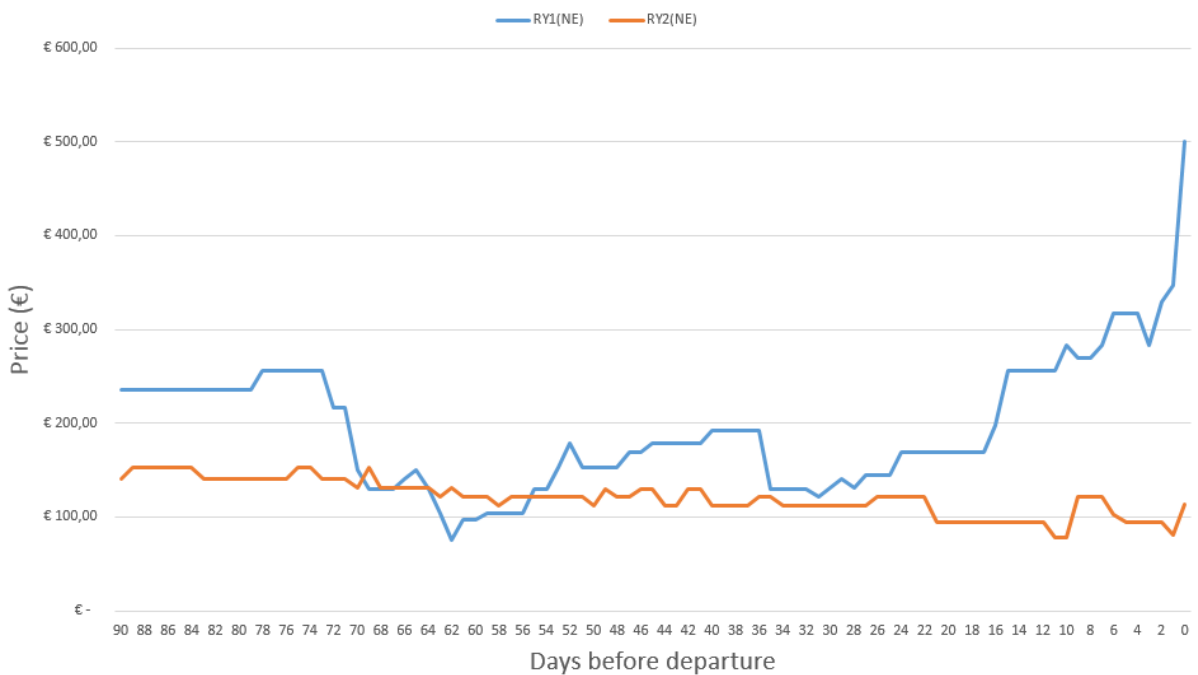

Figure 8. Ryanair's prices The Netherlands-Gran Canaria

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The last flight analyzed for The Netherlands belongs to the tour operator Arke, which is part of TUI. The selected low season flight departed the 18th May from Amsterdam at 14:55 and arrived in Gran Canaria at 19:00. Its return flight left at 19:30 the 25th May and landed at 1:20 the 26th May in Eindhoven. The high season flight had its departure the 9th November 2015 at 7:00 arriving in Gran Canaria at 11:05, its return flight departed the 16th November at 11:35 from Gran Canaria and arrived Amsterdam at 17:25. The price included only hand luggage. Nomenclature AR1(NE) will be used to identify the low season flight and AR2(NE) for the high season one in the next graphic (Figure 9).

Figure 9. Arke's prices The Netherlands-Gran Canaria

4.4 Norway - Gran Canaria

For the Norwegian market Iberia was the traditional airline chosen to study, these flights had one stop in Madrid before getting to their final destination. The low season flight departed from Oslo the 18th May at 14:40 landing at 21:30 in Gran Canaria. The return flight departed the 25th May at 11:20 and landed at 22:25 in Oslo. The high season flight departed from Oslo the 9th of November at 7:25 arriving in Gran Canaria at 17:55 and had its return flight the 16th November at 13:45 with landing in Oslo at 22:55. The price included hand luggage, seat selection and additional luggage. IB1(NO) is the nomenclature to identify the low season flight and IB2(NO) the one to identify the high season flight in the graphic (Figure 10).
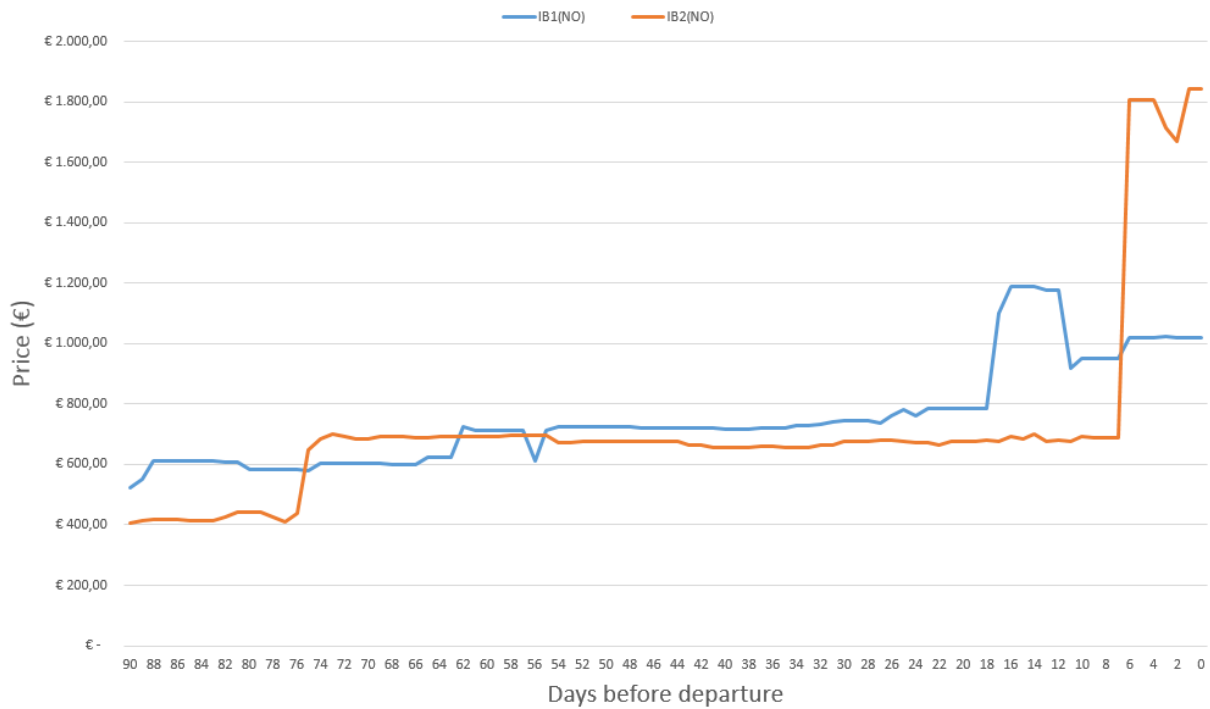
Figure 10. Iberia's prices Norway-Gran Canaria

This time Norwegian Airlines is selected as low cost carrier to cover the Norway-Gran Canaria route. For the low season the chosen non-stop flight departed the 18th May from Oslo Gardermoen at 18:50 and landed at 23:35 in Gran Canaria. The return flight took off the 25th May at 11:40 to arrive in Oslo Gardermoen at 18:05. The high season flight had its departure the 9th of November 2015 at 17:30 landing in Gran Canaria at 22:15 and its return flight departed the 16th November at 10:00 arriving Oslo at 16:40. Only hand luggage was included in the basic ticket's price. To identify these flights in the following graphic (Figure 11) the nomenclatures NA1(NO) and NA2(NO) for the low and high season flights, respectively, are used.
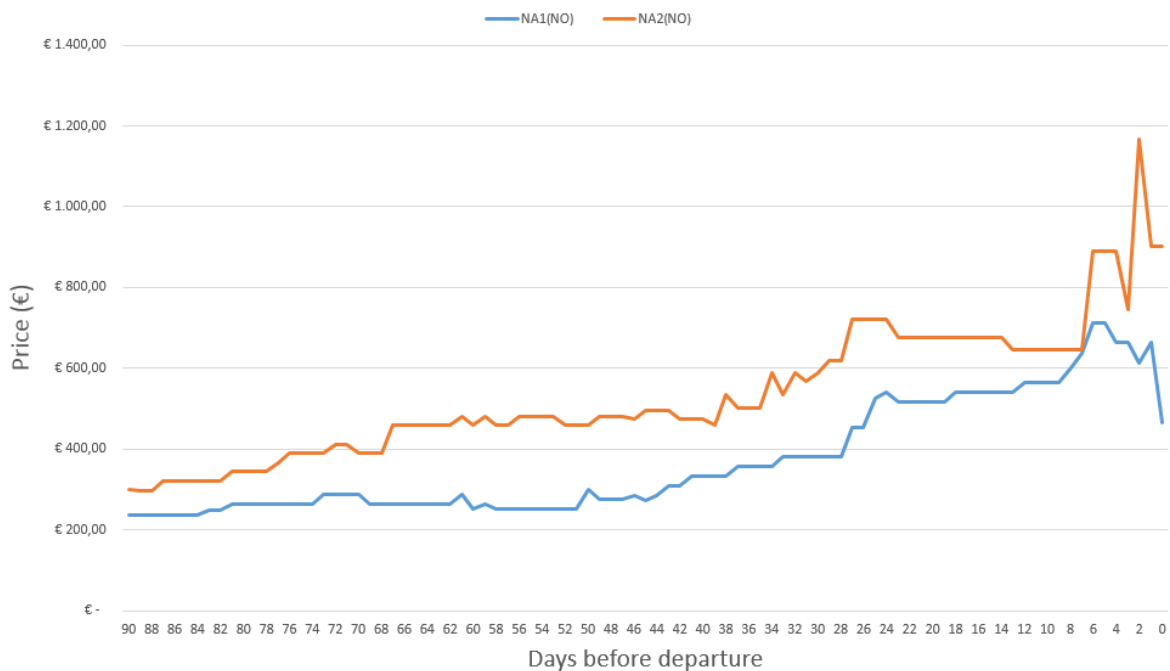

Figure 11. Norwegian Airlines' prices Norway-Gran Canaria

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Lastly, the tour operator chosen for the Norway-Gran Canaria flight was Apollo, which low season flight departed the 20th May from Oslo at 18:50 and landed in Gran Canaria at 23:35, and its return flight was scheduled to depart at 11:40 the 27th May landing in Oslo at 18:05. The high season flight took off from Oslo at 9:00 the 11th November 2015 landing in Gran Canaria at 13:50, its return flight departed the 18th November at 14:50 and arrived in Oslo at 21:30. This was a non-stop flight which included hand luggage and additional luggage. AP1(NO) and AP2(NO) will be the nomenclatures used to identify the low season and high season flights in the next graphic (Figure 12), respectively.
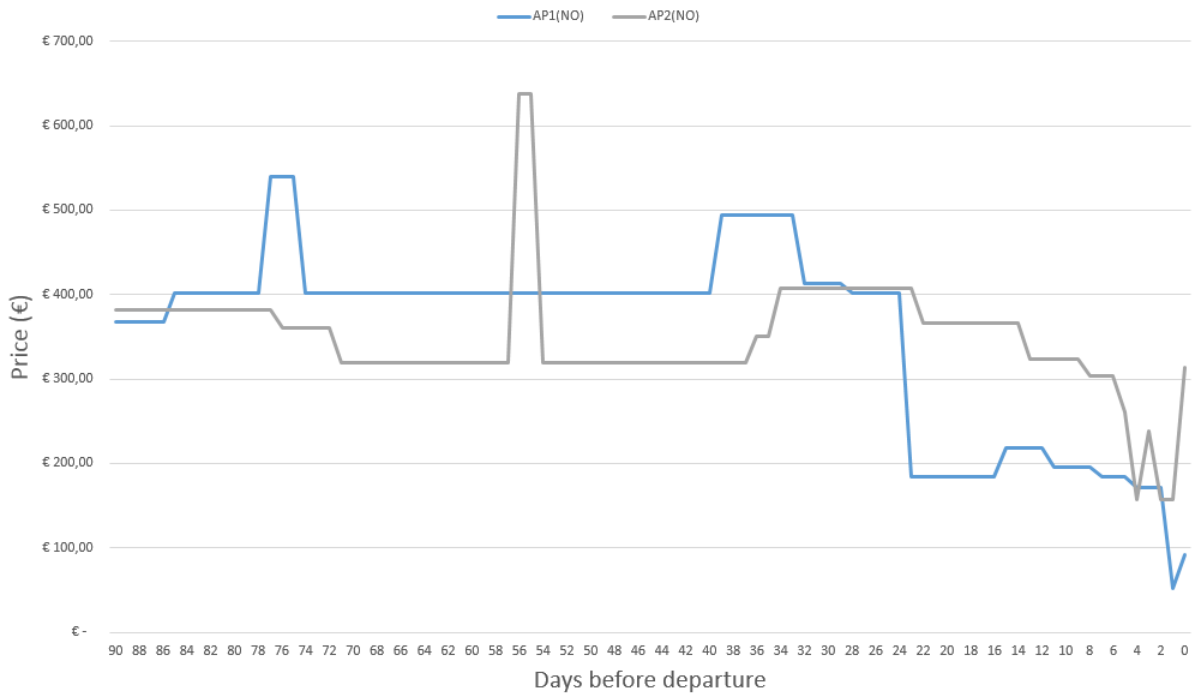

Figure 12. Apollo's prices Norway-Gran Canaria

5. RESULTS

After presenting each flight with its details and its price variation graphic, they must be compared. To understand if there is some sort of response to the price variations from one company by others, and to observe if the different companies work with the same price trend, the different markets will be first analyzed solely, later on a comparison with all data will be presented to find a pattern in the different price strategies to know if there is an estimated number of days in advance in which the flights should be booked.

5.1. Evidences in United Kingdom-Gran Canaria route

In Figure 13 all the observed flight prices for the United Kingdom-Gran Canaria for both seasons are presented together. The first evidence gathered is that British airways seems to have a similar pricing policy without depending on the season, both of its flights have a similar starting and final price, what varies is how the flight price fluctuates during each season, having and increasing trend in the low season, with major price stability periods, and a stable or lower price during the first observed month to then start mixing weeks of higher prices with weeks of lower prices for the second month, but in average having higher price than the period before the increase. In both season a greater increase of the price can be found around 3 weeks before departure with a price decrease once the departure date approaches for

the British Airways flights. In the low season the prices doesn't fluctuate in a wider range for Ryanair's and Thomas Cook's flights at least till the last days before departure, and for the case of British Airways even if the price has an increasing trend, as said before, the prices remain stable for long periods of time. Both Thomas Cook and Ryanair share similar prices during all the low season, except for the last week, where Thomas Cook heavily increases its price after British Airways had done a last price drop one week before departure, this last could be a strategy to sell the remaining seats to fill the plane as they already got profitability of the flight.

In the high season occurs something curious for the analyzed route, the low cost carrier is the one with the highest prices, just being surpassed by British Airways in some short periods of time during the last month before departure. The lower prices for the traditional and tour operator flights could be explained because the number of flights offered during this period of time is much higher, both companies were offering more flights per day in different timeframes which gives more options to choose for the demand. A price reaction from Ryanair to British Airways' price changes can be notice in the graphics with some days of delay, as once the second starts reducing its ticket's price the first one does the same, and once it starts to rise it again Ryanair follows.
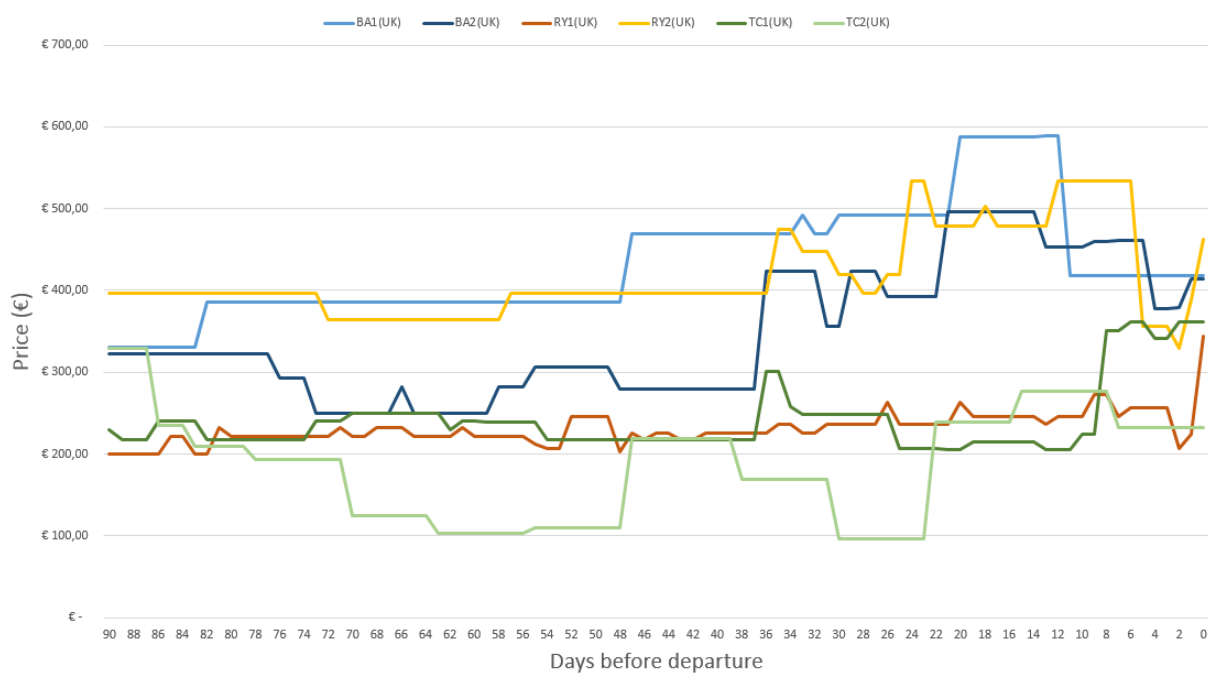

Figure 13. United Kingdom-Gran Canaria's route price comparison

5.2. Evidences in Germany-Gran Canaria route

In Figure 14 the flight prices observed for the Germany-Gran Canaria route are presented. The German market seems to be a more stable flight price market, the starting and the ending price in most of the cases is around the €50 variation, except for the Condor high season flight (€119 lower last than first day price) and Ryanair low season flight, which has an ending price €290 higher than the starting price. The daily price fluctuation is very stable too except for some counted exceptions, the TUI high season flight, which had a heavy increase in price, and then started to be published in their web page at discounted rate for the following weeks till departure; the Condor flights, which in both season have seen punctual heavy increases in their flight prices, this can probably be explained by peaks of purchases,

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where the number of seats lower to just 3 or less remaining and due to cancelations the price recovered a price similar to the period before the increase.

Other evidence observed in this market is that the starting price for both season's flights is very similar for each company, and even if the prices seems to be lower at the starting days of the low season compared to the high season, the price end up being higher for the low season than the high season. The explanation to this trend could be that as the companies have an historical record of their sells and number of empty seats, during the low season they have to capitalize on the lower number of seats sold to get profit, so they sell at lower prices till they reach the profitability point and then they increase their prices to get as much revenue as possible for each extra sold seat, meanwhile in the high season flights they can sell a number of initial seats to higher prices so that they get the profitability point very quickly and then sell the rest of seats at lower prices to maximize revenue at the same time they avoid flying with empty seats.
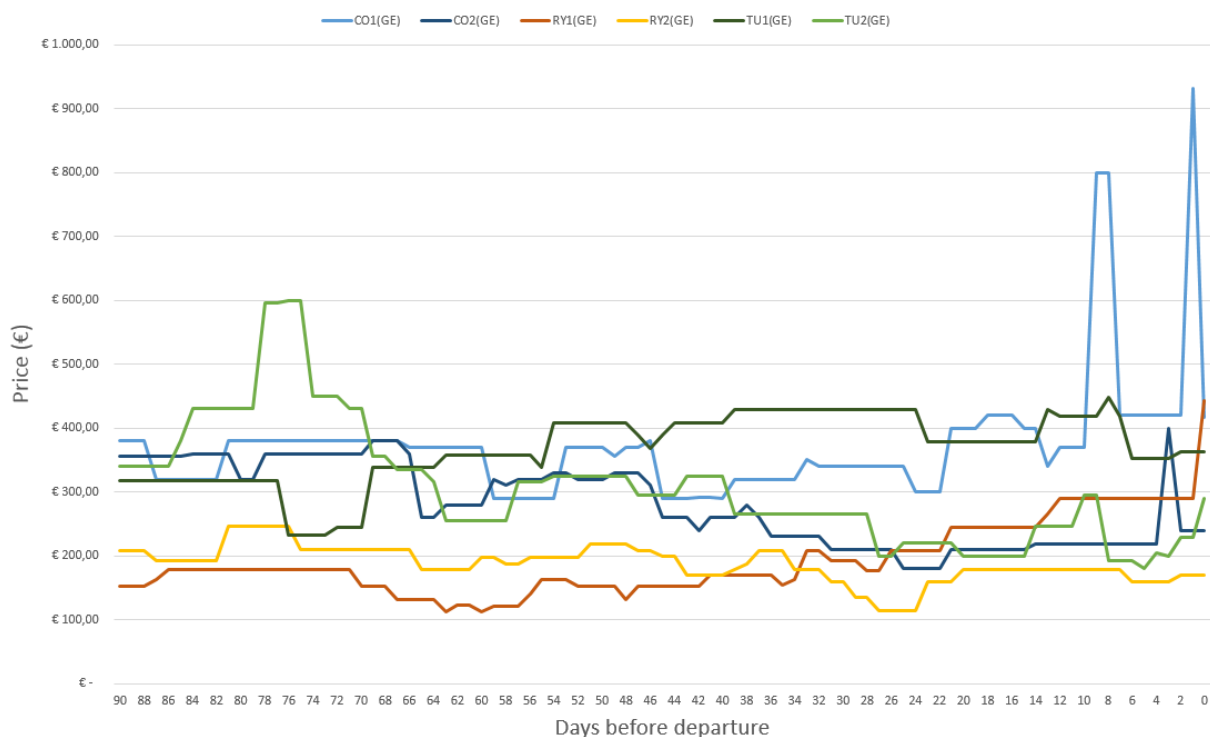

Figure 14. Germany-Gran Canaria's route price comparison

5.3. Evidences in The Netherlands-Gran Canaria route

In Figure 15 the flight fares offered by the different analyzed airlines operating in the Netherlands-Gran Canaria route are shown. The clear evidence that can be observed in this market is that KLM Royal Dutch shows a great price differential in each season compared to the other airlines operating in that market, it has always the highest price, except for the first two weeks analyzed in the high season, where the tour operator's price is slightly higher. This price differential could be a pricing policy applied to differentiate themselves from other airlines, as KLM Royal Dutch is the only analyzed airline company in any of the markets that offers hand luggage, additional luggage, seat selection and a snack for each of its landings at its lowest offered fare. How their fares evolve in both periods shows a lot on how the pricing policy for this company works, as they offer immobile prices for very long periods during the first two month, and then they increase the prices in a weekly basis during the last month before departure.

Meanwhile the tour operator Arke offers a very stable price during all the low season, with minor daily price updates, and discounted rates for long periods during the high season, where they had up to 60% discount offers during nearly two month and then they dropped their prices in the last three weeks with no discount advertising but being even though much cheaper than the "discounted" rate of the previous period. With this they probably pretended to fill their flights as soon as possible at the same time they were reaching their profitability point and then sell the rest of seats to the lowest profitable price possible for them.

The case of Ryanair is just the opposite, offering a very stable, but daily updated, price with a decreasing tendency in the high season and a "U" shaped curve for the low season, with an initial price which then lowers to start slowly increasing up to date of departure. This last strategy is probably explained by the price reduction as no enough seats were being sold and as the seats got sold start to increase the price to start maximizing profit.
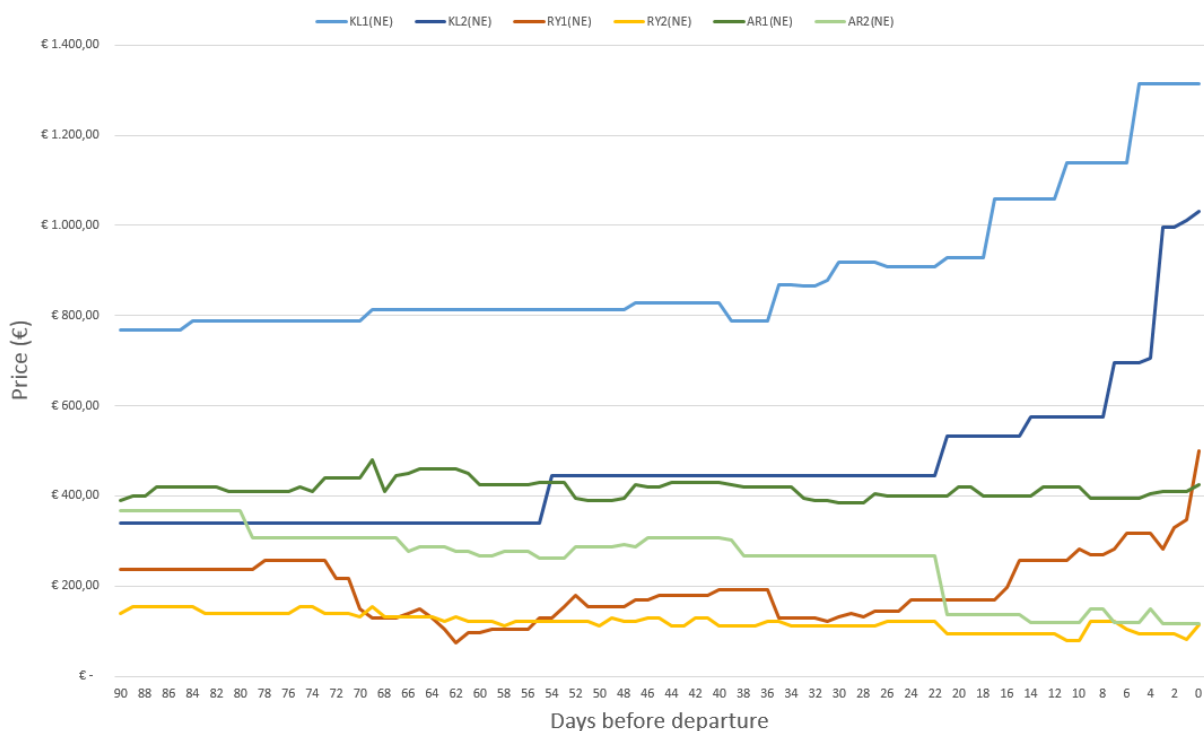

Figure 15. The Netherlands-Gran Canaria's route price comparison

5.4. Evidences in Norway-Gran Canaria route

In Figure 16 the tickets' price evolution for the different analyzed airline companies operating in the Norway-Gran Canaria route can be observed. The first evidence found is that the traditional airline has the highest price in both seasons, just being surpassed during a short period in the high season by Norwegian Airlines, the low cost carrier. The second evidence that can be observed in this market is that the prices are very stable during the first two month of both seasons, and then depending on the type of company the prices start increasing or decreasing. In the case of the tour operator Apollo, the price has a decreasing tendency in the last 3 weeks during the high season, with some irregular increases in the last days, and a heavy drop in price starting the last 3 weeks before departure in the low season case with a stable price during those weeks till the last days when the prices drop even more.

In the case of Iberia, the traditional airline for this market, the price is heavily increased 3 weeks before departure in the low season scenario and 1 week before the high season

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scenario, being the high season increase much more dramatically than in low season; in low season the price increases from approximately €770 to nearly €1,200 and in the high season the price change was from €690 to more than €1,800.

Meanwhile the low cost carrier Norwegian Airlines starts with the lowest price and has a slow price increase tendency during both seasons, surpassing the tour operator's price and in some periods of high season having even greater price than the traditional airline.

In the low cost carrier against tour operator situation there can possibly be a competitive reaction, while the low cost carrier increases its price as they sell all their seats, the tour operator maintains their prices lower than the low cost carriers ones to gain market share and fill its own flights.
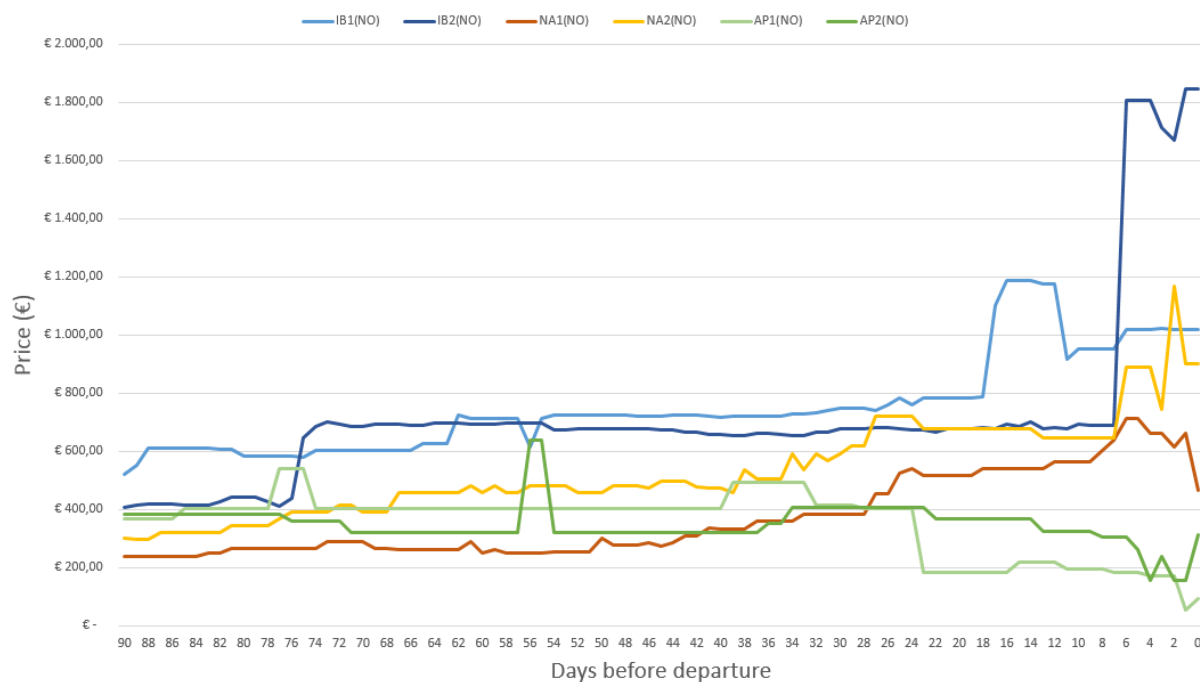

Figure 16. The Netherlands-Gran Canaria's route price comparison

5.5. *All in one analysis*

Once the different markets have been analyzed separately giving some explanation on how were the different companies applying their pricing policies, a general analysis is required to find out what are the pricing techniques applied by the different airlines which are not related to the single markets but are a general pricing policy for most of their flights.

A conjoint graphic is shown in Figure 17 where all the 24 flight prices can be observed. Because of the graphic designer limitations and to aid in the observations, Figure 17 will be shown in a higher size in Appendix 1 followed by Appendix 2 and 3 where conjoint graphics are presented separating the flights by seasons.

What can be observed in those graphics is that the general price differentiating strategies make traditional airlines to have the higher but less variable prices, having big price incremental the near of the day of departure they are. The only case where the traditional company is not the one with the highest price is in the high season of the United Kingdom-Gran Canaria route, where Ryanair had a big price difference with British Airways and Thomas Cook.

Other evidence we can see on the graphics is that tour operators have lower prices, and their prices are not too volatile, they have minor changes every day. Arke was the only one in publicly show in their web page that a flight was having a discount rate and it was just applied in the high season. In general lines, except for the Thomas Cook low season flight, all the tour operators' initial prices are around €300, and from there the prices ended up being higher the day of departure in all cases during the low season, and lower in all case, except the Norwegian market, in the high season.

In most of the cases the prices increase dramatically in the last 3 days, and there are already price incremental during the last 21 days, so to get the best prices is better to buy the tickets before this 3 weeks mark. The best would be the sooner the better, but as it has being presented on the different graphics there are opportunities where waiting until 30 to 60 days before departure good prices and/or interesting discounts can be found. And it depends too on the type of airline we are contracting with our flight, as most of tour operators presented here have stable or even decreasing prices until the last week before the flight.

The explanation on why some airlines increase their prices as departure approaches or they lower them can be found in different factors. The airlines can be lowering their prices as departure approaches to gain market share once they have reached their profitability barrier, or they can be trying to fill in the empty seats with last minute sells. In the opposite side are the reasons behind increasing the prices dramatically as departure approaches, which could be explained by the airlines trying to maximize profit from the last seats to sell and get the best revenue even if they don't fill the plain or they are taking its price policy in accordance with the type of traveler which normally purchase their flights in the last days, which are business travelers. It's assumed that business traveler will mainly purchase flight tickets from traditional airlines and, each time more often, from low cost carriers, while the tour operator tickets are mainly sold to leisure passengers which have higher price elasticity.

In the concrete case of the tour operators lowering their prices in the last days before departure it can be assumed that, as tour operators normally will sell their flight tickets in a package holiday, including accommodation and other services, they are selling the last seats outside of package holiday at discount prices just to fill the flight and get an extra revenue as their main income will come from the selling of package holidays.

Lastly, focusing on why high season flights were sold cheaper than low season flights for all markets except the Norwegian market, is difficult to find an answer, as the logic would suggest that as high season means more demand, the prices should be higher than in the low season, when less people buy flights and the competition between airlines is higher as they fight for the market share and revenue.

Even though, after some research, a logic explanation was found. As stated by different national newspapers, starting on November Norwegian Airline, the Scandinavian low cost carrier, introduced itself completely in the Canaries' flight market, increasing their operations not only between the Canaries and the Mainland, but with 7 of the main destination in Europe. This led to the rest of the airlines to start a price war against the low cost carrier to try to expulse it from the market or minimize the lost in market share. The Norwey-Gran Canaria route was not affected by this price war as Norwegian Airlines was already operating this route since various years ago and the market had already reach stability.
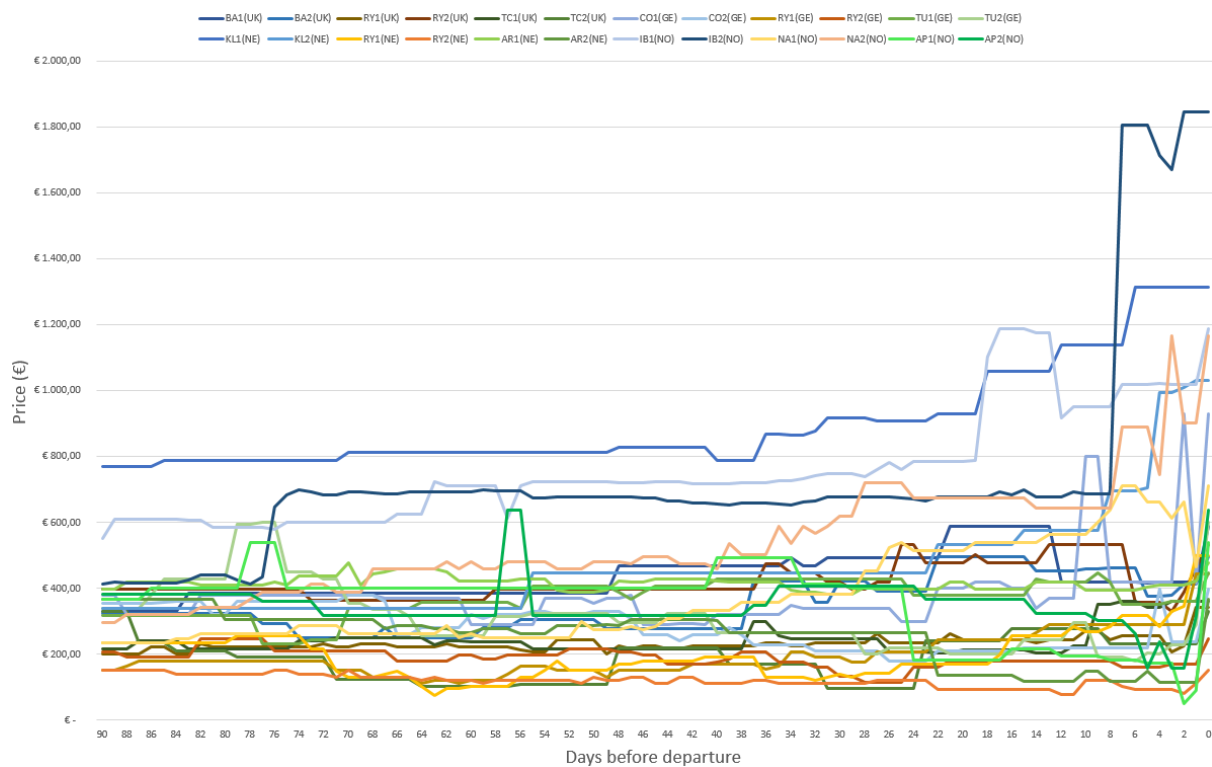
Figure 17. All in one price changes comparison

6. CONCLUSIONS

In the present study a new point of view to the revenue management in the airline industry was presented, as most of the previous work presented in this paper only focused in a concrete market.

This essay tried to show the different pricing policies that airline companies apply in the main touristic markets for Gran Canaria, trying not only to observe the differences in the pricing techniques applied for each company in each market, but to find common pricing techniques applied by the airline companies through the different markets.

What could be discovered in this article is that a lot of different factors affect the price of the tickets, and the revenue management systems take them into account to change, or not, the price in a daily or weekly basis.

There are a lot of non-observable factors that affect the price and because of data limitations this essay could not take them into account. Number of total seats per flights and how the prices changed as the number of seats available was lower is one of the factors that affect the prices. Most of the airlines web pages just gave some advice when the number of seats was below nine or five, and on those cases the prices were higher the lower the number of seats was, but it could not be proven that this was a real data given by the airlines or just a marketing technique to influence possible buyers actions.

Other airlines, as Ryanair, didn't gave a number of remaining seats available from the total, but gave a number of remaining seats at the shown price, which gives some possible information on how their pricing policy works, a number of seats to a discounted fare, another number of seats at a higher prices and so on, changing the price in a daily basis if it was needed to improve revenue or to sell more seats to not fly with them empty.

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The influence of time before departure is a clear and observable factor for the revenue management system, and it would change prices depending on the pricing policy the airline company was focusing, if it was to market share, the prices would lower as the departure approaches, and if it was to maximize revenue, the price would be higher.

Time factor cannot be observed alone, even to this factor, other factors have influence, which makes very complicated to understand the price changes, as the type of demand focused has an important weight on the price presented, as even if the focus is to market share, the company can be increasing prices the last minute business traveler purchasers because the other companies have already risen the price and there is not risk to lose market share. This is explained because if the airline company increases its price, but it is still the lowest price in the market it will not affect that match the market share and the revenue will increase faster as the focused passenger is less price-elastic.

Market factors can affect the price too, as the introduction of a new competitor can obligate to the different competitors of that market to sacrifice revenue in exchange of not losing market share.

And then there is the supply factor too, as the actual tendency of decreasing fuel cost can allow companies to lower their costs being able to sell cheaper to gain market share or to sell at the same price to increase revenue.

With all this, it is clear that revenue management is a very complex field which can be applied to the different sectors and markets in different ways, which would explain all the gaps presented by different authors in their articles, and this one is no exception, as it is impossible for someone which is not directly controlling the prices and working in the revenue management department of a company to understand exactly how their systems and pricing techniques work or what factors are they taking into account to match their pricing policy with the company objectives.

Lot of researches have already been done in the past about revenue management, and more concretely for each of the different sectors where it can be applied, all of them offer different techniques or different conclusions on how to understand each pricing policy presented in their works, this is one more of those articles which will have to be improved in the future when more data is available for researchers.
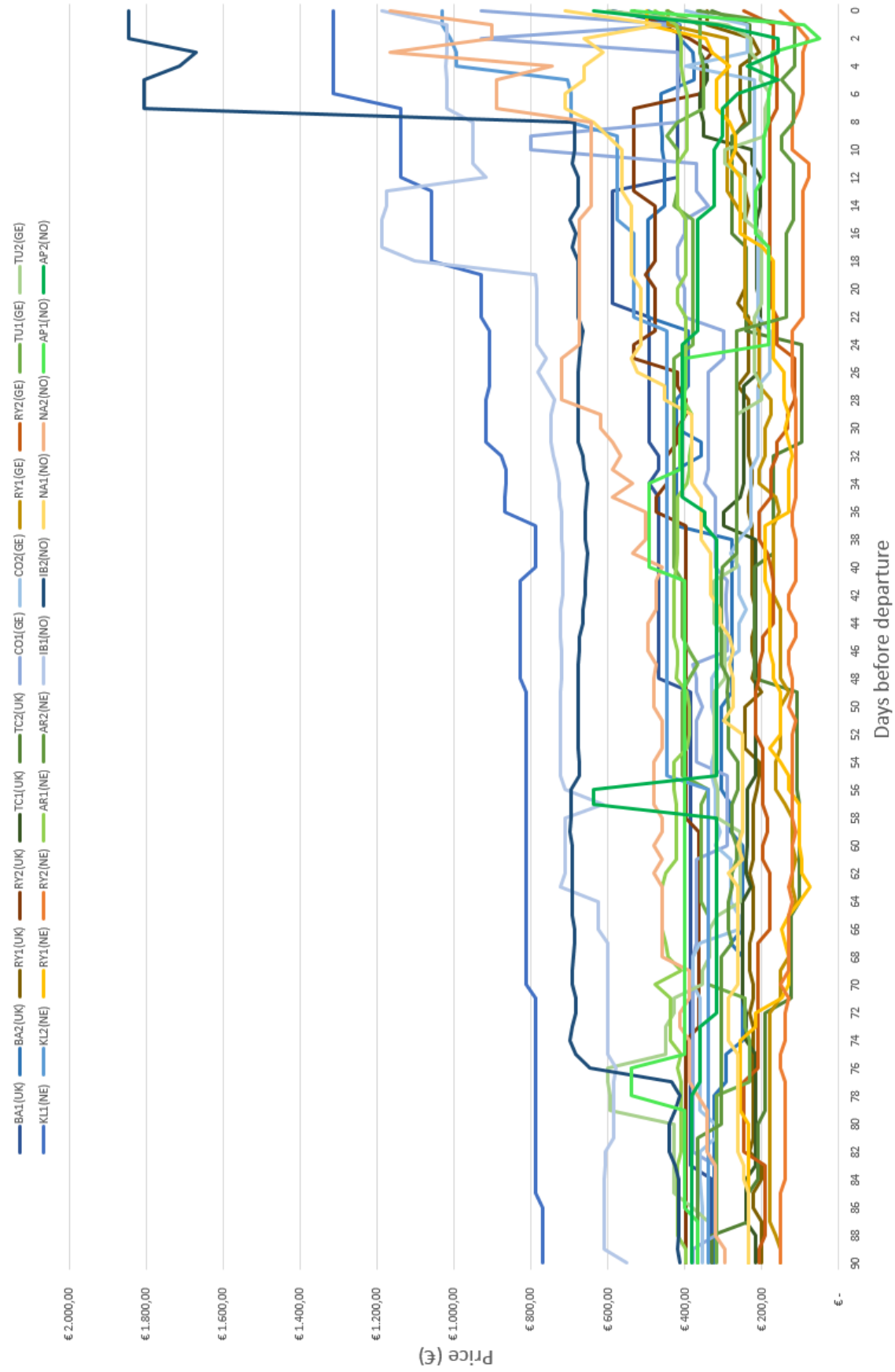
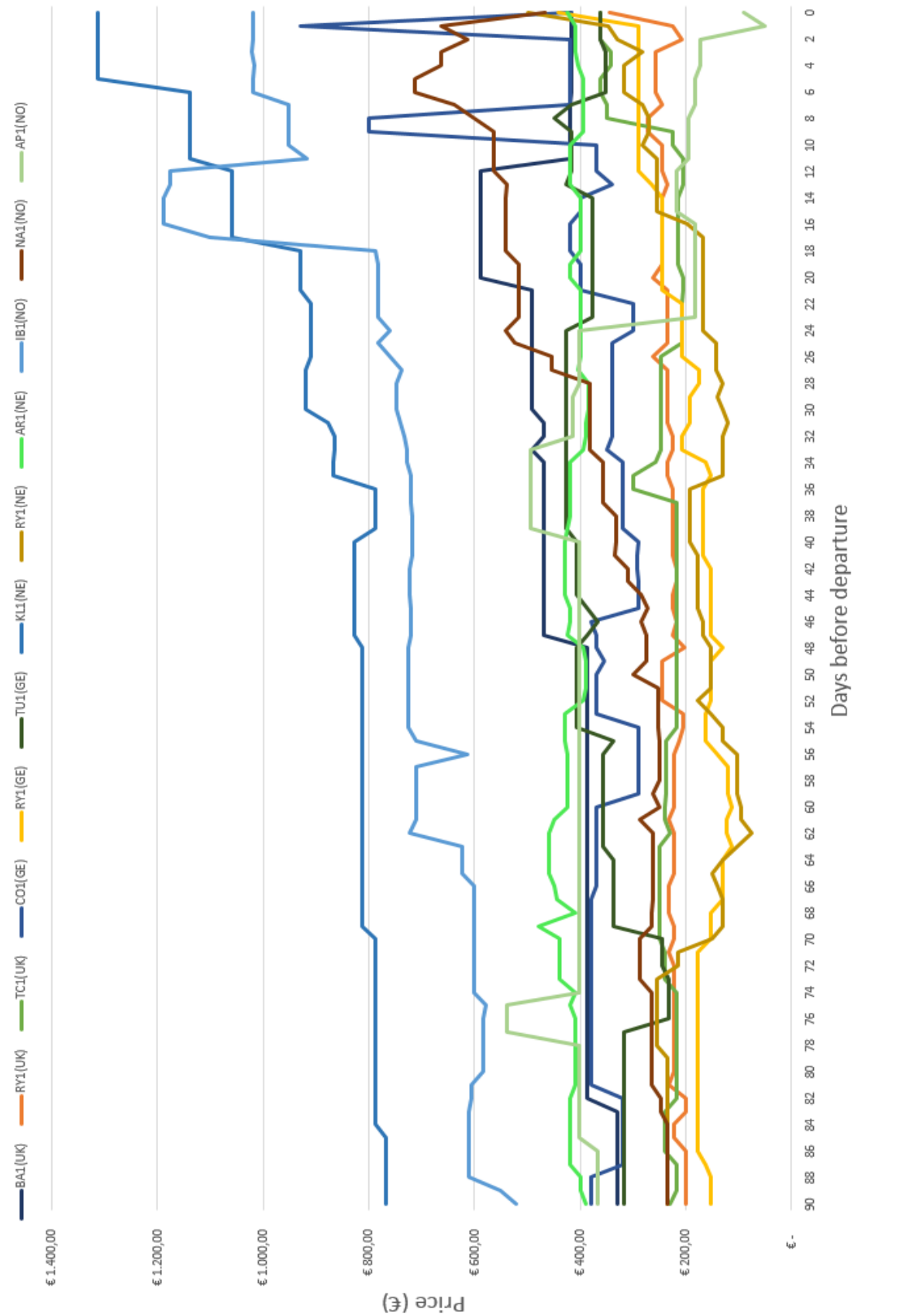**Figure 18. All in one price changes comparison**

APPENDIX 2

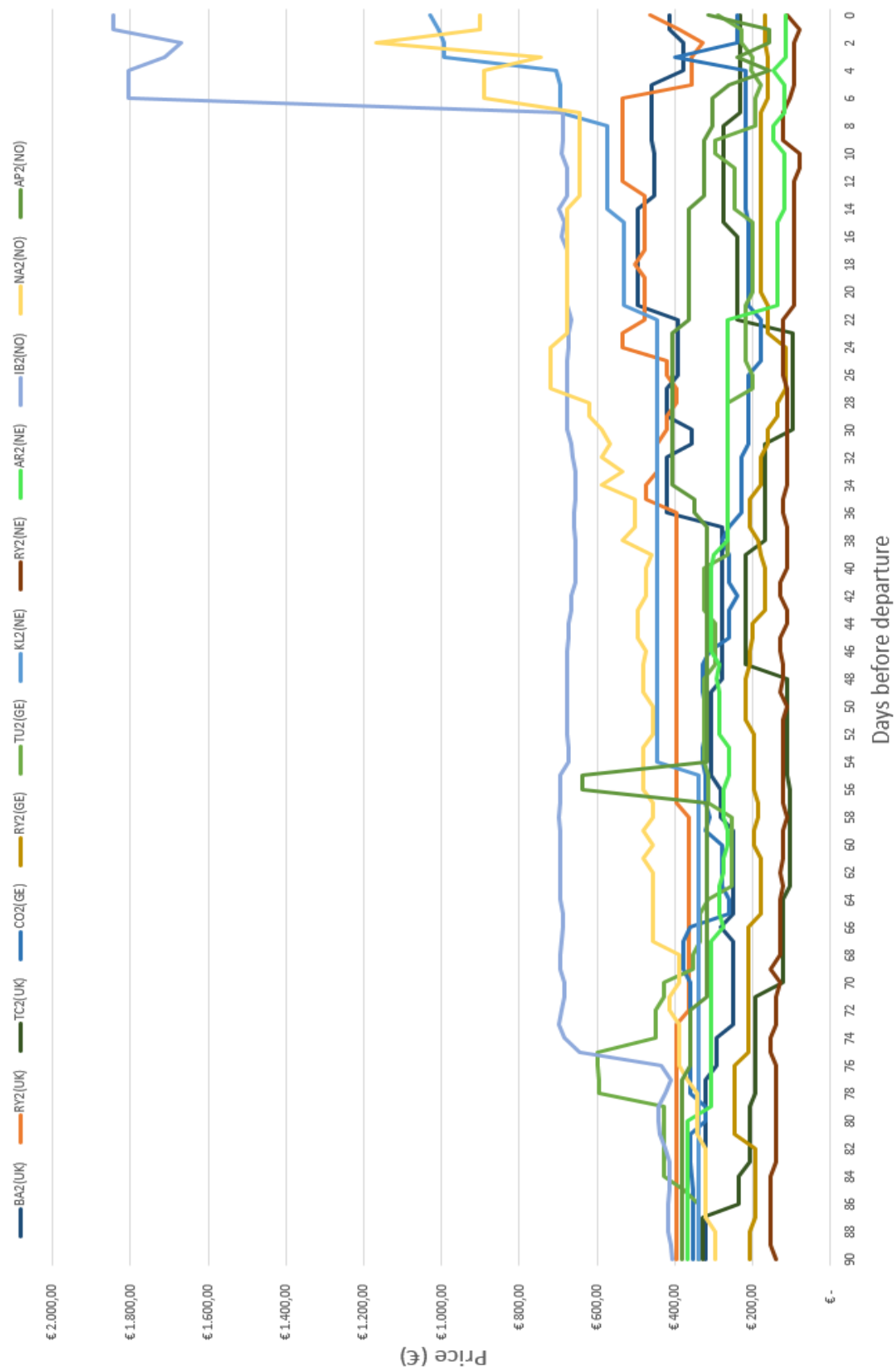**Figure 19. Low season's price changes comparison**

Figure 20. Low season's price changes comparison

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