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Switching Costs and Price Discrimination by European Frequent Flyer Programmes

Master of Science Thesis

by

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Abstract

This thesis presents the two hypotheses that airlines use their frequent flyer programmes (FFPs) to introduce switching costs to combat competition by increasing the percent discount of the value of the points their FFP members receive, and that they use their FFPs to support price discrimination by offering business travellers more value for their travel choices. Economic theory to support these hypotheses is offered and real life data is collected for a number of routes from five major European airlines. The percent discount and value received by frequent flyers is regressed on price, competition level, and other relevant variables to determine their predictive strength and interdependence. The results and following analysis confirm the hypothesis that airlines use their FFPs to support price discrimination since there is a strong connection between the price passengers pay and the value of the points they receive. The hypothesis that airlines use their FFPs to introduce switching costs when facing competition is only partially confirmed since only two airlines increase the percent discount they offer their FFP members when competition is high. The remaining three airlines instead lower the percent discount as they face increased competition. To accurately determine the reason for this difference, more detailed analysis is required.

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Content

1 Introduction

1.1 History of customer loyalty programmes and frequent flyer programmes

Modern customer loyalty programmes started with Raleigh cigarette coupons and stamp-based programmes, and according to Berman (2006) the first frequent flyer programme (FFP), AAdvantage, was created by American Airlines in 1981. The first FFPs were designed to maintain customer loyalty and are based on Klemperer's (1995) findings that customers will stay loyal if the switching of supplier involves high costs. Instead of continuously fighting for market share, the airlines realised that if they focused their marketing efforts on those passengers who have the ability to make repeat purchases and become 'lifelong customers', they could save on their cost of marketing while at the same time create a solid base of loyal customers (Whyte 2004).

As Klophaus (2005) points out, FFPs are now a standard product which is offered by most established airline carriers. Notable exceptions are European low-cost carriers such as Ryanair and easyJet who focus their entire strategies on offering no-frills flights at the lowest possible prices. But the total number of FFP members seems to be steadily rising since one passenger survey indicated that there where a total of 18 million FFP members in 1988 (Hu et al. 1988) while another mentions that the total number was 32 million in 1997 (Arnesen et al. 1997). In 2006 there were over 130 airlines with a FFP and 163 million people who collected customer loyalty points, or 'miles' (Berman 2006).

1.2 Purpose, method, and limitations of the investigation

Frequent flyer programmes have developed from simple schemes, with coupons for free flight awards, to become very complex tools for airlines to increase revenue and help them grow their profits. Apart from offering free trips, they now offer a number of additional perks and convenient advantages which range from lounge access to additional baggage allowance and the possibility to also earn points with a number of 'partner businesses'. Airlines naturally offer passengers these additional advantages with the expectation that their customers will become loyal repeat customers. To understand how, and why customers would not choose to collect the frequent flyer points of a competing airline in the future instead, we need to

familiarise ourselves with switching costs. Since the rewards are not immediately available, but take a considerable amount of time and travel to achieve, a customer would 'reset' his balance of points and wait a longer time until receiving a free trip as a reward if he chooses to travel with a competing airline. This cost of switching supplier is known as a switching cost and there are a number of different types as identified and categorised by Klemperer (1995) and Burnham et al. (2003). But the most easily recognised and valuable of switching costs are financial switching costs, such as not receiving free air travel. These switching costs are artificially constructed through the FFPs and are expected to reduce the competition between aircarriers since they constitute barriers of movement to the passengers.

Another aim of the FFPs is to increase the value, direct or indirect, which is received by passengers who select higher margin products and generate more revenue and higher profits for the airlines. While rewards are not immediately available, they can more quickly be achieved with additional purchases or by purchasing higher priced products such as business class tickets. These possibilities are particularly attractive to business travellers who travel frequently and themselves do not have to pay for the additional cost of extra travel or higher priced business class tickets. They form part of a group of price insensitive customers which airlines, regardless who pays the ticket, wishes to single out and identify. Since airlines themselves cannot determine who the price insensitive customers are and who will help them increase their profits, they let the customers categorise themselves through a process known as price discrimination. By offering a higher quality product which offers the customers more value, the airlines can expect the price insensitive customers over a certain preference level to select it instead of the lower quality product with less value. In this process, the FFPs are expected to play an important role since they provide the airlines with an opportunity to offer the price insensitive customers more value (more points) for the purchases they select.

This paper aims to investigate how FFPs affect switching costs and thereby competition and how FFPs are used as a tool to facilitate price discrimination. The following two hypotheses are presented:

Hypothesis 1: Airlines will in the presence of competition use their FFPs to increase the percent discount of the value of points passengers receive in order to avoid lowering their prices.

Hypothesis 2: Airlines can support price discrimination by offering business travellers more value for their travel choice through their FFP.

These hypotheses will be investigated by the collection of actual data on prices, competition level and reward level for five major European airlines and their FFPs. Through multiple regression, connections between the selected variables and the value they offer the passengers for their travel choice will be investigated and compared to the hypotheses to see if they may be supported or not. With the exception of a smaller analysis of the status levels of the FFPs and their impact on switching costs and price discrimination, this paper will limit its focus entirely on the travel awards the FFPs offer their frequent travellers.

2 Frequent flyer programmes in practice

2.1 Different types of customer loyalty programmes

There is a variety of different customer loyalty programmes, but the best description and categorisation has been presented by Berman (2006) who describes four different types of loyalty programmes described in Table 1.

Berman does not consider Type 1 to be a true loyalty programme since it is open to all customers and gives the same discount with no consideration to the customers purchase history. Further, these types of programmes do not reward loyalty or encourage repeat purchases. The Type 1 programme simply rewards membership and is typically employed by smaller companies with smaller resources. The loyalty programme Types 2, 3 and 4 offer rebates, free goods or discounts related to customer's purchase with the aim to increase the customer's number of total purchases.

Programme type	Characteristics of programme	Example
Type 1: Members receive additional discount at register	• Membership open to all customers • Clerk will swipe discount card if member forgets or does not have card • Each member receives the same discount regardless of purchase history • Firm has no information base on customer name, demographics, or purchase history • There is no targeted communications directed at members	Supermarket programmes
Type 2: Members receive 1 free when they purchase n units	• Membership open to all customers • Firm does not maintain a customer database linking purchases to specific customers	Local car wash, nail salon, hairdressers, airport car parks
Type 3: Members receive rebates on points based on cumulative purchases	• Seeks to get members to spend enough to receive qualifying discount	Airlines, hotels, credit card companies
Type 4: Members receive targeted offers and mailings	• Members are divided into segments based on their purchase history • Requires a comprehensive customer database of customer demographics and purchase history	Very large retail chains

Table 1: Different types of customer loyalty programmes

A Type 2 programme offers a quantity discount where members get a free unit after having bought a certain number of units. This type of programme is easy to administer and often used by smaller retailers with smaller resources. Type 3 programmes typically have a point system where the discounts or awards are related to the number of points gathered. This way,

consumers are encouraged to buy more and make bigger purchases. Type 3 programmes often involve different partner companies who offer complementary goods or services (such as airlines and hotels) and thereby further encourage customers to collect more points. This type of programme requires quite a bit of resources and is often employed by larger corporations such as airlines, hotel chains and credit card companies. But with a Type 3 programme, customers should not be able to earn more points through partner companies than through the main company of the loyalty programme. For a FFP, Klophaus (2005) finds that "non-airline partners may erode the specific carrier loyalty effect if frequent flyers can accrue miles faster through them". A Type 4 programme works in the same way as a Type 3 programme, but is much more advanced in the way that it involves extensive data hoarding which is aimed at predicting the customer's future purchases. By using the data of past purchases, merchants with Type 4 programmes send targeted offers to their members. The purpose of these targeted offers is to improve the probability that the customer increases his purchases by sending him the offers which are most likely to appeal to him. A Type 4 programme requires big resources and extensive data storage and is commonly used by dedicated merchants such as large retail corporations. Since published by Berman in 2006, it is however presumed that the FFPs of airlines have developed into Type 4 programmes based on the amount of passenger data which is available to them and the reduced cost of data storage.

Every time a member of a Type 3 or Type 4 programme uses his membership in association with a purchase, the merchant registers the information in his database and uses this information for anything from pricing, inventory management or promotion planning. The database also allows for the merchant to evaluate the results of promotions, the use of new sales channels and advertising effects. Since all the customer has to do is to swipe his or her card, the reported data is accurate as opposed to self-reported data from market studies and quickly builds very large samples of true transactional data.

Providers of Type 3 and Type 4 programmes can lower the costs for their programmes by partnering with other companies or creating coalition loyalty programmes such as airline alliances. By sharing their data, the companies can not only share costs but also access each other's data to find cross-selling opportunities. Apart from airlines, other popular loyalty programme partnerships include companies in the travel, fuel and financial services industries.

Effective Type 3 or Type 4 loyalty programmes are commonly run by cross-functional organisations which are wholly dedicated to the management of the programme. Tesco's

Clubcard is said to employ 500 people who work in their call-centres, in marketing, accounting and store operations and loss prevention functions (Berman 2006). Also in the airline industry, customer loyalty programmes are run by dedicated teams and many of them are even organised as separate company entities. For example, the Lufthansa Group's FFP is organised under a company called Miles & More GmbH, British Airway's FFP is organised under a company called Avios Group Limited (AGL), and Air Berlin's FFP is organised under a company called Topbonus Ltd. and located in the UK.

Klophaus (2005) points out that after Southwest Airlines pioneered the concept of being a no-frills low-cost airline (LCA), the model was quickly adopted by several European carriers, most notably Ryanair and easyJet. By March 2005, still only 20% of these European LCAs had FFPs or other loyalty schemes and several reasons are mentioned for them to not yet offer FFPs. Among the reasons are the limited numbers and lack of partners, the strong market growth, the strong focus on costs and pressure on prices. But he still argues that "for LCAs with no prospect of becoming one of the cost leaders, however, the pressure on prices is not an argument against introducing selected frills, but in some context a reason favouring it." Klophaus refers to a 'winner-takes-all' effect where only the market leading LCAs in Europe and North America have continuous high profits and suggests that the answer to the other LCAs could lie in introducing more basic customer loyalty programmes which he calls 'FFP light'. As an example, he mentions JetBlue and Southwest Airlines who have created FFPs which are significantly cheaper to administer and makes it easier for customers to predict their rewards. Instead of a more complex mileage or points system, Southwest Airlines' FFP awards one credit for each flight taken and rewards its frequent flyers with an award once the member has reached 16 credits. Reward flights are issued automatically and are transferable to friends and relatives and can be used on any flight where there are still available places. Although this scheme was rewarded with the Freddie Award for best American FFP in 2001, no European airline has yet implemented this type of 'FFP light'. Instead, the cost-cutting race has continued and led to a number of bankruptcies while others have introduced or expanded their FFPs. Examples include Air Berlin who has joined the Oneworld alliance and Germanwings who has been developed to be Lufthansa's European low-cost alternative which serves all routes not to or from the hubs of Frankfurt or Munich. Germanwings now has its own FFP called the 'Boomerang Club', but members of the Lufthansa Group's FFP, Miles & More, can still also collect points on Germanwings flights.

Terblanche (2014) finds that the benefits which FFP members perceive are industry specific and points out that managers should be familiar with the expectations of programme members. He suggests that managers ask if the additional benefits which a higher status level offers meets customers' expectations and is of sufficient value to customers for them to strive to obtain it or if they think that more benefits or status levels are necessary.

2.2 Additional FFP benefits offered to frequent flyers

Terblanche (2014) used previous research to group customer perceived FFP benefits into seven groups consisting of monetary savings, exploration[1], entertainment, recognition, social status, convenience and preferential treatment.

But this type of grouping does not very clearly categorise FFP benefits as an example easily demonstrates. Access to lounges may be considered to provide elements of all these categories since it apart from convenience offers both recognition and social status through preferential treatment. Most lounges also offer newspapers, drinks and lighter or even full meals which present monetary savings to the travelling businessman.

An alternative view on the additional FFP benefits is presented by Whyte (2004) who in a survey identified 25 different FFP benefits apart from 'free flights' and clustered them into 8 key benefits which are listed in Table 2 according to their ranking by passengers.

1	Lounge
2	Preferred seating
3	Priority check-in
4	Occasional upgrades
5	Priority baggage
6	Increased baggage allowance
7	Partner benefits (alliances/hotels/car rentals)
8	Booking service

Table 2: Whyte's (2004) ranking of additional FFP benefits

[1] From permitting customers to visit and experience exceptional places which they would not have visited if it was not for the frequent flyer programme.

Most FFPs offer additional benefits such as listed in Whyte's (2004) ranking, but the extent and availability depends on the status level of the frequent flyer and is an additional way in which airlines try to differentiate themselves compared to competition.

2.3 FFPs and ethical concerns

FFPs present a number of ethical problems since it is often the employee who selects the airline while it is the employer who pays for the flight. A problem commonly referred to as the principal-agent problem. Deane (1988) highlights four main ethical problems which should be considered.

1. Inefficiency in selecting travel services
    - There is a risk that an employee selects a less efficient route or more costly service so he can accumulate more points with his preferred carrier. This leads to higher costs and lower employee efficiency for the employer.
2. Price subsidies
    - While it is clear that frequent flyers have to pay higher ticket prices to finance the rewards, this is also true for non-business and non-frequent flyers. The costs of the rewards need to be covered somehow and with ticket prices being the same, this means that one group of travellers is subsidising reward travel for another group.
3. Promotes the evasion of income tax
    - A free reward trip which is the result of company paid travel equals an additional income which is taxable. But the procedures of FFPs do not allow for easy tracking and therefore promotes underground economy.
4. Distorts competitive forces
    - FFPs distorts competition since smaller airlines don't have the possibility to offer reward trips to as many and maybe exotic locations as larger airlines.

To alter the ethical issues regarding FFPs, Deane suggests a practical resolution of tax issues by the IRS (U.S. taxation authority) and corporate flyer accounts.

Chin (2002) refers to a source in which airline marketing officials claim that FFPs increase their business with 20-35% but points out that it is highly improbable since it would mean that business travellers would take unnecessary trips for billions of USD every year. Unnecessary use of business trips, or unnecessarily expensive business trips, may occur if the business traveller himself arranges the travel and gets to claim the accumulated points privately. And apparently, unnecessary flights or additional layovers to gain miles in order to achieve a higher status level is still a common enough phenomenon to be known as a 'mileage run' in online FFP forums such as flyertalk.com.

According to a study of 204 corporations, Hu et al. (1988) found that most companies mentioned more expensive fare choices as being their main problem regarding FFP abuse (57%) with other big FFP abuse problems being unnecessary travel (16%) and wasted employee time (14%). Deane (1988) conducted a study of 625 airline passengers where 95% of the business traveller respondents reported that they received the miles for travel paid for by their employer. 25% of the respondents admitted to having taken trips that were unnecessary so they could accumulate more points. And while 80% of the business travellers admitted that their FFP membership influenced their choice of airline, only 25% saw it as an ethical problem. This is in stark contrast to the non-frequent flyer respondents of which 50% agreed that FFPs present ethical problems. Later, the study of Arnesen et al. (1997) which included 506 corporate travel managers, found that 70% of the companies complained of additional costs due to unnecessary business travel by their employees. The total additional cost of unnecessary business travel was estimated to be 8% of corporations annual travel expenses. This figure also included the costs of higher fares, wasted employee time and additional hotel accommodation costs.

Apart from the ethical matter of employees engaging in 'mileage runs' and unnecessary travel, Arnesen et al. (1997) also address the ethical issues which relate to the consequences of these actions to society as a whole. They argue that the rewards are attractive, addictive and in practice tax free. In most countries, the tax laws require an employee to pay tax for the miles privately accrued from business travel which has been paid for by the employer. But the system relies on self-reporting and the value of accrued miles cannot be determined until they are used since they will be valued differently depending on which reward the FFP member chooses. For instance, it is not clear if the value of a reward flight should be taxed at full or at discounted value since the reward flight would be at a discounted fare price (Hu et al. 1988).

Even though Hu et al. in their work pointed out that frequent flyer rewards in the U.S. may be treated as discounts and would therefore not be taxable, they concluded that it was completely irrelevant since the law is totally unenforceable. Since no customer loyalty programme points are reported, the risk of being caught for not declaring the value of them is virtually non-existent. This fact was made rather clear as the U.S. tried to pass a bill which was designed to require airlines to report rewards for taxation purposes – it was abandoned due to the complexity of the accounting and evaluation of rewards (Deane 1988). And while the taxation of FFP points may be difficult enough to implement due to the existing format of the loyalty programmes, airlines are doing their part to complicate things further in order to protect their members and thereby the value of their FFPs. In 1993, when the Australian Tax Office declared that frequent flyer rewards were taxable, the domestic airlines immediately came up with elaborate schemes which allowed their members to avoid taxation.

According to Arnesen et al. (1997) U.S. courts have despite of mentioned research results found that FFPs are not illegal since they "do not encourage employees to break their fiduciary duty to their employers, introduce tortuous interference with contractual relations, or constitute commercial bribery". But as Arnesen et al. point out, "legality is not a sufficient condition for ethicality". They also conclude that FFPs do not satisfy the deontological requirement[2] for being ethical due to the intentions of the airlines and this certainly becomes true if an employee engages in the practise of incurring unnecessary travel costs. Neither do they find FFPs to be ethical according to consequential utilitarianism[3] since they are contrary to the agency relationship and also this becomes clear if the employee incurs additional costs due to unnecessary travel and thereby causes social costs and lost productivity.

Some U.S. corporations, including Texaco, Boeing and Texas Instruments, have demanded that frequent flyer miles are used for business travel. But they are exceptions since a survey of 313 corporations revealed that only 11% of companies believe that the FFP rewards of employees belong to them (Hu et al. 1988). One reason for this is claimed to be that airlines have refused to share information on their FFP members and their account records and it is concluded that airlines will fiercely resist any attempts from companies to make gain or use any FFP benefits accumulated by their employees. One important reason for this is said to be

[2] An act that satisfies the requirement of being generalisable and equal to all and also reversible so that one would be willing to be treated in a similar way.

[3] An act is under utilitarianism ethical if it in the long run has a bigger positive effect on social welfare than its consequences.

that corporate travel managers would coordinate the benefits and make good use of them and thereby significantly lower the breakage. Hu et al. remark that this is handled much differently by European and Japanese airline carriers who instead have created corporate frequent flyer programmes. Historically, companies have not been able to participate in FFPs and only individuals could join. This has however changed and many airlines now offer FFPs also to companies, among the examples PartnerPlusBenefit from the Lufthansa Group, On Business from British Airways and SAS Credits from SAS can be mentioned. But many companies still don't participate due to the administrational burden of participation and prefer to give their travelling employees the perk of airline miles as an additional appreciation which does not affect their balance sheet.

Many U.S. companies, including Citicorp and AT&T, state in their corporate policies that any travel mileage accrued on company travel belongs to the employee. However, the corporate policy of AT&T also provides restrictions and prohibits employees from significantly changing their itinerary to gain more FFP points (Deane 1988). Some employers, such as Brazier Forest, believe that this practise is a simple fringe benefit to compensate employees for being away from home. Arnesen et al. (1997) therefore believe that every organisation should have a policy which clarifies how frequent flyer awards should be managed. It is however clear that very few companies attempt to claim the FFP points which their employees earn on business trips. One reason for this is according to Deane (1988) that it risks putting an unnecessary schism between travelling employees and their employer.

Unfortunately, the ethical matters on FFPs aren't that easy to settle. While it is easy to understand the argument that an occasional free flight is a harmless fringe benefit for employees who have to travel much and stay away from home, it may of course also be argued that many managers who take this decision are most likely to also benefit from this perk themselves. And the survey of Arnesen et al. (1997) also highlights that several corporate travel officers reported that the most severe abuse of FFPs was conducted by their high-level executives. This further strengthens the case for clear but stringent travel policies such as the ones which AT&T has in place, because: "Ethical views in organisations start at the top. Under such hypothesis, employees accept a practise as ethically sound if it is condoned and supported by top management" (Deane 1988). Conclusions on the ethics of FFPs are widely scattered and most likely also strongly influenced by the personal opinion of the author/s. Hu et al. (1988) conclude that they are of the opinion that airlines should continue their successful practise of keeping FFP rewards from the companies who pay for

the business travel and do what they can to let the individual traveller keep it. They consider it to be an affordable and charitable way of compensating business travellers for flight delays, poor meals, lost baggage while having to be away from home. On the other end of the spectrum lies the short and clear statement of Whyte (2004) who in his conclusion remarks that "the schemes create spurious loyalty and are a form of commercial bribery".

2.4 The typical FFP member

A survey conducted by Whyte (2004) determines the profile of a typical corporate frequent flyer to be male (75%), middle-aged and a senior executive, manager or professionally employed. A majority of FFP members have been members for over 5 years and they predominantly book full economy class for domestic travel but there is a noticeable shift towards business class for international travel. Since Whyte's survey was conducted in Australia, it is worth noting that international travel in his survey, for most cases compares to intercontinental travel for a European traveller.

While the reasons for targeting frequent business travellers may seem self-explanatory, the work of Martín et al. (2011) confirms that FFP members have a higher willingness to pay higher ticket prices than non-FFP members, but also that there is a big variation depending on who pays for the ticket. Not surprisingly, FFP members who don't pay for their tickets themselves, essentially business travellers, are much less price-sensitive and willing to pay for additional services (including airline miles).

Proussaloglou and Koppelman (1999) determined that business travellers are willing to pay a premium of 21 USD to travel with an airline where they hold a membership with its FFP and this premium ranges as high as 52 USD for low-frequency travellers and 72 USD for high-frequency travellers. The premium which leisure travellers are willing to pay is notably lower at 7 USD and 'only' ranges as high as 18 USD for low-frequency travellers and 26 USD for high-frequency travellers. This result clearly explains why airlines aim to mainly target their FFPs towards business travellers and how strongly an active participation in an FFP can raise an airline's revenue.

3 Switching costs and price discrimination in theory

3.1 Switching costs

Due to the nature of the FFP's rewards, most switching costs faced by an FFP member are financial switching costs and relational switching costs according to the classification of Burnham et al. (2003). While relational switching costs may be of significance, we here focus on the financial impact on the decision making process since this is the main component of the FFPs. According to Holm, (2000), if a business traveller receives the utility U^A from travelling with airline A and the utility U^B from travelling with airline B, he will choose to travel with airline A if $U^A > U^B$ regardless of price if his employer pays and he himself feels no obligation to save his employer money. And if a FFP increases the utility of the traveller with α, he will chose to travel with airline A if $U^A + \alpha > U^B$. The natural consequence which follows is of course that airline A can increase its price and charge more than airline B, for the same product, while still winning the business. FFPs increase switching costs since customers perceive competitors prices to be higher due to missing out on discounts or rewards from the accrual of miles as pointed out by Terblanche (2014). By comparing prices and switching costs for seven domestic airlines in Sweden, Carlsson and Löfgren (2006) showed that the FFP of SAS, Eurobonus, increased the switching costs with 12% of the average ticket price.

But the case with FFPs is even more complex than that since the switching costs are non-linear and instead progressive as both Klemperer (1995) and Carlsson and Löfgren explain. The main reason for this is because when a traveller already has accrued some points with the FFP of a certain airline, additional points will be more valuable to him since they will bring him closer to the level required to claim a reward trip. But another reason is that FFPs have divided their members into status levels depending on the level of business the traveller has awarded them with in the past. And these status levels offer further rewards such as additional points or lounge access, hence tying the FFP members closer and more strongly to them.

Considering Klemperer's two-period model, and expanding it to n periods and adding α_p for the additional utility offered by the FFP of airline A in period p, we get:

$$U^A + \alpha_p > U^B, \text{ where } \alpha_1 < \cdots < \alpha_p \leq \cdots \leq \alpha_n, \text{ for } p \in \mathbb{N}. \qquad (1)$$

The above equation gives the decision criteria at period p and states that airline A can charge more for its product for each period p which goes by. There is however a practical limit since

the growth of α_p declines with each period as the FFP member eventually stagnates at a certain travel level which may be considered an asymptote of the combined growth of utility over time. Still, it is clear that the artificially introduced switching costs reduces the competitive ability of airline A's competitors.

If the business traveller is completely loyal to his employer, he will choose to travel with airline A if $U^A - U^B > P^A - P^B$, where P^X is the price of airline X. But with company A offering a FFP, his decision criteria becomes:

$$U^A + \alpha_p - U^B > P^A - P^B. \qquad (2)$$

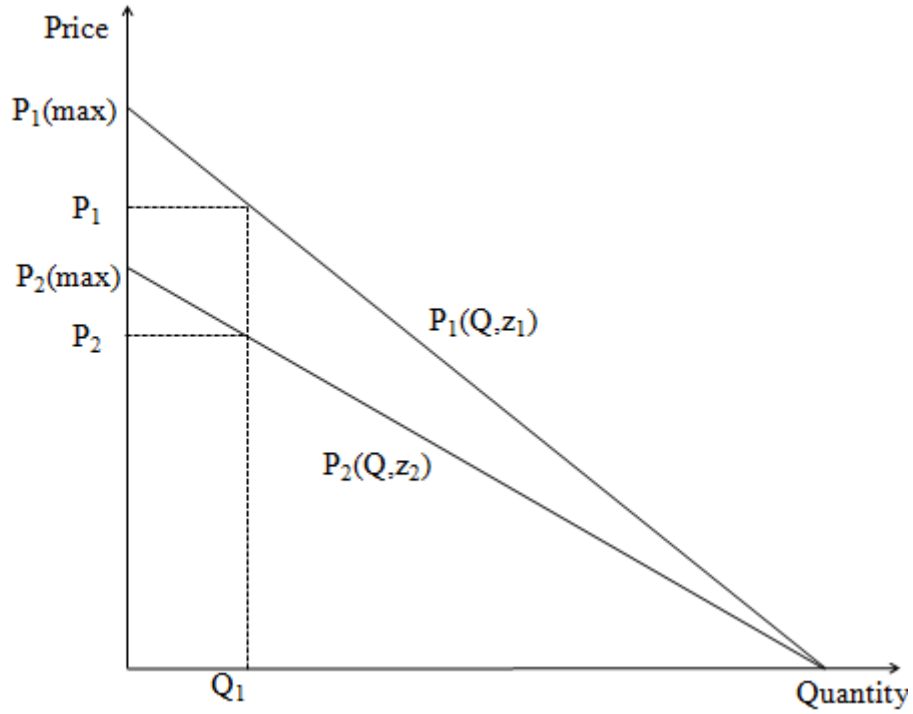
The additional utility, for his personal benefit, gives him a strong incentive to choose airline A even if it is not the alternative which optimises the benefit to his employer who pays for the trip. For clarity, it is pointed out that it is not necessarily the lowest cost alternative which optimises the benefit to the employer since it may include an unnecessary layover and cause a waste of employee resources. This very clearly illustrates the principal-agent-problem and how the agent (employee) may be corrupted by the FFP to act against the best interest of the principal (employer). If the traveller is travelling privately and himself paying for the ticket, the above decision criteria ceases to be a moral hazard but will still affect his decision making in favour of airline A. And since he may have accumulated points from previous business travel, his business travel may have a strong affect on his choice of aircarrier also when travelling privately. Additionally, the higher the switching costs are, the less the search for an alternative provider is likely to pay off since a new alternative must not only pay for the cost in time to be found but also offer a price P^B, where P^B and α_p combined need to be lower than P^A, thus further lowering the competitiveness of the market place.

Regardless of who is paying for the airline ticket, the switching costs of airline A may be fought by other airlines also introducing a FFP of their own, just as most large aircarriers have done. But as the equations show, the later the period in which a new provider enters the game, the higher the switching costs have become and thereby constitute a significant entry barrier which deters new entrants and lowers competition. Because of these switching costs, a firm's current market share is important for its future revenue when customers are tied to the provider (Klemperer, 1995). This is expected to lead to stronger competition with larger discounts (more points) being offered in early periods when more carriers compete, but lead to lower competition and higher prices in later periods when a few number of carriers become and remain profitable while others give up the route. This reasoning, supported by expression

(2) above, provides the theoretical background of Hypothesis 1 and why airlines are expected to offer higher percent discounts when facing competition.

3.2 Price discrimination

Some customers being willing to pay more for higher quality and more value is easy to understand, but the mechanisms behind the decisions and how to maximise the revenue from higher quality requires more analysis. This is easiest visualised by considering inverse demand curves $P_i = z_i(k - Q)$ as suggested by Pepall et al. (2004), with $i = 1$ for a high quality product and $i = 2$ for a lower quality product and where P_i is the price, Q_i is the quantity, z_i is the quality level of product i and k is a constant. Since prices are not expected to be negative, it follows that $k \geq Q$. By increasing the quality level from z_2 to z_1, the inverse demand curve rotates and increases the customers' reservation prices. In some cases the market size also grows, but the air travel market can in this respect be considered a monopoly in the short term due to fixed quantities because of seating configurations and allocation of slots (highly regulated airline 'timetables'). So the increase in quality rotates the inverse demand curve from $P_2(Q, z_2)$ to $P_1(Q, z_1)$ as shown in Graph 1.



Graph 1: The pivoting of inverse demand curves when quality increases

Now, the reservation price of the Qth customer will mean that he is indifferent between paying P_2 and receiving quality z_2 or paying P_1 and receiving quality z_1, thereby raising his

reservation price. It also gives less price sensitive customers, who place high value on quality and are located to the left of curve compared to the Qth customer, an appealing offer which also earns the supplier more revenue. Depending on the desired price and quality level which maximise profits, companies which offer two quality level products, such as airlines, will often choose to select a quantity Q_1, and quality z_1, which ensures that $P_1(min)$ remains above a certain level and separates price sensitive customers from price insensitive customers. This is known as vertical product differentiation and allows the supplier to distinguish high profit customers from low profit customers.

The indirect utility a customer of type i, receives is $U_i = \theta_i(z_i - \underline{z_i}) - P$, $(i = 1, 2)$, where θ_i is a measure of how much value the customer places on quality and $\underline{z_i}$ is the lower bound of quality where the customer still buys. Additionally, $\theta_1 > \theta_2$, $\underline{z}_1 \geq \underline{z}_2 = 0$ and naturally $U_i \geq 0$ for the customer to buy at all. A customer of type 2 will buy the lower quality product if $P_2 = \theta_2 z_2$, but a customer of type 1 will only buy the high quality product if he receives a non-negative indirect utility and if $\theta_i(z_i - \underline{z_i}) - P_1 \geq \theta_2(z_2 - \underline{z_2}) - P_2$. Substituting P_2 with $\theta_2 z_2$, we see that

$$P_1 \leq \theta_1 z_1 - (\theta_1 - \theta_2) z_2 \qquad (3)$$

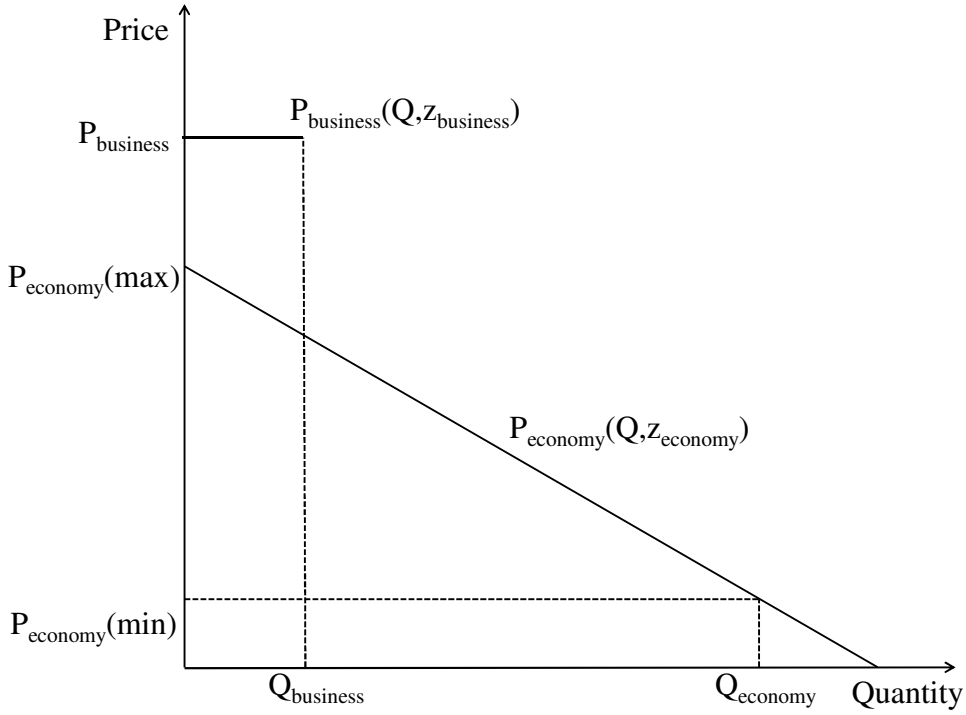
is the highest price the supplier can charge for the high quality product. As can be seen, the price which can be charged for the higher quality product becomes higher the more value the customers place on quality. It should be noted that also the value which type 2 customers place on value has a positive effect on the price for the higher quality product. It can also be seen that the larger the difference between the product qualities z_1 and z_2 is, the higher price can be charged for the high quality product.

This important result, that larger quality differences lead to the ability to charge higher prices for the higher quality product, explains the big product difference in the airline industry.

One very well known way in which airlines differentiate their product is through selling tickets in different classes, most commonly economy class which is a lower quality product and business class which is a higher quality product. Business class tickets don't only offer better seats and meals, but also additional conveniences such as lounge access and higher baggage allowances. Another way to offer business passengers more value and further increase the price of their tickets and strengthen the price discrimination is by offering them

more points or a higher value of their points. This provides theoretical support for Hypothesis 2 and why it is expected that airlines offer business travellers more value for their points.

It is well understood that there is a finite number of seats and thereby tickets which are offered for the different classes on any certain route and day. And it is also well known that the price differences between economy and business class tickets are very big, often several factors, and with practically stable prices for business class tickets. This creates two very distinct and separate customer groups and leads to the inverse demand curves for air travel to be assumed to look like in Graph 2.



Graph 2: The assumed inverse demand curve for airline travellers

As can be seen in Graph 2, there is a certain minimum price which needs to be paid for a seat in economy class and a certain minimum price which needs to be paid in business class. Most travellers will be located between $Q_{economy}$ and $Q_{business}$ and buy an economy class ticket. Those travellers who are located to the right of $Q_{economy}$ will think that air travel is too expensive and choose an alternative travel method such as train. But the left-most travellers in Graph 2, who belong to a rather exclusive group which is less price sensitive, will become more inclined to purchase business class tickets since it will increase their indirect utility according to their personal preferences.

4 Variables and collected data

Five large FFPs, which customer benefits are analysed, were selected for the research in this paper. The FFPs, the airlines they serve as FFP for, and the airline alliance they belong to are shown in Table 3.

Frequent flyer programme	Airlines served	Airline alliance
Executive Club	British Airways (BA)	Oneworld
Eurobonus	Scandinavian Airlines (SAS)	Star Alliance
Flying Blue	Air France (AF), KLM, Air Europa, Kenya Airways, TAROM	SkyTeam
Miles & More	Lufthansa (LH), Austrian Airlines, LOT Polish Airlines, Swiss International Air Lines, Adria Airways, Croatia Airlines, Condor Flugdienst, Luxair, Brussels Airlines, Germanwings	Star Alliance
Topbonus	Air Berlin (AB), Niki	Oneworld

Table 3: Overview of frequent flyer programmes, the airlines they serve, and airline alliance

Each of these 5 FFPs have four different status levels which members can strive to obtain by collecting enough points within a given amount of time, usually a year. Apart from giving access to certain service rewards, such as lounge access, higher status levels often give an additional amount of points as bonus on flight travel. An overview of these status levels and the amount of bonus points they offer on flight travel can be seen in Table 4.

	Executive Club	Eurobonus	Flying Blue	Miles & More	Topbonus
Lowest status level points bonus	0%	0%	0%	0%	0%
1st status level points bonus	Ca. 15-25%	0%	50%	25%	20%
2nd status level points bonus	Ca. 60-100% Same as 3rd level	25%	75%	25%	40%
3rd and highest status level points bonus	Ca. 60-100% Same as 2nd level	25%	100%	25%	40%

Table 4: Overview of status levels and the amount of bonus points they offer

To calculate the value of the points received, and the level of discount they present, 13 European and more distant locations were selected to represent flights of different distances. These locations can be found in Appendix A. The main hub of the main airline served is for each of the 5 FFPs included among the European locations and serves as the home location

for each simulated frequent flyer. This means that the frequent flyer using Executive Club, which serves British Airways, has London as his home location and that the frequent flyer using Miles & More, which mainly serves Lufthansa, has Frankfurt as his home location. In the same way, the home location of the frequent flyer using Eurobonus is Copenhagen, the home location of the frequent flyer using Flying Blue is Paris, and the home location of the frequent flyer using Topbonus is Berlin. Since someone travelling from London with relative ease can use any of greater London's 6 international airports, the home location is not identified as an airport but as a city, and a traveller may use any of the airports in the city's greater area. Only direct flights were considered, which meant that in some cases flights between selected locations had to be substituted with flights between other locations of similar distance in order to not lose observations when no direct flights between the original locations were available. A list of such substituted routes may also be found in Appendix A.

Data has then been collected online for return flights from the home city of each of the frequent travellers, to each of the other locations, buying a ticket from the main airline which their FFP serves. Prices for tickets bought 1 or 14 weeks in advance, in business class or lowest economy (including any costs for 1 checked-in piece of luggage), and for the travel days of Monday-Friday were used, thereby simulating a businessman who is gone for business during an entire working week. When a ticket was sold out, the price of the same type of ticket 1-3 weeks earlier or later was used instead, and the variable "Weeks" was changed from 1 or 14 to reflect the true number of weeks before departure that the ticket price was obtained. Ticket prices where all obtained between Friday and Sunday on the weeks 10-13 during March 2015, and for British Airways tickets, the exchange rate of 1:1.37 between EUR/GBP was used[4].

For each flight, the ticket price, with fees and taxes added separately, was used to calculate the value of the frequent flyer points received. For instance, a SAS lowest economy return flight between Copenhagen and Oslo which is bought 14 weeks in advance costs the traveller 80.00 + 66.12 = 146.12 EUR. As a Eurobonus member, he will earn 500 or 630 points for this return flight depending on his FFP status according to Table 4. Since the same flight would cost him 20,000 points and 36.08 EUR in fees and taxes if booked as an award flight, the value of his earned points can be calculated to be 2.75 EUR or 3.47 EUR or a Percent discount of 1.9% or 2.4%, again depending on his FFP status with Eurobonus. After

[4] www.xe.com, 2015.03.27

collectionof the data of the flights and routes, multiple regression using OLS will be used to clarify which variables significantly affect the value of the points obtained, and the ticket discount in percent, and if they support the hypotheses stated in the introductory part of this paper. The data which was collected for the regressions on the value of the points obtained, and on the discount, is shown in Table 5.

	Value	**Percent Discount**	**Weeks**	**Competitors**	**Class**	**Distance**	**Status level**
Definition	Value in EUR of the points received for a flight	Value/Paid price	Number of weeks in advance of flight, the ticket price was offered	Number of competing carriers serving the same route	1 if Business or 0 if lowest economy	Distance between locations in km	Between 0-3, depending on status level in Table 4
Min value	0.6	0.3	0	0	0	293	0
Max. Value	2142	46.5	14	5	1	9760	3
Average	132.5	8.3	6.2	2.0	0.5	2696	1.5
Std. Dev.	221.8	6.5	6.4	1.28	0.5	N/A	N/A

Table 5: Overview of the variables on which data was collected

For most award flights, the frequent traveller still needs to pay for the fees and taxes and only receives the airlines ticket price for free. But with Air Berlin and Lufthansa, it is on many European routes also possible to pay for the fees and taxes with additional points. When this has been the case, the values of both options have been calculated and the option which gives the most value to the traveller has been chosen.

5 Results

5.1 Investigation of Hypothesis 1

Having collected the data described in Chapter 4, we regress Percent Discount on Weeks, Competitors, Class, Distance and Status to see how much Competitors affect the percent discount compared to other relevant variables. The results are given in the regression table in Table 6. The values are the independent variable coefficients for predicting Percent Discount and the values in parenthesis are the p-values. The p-values are noted with * if significant at the 95% level, with ** if significant at the 99% level and *** if significant at the 99.9% level.

	Regr. 1	Regr. 2	Regr. 3	Regr. 4	Regr. 5	Regr. 6
Intercept	-0.18 (0.6832)	7.49 ($1E^{-73}$)***	6.74 ($2E^{-106}$)***	5.84 ($2E^{-95}$)***	6.23 ($2E^{-94}$)***	$-6E^{-3}$ (0.9886)
Weeks	0.02 (0.3081)	-	-	-	-	-
Comp.	1.07 ($3E^{-19}$)***	0.35 (0.0219)*	-	-	-	1.07 ($3E^{-19}$)***
Class	2.78 ($1E^{-20}$)***	-	2.98 ($3E^{-14}$)***	-	-	2.78 ($1E^{-20}$)***
Distance	$1E^{-3}$ ($3E^{-71}$)***	-	-	$9E^{-4}$ ($2E^{-39}$)***	-	$1E^{-3}$ ($3E^{-71}$)***
Status	1.25 ($8E^{-21}$)***	-	-	-	1.25 ($2E^{-16}$)***	1.25 ($8E^{-21}$)***
Adj. R^2	26.9%	0.4%	5.2%	14.6%	4.3%	26.9%
Observ.	1520	1063	1063	1063	1520	1520

Table 6: Regression table of regressions for Percent Discount

As can be seen in the column of Regression 1, the coefficient values for all independent variables are significant, with the exception for Weeks which does not have any predictive significance and should be omitted. In order to make sure that the regression result is robust, we also regress Percent Discount on the remaining independent variables on their own and check that their p-values are still significant. The reason for losing some observations when regressing on Competitors, Class and Distance is because a number of duplicate observations are omitted when Status is not included in a regression. The duplicate observations is a result of not all FFPs offering different amounts of bonus points for their different status levels as shown in Table 4. Since all remaining independent variables also have significant p-values when regressed on individually, they are considered robust enough to be included in the

prediction of Percent Discount and the result is Regression 6 in Table 6. One may be surprised by the low coefficient of Distance and believe that it does not affect the prediction of Percent Discount very much. But this would be a big error since it is actually Distance which is the variable that has the greatest effect on the prediction of Percent Discount as can be seen when comparing the coefficients of determination for the independent variables. On its own, it explains 14.6% of the percent of the discount offered to passengers by the FFP points they receive. Despite its low coefficient, it greatly affects Percent Discount since the distances flown are usually great. From Regression 6 we see that for every 1,000 km of a flight's distance, an FFP member may expect to receive 1 additional unit percent of discount. Additionally, he can expect to receive an additional 1.25 unit percent of discount for every status level he has advanced and another 2.78 unit percent of discount if he flies business class instead of lowest economy. And for every competing carrier on the route, he may also expect an additional 1.07 unit percent of discount which supports Hypothesis 1 and that airlines increase the percent discount of the value of the points they offer their passengers in the presence of competition. Together, the variables Competitors, Class, Distance and Status explain 26.9% of the Percent discount of the points awarded to FFP members.

While the results from Table 6 seem convincing in supporting Hypothesis 1, it is still possible that the airlines react differently to competition since Table 6 gives a prediction of what to expect from all of them collectively. To see if any airlines act differently under the influence of competition, we create 4 dummy variables called "If EB", "If FB", "If MM" and "If TB" which take the values of 1 if a flight is carried out by the airline mainly served by Eurobonus, Flying Blue, Miles & More or Topbonus respectively, or 0 otherwise. Flights carried out by the airline mainly served by Executive Club is the base case and we create 4 new interaction terms where the variable Competitors is multiplied with the 4 new dummy variables.

	Regr. 7
Intercept	1.49 ($4E^{-5}$)***
Comp.	1.69 ($1E^{-46}$)***
Comp. x If EB	-3.04 ($4E^{-59}$)***
Comp. x If FB	-1.88 ($2E^{-43}$)***
Comp. x If MM	-3.3 ($1E^{-58}$)***
Comp. x If TB	0.41 (0.0095)**
Class	2.78 ($1E^{-28}$)***
Distance	$1E^{-3}$ ($6E^{-87}$)***
Status	1.25 ($7E^{-29}$)***
Adj. R^2	49.2%
Observ.	1520

Table 7: Regression with interaction variables for Percent Discount

The regression output is seen in Table 7, and apart from the base case it also gives the terms for the coefficients of the other 4 cases to be added to the base case. Adding these terms, we get the individual regression coefficients for the FFPs' Percent Discount in Table 8. This regression also strongly increases the coefficient of determination to 49.2%.

	Executive Club	Eurobonus	Flying Blue	Miles & More	Topbonus
Comp.	1.69 ($1E^{-46}$)***	-1.35	-.19	-1.61	2.1

Table 8: Individual coefficients for the FFPs for regression on Percent Discount

As seen in Table 8, the different airlines manage competition in different ways. As expected, Executive Club and Topbonus give an FFP member 1.69 and 2.78 unit percent higher discount respectively, for every competing carrier which is trafficking the same route. But Eurobonus, Flying Blue and Miles & More work in the opposite direction and give their FFP members a lower percent discount for each competing carrier they face on the same routes. So while the market as a whole supports Hypothesis 1, three out of five airlines still offer lower discounts when facing increased competition.

5.2 Investigation of Hypothesis 2

To investigate Hypothesis 2, Value is regressed on Weeks, Competitors, Class, Distance and Status and the regression table in Table 9 is obtained. Just as when regressing Percent Discount, Weeks does not play a significant role and is omitted as a variable. When regressing Value on the remaining variables individually to check for robustness, it reveals that also Competitors should be omitted. The negative coefficient of determination may cause confusion, but is a valid output since it is the adjusted coefficient of determination. It being negative in this case means that the prediction is worse than the prediction offered by the mean value.

	Regr. 8	Regr. 9	Regr. 10	Regr. 11	Regr. 12	Regr. 13
Intercept	-154.09 ($8E^{-30}$)***	128.16 ($5E^{-22}$)***	71.921 (2^{E-14})***	1.1111 (0.8798)	100.23 ($2E^{-23}$)***	-93.309 ($1E^{-21}$)***
Weeks	-0.3033 (0.6552)	-	-	-	-	-
Comp.	27.913 ($2E^{-15}$)***	1.8019 (0.7305)	-	-	-	-
Class	121.07 ($1E^{-41}$)***	-	120.01 (2^{E-19})***	-	-	120.99 ($3E^{-40}$)***
Distance	0.0545 ($2E^{-181}$)***	-	-	0.0507 ($3E^{-114}$)***	-	0.0518 ($4E^{-168}$)***
Status	20.487 ($1E^{-7}$)***	-	-	-	20.531 (0.0001)***	20.531 ($2E^{-7}$)***
Adj. R^2	46.4%	-0.08%	7.31%	38.5%	0.9%	44.2%
Observ.	1520	1063	1063	1063	1520	1520

Table 9: Regression table of regressions for Value

The remaining 3 variables are significant and the prediction of Value is the result from Regression 13 in Table 9. The prediction of Value tells us that a business man who chooses to travel business class may expect to receive points which are worth 121 EUR per flight more compared to if he chooses to fly lowest economy. For each flight, he will also receive points for an additional value of 20.5 EUR for each status level he has reached within his FFP. But the dominant predictor of the Value of the points a FFP member receives is the distance of his flight and he will earn points of a value of over 5 cents for each km he travels. These three variables together explain 44.2% of the value a traveller earns from his collected points.

Considering how Hypothesis 2 states that airlines wish to offer price insensitive customers more value in order to encourage them to purchase more expensive high quality products, one has to ask if the price the customer pays may be a good variable for predicting the value he receives. The price paid has purposely been excluded since it was expected to correlate with many of the other variables and cause problems with multicollinearity. But in Regression 13 only two price correlated variables remain, Class and Distance. Passengers have to pay more for travelling in business class or longer distances, but their status level depends only on previous purchases. So for this reason, Value is again regressed, but this time on Price Paid and Status and the results are presented in Table 10.

	Regr. 14	Regr. 15
Intercept	-70.968 ($1E^{-37}$)***	-32.438 ($6E^{-13}$)***
Price Paid	0.1456 (0)***	0.1376 (0)***
Status	20.531 ($2E^{-15}$)***	-
Adj. R^2	76.5%	75.3%
Observations	1520	1065

Table 10: Value regressed on Price Paid and Status

Maybe not so surprising, the best prediction variable to determine the value of the points a frequent flyer receives is the amount of money he spends on his ticket. On its own, this variable explains 75.3% of the value of the points a passenger receives and in combination with his status level it explains 76.5%

5.3 The cost of achieving status

Apart from free travel rewards, FFPs offer other privileges including lounge access and increased baggage allowance depending on the member's status level. And as presented in Table 4, a higher status level also leads to a higher earning rate of points and an increased value received. The status level of a frequent flyer is determined only from the points he earns from air travel. And since there is such a strong correlation between the value of the points he receives and the price he pays for a ticket, this has been used to calculate how much money he needs to spend to reach the different status levels of the different FFPs. These results have been gathered in Table 11.

Frequent flyer programme	Annual travel cost to achieve status level 1	Annual travel cost to achieve status level 2	Annual travel cost to achieve status level 3
Executive Club	8,968 EUR	17,935 EUR	44,838 EUR
Eurobonus	3,783 EUR (or 10 flights)	8,512 EUR (or 45 flights)	17,025 EUR (or 90 flights)
Flying Blue	5,419 EUR (or 15 flights)	10,837 EUR (or 30 flights)	16,255 EUR (or 60 flights)
Miles & More	8,428 EUR	24,080 EUR	72,241 EUR (2 years in a row)
Topbonus	4,202 EUR (or 24 flights)	8,404 EUR (or 60 flights)	16,808 EUR

Table 11: Annual travel cost required to reach different status levels

As seen in Table 11 it is also possible to achieve certain status levels with some FFPs by flying a certain number of flights per year. This is an additional possibility for frequent travellers who often travel short flights but do not earn many points due to the short distances and reluctance to pay for business class for the short journey to also achieve a higher status level.

6 Conclusion and discussion

The level of the percent discount a frequent traveller gets on the points he receives mainly depend on the distance of his flight, the class he travels in and the status he has achieved with his FFP. The number of competing carriers on the route he travels also plays a significant role, but how is very much depending on his FFP and the main airline it serves. According to Hypothesis 1, it was expected that the traveller would receive a higher percent of discount the more competing carriers serving the same route. This was expected since theory shows that the introduction of switching costs skews competition and allows an airline with an FFP to charge higher prices due to having introduced switching costs. But the investigation shows that while this was to be expected in general, only Executive Club and Topbonus and their respective main airlines served, British Airways and Air Berlin, behave like this. The remaining 3 FFPs, Eurobonus, Flying Blue and Miles & More and their main airlines served, SAS, Air France and Lufthansa, instead offer a lower percent discount when facing competition. There may be a number of different reasons for this difference in behaviour. It could be that airlines on certain routes compete for larger groups of passengers who are not business travellers and thereby need to lower their prices to attract them since they are not members of the airlines' FFPs and never will be. Being forced to compete by lower prices will then naturally lead to the airline having less margin to offer on discounts. With the strong growth of low-cost airlines in Europe, it is possible that such competitors are able to offer prices which are so much lower that it cancels many of the effects which switching costs have. It may also be that airlines choose to combat competition differently depending on route and type of competing carriers and that the observed differences are a result of the different routes being compared. Another possibility may be corporate or airline alliance policies since both British Airways and Air Berlin belong to the same airline alliance, Oneworld.

Also the value of the points which a frequent flyer receives depend s mainly on the distance of his flight, the class he travels in and the status he has achieved. Even though the distance of a flight has the strongest effect on the value of the points earned from a flight, both the coefficients for Class and Status are positive and will help FFP members to receive even more value for choosing to travel in business class or having chosen more expensive travel in the past. So this supports Hypothesis 2 and that airlines can support price discrimination by offering business travellers more value for their travel choice through their FFP. The link between additional value received and higher priced products became even clearer when

regressing Value directly on Price Paid which alone explains over 75% of the value of the points a FFP member receives. And this in turn even stronger supports Hypothesis 2.

Regardless of how the status levels have been reached, it is however clear that they present significant switching costs as well as added value to passengers who achieve them. If changing airline, the amounts in Table 11 reveal how much a traveller has to spend within a year to again be able to enjoy the added value provided by these status levels. And in the meanwhile he will have to do without them which constitutes a significant switching cost. These amounts also very strongly support Hypothesis 2 since it is clear that the status levels offer significant additional value and also require travel on a business level to be achieved.

In conclusion, Hypothesis 1 has only partially been confirmed since only two airlines and their FFPs offer higher percent discounts when facing increased competition. These two airlines and their FFPs are however dominant enough to provide this as a general and significant result for the entire part of the investigated market. The remaining three airlines and their FFPs instead offer lower percent discounts in the presence of tougher competition. To more accurately explain these differences, more research and more detailed analysis would be required. Hypothesis 2 is considered to have been confirmed since there is a very strong connection the price a passengers pays and the value of the points he receives. It is therefore concluded that airlines use their FFPs to support price discrimination.

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Appendix A – List of locations and substituted routes

European cities	Distant cities
Amsterdam	Beijing
Berlin	Chicago
Copenhagen	Dubai
Frankfurt	Istanbul
Helsinki	Moscow
Lisbon	New Delhi
London	New York
Madrid	Shanghai
Munich	Tokyo
Oslo	
Paris	
Rome	
Zürich	

Table 12 List of locations

Substituted route	Alternative route used
PAR-HEL-PAR	PAR-ARN-PAR
TXL-OSL-TXL	TXL-ARN-TXL
TXL-IST-TXL	TXL-AYT-TXL
TXL-TOK-TXL	TXL-TLV-TXL
TXL-DBX-TXL	TXL-AUH-TXL
TXL-LIS-TXL	TXL-MAL-TXL
TXL-AMS-TXL	TXL-DUS-TXL
CPH-IST-CPH	CPH-ATH-IST
CPH-DBX-CPH	CPH-TLV-CPH
CPH-MAD-CPH	CPH-PMI-CPH
CPH-LIS-CPH	CPH-MIL-CPH

Table 13 List of substituted and alternative routes