

**VALUATION OF DIRECT INTERCONTINENTAL FLIGHTS
AS OPPOSED TO NON-DIRECT ONES -
INSIGHTS BASED ON A HEDONIC APPROACH**

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Abstract:

This paper is about valuating direct intercontinental flights as opposed to non-direct ones, taking an individual travelers' perspective. The methodology of this study is derived from a hedonic approach which tries to explain actual expenditures (in our case of air transport) by

means of a number of non-divisible characteristics (origin and destination, number of stopovers, choice of travel class).

The results reveal that direct flights are valued higher than non-direct ones. However, the share of this advantage in relation to other characteristics by which a flight can be valued is limited, ranging from 15 to 20 per cent (in the context of travel in economy class; *ceteris paribus*) to less than 10 per cent (in the context of travel in business class; *ceteris paribus*). In contrast, and to put those numbers into perspective, choosing business class (instead of economy) adds 240% to an economy air fare (*ceteris paribus*).

Key Words: flight characteristics valuation, hedonic approach, direct flight, air transport pricing

1 INTRODUCTION

The transport of goods and persons in general and air transport in particular have become a key prerequisite for the international division of work in a globalized world. A myriad of authors come to the conclusion that the major benefit of overcoming geographical space lies in the creation of potentials for interaction and thus economic exchanges (e.g. Aberle, 2000; Abiero-Gariy, 1999; Kaspar, 1998; Brilon, 1996; Laesser, 1996; Button, 1993; Ihde, 1991). To measure those potentials, one draws from the degree of ability of transport systems to have individuals reach destinations of their choice.

The individual willingness to overcome space is very much dependent upon the perception of the benefit about to receive at the destination (interaction and economic exchange) and the costs of getting there (i.e. overcoming the space between origin and destination) (Aberle, 2000; Kaspar, 1998; Brilon, 1996). With regard to the latter, it is widely accepted that the assessment of space (in terms of a distance measure) is very much depending on individual perception, i.e. the individual cognitive distance, such as discussed by Harrison-Hill (2001), Laesser (1996), McNamara (1986), Ankomah et al. (1985), or Cecora (1985). They suggest a number of significant factors determining cognitive distance, such as: (1) magnitude of geographical distance, (2) magnitude of temporal distance, (3) magnitude of costs to get from origin to destination, (4) frequency of relation built/ commonness and familiarity with destination, (5) hardly surmountable barriers (such as high mountains or oceans, including permeable obstacles between origin and destination), (6) attractiveness of route and characteristics/ signs of distance passed, (7) choice of transport mode.

Numerous studies suggest that apart from the overall travel time as well as costs (which are the most important choice determinants), it is also frequencies (and thus flexibility), degree of comfort, reliability, and familiarity which determine a decision pro or contra a transport mode (Jara-Diaz and Guevara, 2003; Fowkes, 2001; Algers et al., 1995; Fowkes et al., 1986). However, and with regard to overall travel time and costs, there is an extensive body of literature supporting a differentiation between (1) objectively measurable parameters, and (2) their perception: Travel costs are indeed objectively measurable, whereas the valuation of overall travel time is subject to individual perception. Overall travel time of modes used more often than others will generally be rather underestimated and vice versa (Shifton and Bekor, 2002; Bamberg, 1996; Bamberg and Schmidt, 1993). Additionally, the emphasis on overall travel time as opposed to other trip determinants is very much depending on the rationale of a trip; overall travel time in many cases overrides all other choice parameters (Mackie et al.,

2003; Fowkes, 2001; Hensher, 1997; Mandel et al., 1997; Algers et al., 1995). Finally, and deduced from Fishbein and Aizen's Planned Behavior Approach (Fishbein and Aizen, 1985; Broeg and Erl, 1983), one would assume that habit would be another key determinant of choice. A number of studies however, summarized in Bamberg et al. (2003), suggest that habit does not necessarily create resistance against incentives either with regard to prices or overall travel time.

Paying respect to that central role of travel time in general and travel time in relation to air transport, this paper is about the assessment of the individual economic value of direct flights as opposed to non direct ones in the context of global routes from and to Central Europe (Switzerland, Germany, France, Italy, and Austria). The underlying rationale for the case of Central Europe is derived from the bankruptcy of Swissair and the subsequent establishment of Swiss, lately becoming part of Lufthansa: as one of the consequences of that development, direct intercontinental connections to Zurich as the former hub of Swissair and Swiss have decreased and will possibly decrease further in the future. This development is mainly due to the consolidation strategies (justified by a very competitive international environment and slower growing markets) of the national network carriers, which of Lufthansa (and owner of Swiss) is one (Bieger et al., 2002).

Both the past events and the future perspective have brought forward a broad discussion on the valuation of direct intercontinental flights to and from Zurich. The arguments have mainly been based on optional values of direct intercontinental flights, focusing on macroeconomic issues (i.e. the benefits “for the economy” of the fact that there were such connections, no matter if demand actually rectified them or not), but not on the actual consumption value, focusing on the (real) individual economic unit (i.e. the benefit of a direct flight as opposed to an indirect one upon the occasion of actually traveling from a given origin to a destination). With this paper, we intend to contribute to the discussion of valuating direct intercontinental flights as opposed to non-direct ones, taking the perspective of the individual traveler. The methodology of this study is derived from a hedonic approach which tries to explain actual expenditures (in our case of air transport) by means of a number of non-divisible characteristics (origin and destination, number of stopovers, choice of travel class, i.e. economy and business).

The remaining of the paper is structured as follows: a short literature review providing an insight into the ongoing discussion of valuating air transport transfer time is followed by a methodological section, leading to results and its discussion and conclusions.

2 LITERATURE REVIEW

The valuation of flight characteristics is basically linked to choices, such as between modes (flights vs. other models of transport), carriers and classes of transportation, routes (i.e. O&D origin and destination), and airports (if multiple airports in a destination are present). As it is commonly known, airfares are determined by a complex system of discounts (Bieger et al., 2002). Consequently, customer valuation of flight characteristics and charges causes great differences between fares paid by individual travelers, not only because of individual preferences but also because of different airline pricing strategies in different markets. The analysis of individual travel decisions thus can only be dealt with adequately if data on actually paid fares are available.

Other than in other fields of transport research, published results of valuation studies are fairly scarce, probably because of the lack of publicly available data of sufficient quality (especially with fare data; Lijesen, 2004). However, there are a small number of studies which give indication on the valuation of time with special reference to air transport, thus providing an indication of the intermediate stop time costs related to any non-direct flight. To allow a comparison of the results, we present them in terms of real EUR per 60 minutes intermediate stop time (as per 2005) saved by a direct flight as opposed to a flight with at least one stopover.

Table 1: Values of a 60 minute travel time saving by means of taking a direct flight in contrast to a connecting service

Reference	Area of study	Type of study	Value of direct service in EUR
Morrison and Winston (1985)	US	Mode choice	90
Kanafani and Ghobrial (1985)	US	Route choice	110
Ford (1989)	UK	Direct vs. indirect flights	130
Nako (1992)	USA	Airline choice of business travelers	80
Lijesen (2004)	NL	Multiple choices	78

The value of a direct service represents the value of 90 minutes total transfer time

The corresponding results are presented in table 1, revealing a spread in value of time savings by a direct flight of 78 – 130 Euros, depending on the geographical area of the study as well as the test persons and their class of travel.

The comparison of results suggests that the values of time savings over time first start to increase, with a decrease in rather recent studies. Nako (1992) as well as Lijesen (2004) point out that the improvement of facilities in many airports both for the leisure as for the business travelers make a change of plane less arduous and thus the time used for this process less valuable. Additionally, the increase in use of planes over time generated demand for new destinations. As new O&D were more and more served in a hub-and-spoke system, travelers got increasingly accustomed to having to change planes (Bieger et al., 2002). Finally, only a very small share of travelers take a cheaper indirect flight if there is a direct connection available (in the case of Switzerland, only 5-10% take a non-direct flight if there is a direct one available; Wittmer et al., 2005), mainly due to the fact that loyalty with a given airline or network system is limited (Bamberg et al., 2003).

3 METHODOLOGICAL APPROACH (DATA AND ANALYSIS)

3.1 Method and data: Overview

The majority of the results of previous studies discussed in the last section is based on choice models of suggested itineraries, which were presented to selected test persons. In contrast, our study looks at an actual travel history of test persons, looking at differences of expenditures between their actual travel choices. For that reason, we estimate the overall costs (expenditures) for a flight on the basis of differences with regard to levels of its constituting elements (origin and destination, i.e. O&D, stopovers, and choice of class).

The underlying idea of hedonic regression is based on Working (1927), Rosen (1974) and Combris et al. (2000). They stipulate that the expenses (i.e. the total costs) of a given good (i.e. a flight) is assumed to be a function of its supply-sided characteristics. A difference in one of those characteristics (*ceteris paribus*) induces a different price. That difference represents the implicit or hedonic price, reflecting the marginal difference in the good's utility.

That approach is well supported by household production theory (cf. to Becker, 1965; Muth, 1966; Betancourt and Gautschi, 1992), according to which a household allocates its income on different goods, which represent different levels of utility. A flight is one such good, consisting of elements, of which each one can be distinguished by customer oriented characteristics of its own. So, the individual must make an expenditure allocation decision with regard to each element of a given bundle. According to the principles of Gossen, the consumer would allocate resources for traveling by optimizing the partial marginal benefits of each element in a way that the overall utility of a given trip is maximized (Seddighi and Theocanous, 2002; Hirshleifer and Hirshleifer, 1998). Due to the indivisibility of the good analyzed (Papatheodorou, 2001; Morley, 1992; Rugg, 1973; Lancaster, 1966), a given element of a flight does not generate an immediate utility but is bearer of characteristics generating indirect utility: Maximizing utility requires choosing a goods configuration which generates the optimum bundle of characteristics (Seddighi et al., 2002).

However, one should be aware that the estimated utility value based on real purchase data does not necessarily explain the actual willingness to pay for a given good. Thus, numerous authors claim that the drawing of conclusions from purchase data of a given person to his willingness to pay is limited (Sattler and Nitschke, 2001; Ben-Akiva, 1994).

Hedonic regression has been widely used in different fields. Three applicable areas of research have evolved over time: (a) environmental economics in general and the measure-

ments of impacts of environmental disturbances on real estate values (e.g. studies on the impact of traffic noise; Pommerehne, 1998; Langer, 1996); (b) valuation of real estate (in this field, hedonic regression is possibly the most wide-spread; e.g. Tiwari and Hasagewa, 2002; Boyle et al., 2002; Spalatro and Provencher, 2001; Hite, 2001; Legget and Bockstael, 2000; Cheshire and Sheppard, 1998; LeGoffe, 1996); (c) valuation of consumer goods components, as in the case of cars as long lasting ones (Hogarty, 1975; Cowlin and Chubbin, 1972; Griliches, 1961) or agricultural products in general (Carew, 2000; Ahmadi-Esfahani and Stanmore, 1997) with wine (Gergeaud, 1998) and cereal (Nerlove, 1995) generating a particular focus.

Expenditure behavior models in the area of transport and tourism have largely focused on aggregate demand (for an overview cf. to Witt and Witt, 1995; Frechtling, 2001; Papatheodorou, 2001; Melville, 1998; Crouch 1994a and 1994b), neglecting products specifics and thus utility issues. However, the hedonic approach has recently been re-introduced within tourism research as well. A number of different streams of studies can be identified, such as (1) on package tours (Taylor, 1995; Aguilo et al., 2001; Thrane, 2005), (2) on cruises (Vina and Ford, 2001), (3) on the measurement of the utility contributions in a destination context (Seddighi and Theocharous, 2002; Melville, 1998), or the entire travel context (Laesser, 2004).

3.2 Data collection and sample

We collected data at Zurich airport during 7 non-consecutive days in April 2005. Overall, 2500 questionnaires were handed out at random to flight passengers; they were distributed not only at gates but also in different business lounges, thus including not only economy class passengers but also persons traveling in business class. However, only passengers who stated that they were able to fill in the questionnaire in English or German and who would use Zurich airport on a regular basis were handed over a questionnaire. Due to those selection criteria most of the respondents' place of residence was in Switzerland. Subsequently, 1000 questionnaires were returned, which results in a response rate of 40 %. These questionnaires are the ones used for the analyses in this paper.

3.3 Data measurement

Among other questions, respondents were asked to report their most recent three flights according to the following constituting criteria: (1) Airport of origin and airport of destination, (2) choice of travel class (economy or business), (3) number of stopovers, and (4) price paid

for a return ticket. For analysis purpose, the airports of origin and destination were grouped according to their geographical location, including Central Europe (i.e. Switzerland, Germany, France, Italy, and Austria), Europe (except Central Europe), North and Central America, South America, Africa and Middle East, Asia, and Oceania.

3.4 Data analysis

The data analysis consisted of two steps: (1) estimating the utility of the features of a flight by means of a logistic regression, and (2) estimating the feature-specific expenses, differentiated by destination and travel class, on the basis of the coefficients of the above regression.

3.4.1 Estimating the utilities of the features

We measured the utility of the above features (1-3) by a logistic regression of their levels towards the expenses of a given flight (4). This approach is based on the assumption, according to which the price paid for an air ticket is the result of a function of its supply-sided features (Rosen, 1974), which from a demand sided perspective are perceived as attributes (attributes do not have to be fully identical with features, as only the perception of features results in the formation of attributes; Louviere et al., 2000). A difference with regard to one of those attributes results in a different price paid (*ceteris paribus*). This difference represents the implicit price, giving an indication of the marginal utility of the observed attribute.

A good (=flight) be characterized by a n-dimensional vector of attributes:

$$\vec{z} = (z_1, z_2, \dots, z_n) \quad (1)$$

The hedonic function displays the evaluation of those attributes by the consumer, who at every given point of time tries to maximize the consumer utility. So, the expenses function, which is at the same time, and from the consumer perspective, a cost function, is therefore defined by:

$$C(\vec{z}) = c(z_1, z_2, \dots, z_n) \quad (2)$$

In a hedonic regression framework, the expenses per person for a given trip are to be determined on the basis of value propositions of different attributes and their characteristics. Thereby, the implicit value of an attribute (by means of shadow expenses) can be calculated by means of its differential, at which the partial derivative shows the marginal variation with regard to expenses for good z_i against marginal variation of attribute z_i :

$$\partial \vec{c} / \partial z_i = p_{z_i}(z_1, z_2, \dots, z_n) \quad (3)$$

This partial derivative indicates the marginal increase of the expenses c for the good z due to a marginal increase of the attribute z_i . This implicit expense function displays the value of a single characteristic.

To specify the (marginal implicit) expenses (and thus the indirect demand), the explanatory variables are regressed towards the estimated implicit marginal expenses by means of a log-linear function (equation 4). The notation of this function is as follows

$$\ln TC = \alpha + \phi CHANGE + \delta CLASS + \lambda_1 DEST1 + \lambda_2 DEST2 + \dots + \lambda_7 DEST7 + \varepsilon \quad (4)$$

with:

$\ln TC$ LN of the total costs of a return tickets

$CHANGE$: Stopover/ change of planes (dichotomous; 0=no; 1=yes)

$CLASS$: Choice of class (dichotomous; 0=Economy; 1=Business)

$DEST1$: Destination = Central Europe (CH, D, A, I, F) (dichotomous; 0=no; 1=yes)

$DEST2$: Destination = Europe(dichotomous; 0=no; 1=yes)

$DEST3$: Destination = Middle east and Africa (dichotomous; 0=no; 1=yes)

$DEST4$: Destination = Asia (dichotomous; 0=no; 1=yes)

$DEST5$: Destination = North and Central America (dichotomous; 0=no; 1=yes)

$DEST6$: Destination South America (dichotomous; 0=no; 1=yes)

$DEST7$: Destination = Oceania (Australia, NZ) (dichotomous; 0=no; 1=yes)

Hence, the flight features and its characteristics respectively are dummy variables representing factors by which overall expenditure varies. In order to specify the marginal expenses, the features are first regressed towards the marginal expenses. Secondly, and to calculate the ceteris paribus changes with regard to expenses and attributes, the coefficients are exponentiated (antilog). We calculate two models, one (1) representing all intercontinental flights *originating or terminating* in Central Europe (cf. table 2), and (2) representing all intercontinental flights *originating only* in Central Europe (cf. table 3). Hence, the first model included flights whose tickets have been bought anywhere in the world, whereas model 2 included only flights for which the ticket has been bought in Central Europe. A comparison of both models is presented in table 4.

3.4.2 Estimating the feature-specific expenses, differentiated by destination and travel class

As a second step, the feature specific expenses of flights originating in Central Europe were calculated and aggregated with regard to destination and travel class, differentiating between direct as opposed to a non direct connection. The results, presented in table 5, indicate the value of a direct as opposed to an indirect flight in a specific travel class from Central Europe to a specific destination. Additionally a spread comparing business class direct flights with economy class ones ($\frac{\text{Business class EUR}}{\text{Economy class EUR}}$) is calculated to facilitate the further discussion.

3.5 Hypothesis with regard to the results of the analysis

Based on the results of this review, and according to the pricing logic of the airlines (which try to allocate demand on their direct as well as non-direct connections), one would assume that non-direct flights on a given O&D cost less (*ceteris paribus*) than a direct flight, given that a direct connection is provided in the first place. Based on that, coefficients with regard to a non-direct connection would always have a negative algebraic sign. This assumption has to be put to questions, basically due to the following consideration (Bieger et al., 2002; Wittmer et al., 2005): There is only a limited share of O&Ds for which a direct as well as a less dear non-direct connection is simultaneously available (e.g. even from a large hub such as London Heathrow, only a limited number of destinations in the US is simultaneously reachable by means of nonstop connections). Hence, and with regard to each as well as our sample consisting of flights based on actually made travel choices, the majority of non-direct flights recorded will actually be based on the fact that very likely no direct flight was available for a given travel situation.

As a result, and if there is no (1) direct flight competing against an indirect connection or (2) heavy competition between multiple options of non-direct flights (where airlines try to allocate route specific demand by means of pricing measures), one has to assume that connecting flights (consisting of multiple legs implying higher transportation costs) generally increase than decrease the price of a given O&D as opposed to a similar direct O&D (in terms of distance, airline, equipment used for transport, etc.). Hence, we can expect a positive mathematical sign with regard to non-direct O&Ds as opposed to direct ones. Under this regime, the entry supply price of a new direct connection would match the competing indirect one, which in turn would likely be lowered as a reaction to the newly introduced direct connection. So, the (positive) value of a direct connection results from the reversed difference of prices paid between indirect and direct connections on a given O&D.

4 RESULTS

The results are presented in two tables, with table 2 encompassing the first model including all flights originating or terminating in Central Europe (Switzerland, Germany, France, Italy, Austria), and table 3 encompassing the second model including all flights originating exclusively in Central Europe. In table 4, the two models are compared, serving as a foundation for the interpretation and discussion of results.

Table 2: Decomposition of values with regard to flights with O&D Central Europe

Model Fit (R2) = .473; DF (Regression) = 10; DF (Residual corrected) = 20'702				
Variable	Coefficient	Standard Error	t-value	c.p. difference
Constant	6.955*	.013	535.000	1048.379
Stopover/ change of planes	.184*	.008	23.000	20.2%
Business-Class (in contrast to Eco)	1.206*	.051	23.647	234.0%
Route: Central Europe (CH/D/A/I/F)	.129*	.051	2.529	13.8%
Route: Europe	.118*	.022	5.364	12.5%
Route: Middle East & Africa	.009	.016	0.563	0.9%
Route: Asia	-.091*	.013	-7.000	-8.7%
Route: North- and Central America	.118*	.010	11.800	12.5%
Route: South America	.257*	.016	16.063	29.3%
Route: Oceania	.245*	.020	12.250	27.8%

* Level of significance @=0.99

Table 3: Decomposition of values with regard to flights originating in Central Europe

Model Fit (R2) = .470; DF (Regression) = 10; DF (Residual corrected) = 12'782				
Variable	Coefficient	Standard Error	t-value	c.p. difference
Constant	7.181*	.0534	134.476	1314.222
Stopover/ change of planes	.159*	.0104	15.288	17.2%
Business-Class (in contrast to Eco)	1.213*	.013	93.308	236.4%
Route: Central Europe (CH/D/A/I/F)	-.085	.073	1.164	-8.2%
Route: Europe	-.214*	.059	3.627	-19.3%
Route: Middle East & Africa	-.228*	.054	4.222	-20.4%
Route: Asia	-.307*	.053	5.792	-26.4%
Route: North- and Central America	-.102	.052	1.962	-9.7%
Route: South America	.116*	.054	2.148	12.3%
Route: Oceania	.046	.055	0.836	4.7%

* Level of significance $\alpha=0.99$

Table 4: Model comparison

	Model 1 <i>flights either originating or terminating in Central Europe</i>		Model 2 <i>flight originating only in Central Europe, terminating anywhere</i>	
Variable	Coefficient	c.p. difference	Coefficient	c.p. difference
Constant	6.955*	1048.379	7.181*	1314.222
Stopover/ change of planes	.184*	20.2% (1260.2)	.159*	17.2% (1540.3)
Business-Class (in contrast to Economy)	1.206*	234.0% (3501.6)	1.213*	236.4% (4421.0)
Route: Central Europe (CH/D/A/I/F)	.129*	13.8% (1193.1)	-.085	-8.2% (1206.45)
Route: Europe	.118*	12.5% (1179.4)	-.214*	-19.3% (1073.7)
Route: Middle East & Africa	.009	0.9% (1057.8)	-.228*	-20.4% (1064.12)
Route: Asia	-.091*	-8.7% (957.2)	-.307*	-26.4% (967.3)
Route: North- and Central America	.118*	12.5% (1179.4)	-.102	-9.7% (1186.7)
Route: South America	.257*	29.3% (1355.6)	.116*	12.3% (1475.9)
Route: Oceania	.245*	27.8% (1339.8)	.046	4.71% (1376.1)

* Level of significance $\alpha=0.99$

The data fit both models reasonably well, with approximately 0.5 for the adjusted R² in both models. A majority of coefficients is significantly different from 0, with the following exceptions: Routes to and from the middle East and Africa (model 1) and routes within Central Europe, to North- and Central America and Oceania with respect to model 2. The coefficients and their antilogs with regard to the destinations differ between the models: however, the absolute values estimated on that basis turn out to be quite similar, indicating a high validity of the models.

There are significant differences especially with regard to (1) travel class and – not surprisingly, with respect to (2) the differentiation between direct and non-direct connections.

Ad (1): Choosing business instead of economy class results in a 240 per cent increase of expenditures for a flight (*ceteris paribus*). This result is in a range one would expect and therefore does not need to be discussed any further.

Ad (2): The value of the antilog with regard to the type of connection (indirect as opposed to direct) suggests that a ticket for a non-direct flight originating or terminating in Central Europe is 20.2% (212 CHF -> 142 EUR) dearer than a one for a direct flight. With respect to connections only originating in Central Europe (model 2) the same value amounts to 17.2% (226 CHF -> 150 EUR). As the expenses are based on return flights, the one way values amount to 71 EUR (model 1), and 75 EUR (model 2).

The results with regard to the feature-specific expenses, differentiated by destination and travel class (cf. table 5) suggest that direct flights are valued most with short haul within Europe as well as long haul to the US. The highest spread between business and economy class is observable with regards to flights to Asia.

Table 5: Value of a direct one way connection as opposed to an indirect connection per destination area and travel class

	Economy class EUR	Business class EUR	Spread (Business class value / Economy class value)
Route: South America	87	269	3.10
Route: Oceania	79	266	3.36
Route: Central Europe	71	253	3.57
Route: North and Central America	70	251	3.62
Route: Europe	62	244	3.93
Route: Middle East and Africa	61	243	3.96
Route: Asia	57	239	4.21

Spread: Business class EUR/Economy class EUR

The routes are ranked according to the values in both economy and business class.

5 DISCUSSION

Our hypothesis, according to which the coefficients with regard to expenses for indirect flights would be higher than for direct ones, is thus confirmed. As discussed previously, the value of a direct connection results from the reversed difference of expenses between indirect and direct connections on a given O&D; hence the estimates based on the coefficients constitute the positive value of a direct flight as opposed to an indirect one.

Assuming a minimum stopover time of 60 minutes (for changing planes only, thus excluding for example immigration procedures, baggage claim or customs), the results of both models are quite similar to the ones suggested by Lijesen (2004: 78 EUR) and Nako (1992: 80 EUR). The relative value proposition differs significantly between destinations and classes chosen by the travelers: With flights either originating or terminating in Central Europe, and in the case of travelers choosing business class, the relative value contribution of a direct connection as opposed to an indirect one amounts to 6% (as opposed to 20.2% in the context of economy class). With regard to economy class and routes within Central Europe and Europe the respective value contribution amounts to 18%, 20% with regard to routes to the Middle East, 22% to Asia, 18% to North and Central America, and 15% to South America respectively. Due to technical reasons, direct flights from Central Europe to Oceania are not available; the value proposition of 15% (as in the case of South America) thus is a technical value only.

The results of the estimates as well as the spreads between business and economy class give further insights into the mechanisms of air travel expenses.

(1) With regard to travel class specific values: The smaller the likelihood of a direct connection for a class-specific demanded O&D, the higher the value of a direct connection (either in business or economy class); the number is thus an indicator of relative scarcity, measured by means of a quotient of *number of directly served O&D* over *number of potentially servable O&D*. For example, there are direct connections on many O&D between Europe and North America; however, a majority of passengers comes from origins or continues to destinations not linked directly. In contrast, and in the case of Asia (as well as Europe), there is a comparably higher match of demanded and served direct O&D, resulting in lower values for those direct flights.

(2) We discuss the spread on the basis of two examples: South America (smallest spread) and Asia (biggest spread) respectively. The smallest (biggest) spread with regard to flights on the South America (Asia) route indicates a comparably good coverage of business class

(economy class) market needs by existing direct connections whereas the economy class customer (business class customer) very likely needs connecting flights once arrived in one of the South American (Asian) hubs. The O&D portfolio of the economy class (business class) passenger is comparably bigger than the alternative class's one. While tourists in the South America case continue to/ come from tourist destinations, business class passengers in the respective case (Asia) likely continue to one or more of the numerous business centers in China, India, and South East Asia. So, differences with regard to the spread stem from differences with regard to the coverage of class-specific market needs. As the spread increases with the decrease of both (economy and business class) values of direct flights, one can presume larger price flexibility for business class on routes with only a small number of direct flights.

6 CONCLUSIONS

In terms of results, the study has revealed that there is a higher value for a direct flight than for an indirect one. However, the share of this advantage in relation to other characteristics by which a flight can be valued is limited, ranging from 15 to 20 per cent (in the context of travel in economy class) to less than 10 per cent (in the context of travel in business class).

Interpreting that outcome in the light of results of previous studies, one comes to the conclusion that the value of directness of O&D in air transport is decreasing than increasing. Passengers might have familiarized themselves with the result of the consolidation - the hub and spoke systems - of all major network airlines, forcing a majority of passengers to change planes on more and more relations. So, decreasing minimal connecting time as far as possible would be the appropriate airline's answer to that development, as passengers never the less remain time sensitive.

From a methodological perspective, the regression of flight characteristics on fares paid turned out to be suitable approach to estimate values of direct connections as opposed to non-direct connections. However, a larger sample, including a larger number of cases which had selected non-direct flights even if there were direct ones available, might improve the results.

In terms of further research, additional investigation on flight characteristics valuation solely in the leisure market is recommended: the likelihood of congruence between the one who pays and the one who travels is higher than with the business travel market, thus providing possibly real results in terms of appreciation of attributes. Furthermore, the inclusion of additional characteristics (flight related as well as inter-modal ones, thus including aspects of upstream and downstream transportation) might provide further insight into the value of a flight.

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8 *TABLE OF TABLES*

Table 1: Values of a 60 minute travel time saving by means of taking a direct flight in contrast to a connecting service

Table 2: Decomposition of vlaues with regard to flights with O&D Central Europe

Table 3: Decomposition of values with regard to flights originating in Central Europe

Table 4: Model comparison

Table 5: Value of a direct one way connection as opposed to an indirect connection per destination area and travel class