High-Speed Rail, Intermodal substitution and Willingness to Pay. A Stated Preference Analysis for the "Bari-Rome" route

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Abstract

The aim of the study is to provide a Stated Preference analysis of the demand for a new High- Speed (HSR) line on route Bari-Rome and its indirect effect on the Brindisi-Rome line. By using a broad range of discrete choice models, we find that for shorter distances, as for the case of Bari and when the HSR is considered, access and egress time are evaluated more than the travel time, confirming that fragmented journeys yield a higher disutility. We explore the heterogeneity among respondents by looking at the differences in travel purposes and finding that business travelers are more sensible to reliability, travel and access/egress time with smaller price elasticity and higher WTP as well as differences in income levels and typology of travelers (frequent or occasional). We study patterns of intermodal substitutability finding that increasing the travel distance to 570 km (to Brindisi) still guarantees large substitution between HSR and air transport mode.

JEL Classification: R23; R40;

Keywords: intermodal substitution, stated choice, transport, willingness to pay, travel time, high speed rail.

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1 Introduction

The relationship between access and egress time to get to the airport and the in-vehicle travel time is increasingly becoming relevant in shaping competition among different modal alternatives and mainly between airlines and train operators. Airports are often distant from the centre of cities and getting to there can be pricey in terms of additional travel time and costs while rail stations are usually more accessible to users and established in the centre of the city, with a lower impact of access and egress time. Reducing travel time through the implementation of the High-Speed Rail (HSR, hereafter)[1] exerts, indeed, a competitive pressure on airlines which cannot react by reducing further more the travel time. In this regard, using Italian data, Capozza (2016) studies the relationship between rail travel time and airlines ticket prices finding the second are increasing in the first.

Other empirical works have shown that airlines reacted to the HSR reducing their operations (Jiménez & Betancor 2012). Albalate et al. (2015) find that airlines responded to the introduction of HSR by reducing the number of seats available on that route but not the overall number of flights. Dobruszkes et al. (2014) find that the HSR travel time strongly affects the presence of air services both in terms of seats and flights, with a greater impact than that of frequency and with passengers preferring faster services. De Rus & Nash (2007) report that the introduction of HSR on the route between Madrid and Sevilla determined a reduction by 50% of the air transport demand and a negative impact for the Sevilla Airport which mainly benefited from this traffic. A similar reduction in the air transport volume share was observed by Park & Ha (2006) for the Paris-Lyon. Clewlow et al. (2014) assess the impact of HSR lines and the presence of LCCs on the volume of air passengers in Europe concluding that the introduction of HSR reduces the air passenger demand in the domestic market and that airlines reallocate their traffic toward medium and long-haul distances.

Few papers have instead investigated the case of Italy where infra and inter modal coexist from 2012, when Nuovo Trasporto Viaggiatori (NTV) decided to enter on the HSR market in regime of *open access*. In this regard, Bergantino et al. (2015) find that airlines fares reduced in presence of competition with HSR. This is also confirmed by Cascetta & Coppola (2014) with the average single ticket price for HSR reduced by 31 % from 2011 to 2012 due to the entry of NTV (Nuovo Trasporto Viaggiatori) in the HSR market.

More recently, the introduction of the HSR line on the route Rome-Milan[2] determined substantial changes in the market structure, with Ryanair, the leading low cost carrier (LCC), deciding to leave the Rome Ciampino - Milan Orio al Serio route[3]. Official data reported by ART (2015) states that the introduction of HSR led the train mode (traditional and HSR) to represents the 58% of the market share in 2012 and 65% in 2014 (from only 6% of 2008) and the flight transport mode diminished from 50% in 2008 to 32% and 24% respectively for 2012 and 2014.

We know from theoretical and empirical works that the price charged by airlines decreases in the access time to the airport whilst HSR increases their fares (Yang & Zhang 2012) and that individuals have different sensitivity to access and egress time. Pels et al. (2003) find that business travelers are more sensible to access time than leisure travelers. Román et al. (2010) observe a greater willingness to pay for reductions in the

[1] According to the Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system, it is possible to define HSRs as those newly lines with speeds equal or greater than 250 km/h and those upgraded for speeds of 200 km/h.

[2] Note that, on this route, there is a stronger competition between the incumbent operator Trenitalia and the entrant NTV Italo, which has driven to a substantial reduction in their fares as reported by (Bergantino et al. 2015)

[3] Orio al Serio is a secondary airport close to Bergamo (5 km) and Milan (50 km), mainly used by LCCs but with the limitation of requesting additional links to Milan and additional travel time (around 50 minutes by bus, without considering the waiting time at the bus station). Orio al Serio has a strategic relevance since representing the forth airport in Italy in terms of number of passengers (8.774.256 in 2014 according to ENAC data) with a strong presence of Ryanair.

travel time in presence of mandatory trips and that access/egress time are less considered when their sum is lower than 60 minutes. Moreover, when the travel time increases, the evaluation of the waiting time is lower. Gonzales-Savignat (2004) finds that the marginal disutility of travel costs affects the probability of choosing HSR more negatively in case of self-employed, confirming also the main differences among business and leisure travelers. He also verifies that people traveling more frequently derive higher disutility from access time and higher utility from service frequency and that leisure travelers are less sensitive to travel-time changes. Hess et al. (2007), instead, verify that the WTP (Willingness to Pay) for reductions in schedule delay and improved on-time performance is greater for business travelers than for Holiday and VFR (Visiting Friends and Relative). They also find that all respondents but holiday travelers are more sensitive to early than late arrivals, since they prefer to stay more at home than getting earlier to their destination.

Despite these results, nothing we know about the changes in the willingness to pay for access, egress and travel time reduction driven by the introduction of the HSR and how these differ across groups of individuals as compared to the status quo, without the HSR. The aim of this paper is to provide a Stated Preference (SP) analysis of the demand for a new High-Speed line able to reduce by 1h the travel time on the route Bari-Rome and its effect on intermodal competition by comparing the changes in the willingness to pay (WTP) for access, egress and time reduction before and after the introduction of the HSR. We use a broad range of discrete choice models to estimate modal decisions by taking into account all available alternatives on the route of interest, ranging from the air transport mode to the conventional train service, from the bus service to the car and the car-pooling and adding to the current set of transport mode also the planned HSR. This work complements the study of Bergantino & Madio (2016) on the socio-economic determinants and the origin of the modal change toward the HSR when introduced which finds that the demand is more likely to be derived by air transport modes and conventional rail services, with an intermodal substitution more pronounced between flights and HSR in Bari.

Our estimates show that for shorter distances, as for the case of Bari and when the HSR is considered, access and egress time are evaluated more than the travel time, finding that fragmented journeys yield a higher disutility. Instead, the willingness to pay for travel time reduction is absolutely and relative to access and egress time higher in absence of the HSR, that is under the current set of modal alternatives. Thus, when the average travel distance is larger, travelers tend to prefer reducing in-vehicle travel time but the situation is reversed in presence of shorter (average) travel time derived from the introduction of the HSR.

Moreover, the presence of detailed individual data and the number of observations allows also to enrich the analysis by looking at different segments of population. Business and leisure travelers behave differently, with those traveling for work characterized by greater willingness to pay and high sensitivity to access and egress time, confirming previous results (Gonzales-Savignat 2004). Heterogeneity is also present according to income levels of respondents such that operators can differentiate their fares according to *time sensitive* and *cost sensitive* passengers. A further subsample analysis is performed by looking at the frequency of trips on the route and distinguishing between frequent and occasional travelers, finding that the firsts have a greater willingness to pay for any type of time reduction.

Further, our paper contributes to develop the current literature on intermodal substitution between HSR and airlines when the travel distances increases over 500 km. In this regard, Kappes & Merkert (2013) report that airline managers rank the second most effective barrier to entry: "*The route under consideration is already served by a high-speed rail link*", since distances up to 500 km are now favourable to HSR, preferring cooperation rather than competition. This is coherent with the relevant literature which shows that HSR may have a competitive advantage even up to 600-800 km but the potential demand and the potential time saving reach their peak at around 400 km, with the greatest benefits up to around 550 km (Janić (1993); Vickerman (1997); Gleave (2004);Rothengatter (2010)). To verify what is the extent of the intermodal competition in presence of longer distances, we perform our analysis by considering to locations: i) the original and planned location, Bari, with a travel distance from Rome of around 450 km; ii) Brindisi, a potential location which can indirectly benefit from the introduction of the HSR to Bari located at around 570 km from Rome. This comparison is made possible because both location share the same type of modal alternatives (and sometimes services, as shown in Section 2) and are characterized by the presence of airports, with daily flights to Rome. The results show that competition between airlines and HSR operators on the same route but with different departure locations is still intense even when the travel distance is higher than 500 km, with no significant differences between these alternatives when Brindisi is considered in most of our model specifications and with a potential demand for the new service of around 26% for the Bari-Rome route and 28% for the Brindisi-Rome route. However, the absence of significant difference is sensible to the model specification and depending on the distribution and correlation of the random parameters. Moreover, we find that when distances increase, HSR is still competitive relative to flights for business travelers and frequent travelers and this can be explained by the possibility to work in-vehicle but becomes less appealing for leisure travelers and occasional travelers.

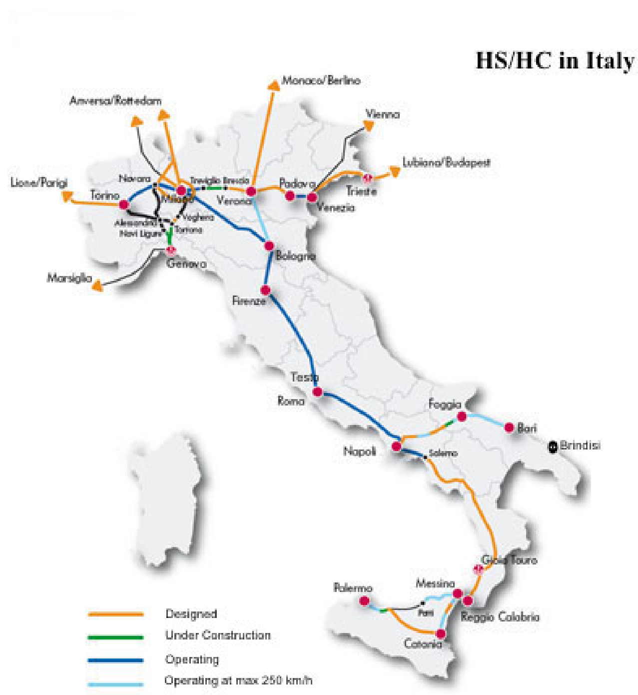
This remainder of this work is organized as follows: Section 2 provides a descriptive analysis of the routes of interest lines; Section 3 presents the description of alternatives, attributes and levels proposed as well as characteristics of the sample population; Section 4 presents the econometric strategy Section 5 reports the main results from the Multinomial Logit, Mixed Multinomial Logit while Section 6 the related mean-Willigness to Pay for reduction in travel time; Section 7 presents conclusive remarks and future research paths.

2 Background

The project is part of the TEN-T (Trans-European Network of Transport) Strategy for the implementation of the Scandinavian - Corridor and it is funded with 6.2 billion of EUR. The works for building the infrastructure started in 2016 and it is expected to be fully operated in 2026[4]. The infrastructure has a strategic validity for the Southern Italy characterized by the presence of a poor infrastructure network and longer travel time. The current HSR network ends in Salerno, close to Naples, on the Tirrenian Coast while there are no direct linkages with the other coast and with one of the most populated city in South Italy, Bari. Both cities are, in fact, only connected via bus services. The new line Bari-Rome will be implemented by connecting Bari and Naples and to Rome through the already existing Naples-Rome HSR route[5]. The expected benefits are the reduction in the travel time to Naples to 2 h and to Rome to 3 h.

[4]See www.napolibari.it

[5]Cascetta et al. (2011) in a Revealed Preference analysis argue that on the Naples-Rome line, the demand induced by the introduction of the HSR was 22% in 2007, after two years launch, with existing rail services continued to ensure 69% of the overall demand in a particular context of lack competition and alternatives (i.e., the car (8%) was the only real alternative to the conventional train choice). They find also that travel time and its quality represent the main reasons for choosing HSR services and that HSR travelers are less sensitive to the travel time than other passengers when the it increases for HSR journeys. On the same route, Givoni & Dobruszkes (2013) investigate the ex-post effects due to the introduction of the HSR, finding that the modal shift after 2-4 years was 10-20% and the rest only modal substitution, mostly from the existing rail service.



Source: Ferrovie dello Stato Italiano.

Figure 1: Extension of HS/HC in Italy

2.1 Analysis of the current market structure

The current market structure is mainly based on the presence of airlines, rail and bus services. There are no data of the real market share but it is possible to use the number of daily connections on the "Bari-Rome" and on the "Brindisi-Rome" route as a proxy. This is quite difficult to derive for the private car transport mode since the choice is unobserved whereas it is possible to have a rough idea of the extent of the car-pooling service looking at the number of ads posted on the website "Blablacar". The tables are reported in the Appendix.

2.1.1 The "Bari - Rome" line

The main operator for autobus services is Marozzi Srl, which provides a total of six daily connections on the route Bari-Rome, with a price charged to passengers is equal to 34.50 euro. The direct competitor is Baltour Autolinee, which supplies only a single daily connection, with different intermediate stops, greater travel time and charging a price of 38 euro. In general, the travel time differs according to the presence of intermediate stops during the journey.

For conventional rail services, there are four daily connections, of which three Frecciargento and one Intercity. These are all supplied by the public monopolist Trenitalia, with Frecciargento taking around four hours to get to destination whereas the Intercity needs around six hours. Fares are differentiated according to the class (First or Second) and the time of booking, with the presence of different alternatives (SuperEconomy, Economy and Base). The lowest price is charged for the Intercity and this is explained by the greater travel time w.r.t. the Frecciargento while the highest price is 77 euro for the First Class - Base and 54 euro for the Second Class - Base.

By looking at the airline industry, there are two competitors[6] with a different cost-structures. Alitalia is the incumbent on that route, a FCC (Full Cost Carrier) covering five daily flights and exploiting also alliances with other carriers whilst the LCC Ryanair, previously using the secondary airport of Rome Ciampino and now assigned to Rome Fiumicino for some domestic flights, covers only two daily flights, in the early morning and in the afternoon. The price structure is, indeed, differentiated according to the class of travel.

2.1.2 The "Brindisi-Bari-Rome" line

Some of the services provided in Brindisi are shared with Bari (e.g. bus and train). Also for Brindisi, the main bus operator is Marozzi Srl, with four daily services, with different travel time and fares (the lowest fare is 39.50 euro and the highest 42.50, charged to the faster service). Trenitalia is the monopolist for long-haul routes, providing up to three daily Frecciargento (the same on the Bari-Rome route), with an average travel time of around 5 hours and price discrimination according to classes and booking time. As in the previous case, booking in advance may lead to substantial discount for the Super Economy fare (around 39 euro) while the maximum price charged on that route is 66 euro for the Second class - Base and 96 euro for the First Class - Base.

Finally, as for the "Bari-Rome" route, there are competitors for the air transport modes: Alitalia and Ryanair. The first has four daily connections with the Italian capital, with different fares according to the time of booking and also to the presence of a return whereas the latter has only two different fares (Standard and Business Plus). The travel time is almost the same, accounting for around 70 minutes but waiting time at the airport and exit time should be added in the total travel time. Moreover, when this alternative is considered, travelers usually take into account also access and egress time and costs, as such time and costs spent for getting to the airport and from the airport to the final destination.

3 Methodology

To implement the design, we consider all currently available alternatives, that is airline services, existing/traditional rail services, bus, car-pooling, private car and we add also the planned high speed rail. For the definition of the attributes, previous studies focusing on inter-modal competition among rail services and airline companies rely upon fares, total travel time and access time. Román et al. (2007), who analyse a competition between two different modal alternatives (air-air vs. air-hrs), add also the presence of baggage integration. Pagliara et al. (2012) report the provision of checkpoints within airports as a factor affecting the modal choice. Park & Ha (2006) control for toll fees and frequency of linkages. Burge et al. (2011) add delays, waiting time and the presence of interchanges. de Dios Ortúzar & Simonetti (2008) use attributes as travel time, fares, comfort (class of the trip) and delay in a Mixed RP-SP model. This method is also used by Román et al. (2010) for estimating the modal split on the Madrid-Zaragoza-Barcelona corridor assessing both the actual market and that with the introduction of the new HSR service. They use RP data for 5 alternatives and SP data for HSR and the plane using, as attributes, travel cost, travel time, access/egress time, frequency of linkages, reliability and comfort

[6] Vueling left its route from and to the Rome Fiumicino Airport during the first months of 2015.

3.1 The Design

Seeking to balance the main attributes of interests and the need to avoid information overloading and fatigues, we use the following four attributes[7]: total travel time (which, for the flight alternative, takes into account the time spent for identification and check-in, waiting time as well as the minimum time needed for handling baggages and moving to the gate[8]), the number of daily connections, the travel cost presented as a menu of fares (for business and standard classes) and also reliability represented by the probability to respect the schedule arrival time. Only for the air transport mode, we add access and egress time defined as the sum of the travel time to get from and to the airport. These attributes are similar to those considered by Román et al. (2010). We consider 3 levels per attribute so as to allow for non-linear effects (Rose & Bliemer 2009) and to minimize, at the same time, the number of potential combinations. Alternatives, attributes and levels are reported in the Appendix and defined on the basis of the characteristics of the current market structure.

In our analysis we use Orthogonal Designs, which are widely used in the transportation literature[9] and we assume that the effect of each attribute is additive and interactions are not considered. Other than practical reasons, it is found that most of the variance (around 80%) is captured by main-effects while second order interactions can only to explain 3-6%, and higher-order interactions even less (Louviere (1988); Greene & Hensher (2010)). In order to reduce the number of possible combinations, Hensher et al. (2005) suggest to use a *Fractional Factorial Design with randomized treatment combinations* (FrFD) which, in our case, yields a subset of 27 treatment combinations[10].

3.2 The Data

[Table 1 around here]

Interviews were conducted in local airports, bus and rail stations in November and December 2015. A pilot took place in November to verify potential fatigue arising from the submission of nine scenarios per questionnaire and the interest of respondents. Each interview took around 15 minutes and consisted in two parts. The first part was related to Revealed Preferences information (socio-economics data, usual modal choices, trips per year on the route, etc.) while the second consisted on nine different scenarios where respondents were asked to make their optimal choice under the current set of alternatives and in that adding also the HSR[11].

Table 1 describes the sample population, consisting in 401 respondents from Bari and 219 from Brindisi. We differentiate between travelers and non travelers. The firsts are individuals currently experiencing a journey toward Rome and interviewed while waiting for their travel. The second, instead, are people usually traveling at least once per year on the route. The data were gathered to obtain information also on individuals usually traveling by private car or car-pooling and whose decisions are not directly observable by us.

[7] According to the theory, a number of 4-6 attributes is required to generate an effective representation of the investigated choice behaviour such that all economic features are satisfied and the respondent is not affected by an overloading of information, which increases exponentially in the number of attributes. Hensher et al. (2005) suggest that the probability of considering more attributes increases as the number of attribute decreases with the consequence that the attribute definition process is highly important for obtaining good estimates. Willis et al. (2005) add that with a large number of factors, the decision-maker increasingly starts to concentrate their choices on a limited number of factors and, in presence of time-constraints, 4-5 is the maximum number of factors able to satisfy non-satiation, transitivity, continuity, IIA.

[8] This time is likely to be increasing in the dimension of the airport. However, both Bari and Brindisi airports are not big enough.

[9] As reported by Bliemer & Rose (2011) considering the period between 2000-2009, 66% of estimates published in a subset of transportation journals, was based on orthogonal designs whilst 20% on D-Efficient Designs.

[10] According to Hensher et al. (2005), when this method is used, it is particularly important to have the randomized columns not assigned next to the original treatment combination, so as to avoid perfect collinearity.

[11] An example of a choice-set for those interviewed in Bari is presented in the Appendix.

Using the nine choices per individual, we obtained a total of 5580 observations for both the status quo of modal alternatives and the one introducing the HSR. Table 1 reports the stated modal shares for both locations, showing that the HSR is more likely to capture demand from air transport modes and conventional train services.

4 Econometric methods

The utility of individuals derived from recurring to the transport modal alternative j is given by $U_{ji} = V_{ji} + \epsilon_{ji}$ where $V_j = \alpha_j + \sum \beta x_{ji}$, with α_j being the vector for the alternative-specific constants capturing the average of all unobserved factors affecting each transport mode, β the vector of parameters to be estimated and x_{ji} the vector of attributes for individual the i and alternative j. Indeed, V_{ji} represents the non-stochastic utility function while ϵ_{ji} the random components.

The Multinomial Logit model (MNL) allows to measure the probability that a given alternative is chosen against another and provides a closed-form solution. The main problem of using the MNL is related to the IIA (Independence of Irrelevant Alternatives Assumption) property which states that the odds of two alternatives is not dependent on the characteristics of other alternatives. According to Train (2009) IIA is time-saving and useful when the scholar is not interested - as, instead, we are - in assessing inter-modal substitutions (or choices) among all possible alternatives but only considering a limited subset and when homogeneity across respondents in their tastes is a reasonable assumption. However, this is an unrealistic and very stringent assumption and flexible models allowing for heterogeneity may be often necessary to provide a better fit in the analysis of choice behaviour.

Instead, by using Mixed Multinomial Logit models (MXL), these assumptions are relaxed and taste heterogeneity arises from distributional forms. In other words, random coefficients variy across respondents according to some parameters (e.g., socio-economic characteristics, etc.). Therefore, consider the individual $i = 1...I$ choosing among a set of $j = 1...J$ alternatives in a given choice-set $k = 1...K$. Then, the utility function U_{jik} is as follows:

$$U_{jik} = V_{ijk} + \epsilon_{ji} = \alpha_j + \beta^{'}_{ji} X_{jik} + \phi^{\prime}_j Z_i + \epsilon_{jik} \tag{1}$$

with β_{ji} the vector of the parameter coefficients (attributes), with $\beta_{ji} = \beta_j + \eta_i$ for the random parameters (access, egress and travel time) and $\beta_{ji} = \beta_j$ for those kept as fixed (fare, reliability, frequency); Z_{ji} is the vector containing alternative-specific socio-economic characteristics as the self-evaluation of the flight security, gender, departure location and three age bands (<30 y.o.; 30 - 50 y.o.; >50 y.o.); ϵ_{ji} are the random error components iid Gumbel distributed[12]. The unconditional probability of choosing an alternative j among J alternatives is strictly dependent on $f(\beta|\eta)$, that is the density function of β. Because we have multiple responses per individual, we deal with a Panel Data structure, such that the unconditional probability for the respondent i contains the product of the unconditional probability for each choice set $k = 1, ..., K$, that is

$$P_{ji}(X_i, Z_i, \eta) = \int \prod_{k=1}^{K} \frac{\exp(\alpha_j + \beta^{'}_{ji} X_{jik} + \phi^{\prime} Z_i)}{\sum_{j=1}^{J} \exp(\alpha_j + \beta^{'}_{ji} X_{ijk} + \phi^{\prime} Z_i)} f(\beta|\eta_i) \mathrm{d}\beta \tag{2}$$

[12]The assumption of independent and identically distributed (iid) error terms is relaxed when - under some circumstances - correlation across alternatives is considered. In the latter case, the lower triangular variance-covariance matrix enters in the model.

Because we are interested in deriving the willingness to pay for access, egress and travel time savings, we model as random only these parameters while we keep as fixed all other attributes (frequency, reliability and cost). Retaining the cost as fixed has also the advantage of avoiding implausible results in the willingness to pay whose resulting values follows the distribution of the numerator[13]. In fact, according to Revelt & Train (1999), the best way is to proceed is to avoid all attributes being randomly distributed since the related WTP may result in being unstable[14]. Most of studies in transportation economics rely upon the normal distribution[15].

5 Results

[Table 2 around here]

Table 2 presents main results from the Multinomial Logit. The reference alternative is the air transport mode in all model presented. We use it for both the full sample including observations for Bari and Brindisi and the sub-sample for Bari and both in presence and absence of the new alternative. By looking at attribute means, the sign is compliant with our expectations but frequency in absence of HSR. On average (with and without HSR) total travel time and access/egress time are valued in the same way, ranging from -0.005 to -0.007. Punctuality is always relevant and positive, suggesting a positive contribution to the utility of travelers. The average effect of ticket prices is always negative, with a greater coefficient in absence of HSR. Finally, all alternative specific constants are highly significant except for the HSR.

[Table 3 around here]

Table 3 presents results from the Mixed Multinomial Logit model for the sample by looking at the case with and without HSR services. To determine the right functional form, we test different distributions and we select the best performing model by looking at the Akaike selection criteria[16]. As reported by Table 3, T-MIXL identifies such MXL models with triangular distribution, characterized by a symmetric bounded distribution with a single peak; U-MXL identifies models with uniformly distributed random parameters; N-MXL presents models under normal distribution. As it is possible to see from the AIC, the N-MXL model performs slightly better than all other model specification (13,167 for T-MXL, 12,711for U-MXL and 12,632 for N-MXL) in presence HSR. Similar results apply in absence of HSR. Additionally, mixture models are always performance improving with respect to the classic MNL (AIC 15,532). Since N-MXL produces the best fit, we use this model throughout the paper for all estimates. Additionally, it provides the smaller standard deviations from the β-coefficient for two random parameters (travel time and access/egress time). Coherently with our expectations, the MXL models perform better than the simple MNL according to the

[13] As an example, if the travel time is assumed to be normally distributed and the fare attribute held as fixed, than the related WTP defined as the ratio of the travel time and the price is also normally distributed.

[14] The Willingness to Pay is the ratio of the attribute we want to evaluate and the price coefficient. If both are random, then unstable outcomes may arise and retaining the price variable as fixed may able to stabilize the related result. In this regard, Scarpa et al. (2008) state that values of the price coefficient close to the zero may lead to distribution of the WTP to have a longer upper tail. Similarly, assuming a distributional form as the normal for the price coefficient, could lead to irrational situations in the tails, such that for which the coefficient may assume positive or implausible values.

[15] Other than normal, there are also uniform and triangular distributions, with both having the advantage of reducing the population with unreasonable low or high coefficients by providing some boundaries on both sides. The triangular distribution adds also the peaked mean, similarly to the normal distribution. Differently, log-normal and Johnson's S_b distributions are mainly used to force the β-coefficient to maintain the same sign in all elements of the distribution. In order to select the best distributional form, post-estimation statistical tools as Akaike Information Criterion (AIC) and Bayes Information Criterion (BIC) are usually used.

[16] The distributional form check is performed only on the full sample for both the case with and without HSR.

Akaike Information Criterion (AIC) under both both the case with and without the HSR. We find that the Mixed Multinomial Logit model provides also a better goodness of fits (Mc Fadden R^2 or $PseudoR^2$).

The coefficient of the travel time and A/E time parameters is always significant and negative. The magnitude of the A/E time coefficient is greater in presence of HSR than in absence (-0.034 vs. -0.007 for the full sample population; -0.037 vs. -0.017 for Bari) and this happens also for the standard deviation (0.053 vs. 0.030 and 0.057 vs. 0.034).

Our findings show also that A/E time coefficients are greater than that of travel time when HSR (-0.034 for A/E time vs. -0.023 for travel in presence of HSR; -0.007 vs. -0.022 in absence) is considered and this is justified by the reduced average total travel time when HSR are introduced such that A/E time is no longer a marginal component as compared to the total travel time. This result is also confirmed when only the subset of Bari (-0.037 for A/E time vs. -0.023) and, thus, an average shorter distance is considered. In this case, the coefficients are equal in absence of HSR (-0.017). However, it is important to point out that while travel time is averaged across all alternatives, A/E time coefficients of these random parameters refer only to the air transport mode. In this sense, in presence of HSR the disutility of access and egress time is even more relevant, with a greater (negative) effect. This is also coherent with the recent experience on the Rome-Milan route with the LCC Ryanair moving out from that market after the introduction of HSR and the consequential reduction of the related travel time. The explanation is that other factors as the use of electronic devices, mobile data and wifi influence the attractiveness of the HSR with respect to the flight alternative as shown by Nash (2015). Furthermore, the magnitude of the fare coefficient assumes lower value for those traveling from Bari compared to that found pooling all observations.

We move next to the analysis of the other non random parameters used in our model specification. As previously verified with the Multinomial Logit model, we confirm previous results on punctuality and number of linkages per the day. Arriving on time, indeed, matters, with high significance and a slightly larger coefficients for those travelling from Bari. Frequency, instead, negatively affects passengers' utility function only under the status quo of services. In other words, increasing the supply of services without intervening on their travel time determines a reduction of the utility of travelers. Likewise, when the average travel time benefits from the introduction of faster connections, as it is the case of the HSR, individuals care more about the other parameters and frequency becomes not significant. It is important to note, however, that we analyse a generic coefficient while differences can arise according to each modal alternative. We leave this aspect to a further analysis.

[Table 4 around here]

Table 4 presents the normally distributed model accounting for correlated parameters. As shown in the table, new elements are introduced, namely the elements of the lower triangular variance-covariance matrix. To test for the presence of correlated parameters, we use a Likelihood Ratio Test (LR Test) to reject the null hypothesis ($H0$) of absence of correlation. Therefore, two forms of correlation in our model arise: i) correlation in individual choices, which is taken into account using a Panel Data structure; ii) correlation among parameters, which is taken into account relaxing the assumption of i.i.d. error terms. As observed, our main results do not change, with the evaluation of A/E travel time always greater in magnitude than the travel time when HSR is introduced. Likewise, the A/E time in presence of HSR is always greater in magnitude than in absence.

5.1 Controlling for Travel Purposes

[Table 5 around here]

In this subsection, we segment our sample population by travel purposes, differentiating between business and leisure journeys, with the firsts representing around 40% of all individuals. As in Pels et al. (2003), the disutility of both access, egress and travel time is higher for those traveling for business and this is now always greater than that of travel time even in absence of HSR. The mean-coefficient for travel time is -0.033 and -0.029 for business travelers respectively in presence and absence of the new alternative while only -0.016 and -0.08 for those traveling for leisure. The access and egress time mean coefficient is even higher for business travelers in presence of HSR (-0.051) and equal to -0.018 under the current set of alternatives. In contrast, the coefficient is halved for leisure travelers when enjoying the benefits of the introduction of the HSR (-0.022) but not significant for leisure travelers in absence of HSR. Business travelers, thus, are more interested in minimizing travel time, even at a greater cost, as well as in reducing potential fragmentation of the journey (access and egress time) affecting also the possibility to work in-vehicle during the travel. From the standard deviation we still verify the presence of within sample taste heterogeneity, with significant effect in both categories.

Quite intuitively, leisure travelers are sensible to price increases and, indeed, negatively affected more both in presence (-0.060 for leisure versus -0.030 for business travelers) and absence of HSR (-0.069 and -0.016 respectively). Also reliability is particularly important for those traveling for business purposes compared to leisure passengers with almost the same coefficient in presence and absence of HSR. This result is quite intuitive since business journeys are often associated with scheduled meeting and, indeed, are *time sensitive*. Frequency is, instead, almost never significant.

5.2 Controlling for Frequency

[Table 6 around here]

According to Gonzales-Savignat (2004), the disutility of access, egress and travel time is higher for frequent travelers. In this subsection, we want to test whether this is true also for our case. Since 62% of respondents from Bari and 69% from Brindisi make less than 5 journeys per year on the route of interest, we distinguish between occasional and frequent travelers. The latter are those traveling to Rome at least five times per year.

Results are reported in Table 6. We observe that these are not unambiguous as in the previous cases and often the coefficients are not significant at 10% in the case of Bari. This affects the computation of the related willingness to pay. Overall, we still find that access and egress time impact more when the HSR is considered while travel time is more relevant in absence of HSR but this happens more for occasional travelers as compared to frequent travelers. A more precise evaluation is left to the analysis of the willingness to pay.

5.3 Controlling for Differences in Income

[Table 7 around here]

Table 7 reports results from the Mixed Multinomial Logit model by looking at income differences. In this case, however, we do not include socio-economic variables to facilitate the convergence but we estimate a model with only attributes (random and non random) and alternative specific constants.

The impact of access, egress and travel time is increasing in the income level but the effect of access and egress time is always greater than that of travel time in presence of HSR. As expected, the magnitude of the fare coefficient is decreasing in the level of income, ranging from -0.063 (and -0.085 in absence of HSR) for low-income earners (<1000 euro/month) to -0.045 (-0.031) for intermediate income levels (1000-2000 euro/month) and to -0.025 (-0.005 but not significant at 10%) for those earning more than 2000 euro per month. Similar results apply also for the subset including only those traveling from Bari.

The greater is the income level, the greater is also the attention paid to the reliability of the transport mode, with the magnitude of the punctuality coefficient slightly similar for low and intermediate income categories (0.012 for for low-income earners and 0.013 for intermediate in presence of HSR) but three times higher for high income travelers (0.034). It is rather interesting to verify that this effect is confirmed also in absence of HSR but the magnitude is always greater than in presence of the new service for low and intermediate income earners but not for those earning more than 2000 per month. Thus, travelers pay more attention to punctuality when travel time is - on average - larger as consequence of the unavailability of the new service. Looking at the number of daily connections, the coefficient is not always significant but this because relevant for high income earners (0.044) but only in presence of HSR while the effect is negative for low income travelers.

To sum up, all these results suggest the presence of different elasticities among respondents, with high income respondents evaluating more the amount of time spent travelling and less the price paid for reaching their preferred destination.

5.4 Testing degree of competition as a function of distance

[Table 8 around here]

Additionally, we are also interested in testing the degree of competition as a function of the travel distance. We find some slight contrasting results according to different model specifications. As summarized in Table 7, under Multinomial Logit and Mixed Multinomial Logit model with correlated parameters, we find no significant differences between Bari and Brindisi with respect to the choice of the HSR. The coefficient is equal to -0.108 in the first case and -0.188 in the second case but not significant at 10%. All other alternatives are instead less likely to be chosen with respect to the air transport. However, since the competitive advantage of HSR decreases in the travel distances, we may expect that for even longer travel distances competition with HSR becomes less effective and airlines would prevail. In other words, we find support for effective intermodal substitution among these alternatives even when the travel distance moves beyond a theoretical threshold of 500 km to 570 km.

In contrast, when parameters are not correlated but mixture models are still used, we now find a significant and negative impact, although not intense in its magnitude (-0.444) for HSR services relative to the air transport mode and this is significant at 1%. With respect to other alternatives, HSR yields the smallest coefficient but there is a large degree of inter-modal substitution between flights and HSR but when the travel distance is beyond the threshold of 500 km, HSR is slightly likely to be chosen. This is a quite interesting result that, clearly, does not offset the very high percentage of people moving to HSR from air transport modes when the new alternative becomes available.

Thus, comparing different modal specifications, we find that the effect of increasing travel distances to Brindisi is nil or - at most- relatively small enough for HSR over the air transport mode while all other alternatives becomes even more appealing as a consequence of the increased travel time. Indeed, considering an extension of the line to Brindisi would still be able to generate intermodal substitution from airlines and make HSR a good alternative to the air transport.

However, the size and the significance of this effect changes across segments of the population. We report the results from the Mixed Multinomial Logit (without correlated parameters) considering those traveling for business purposes and those for leisure. While there is no effect for the firsts, we find that those traveling for leisure purposes using the HSR from Brindisi experience a reduction in their utility with respect to those traveling by flight from Bari. This effect is significant and, indeed, HSR is less likely to be chosen by leisure travelers from Brindisi with respect to those from Bari relative to the flights.

This result, indeed, since gives an idea on the type of travelers more willing to benefit from the new service. A potential justification of this result may be still found in the disutility determined by access and egress time which, for a business travelers, may interrupt current his own work. Additionally, the absence of internet connection as well as the possibility to have calls during the trip can still affect the modal choice and make the HSR more appealing. Thus, there is perfect substitutability among services even when distances increases. However, this is not the case of leisure travelers for which, instead, the coefficient is negative (-0.459) and significant at 1%.

Another differentiation arises in the number of trips per year. We find that occasional travelers from Brindisi seem to prefer the airline to the HSR (-0.313), with significance only at 10%, while frequent travelers are more likely to rely on the new alternative. This may be explained by the fact that frequent travelers are more aware of the disutility experienced by fragmenting the travel time to reach the airport and from the airport the final destination.

6 Willingness to Pay (WTP)

Because the magnitude of coefficients does not allow to practically determine the real impact of each attribute, a way to better look at changes in the individual behaviours when the new alternative becomes available is by deriving the Willingness to Pay (WTP) for marginal changes in the levels of attributes. The WTP is usually defined as the marginal change in the utility driven by changes in some attributes. More precisely, let us consider the random parameter χ identifying access/egress or travel time, whose coefficient is defined by β_χ, then the mean-WTP is given by the negative ratio of expected value of the random coefficient we want to analyse and the travel cost, where the expectation of the β in the denominator allows to consider the average coefficient given the distributional form of the random parameter. This explains also why mean-WTPs are considered.

$$E(WTP) = \frac{\partial V/\partial \chi}{\partial V/\partial fare} = -\frac{E(\beta^\chi)}{\beta^{fare}} \tag{3}$$

We focus only on the the mean-WTP for travel and access/egress time. This means to calculate the mean-VTTS (Value of the Travel Time Savings) establishing how much an individual is willing to pay for reducing the travel time (or A/E time) of one unit of time. In our case, we investigate the mean-VTTS in terms of euro/hour, that is by multiplying Equation (2)

[Table 9 around here]

The estimates of the willingness to pay derived from the Multinomial Logit model do not allow to disentangle the differences in the perception of access, egress and travel time evaluation by providing a coefficient which is almost the same in all model specifications[17]. When the Mixed Multinomial Logit model is used, instead, the mean-WTP for reductions in access/egress time becomes more valuable than reduction in the travel time as a whole (43.40 versus 29.36 for the N-MXL model) and this is true mainly for Bari, where the WTP for access/egress time reductions is 54.15 euro/hour versus 33.66 euro/hour). This is a relevant result justified by the disutility experienced by travelers when they have to break their journey moving to the airport and from the airport to destination. When HSR is not available, reduction in travel time becomes slightly more valuable than reduction in access and egress time for the full sample population (19.70 vs. 6.27 euro/hour) but not for the case of Bari where these are equal (31.88 euro/hour). This is explained by the effect generated by Brindisi and, indeed, by the fact that travel distance from Bari is shorter and access and egress time represents a non-marginal component of the total travel time. Simila r results apply when we use the model with correlated parameters.

To summarize, when access and egress time are not marginal with respect to the travel time, that is when HSR are introduced and more precisely for the case of Bari (<500 km), then respondents are more willing to pay more for reducing their access/egress time than for reducing the total travel time.

[Table 10 around here]

As in Hess et al. (2007), business travelers have a greater mean-VTTS than leisure travelers. Coherently with previous findings, both are more willing to pay for reductions in access and egress time than in travel time when the HSR is introduced and for shorter travel time as it is the case of Bari. Business travelers are more willing to pay for reductions in travel time when HSR is not already available than when it is both for the full sample population (102 vs. 66 euro/hour) and for Bari only (103.455 vs. 70.34 euro/hour). The situation is reverted when considering the status quo, with more disutility derived from travel time, which is on average longer, relative to fragmentation in the journey determined by the need to get to the airport and from the airport to the final destination. The value of time savings for leisure travelers is, instead, much smaller

Table 10 presents also the mean-WTP by segmenting the sample population according to the travel habits on the route so as to distinguish among occasional and frequent travelers. The value of time savings is increasing in the number of travels per year and this happens for access, egress and travel time. While occasional travelers (<5 journeys per year on the route of interest) are more willing to pay around between 16 and 22 euro per hour of travel time saving, those travelling at least five times per year are willing, on average, to pay more, that is around 22-37 euro/hour according to the presence or not of faster train services. As previously found, access and egress time savings are more valuable than travel time savings only the scenario including the HSR is considered with VTTS ranging from 7 euro per hour for occasional travelers to around 64 euro per hour for frequent travelers. Our results confirm, indeed, the greater willingness to pay for reductions in the travel time for frequent travelers and this is explained by the greater impact of the time subtracted to other activities (leisure, work, etc.) over the whole year that we consider.

By looking at differences in levels of net monthly income , the willingness to pay for reductions in both travel and access time is higher when HSR is not available for high-income individuals. More precisely, for those earning more than 2000 euro/month, the mean-WTP for travel time reduction is, on average, equal to 100.80 euro/hour when HSR is introduced. However, the estimates are not always highly significant providing excessively high results.

[17]The only difference is the the mean-WTP for travel time savings which is 30 euro per hour while the respective for savings access and egress time is 36 euro/hour.

Overall, what we find is that the willingness to pay is increasing in the level of income and this happens in all sample specifications and for both access, egress and travel time.

7 Conclusion

This study investigates inter-modal substitution and willingness to pay for the introduction of High Speed Rails by considering a broad set of transport alternatives. Since we are interested in assessing the potential demand for the new service, we use a Stated Preference analysis asking both travelers and non travelers to respond to our survey, carried on in two different departure locations (Bari and Brindisi) so as to capture both direct and indirect effects of the new alternative and assess the change in the modal choice for longer travel distances. We find that in two (out of three) model specifications there are no significant differences between departure locations although travel distances increases beyond the threshold of 500 km for the case of Brindisi. When these differences are significant, these are very small confirming the presence of large intermodal substitution even for the second location.

Quite interestingly, business travelers moving from Brindisi are those increasing more their utility with respect to flight users and this can be explained by the absence of fragmentation in the journey as well as the presence of facilities allowing to continue to work (wifi, possibility of doing calls, etc.). We also find that business travelers are more sensible to reliability, travel and access/egress time with smaller price elasticity and higher WTP as in Hess et al. (2007). The converse happens for those traveling for leisure purposes or for visiting friends and relatives. We also verify heterogeneity arising from differences in the net monthly income, finding that the related mean-WTP is always greater for high income categories while low-income are more sensitive to the fare coefficient. A further sample cut is performed by distinguishing among occasional and frequent travelers, with the latter willing to pay more for reductions in the travel time when HSR is not available.

Our focus on changes in the WTP driven by the (potential) introduction of the HSR also shows that individuals care more about access and egress time than about travel for relatively shorter travel journeys (in presence of HSR) while the result is reversed when the average travel time is higher (in absence of HSR). Thus, fragmentation of the trip is likely to determine higher disutility but the effect is not homogeneous in the sample population and impacting more on frequent, business and high-income travelers.

These results also confirm the presence of taste heterogeneity that we take into account by using both the Multinomial Logit model and mixture models, with and without correlated parameters. Further research might be targeted to introduce within Mixed Multinomial Logit model through Mixed-Mixed models such to better capture heterogeneity among individuals (Keane & Wasi 2013).

From a welfare point of view, by studying the optimal modal choice both in absence and in presence of HSR, we find that when travel distances are reduced, due to the introduction of the new HSR and mainly for the case of Bari, there is a greater WTP for reduction in access and egress time than for reduction in the travel time, suggesting a higher disutility derived from fragmentations of the journey.

Future research will be devoted to analyse alternative-specific willingness to pay and to contribute to the burgeoning literature on Attribute Non Attendance. This is one of the problems often arising with Stated Preferences that can lead to estimation bias. At the same time, policy implications and assessment of potential market-scenarios will be assessed with the purpose to consider the change in market share in presence of changes in the attribute composition.

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Tables

Table 1: Descriptive Statistics

	N. Individuals			**N. Valid Observations**		
	Bari	Brindisi	Total	Bari	Brindisi	Total
Travelers	249	116	365	2241	1044	3285
Non-Travelers	152	103	255	1368	927	2295
Total	401	219	620	3609	1971	5580
of whom						
Female	41%	42%	41%			
Business trip	42%	33%	39%			
More than 5 trip per year	38%	31%	35%			
Income (Ref: $<$ 1000 EUR/month)						
1000 - 2000	38%	27%	34%			
$>$ 2000	23%	27%	24%			

Modal choices (RP/SP)

	Flight	Train	Bus	Car-Pooling	Car	HS/HC Train
Revealed Preference Current/Usual Modal Shares						
Bari	21%	30%	10%	30%	9%	-
Brindisi	31%	54%	2%	9%	4%	-
Total	25%	40%	6%	22%	7%	-
Stated Modal shares without HSR						
Bari	40%	32%	7%	8%	13%	-
Brindisi	64%	21%	4%	5%	6%	-
Total	49%	28%	6%	7%	10%	
Stated Modal shares with HSR						
	Flight	Train	Bus	Car-Pooling	Car	
Bari	27%	25%	7%	7%	8%	26%
Brindisi	45%	16%	3%	5%	3%	28%
Total	33%	21%	5%	7%	7%	27%

Table 2: Multinomial Logit Model

	All		**Only Bari**	
	With HSR	Without HSR	With HSR	Without HSR
Attribute means				
Fare	-0.022***	-0.014***	-0.018***	-0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
Travel Time	-0.007***	-0.005***	-0.007***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
A/E Travel Time	-0.007***	-0.005***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.002)	(0.001)
Reliability	0.007***	0.010***	0.011***	0.012***
	(0.001)	(0.002)	(0.002)	(0.002)
Frequency	-0.004	-0.009**	-0.005	-0.012**
	(0.004)	(0.005)	(0.005)	(0.005)
Controls (Ref: Flight)				
T: Brindisi	-0.443***	-0.498***		
	(0.095)	(0.082)		
B: Brindisi	-0.797***	-0.779***		
	(0.159)	(0.150)		
CP:Brindisi	-0.564***	-0.536***		
	(0.141)	(0.136)		
C:Brindisi	-0.733***	-0.824***		
	(0.151)	(0.125)		
HSR:Brindisi	-0.108			
	(0.078)			
T: ASC	-0.380**	-0.337**	-0.356*	-0.396**
	(0.156)	(0.146)	(0.193)	(0.176)
B: ASC	-2.175***	-2.449***	-2.129***	-2.544***
	(0.263)	(0.255)	(0.314)	(0.301)
CP: ASC	-0.419**	-0.586***	-0.342	-0.572**
	(0.195)	(0.191)	(0.236)	(0.225)
C: ASC	-0.760***	-1.385***	-0.884***	-1.646***
	(0.200)	(0.187)	(0.239)	(0.221)
HSR: ASC	0.067		0.018	
	(0.141)		(0.175)	
Other controls	Yes	Yes	Yes	Yes
Observations	5,580	5,580	3,609	3,609
McFadden R2	0.119	0.109	0.096	0.086
Log-Likelihood	-7,731.061	-6,412.668	-5,341.157	-4,547.612

Note: *p<0.1; **p<0.05;***p<0.01

The reference alternative is the Flight; B is the Bus service; C is the private car; HSR is the High Speed Rail Service; T is the current Train service; CP is the Car-pooling. Other controls include age, subjective evaluation of air transport mode, gender dummy.

Table 3: Mixed Multinomial Logit under different distributional forms

	All				Ony Bari	
	With HSR			Without HSR	With HSR	Without HSR
	T-MXL	U-MXL	N-MXL			
Random Parameter means						
Travel Time	-0.003**	-0.025***	-0.023***	-0.022***	-0.023***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
A/E Time	-0.008***	-0.045***	-0.034***	-0.007***	-0.037***	-0.017***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Random Parameter s.d						
Travel Time	0.111***	0.055***	0.031***	0.066***	0.036***	0.027***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
A/E Time	0.224***	0.090***	0.053***	0.030***	0.057***	0.034***
	(0.007)	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
Fixed Parameters						
Fare	-0.049***	-0.047***	-0.047***	-0.067***	-0.041***	-0.032***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Reliability	0.014***	0.014***	0.014***	0.025***	0.018***	0.019***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Frequency	-0.002	-0.001	-0.001	-0.019***	0.00003	-0.015**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
Controls (Ref: Flight)						
T: Brindisi	-1.227***	-0.815***	-0.740***	-0.155		
	(0.130)	(0.126)	(0.125)	(0.125)		
B: Brindisi	-1.887***	-1.342***	-0.786***	1.340***		
	(0.227)	(0.219)	(0.227)	(0.225)		
CP:Brindisi	-1.847***	-1.310***	-1.031***	-0.205		
	(0.186)	(0.184)	(0.183)	(0.185)		
C:Brindisi	-1.497***	-1.113***	-0.949***	0.201		
	(0.193)	(0.190)	(0.191)	(0.171)		
HSR:Brindisi	-0.607***	-0.393***	-0.444***			
	(0.113)	(0.111)	(0.112)			
T: ASC	0.088	-0.007	-0.078	1.550***	-0.200	0.046
	(0.220)	(0.218)	(0.219)	(0.225)	(0.269)	(0.268)
B: ASC	-2.570***	-2.938***	-3.195***	-2.400***	-3.380***	-3.035***
	(0.341)	(0.334)	(0.338)	(0.347)	(0.399)	(0.404)
CP: ASC	-0.299	-0.500*	-0.570**	1.207***	-0.667**	-0.392
	(0.268)	(0.266)	(0.266)	(0.279)	(0.320)	(0.326)
C: ASC	0.674**	0.479*	0.407	2.214***	0.086	-0.487
	(0.264)	(0.262)	(0.263)	(0.262)	(0.317)	(0.313)
HSR: ASC	1.004***	0.836***	0.800***		0.508**	
	(0.203)	(0.200)	(0.201)		(0.248)	
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
N.	5,580	5,580	5,580	5,580	3,609	3,609
McFadden R2	0.254	0.280	0.284	0.257	0.277	0.293
Log-Likelihood	-6,546.872	-6,318.856	-6,279.021	-5,348.250	-4,273.006	-3,520.111
AIC	13,167	12,711	12,632	10,758	8,610	1,095

Note: *p<0.1; **p<0.05;***p<0.01

Mixed Logit based on 1000 Halton draws. Successful convergence for all estimation. Optimization through BFGS maximization. Estimates according different distributional forms are not reported for the case in absence of HSR. Other controls include age, subjective evaluation of air transport mode, gender dummy.

Table 4: Mixed Multinomial Logit Model with correlated parameters

	All		**Only Bari**	
	With HSR	Without HSR	With HSR	Without HSR
Random Parameter means				
Travel Time	-0.024***	-0.018***	-0.024***	-0.017***
	(0.001)	(0.001)	(0.002)	(0.002)
A/E Time	-0.029***	-0.011***	-0.031***	-0.017***
	(0.002)	(0.002)	(0.003)	(0.003)
Variance-Covariance Matrix				
aetime.aetime	0.035***	0.024***	0.039***	0.028***
	(0.001)	(0.001)	-0.001	-0.001
aetime.ttime	0.045***	0.001	0.045***	0.003
	(0.002)	(0.002)	-0.002	-0.002
ttime.ttime	0.041***	0.028***	0.043***	0.035***
	(0.002)	(0.001)	-0.002	-0.002
Fixed Parameters				
Fare	-0.048***	-0.041***	-0.042***	-0.032***
	(0.001)	(0.002)	(0.002)	(0.002)
Reliability	0.015***	0.016***	0.019***	0.019***
	(0.002)	(0.002)	(0.002)	(0.003)
Frequency	-0.001	-0.013**	0.001	-0.015**
	(0.006)	(0.006)	(0.007)	(0.007)
Controls (Ref: Flight)				
T: Brindisi	-0.546***	-0.630***		
	(0.126)	(0.124)		
B: Brindisi	-0.668***	-0.615***		
	(0.228)	(0.222)		
CP:Brindisi	-0.899***	-0.890***		
	(0.184)	(0.181)		
C:Brindisi	-0.777***	-0.848***		
	(0.190)	(0.170)		
HSR:Brindisi	-0.188			
	(0.120)			
T: ASC	0.148	0.274	0.018	0.072
	(0.219)	(0.224)	(0.270)	(0.275)
B: ASC	-3.022***	-2.661***	-3.259***	-3.029***
	(0.338)	(0.344)	(0.397)	(0.405)
CP: ASC	-0.333	-0.276	-0.460	-0.363
	(0.266)	(0.276)	(0.320)	(0.332)
C: ASC	0.674**	0.147	0.336	-0.462
	(0.263)	(0.262)	(0.317)	(0.318)
HSR: ASC	0.872***		0.611**	
	(0.201)		(0.248)	
Other controls	Yes	Yes	Yes	Yes
Ho: No Correlation	Rejected	Rejected	Rejected	Rejected
N.	5,580	5,580	3,609	3,609
McFadden R2	0.296	0.299	0.287	0.293
Log-Likelihood	-6,172.680	-5,044.450	-4,211.008	-3,519.619

Note: *p<0.1; **p<0.05;***p<0.01

Mixed Logit based on 1000 Halton draws. Successful convergence for all estimation. Optimization through BFGS maximization. Other controls include age, subjective evaluation of air transport mode, gender dummy.

Table 5: Effect on intermodal competition (Ref. Bari / Flight)

	Multinomial Logit	Mixed Multinomial					
	MNL	Base	With corr	Business	Leisure	Occasional	Frequent
*Reference (Flight*Bari)*							
HSR*Brindisi	-0.108	-0.444***	-0.188	-0.009	-0.459***	-0.313*	0.419**
	(0.078)	(0.112)	(0.120)	(0.206)	(0.151)	(0.170)	(0.203)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: *p<0.1; **p<0.05;***p<0.01.

This table provides a summary of different estimates. The table summarizes the effect of the HSR from Brindisi with respect to those choosing flights from Bari. Occasional travelers make less than five trips per year on the Bari-Rome route. Frequent travelers use the route more than five times per year.

Table 6: N-MXL segmented by travel purposes

	All				Bari			
	Business		Leisure		Business		Leisure	
	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR
Random Parameter means								
Travel Time	-0.033***	-0.029***	-0.016***	-0.008***	-0.034***	-0.030***	-0.018***	-0.013***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
A/E Time	-0.051***	-0.018***	-0.022***	0.0003	-0.050***	-0.018***	-0.030***	-0.014***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Random Parameter s.d								
Travel Time	0.039***	0.033***	0.025***	0.043***	0.040***	0.034***	0.033***	-0.024***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
A/E Time	0.063***	0.041***	0.043***	0.036***	0.063***	0.040***	0.049***	-0.026***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
Fixed Parameters								
Fare	-0.030***	-0.016***	-0.060***	-0.069***	-0.029***	-0.016***	-0.054***	-0.045***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Reliability	0.028***	0.025***	0.006***	0.015***	0.028***	0.025***	0.008***	0.017***
	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Frequency	-0.003	-0.013	0.004	-0.013*	-0.004	-0.014	0.007	-0.011
	(0.011)	(0.011)	(0.007)	(0.007)	(0.010)	(0.011)	(0.008)	(0.008)
Controls (Ref: Flight)								
T: Brindisi	-0.633**	-1.144***	-0.888***	-0.060				
	(0.283)	(0.242)	(0.154)	(0.155)				
B: Brindisi	0.164	-0.904*	-1.282***	0.117				
	(0.519)	(0.513)	(0.264)	(0.265)				
CP:Brindisi	-0.756*	-1.505***	-1.381***	-0.456**				
	(0.427)	(0.416)	(0.222)	(0.220)				
C:Brindisi	0.160	-1.042***	-2.006***	-0.321				
	(0.310)	(0.295)	(0.345)	(0.242)				
HSR:Brindisi	-0.009		-0.459***					
	(0.206)		(0.151)					
T: ASC	0.257	1.027**	-0.150	0.167	0.159	0.827*	-0.462	-0.020
	(0.424)	(0.431)	(0.267)	(0.276)	(0.420)	(0.425)	(0.341)	(0.340)
B: ASC	-1.805***	-0.833	-3.673***	-3.547***	-1.813***	-1.019	-4.245***	-3.653***
	(0.644)	(0.657)	(0.422)	(0.435)	(0.634)	(0.645)	(0.514)	(0.520)
CP: ASC	0.422	1.356**	-0.988***	-0.885***	0.317	1.119**	-1.291***	-0.838**
	(0.523)	(0.537)	(0.323)	(0.341)	(0.513)	(0.526)	(0.404)	(0.409)
C: ASC	0.838*	0.854*	0.231	0.316	0.836*	0.657	-0.262	-0.790*
	(0.481)	(0.484)	(0.349)	(0.336)	(0.476)	(0.477)	(0.424)	(0.409)
HSR: ASC	0.210		1.219***		0.192		0.703**	
	(0.375)		(0.249)		(0.372)		(0.317)	
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N.	2,169	2,169	3,411	3,411	2,169	2,169	2,106	2,106
McFadden R2	0.320	0.349	0.284	0.265	0.318	0.348	0.276	0.284
Log-Likelihood	-2,214.812	-1,732.304	-3,771.869	-3,214.584	-2,222.458	-1,734.872	-2,461.876	-2,053.982

Note: *p<0.1; **p<0.05;***p<0.01

Mixed Logit based on 1000 Halton draws. Successful convergence for all estimation. Optimization through BFGS maximization.

Table 7: Mixed Multinomial Logit segmented by yearly travel frequency

	Full Set				**Only Bari**			
	<5 per year		**>5per year**		**<5 per year**		**>5per year**	
	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR
Random Parameter means								
Travel Time	-0.020***	-0.013***	-0.030***	-0.021***	-0.021***	-0.014***	-0.009***	-0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
A/E Time	-0.026***	-0.006**	-0.052***	-0.020***	-0.039***	-0.014***	0.001	0.010**
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Random Parameter s.d								
Travel Time	0.031***	-0.021***	0.038***	0.048***	0.036***	0.025***	0.092***	0.078***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.005)	(0.005)
A/E Time	0.054***	-0.022***	0.071***	0.036***	0.056***	0.026***	0.095***	0.072***
	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.005)	(0.005)
Fixed Parameters								
Fare	-0.054***	-0.048***	-0.049***	-0.056***	-0.046***	-0.037***	-0.036***	-0.026***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Reliability	0.014***	0.019***	0.016***	0.017***	0.017***	0.020***	0.020***	0.018***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.005)
Frequency	-0.009	-0.020***	0.010	-0.011	-0.002	-0.017**	-0.009	-0.022*
	(0.007)	(0.007)	(0.010)	(0.011)	(0.008)	(0.008)	(0.011)	(0.011)
Controls (Ref: Flight)								
T: Brindisi	-0.456***	-0.108	-0.209	0.323				
	(0.174)	(0.168)	(0.216)	(0.208)				
B: Brindisi	-0.199	0.041	-0.127	1.820***				
	(0.310)	(0.303)	(0.402)	(0.396)				
CP:Brindisi	-1.004***	-0.584**	-0.622*	-0.198				
	(0.240)	(0.232)	(0.352)	(0.350)				
C:Brindisi	-0.750**	-0.488*	0.202	0.713**				
	(0.300)	(0.257)	(0.344)	(0.283)				
HSR:Brindisi	-0.313*		0.419**					
	(0.170)		(0.203)					
T: ASC	0.140	-0.628**	-0.636*	0.283	-0.427	-0.694**	0.443	0.307
	(0.295)	(0.303)	(0.364)	(0.368)	(0.314)	(0.323)	(0.443)	(0.467)
B: ASC	-2.699***	-3.488***	-4.452***	-4.483***	-3.923***	-4.083***	-2.147***	-2.360***
	(0.456)	(0.467)	(0.603)	(0.610)	(0.493)	(0.507)	(0.646)	(0.687)
CP: ASC	-0.470	-1.422***	-2.502***	-1.904***	-1.342***	-1.739***	-0.500	-0.523
	(0.360)	(0.374)	(0.452)	(0.462)	(0.374)	(0.391)	(0.539)	(0.571)
C: ASC	0.739**	-0.364	0.323	1.063**	0.096	-0.815**	1.732***	1.253**
	(0.360)	(0.347)	(0.418)	(0.416)	(0.367)	(0.363)	(0.507)	(0.528)
HSR: ASC	2.035***		1.051***		1.298***		1.955***	
	(0.269)		(0.321)		(0.284)		(0.397)	
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N.	2,709	2,709	1,881	1,881	2,241	2,241	1,368	1,368
McFadden R2	0.261	0.266	0.272	0.263	0.250	0.250	0.215	0.263

Note: *p<0.1; **p<0.05;***p<0.01

Mixed Logit based on 1000 Halton draws. Successful convergence for all estimation. Optimization through BFGS maximization.

Table 8: N-MXL segmented by income levels

	All						Bari					
	Income <1000		1000 - 2000		Income >2000		Income <1000		1000 - 2000		Income >2000	
	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR	With HSR	Without HSR
Random Parameter means												
Travel Time	-0.014***	-0.001	-0.025***	-0.022***	-0.042***	-0.052***	-0.011***	-0.002	-0.026***	-0.022***	-0.039***	-0.044***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.004)	(0.005)	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)
A/E Time	-0.023***	0.010***	-0.027***	-0.012***	-0.055***	-0.022***	-0.037***	0.007	-0.031***	-0.018***	-0.055***	-0.023***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.007)	(0.006)
Random Parameter s.d												
Travel Time	0.023***	-0.016***	-0.032***	0.030***	0.039***	0.043***	0.031***	0.044***	0.035***	-0.033***	0.039***	0.046***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)
A/E Time	0.041***	-0.014***	-0.052***	0.028***	0.070***	0.025***	0.056***	0.059***	0.051***	-0.035***	0.076***	0.026***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)
Fixed Parameters												
Fare	-0.063***	-0.085***	-0.045***	-0.031***	-0.025***	-0.005	-0.063***	-0.070***	-0.040***	-0.021***	-0.018***	0.002
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Reliability	0.010***	0.015***	0.012***	0.021***	0.034***	0.020***	0.011***	0.018***	0.014***	0.023***	0.050***	0.023***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)
Frequency	-0.013*	-0.023***	0.0004	-0.014	0.044**	-0.003	-0.012	-0.017*	0.004	-0.015	0.040**	-0.016
	(0.007)	(0.007)	(0.009)	(0.010)	(0.017)	(0.019)	(0.009)	(0.009)	(0.010)	(0.011)	(0.021)	(0.022)
T: ASC	0.409	-0.089	0.975***	0.794**	0.143	1.308**	0.003	0.043	1.516***	1.075**	-0.252	1.329**
	(0.287)	(0.280)	(0.336)	(0.349)	(0.515)	(0.547)	(0.391)	(0.393)	(0.400)	(0.423)	(0.621)	(0.652)
B: ASC	-1.416***	-2.597***	-1.374***	-1.566***	-5.069***	-3.596***	-2.267***	-2.461***	-0.906	-1.319**	-4.739***	-3.080***
	(0.409)	(0.396)	(0.486)	(0.505)	(0.819)	(0.854)	(0.546)	(0.564)	(0.559)	(0.598)	(0.979)	(1.008)
CP: ASC	-1.161***	-1.970***	-0.672*	-0.829*	-3.108***	-1.329*	-1.524***	-1.689***	-0.012	-0.326	-2.943***	-0.873
	(0.340)	(0.335)	(0.407)	(0.429)	(0.684)	(0.705)	(0.446)	(0.459)	(0.475)	(0.518)	(0.812)	(0.829)
C: ASC	0.137	0.581*	1.709***	0.753*	1.390**	1.581**	-0.205	0.113	2.133***	0.688	0.439	1.272*
	(0.345)	(0.335)	(0.393)	(0.394)	(0.604)	(0.628)	(0.462)	(0.461)	(0.467)	(0.472)	(0.739)	(0.766)
HSR: ASC	1.731***		2.431***		2.166***		1.092***		2.620***		1.442***	
	(0.266)		(0.304)		(0.415)		**(0.372)**		(0.364)		(0.519)	
N.	2,313	2,313	1,908	1,908	1,359	1,359	1,413	1,413	1,377	1,377	819	819
McFadden R2	0.231	0.202	0.257	0.275	0.310	0.359	0.235	0.208	0.229	0.259	0.289	0.320
Log-Likelihood	-2,771.912	-2,455.918	-2,227.236	-1,764.434	-1,147.755	-834.991	-1,721.643	-1,542.413	-1,744.489	-1,401.428	-762.347	-610.543

Note: *p<0.1; **p<0.05;***p<0.01

Mixed Logit based on 1000 Halton draws. Successful convergence for all estimation. Optimization through BFGS maximization. Socio-economic covariates not included.

Table 9: Willingness to Pay for Travel and A/E Time Savings

Model Specification	All (With HSR)	Bari (With HSR)	All (Without HSR)	Bari (Without HSR)
	Mean-WTP for Travel Time Savings			
MNL	19.09	23.33	21.43	30.00
N- MXL	29.36	33.66	19.70	31.88
N- MXL - Corr	30.00	34.29	26.34	31.88
Mean WTP for Access and Egress Time Savings (EUR/hour)				
MNL	19.09	23.33	21.43	36.00
N- MXL	43.40	54.15	6.27	31.88
N- MXL - Corr	36.25	44.29	16.10	31.88

Note: MNL refers to the Multinomial Logit model with a generic coefficient. N-MXL refers to the results from the Mixed Multinomial Logit model with normally distributed random parameters. N-MXL - Corr presents those results in presence of correlated parameters.

Table 10: Willingness to Pay for Travel, Access and Egress Time Savings by Segments

	Yearly Frequency				Income Levels						Travel Purpose			
	All		Bari			All			Bari		**All**		**Bari**	
	Occasional	Frequent	Occasional	Frequent	<1000	1000-2000	>2000	<1000	1000-2000	>2000	Business	Leisure	Business	Leisure
	Mean WTP for Travel Time Savings (EUR/hour)													
With HSR	22.22	36.73	27.39	15.00	13.33	33.33	100.80	10.48	39.00	130.00	66.00	16.00	70.34	20.00
Without HSR	16.24	22.50	17.87	9.23*	0.71*	42.58	624.00*	1.71*	62.86	1320.00*	108.75	6.96	112.50	17.33
	Mean WTP for Access and Egress Time Savings (EUR/hour)													
With HSR	28.89	63.67	50.87	1.67*	21.90	36.00	132.00	35.24	46.50	183.33	102.00	22.00	103.45	33.33
Without HSR	7.50**	21.43	22.70	23.08**	-7.06	23.23	264.00*	6.00*	51.43	690.00*	67.50	0.26**	67.50	18.67

Note: * Coefficient not significant only at 10%; ** Coefficient significant only at 5%

Appendix

Table A1: Existing Autobus connections on the route Brindisi-Bari-Rome

				Bari - Rome line			
	MR 2061R	MR 06	MR 16R	MR 827R	MR 05R	MR 05R	Baltour
Departure/Arrival	00.40 - 06.30	5.15 - 11.20	8.35 -14.15	12.55 - 18.30	17.00 - 22.30	23.59 - 6.30	16.45 -1.20
Travel time	05:50	06:15	05:40	05:35	05:30	06:30	08:35
Fares in euro	34.50						38
				Brindisi - Rome line			
	MR 165R			MR 827R	MR 05R	MR 2061R	
Departure/Arrival	10.50 - 17.30			11.00 - 18.30	15.05 - 22.30	22 .00 - 06.30	
Travel time	06:40			07:30	07:25	08:30	
Fares in euro	42.50			39.50	39.50	39.50	

Note: *The destination is the "Rome Tiburtina Bus Station". Therefore, if we assume as final destination "Rome Termini - Central Station", then there are both further egress time and costs.

Table A2: Existing Air connections on the route Brindisi-Bari-Rome

	Ryanair		Alitalia				
	(1)	(2)	(1)	(2)	(3)	(4)	(5)
			Bari - Rome				
Departure/Arrival	06.35 - 07.40	18.30 - 19.35	06.50 - 07. 50	08.00 - 09.00	12.10 - 13.15	15.30 - 16.35	19.15-20.20
Travel Time	01:05	01:05	01:00	01:00	01:05	01:05	01:05
ONE WAY: Min. Fare - Standard	12.99 euro (Standard)		78.11 euro (Economy)				
ONE WAY: Min. Fare - Business	67.44 euro (Business Plus)		373.11 euro (Flex)				
ROUND TRIP: Min . Fare - Standard	12.99 euro (Standard)		31.10 euro (Light)				
ROUND TRIP: Min. Fare - Business	67.44 euro (Business Plus)		46.10 euro (Economy)				
ROUND TRIP: Min Fare - Flex	-		373.10 euro (Flex)				
			Brindisi - Rome				
Departure/Arrival	06.25 - 07.40	22.00 - 23.15	7.05 - 8.15	11.55 - 13.00	16.30 - 17.40	19.05 - 20.15	
Travel Time	01:15	01:15	01:10	01:05	01:10	01:10	
ONE WAY: Min. Fare - Standard	12.99 euro (Standard)		59.21 euro (Economy)				
ONE WAY: Min. Fare - Business	67.44 euro (Business Plus)		377.21 euro (Flex)				
ROUND TRIP: Min . Fare - Standard	12.99 euro (Standard)		31.21 euro (Light)				
ROUND TRIP: Min. Fare - Business	67.44 euro (Business Plus)		47.21 euro (Economy)				
ROUND TRIP: Min Fare - Flex			377.21(Flex)				

Note: Fares checked on October, the 27th (2015) for November the 25th on both Ryanair.com and for November the 23th on Alitalia.it with the purpose to look at the lowest possible price charged by both companies.

Table A3: Existing Rail services on the route Brindisi-Bari-Rome

		FA 9350			FA 9354			Intercity 704			FA 9358	
							Bari - Rome line					
Departure/Arrival		7.15 -11.20			13.17 - 17.20			16.05 - 22.20			18.17 - 22.20	
Travel Time		04:05			04:03			06:15			04:03	
Fares in euro - First Class (Base; Economy; SuperEconomy)	77.00 euro	69.00 euro	49.00 euro	77.00 euro	69.00 euro	49.00 euro		n.a.		77.00 euro	54.00 euro	39.00 euro
Fares in euro - Second Class (Base, Economy, SuperEconomy)	54.00 euro	39.00 euro	24.00 euro	54.00 euro	39.00 euro	24.00 euro	49.00 euro	19.00 euro	9.00 euro	54.00 euro	39.00 euro	24.00 euro
							Brindisi - Rome line					
Departure/Arrival		6.11 - 11.20			12.17 - 17.20			n.a.			17.14 - 22.20	
Travel Time		05:09			05:03			n.a.			05:06	
Fares in euro - First Class (Base; Economy; SuperEconomy)	96.00 euro	79.00 euro	59.00 euro	96.00 euro	79.00 euro	59.00 euro		n.a.		96.00 euro	66.00 euro	49.00 euro
Fares in euro - Second Class (Base, Economy, SuperEconomy)	66.00 euro	49.00 euro	39.00 euro	66.00 euro	49.00 euro	39.00 euro				66.00 euro	49.00 euro	39.00 euro
Average delay (uniquevisitor.it*)		8 mins			12 mins			n.a.			10 mins	
% Delay (uniquevisitor.it*)		57%			56%			n.a.			67%	
Punctuality Index (uniquevisitor*)		41%			39%			n.a.			29%	

Note: *Analysis on 300 rail services from 1st January 2014 to 30th November 2014.

** Fares checked on October the 27th for November the 25th. Only direct connections are reported.

Table A4: Alternatives, Attributes and Levels on the “Bari - Rome” line

Attribute	Levels	Flight	Bus	HSR	Existing Rail	Car	Car Pooling
Total Travel time	1	1 h 45 min	5 h 15 min	3 h	3 h 45 min	4 h 15 min	4 h 15 min
	2	2 h 15 min	5 h 45 min	3 h 15 min	4 h		4 h 45 min
	3	2 h 45 min	6 h 15 min	3 h 30 min	4 h 15 min		5 h 15 min
Access and Exit time from/to the airport	1	45 min					
	2	1 h 15 min					
	3	1 h 45 min					
Reliability	1	65	65	65	65	99	70
(Probability to respect the schedule time)	2	80	80	80	80		80
	3	95	95	95	95		90
Price (Standard / Business) - in euro	1	25 - 79	30	70 - 100	24 - 49		25
	2	58 - 118	34	95 - 125	39 - 69	75	30
	3	83 - 146	38	120 - 150	54 - 77		35
Frequency (Number of links per day)	1	7	5	4	4		7
	2	10	8	6	6		15
	3	15	12	10	9		30

Table A5: Alternatives, Attributes and Levels on the “Brindisi - Rome” line

Attribute	Levels	Flight	Bus	HSR	Existing Rail	Car	Car Pooling
Total Travel time	1	2 h	6 h 30	3 h 30 min	4 h 45 min	5 h 20 min	5 h 20 min
	2	2 h 30 min	7 h	3 h 45 min	5 h		5 h 50 min
	3	3 h	7 h 30 min	4 h	5 h 15 min		6 h 20 min
Access and Exit time from/to the airport	1	45 min					
	2	1 h 15 min					
	3	1 h 45 min					
Reliability	1	65	65	65	65	99	70
	2	80	80	80	80		80
	3	95	95	95	95		90
Price (Standard / Business) - in euro	1	25 - 79	38	80 - 110	39 - 59		25
	2	58 - 118	42	115 - 145	49 - 79	90	30
	3	83 - 146	46	140 - 160	66 - 96		35
Frequency (Number of links per day)	1	6	4	3	3		7
	2	9	7	5	5		15
	3	14	11	9	7		30

Table A6: Example of choice-set

Example of Choice Set for the "Bari-Rome" route for the Multiple Choice Design

Block 1 - Choice Set n. 4

Attributes	Flight	Train	HSR	Bus	Car Pooling	Car
Total Travel Time	2 h 15 min	3 h 45 min	3 h	5 h 45 min	4 h 15 min	4 h 15 min
Total Time to Get from and To the Airport	1 h 45 min					
Reliability (Probability to respect the schedule time)	95%	65%	80%	80%	90%	99%
Fares (Standard / Business)	83 - 146	39 - 69	70 - 100	30	30	75
Frequency (N. daily connections)	10	6	9	8	30	Infinite
Which alternative would you choose in absence of HSR? (For Flight and Train, you must choose whether Standard/II Class or Business/I Class)						
Travel Choice	[] Standard [] Business	[] Standard [] Business		[]	[]	[]
Which alternative would you choose in presence of HSR? (For Flight, Train and HRS, you must choose whether Standard/II Class or Business/I Class)						
Travel Choice	[] Standard [] Business	[] Standard [] Business	[] Standard [] Business	[]	[]	[]
Select such factors (if any) which have not affected your final travel choice:						
[] Travel time [] Access/Exit from/to Airport [] Reliability [] Fares [] Frequency						