

An investigation of direct and indirect demand for transport and logistic services in transition countries: methodological and empirical issues. The case of Albania

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ABSTRACT

This paper investigates the factors influencing firms' choice with relation to both alternative transport services and outsourcing logistic service to third parties and the value of freight transport service attributes for operators localised in a transition country. We use two original datasets. One collected from a sample of Albanian manufacturing companies, the second created by collecting data through an adaptive stated preference experiment from a sample of specialised logistics operator localised in Albania. Both represent unique database for a geographical context which is jet largely unknown. Models set up are based on Random Utility Theory. The data on manufacturing companies is analysed using a simple Logit framework to obtain insights in firms' behaviour in relation to the organisation of transport services and their preferences towards third party logistics. The second set of data is analysed using a Mixed Logit model to capture heterogeneity of tastes among operators. We estimate individual preferences and trade-off values for the key choice variables: cost, time, frequency and reliability. The empirical results suggest that for Albanian operators frequency and savings in voyage time are the most relevant factors in choosing among alternative services. The valuation of the attributes, however, varies significantly among operators, supporting the use of Mixed Logit approach. We find also that operators have no a priory reluctance towards new services which imply a modal shift.

1. INTRODUCTION

The transition from a state planned closed economy to an open democratic economy has had strong implications for the transport sector of Albania. Previously, the transport network reflected the view and the approach of the political context: closure toward the foreign economies both in economic, social and physical terms. The role of transport was that of servicing national production plants. Private commodity and passenger mobility within the country and to/from most of the neighbouring areas was strongly discouraged if not prohibited. Special permits, limitation on car-ownership, absence of private transport operators, public ownership and management of both services and infrastructures were the key ingredients of the transport system of pre-reform Albania.

National policies and aid from European and other countries and institutions have contributed to change significantly the country's approach placing transport network at the core of development policies. In the last fifteen years, in fact, Albania has been spending a significant share of public resources on development and renovation of the transport sector (almost 40% of total public expenditure; World Bank, 2006a, b). However, the results are not in line with the expectations. In particular, for the rural areas of the country, poor road access is one of the main factors hampering the distribution of products to the wider and richer urban and international markets, contributes to migration and inhibits the delivery of social services.

The lack of an efficient transport network for a small open economy at the margin of the main European markets is critical. The more so, when considering the negative spill-over effects due to the current developments of international transport networks bypassing Albania in neighbouring countries (i.e. the Egnatia Motorway) and the slowness in the realisation of Corridor VIII which should instead project Albania towards the European and the Black Sea market (Bergantino et al. 2009).

Unaffordable and inefficient transport systems and services hamper the productivity of the industrial and manufacturing sector limiting the mobility of labour, inputs, capitals and outputs. The absence of any logistic-oriented approach to freight transport or infrastructures complicates

commodity groupage and hinders rationalisation of costs, travel time and frequencies. In general, the role of logistics in promoting economic growth in transition countries is widely recognised (Juhel, 1999). From the new Logistics Performance Index calculated by the World Bank in 2007 it appears that growth rates are higher in those countries where there is a better logistics environment¹. Albania classifies at the 139th place in the ranking, last among Balkan countries and well below the preceding Balkan country. Serbia and Montenegro are, in fact, at the 115th place².

Reduction in time of travel, capacity to integrate services over different modes, groupage opportunities, frequency of service, reliability of connections together with the realisation of new infrastructures can generate important value added to operators wishing to access new markets or to consolidate their economic hinterland. Generally, however, these opportunities can be grasped only by specialised companies, supplying their services to a number of economic operators, specialising in the realisation of goods and manufactures. Additionally, investments in this sector are often very large, and need public intervention. Although, in general, improvements in transport related infrastructures have positive effects, in presence of scarce resources, however, it is important to prioritise and to correctly evaluate alternatives.

In order to do so it would be necessary to possess estimated coefficients for the values assigned to infrastructures and services attributes improvements to insert in the evaluation procedures (cost-benefit analysis; multicriteria analysis; infrastructure impact analysis, etc.). Although some estimations from other European contexts are available, very few studies have been carried out to define the value of the main attributes of transport to operators, their propensity to use intermodal transport and service alternatives in transition countries. None of these, to our knowledge, have considered Albania and other Balkan countries. Insights in these figures, however, would be of great use for both policy makers and public investors and for private finance and companies involved in the logistic and transport sector for investment and marketing decision-making support.

The objective of this paper, which is part of a wider research project on the analysis of the logistic network in the transition countries located in the Balkan area, is twofold. On the one hand, analyse the behaviour of consumers of freight transport services in relation to the choice of transport services and to the organisation of the transport and logistic function of the company. On the other hand, carry out an in depth analysis of the relative value of the main attributes of transport services and the propensity to use intermodal transport.

The users of transport services can be production companies or service companies. In the first case, they are the direct, final, users of the service which choose to carry out in-house the organisation of the transport and logistic function. In the latter case, they are intermediaries, freight-forwarders or third party logistic operators, which can be assimilated to indirect, specialised, demand. Freight forwarding agencies and third party logistic operators represent, in fact, privileged observers of the transport market. Following the specialised literature of the topic and given the peculiarities of the geographical area we are studying, we have carried out the analysis on a sample of both direct and indirect demand.

The results of our study are based on two original databases. The first, collected via a traditional questionnaire administered to a sample of 400 manufacturing companies located in Albania, which

¹ The Logistics Performance Index calculated by the World Bank is based on a worldwide survey. Global freight forwarders and express carriers of over 100 countries have provided feedback on the logistics "friendliness" of the countries in which they operate and those with which they trade. They combine in-depth knowledge of their country's operating environment with informed perceptions of other countries with which they trade, and experience of global logistics environment. Feedback from operators is supplemented with objective data on the performance of key components of the logistics chain in the home country. Albania, among its fellow Balkan countries, receives a quite low evaluation for most indicators.

² The other Balkan countries rank as follows: Hungary (35th); Slovenia (37th); Romania (51st); Bulgaria (55th); Croatia (63rd); Bosnia-Herzegovina (88th); Macedonia, FYR (90th). Italy and Greece, rank, 22nd and 29th, respectively.

reveals demand related preferences with respect to transport and logistics systems attributes, given respondents' characteristics.

In particular, a simple logit model has been estimated to determine the propensity to use logistic services and understand the potential for logistic service development, given differing evaluation of service attributes.

The second database has been created by collecting experimental data from a sample of Albanian logistic operators through both revealed preferences survey and interactive stated preference experiments. The latter database is used to derive, in terms of trade-offs, the relative values of transport service attributes for these operators and to determine a ranking of their preferences for service quality improvements. The estimation has been carried out using a mixed logit on the *pooled* database obtained for the logistic companies³, in order to take account of potential respondents tastes' heterogeneity. Though the estimation we find the service attributes which most influence freight-operators attitudes towards specific transport and logistic services and their characteristics, confirming the relative high importance of frequency of service. Reliability as compared to time savings, instead, has a significantly lower evaluation, as it is, in general expected, for less developed areas (Bergantino, 2007). The distribution of the evaluations however, seem to vary significantly across the companies involved in the study, supporting the choice of the mixed logit specification for picking up the heterogeneity among operators.

The paper is structured as follows. Section 2 reports the analysis of the sample of firms interviewed to understand the structure of consumers preferences with respect to transport service attributes in a transition country and to identify factors influencing the decision to outsource the logistic functions to third party operators. Section 3 describes the stated preference experiment we carried out to obtain data by logistic operators and summarises the main characteristics of the sample. Section 4 contains a detailed description of the estimation procedures. The results are presented and discussed in Section 5. Section 6 briefly summarises the main conclusions.

2. Analysis of direct demand

The first part of this study aims at identifying and ranking the transport service attributes which are considered more relevant by manufacturing companies localised in Albania and the factors influencing their decision to outsource the logistic services. The objective of this part of the study is to pin point critical aspects of the transport services and to verify whether it is possible to find some common patterns in transport users' preferences for specific service characteristics. Secondly, to verify whether outsourcing of transport and logistic services is considered a viable option for Albanian firms and which companies are more likely to rely on it.

2.1 The sample of manufacturing companies

In this part of the study we use the data collected through an original questionnaire⁴ administered by Albanian speaking interviewers to owners or managers of a sample of four-hundred manufacturing companies - including extracting and construction - operating in Albania, randomly sorted from the public register of companies⁵. The questionnaire includes five sections: the first reports firm specific information, the others tackle specific issues. Questions relating to transport and logistic issues are contained in the last section. Thus, only the first and the fifth sections of the questionnaire are relevant for this study.

The first part of the questionnaire contains company's details and information on type of activity, location, employees and juridical form. It also contains information on import and export activities,

³ For a different approach, using firm by firm data, see: Bergantino and Bolis (2008).

⁴ The questionnaire included five sections: only the first and the last are relevant for this study.

⁵ Greater details of the questionnaire and of the data-collection process are contained in D'Elia (2008).

on the countries involved and on whether the company is part of a delocalised production process. The great majority of the companies are localised in Tirana (52,5%) and in Durazzo (18%). The higher concentration of firm can be found in the class with between 26 and 50 employees (23,9%) which accounts also for 25,5% of the total employment. In general, as expected, the larger companies account for more than 66% of total employment (firms with more than 26 employees). Quite relevant is also the percentage of firms in the 16-20 employees class (16,6%). The majority of respondents are joint stock companies (75,3%) although a relevant number are self-employed companies (almost 20%). Almost 50% of the companies operate in three sectors: food products, beverages and tobacco (18,1%), manufacturing (17,1%) and construction (12,6%). About 38% of companies are involved in exporting activities.

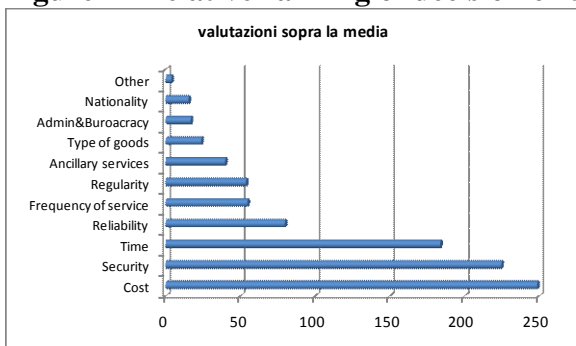
Using the data collected through the fifth section of the questionnaire we identify, for each respondent, the amount of freight transported, the average distance covered by the representative shipment, the mode of transport generally used, how the transport service is organised (externalised or planned internally), the relative ranking of transport service characteristics and their impact of the companies' choice of transport mode.

Most frequently the road is the only mode of transport used, especially for short-medium haul. However, many operators use road transport also for international traffic (34%). On average the distance travelled is relatively short (less than 500 km), however, the spread is high with some companies specialising in domestic trade and others in international markets (40%). Just above one fourth of the companies outsources services. Considering that more than two thirds of the respondents are joint stock companies and that about 40% of them have more than 25 employees this percentage can be considered extremely small and indicative of a limited development of the market for third party logistics.

2.3 Data analysis

The ranking of the criteria used in deciding how to organise the transfer of their products to the final destination shows that cost, security and time related aspects are considered to be, by far, the most relevant. In particular, from figure 1, it is possible to verify that almost 65% of the respondent place *cost related issues* among the top factors in influencing their choice while *security* and *time* are chosen among the top factors by about 58% and 47% of the sampled population, respectively. *Reliability* is considered important by more than 20% of the population and *frequency* and *regularity* are both considered above average in the ranking of about 15% of the respondents.

Figure 1 – relative ranking of decision criteria



Analysing the replies separately for companies that organise their own transport services and those that externalise this function we find that the ranking for *cost*, *reliability* and *time* related issues is quite uniform – with firms carrying out their own organization showing, in general, higher values. The ranking for *frequency* and *security* are, instead, significantly different. There is, for both these

variables, almost 10 percentage points difference among the two rankings. The detailed percentages are reported in table 1.

Table 1 - relative ranking of decision criteria segmented for type of company

	cost	security	time	reliability	frequency
OWN (247)	91,50%	92,31%	85,83%	63,56%	15,79%
EXTERNALISED (136)	89,71%	82,35%	80,15%	66,18%	8,82%

It is obvious, thus, that cost, time and reliability play a relevant role in the transport choice independently of the decision to organise internally or externally the shipment of freight. In particular, those choosing to externalise the service are less concerned with costs and length of journey with respect to those maintaining transport and logistics as an internal function. The latter are more concerned also with security and frequency of service. In particular, those choosing to organising internally freight shipments, consider security as the most important decision criteria in determining the transport mode, followed by costs' related considerations, length of travel, reliability and frequency of service. The latter is considered relevant only by about 16% of the sampled companies. This factor is considered even less important by the operators externalising the services; less than 10% of them consider it above average. Those externalising the service place more importance on cost, security and duration of the trip.

These outcomes have lead us to analyse in greater detail the decision to externalise and to obtain a profile of the companies carrying out their own transport organisation and of those, choosing to delegate the functions to third parties. We determine the main factors that lead to transport related functions outsourcing. With this aim, the estimation of a simple logit model has been carried out using, as the dependent binary variable, the circumstance of being a company which has outsourced the organisation of the transport service or one which organises it in-house.

2.4 The model

Survey responses are interpreted as utility differences between choice situations. Recalling Random Utility Hypothesis, every time a respondent ($n = 1, \dots, N$) participates to a choice exercise amongst a set of j ($j = 1, \dots, J$) alternatives in each of the t ($t = 1, \dots, T$) choice situations, he/she is assumed to select the alternative that leads to a higher level of utility, having considered the full set of alternatives presented⁶. The relative utility of the respondent n , from alternative j , in choice situation t can be represented in a discrete choice model by the following general form utility expression:

$$U_{njt} = \beta_n' X_{njt} + \varepsilon_{njt} \quad [1]$$

where:

- X_{njt} is the vector of independent, non stochastic, observed variables. It includes, besides the attributes of the alternatives, socio-economic characteristics of the respondent and descriptors of the decision context and choice task itself in choice situation t ⁷;
- β_n is the coefficient vector, unobserved for each individual⁸ and,
- ε_{njt} is the error term, which, together with β_n , is considered stochastic.

⁶J and T can vary over respondent: in our specific case the alternatives were two presented as binary choices against the current service and the choice situations can be, at the most, 40 per respondent.

⁷ The reader is referred to Hensher and Green (2003, p. 135) for a comprehensive list of the variables that can be included.

⁸ As the subscript n indicates, the coefficient can be allowed to vary across individuals.

In this case, the respondent n is assumed to choose alternative j , if and only if, $U_{nj} > U_{ni}$, for all j different from i ⁹. Considering only two alternatives - outsource (A) or not to outsource (B) the service - and assuming that the unobserved errors are independent and identically Gumbel distributed, we can formulate the decision taken by the company as a binary logit model. We, thus, observe probabilities and hence we can estimate a logit regression model through standard econometric packages.

In particular, the model has been estimated taking into account firm specific characteristics: location, export activity and size¹⁰. The valuation of service attributes has been included in order to verify the impact of each attribute on the final decision. Finally, a mode specific dummy has been considered. The output of the estimation is reported below in table 2.

Table 2: estimated coefficients

variables	coefficient
const	0,533356 (0,637637)
D_location	1,27492 (0,349391) ***
D_export	0,911865 (0,311996) ***
D_employ	-0,89978 (0,309976) ***
D_250	-1,18989 (0,395062) ***
D_cost1	0,498425 (0,3714)
D_time1	-0,315083 (0,477915)
D_reliab1	1,49304 (0,594424) **
D_frequ	-0,992033 (0,525691) *
D_secty	-0,814078 (0,471414) *
Road	-0,029052 (0,0048122) ***
Log-Likelihood	-130,26
McFadden R ²	0,385414
McFadden R ² adj.	0,338232
LR test $\chi^2 =$	163,375 [0,0000]
n. of obs.	367
*=10%; **=5%; ***=1%; standard errors in parenthesis	

The results of this simple model show that it is possible to establish a typology of companies which are more likely to outsource the services: these operate in the international markets, have relatively large dimensions in terms of employees (above average) and are located in the capital, Tirana. In general, they do not use road transport for the greater part of the journey of their products and ship their products over distances greater than 250 km. When controlling for these factors, it is possible to show that being concerned with reliability, frequency of service and security issues influences the probability of outsourcing. The coefficient of the dummy related to reliability is positive and significant at the 5% level, implying that the impact is positive, while, the coefficient of frequency and security, significant at the 10% level, imply a negative effect on the probability of outsourcing

⁹ The respondent is thus assumed to know the values of his own β_n and ε_{njt} for all j .

¹⁰ In previous estimations, other firm specific variables were included (branch of activity, juridical form, subcontracting activities, economic situation of the company, etc.), but their impact did not appear significant and they were, thus, removed.

logistic services to third parties. The relative rankings assigned to cost and trip duration do not influence the propensity to outsource, being their coefficient not significantly different from zero.

From a policy perspective, our results suggest that investments in frequency and security enhancing services and infrastructures could lead to a greater degree to outsourcing, still relatively limited in Albania than with respect to more advanced countries. Also, it is possible to state that, increases in the degree of openness of the economy and in the scale of production should favour a greater specialisation of activity and, consequently, a larger market for third party logistic operators.

In order to gain a more in-depth analysis of the values of the attributes of transport for Albanian operators, and, thus, being able to quantify the value of each attribute we move to the analysis of a second database, constructed through direct interviews with transport and logistic services' companies.

3. Analysis of indirect demand

3.1 Description of the sample

The second part of the study has the objective of analysing logistics operators' preferences for transport service attributes. This analysis is complementary with respect to the previous in that it yields estimates of relative monetary values for each of the factors influencing transport choices, independently from the currently available alternatives, focussing on transport service intermediaries. This choice has allowed us to gain insight on a part of the market for transport service, which accounts, on average, for more than half of the transport decisions (Unescap, 2000; Ojala and Queiroz, 2001)¹¹. Focussing on freight-forwarding agents and third party logistic operators has three main advantages. On the one hand, it allows us gain insights from a wider spectrum of consumers as their clients are differentiated. On the other hand, it allows overcoming the issue of obtaining a representative population across the different productive sectors at an acceptable cost. Finally, it allows to compare outcomes with other studies carried out in EU countries.

The present analysis has been carried out, consequently, on a sample of 19 freight-forwarders¹² and logistic operators located in Albania¹³. We have restricted the interviewed sample to those operators who have a certain familiarity with both local and international markets. They cover over 60% of the Albanian freight-forwarding companies. We have adopted an iterative procedure to obtain, besides revealed preference information, also stated preference data.

3.2 Data collection mechanism: adaptive stated preference choice experiment

The second part of our empirical application uses data from a stated preference experiment. The stated preference method allows to control the explanatory variables (Kroes and Sheldon, 1998) and discloses the respondents' preferences for a range of plausible values for a selected set of choice attributes. Through this methodology it is possible to measure the trade-offs individuals make in choosing between products and service providers. It was first developed in the marketing sector and

¹¹ For greater insight on the choice of respondents the reader is referred to Bergantino and Bolis (2004, 2008).

¹² A freight forwarder is a company that dispatches shipments via carriers and books or otherwise arranges space for shipments. Carriers could include vessels, airplanes, trucks or railroads. Freight forwarders arrange cargo to both national and international destinations. Generally they operate on international markets and thus they are referred to as international freight forwarders, and have the expertise that allows them to prepare and process the documentation and perform activities that are needed for international shipments. Some of the information reviewed by a freight forwarder is the commercial invoice, shipper's export declaration, and other documents required by the carrier or country of export, import, or transshipment. Common services of freight forwarders are: air freight and sea freight, shipping, logistics management, trucking, rail freight and specialized transportation.

¹³ The interviews are currently being carried out in order to enlarge the representativeness of the sample. As the additional data will be available it will be added to the sample.

has been largely used to predict consumers' choices for products and services which were not jet in commerce, and now it is a well-established procedure in transport studies¹⁴

In particular, in order to avoid presenting options which are irrelevant for the respondent, we discard traditional stated preference techniques in favour of the adaptive stated preference (ASP). This interactive data collection technique amends attribute levels during the experiment on the basis of the choices the respondent makes. One significant advantage of this method is that it makes it possible to cope with a wide range of "situations" which are comparable with the real world known by the respondent, through its capacity to adapt to "personal" contexts (type of commodity, time variance of attribute valuation, etc.).

The hypothetical services are constructed through a particular form of "pivoting", defined by Train and Wilson (2008), stated preference – off – revealed preference approach¹⁵. The attributes in the stated preference experiment are, in fact, created changing the attributes of the chosen revealed preference alternative. Furthermore, the alternatives are varied (improved or made worse off), depending on the respondents' choice at each iteration. The advantage of pivoting is that it creates more realism in the stated preference experiment by assuring that the alternatives are similar to the respondent experience in a revealed preference setting. It also provides a greater specificity of the context of the stated preference task, since the respondent can think of the stated preference alternatives. On the other hand, as we shall see, it creates some problems in the utilisation of the data collected.

The "ASP experiment" was carried out with the support of a portable computer and of the Leeds adaptive stated preference software which presented a consistent, on-screen, series of scenarios adapting to the respondents' choices. Starting from the "typical" transport operation performed by the company (acquired through the revealed preference survey), the respondent is invited to select, at each iteration, the preferred choice among two new alternatives and to assign to it a rating from 1 to 200, given that the current status is given 100 in default¹⁶.

On the basis of the outcome of the previous part of the study and of the relevant literature four attributes are identified as most significant in defining the transport service:

- price (P), i.e. out-of-pocket cost of transport, including loading and unloading;
- time (T), i.e. door-to-door transit time, including loading and unloading;
- reliability (R), i.e. as % of deliveries as scheduled;
- frequency (F), i.e. as % of service per week offered by the carrier

In every repetition of the experiment, the hypothetical alternatives presented to the respondent change: new computer generated alternatives are presented and the respondent is asked to rank the two alternatives against the current option on the basis of the value he/she assigns to the "new" service.

The iterations continue until, for each variable in turn – starting with price –, indifference is reached. In other words, once variations in prices as a function of the rating given by the

¹⁴ For detailed reviews of applications to the transport sector see: Hensher et al. (2005) and Train and Wilson (2004 and 2008).

¹⁵ A growing body of literature has been emphasising the advantages of combining revealed preference and stated preference data in order to exploit the strengths of both. Among others, see: Ben Akiva and Morikawa (1990), Swait et al (1994), Adamowicz et al. (1997), Bradley and Daly (1997), Stopher (1998), Wardman (1998), Brownston et al. (1999), Louviere et al. (2000), Train and Wilson (2006).

¹⁶ For a detailed presentation of the characteristic of the ASP experiment, the reader is referred to Bergantino and Bolis (2008).

respondent in the previous iteration do not lead to a variation in the rating, the new screen presents options in which the remaining attributes change values following the same procedures. The process continues until convergence is found for all attributes or at the 20th iteration.

A point that deserves some attention before describing the results of the modelling exercise is the repeated choice nature of the data and the consequent serial correlation problem associated to it. With the ASP experiment, in fact, each respondent is asked to repeat the choice exercise a number of times (maximum 40 times in our experiment). Not accounting for the possible correlation between the behaviour of a given respondent across the different choice situations can, potentially, bias significantly the outcomes. In particular, it could lead to over or under estimated standard errors (Ortuzar and Willumsen, 2001) and, thus, to misleading interpretation of the results.

3.3 Preliminary data analysis

The shipment generally carried out by the “average” company participating in the survey lasts four days, it is relatively frequent (every 3 days), it is delivered at the expected time 89% of the times and costs about 9 euro per kilometre. Table 3 reports the main characteristics of the database.

	Average	Min	Max
distance (km)	980	276	1.800
Cost value	8.780	1.850	54.000
trip length (h)	87.000	16.500	168.000
frequency (monthly)	91	12	144
Reliability	10	1	60
% of international business	89%	78%	97%
Multimodal	87%	25%	100%
	90%	30%	100%

As it can be seen the companies which have taken part to the experiment are, generally, involved mainly in international business and tend to organise, on average, multimodal transports.

4. MODEL STRUCTURE AND ECONOMETRIC ISSUES

From section 2.4, assuming that the respondents tastes, β_n , vary among different respondents, and that error term ε_{njt} is distributed iid extreme value type I (Gumbel distribution), we have two alternatives in modelling. The first possibility is to use a standard logit for the estimation of the parameters for each firm individually¹⁷. With this approach we estimate, for each operator, the preferences and the relative values of the trade-offs between the different attributes. The resulting values can then be averaged in order to find the samples' values. This solution, although widely used by experimental economists¹⁸, has the main disadvantage, among the others, of limiting significantly the size of the sample.

The second alternative is to estimate the model over the entire database in order to estimate tastes across respondents and alternatives. This option requires, however, appropriate econometric

¹⁷ This option takes account only of the correlation among the responses by the same subject and does not allow to deal with possible correlation between the behaviour of a give respondent across the individual choice situations. As Hess and Rose (2007) point out, the assumption of the absence of inter-observational variation might yield to confusion between serial correlation and random taste heterogeneity.

¹⁸ Generally, experimental economists tend to prefer this approach. Such a choice is dictated, among other reasons, also by the consideration that there might not ne one best preference functional for all subjects but that, instead, the behaviour of different subjects may be explained best by different functionals (see for all Hey and Orme, 1994). Until recently most studies focussing on evaluating transport attributes used this approach (Fowkes, and Tweedle, 1997 and 1998, Bolis and Maggi, 1999, Bergantino and Bolis (2004, 2005, 2008); Bergantino et al. (2006), Bergantino, 2007). For the outcome of this estimation approach on the Albanian database see: Bergantino (2008).

modelling. One approach commonly used to estimate utility function *pooling* all the collected information is the random parameter logit (RPL) or mixed logit model (MLM)¹⁹. This model allows for random taste variation, unrestricted substitution patterns and correlation in unobserved factors over time/choice situation. The latter is particularly useful when using, like we are doing, stated preferences. Given the presence of repeated observations on each respondent, in fact, we cannot reject, *a priori*, the absence of correlation among responses elicited by the same individual and dictated by subject/company specific characteristics²⁰. A random parameter model is, thus, necessary to account for the potential correlation introduced via the data collection methodology²¹. It is a very flexible model that can approximate any random utility model with complete precision (McFadden and Train, 2000).

In specifying the utility of alternative j , considering equation [1], the basic assumption is that the coefficient vector β_n varies in the population with density $f(\beta_n | \theta^*)$, where θ^* are the true parameters of this distribution (eg. the mean and the covariance). Several distributions can be assumed (normal, lognormal, triangular, uniform, ecc.). The error term of [1] - ε_{njt} - is assumed to be distributed iid extreme value type I (Gumbel distribution), independent of β_n and X_{njt} . It represents unobserved effects.

Conditional on β_n , the probability that a respondent chooses alternative i in the choice situation t is a standard logit:

$$L_{nit}(\beta_n) = \frac{e^{(\beta_n' X_{ni})}}{\sum_{j=1}^J e^{(\beta_n' X_{njt})}}$$

Since β_n is unknown, the unconditional choice probability is the integral of the conditional probability, ($L_{nit}(\beta_n)$), over all possible values of β_n , which depends on the parameters of the distribution of β_n :

$$P_{nit} = \int L_{nit}(\beta_n) f(\beta_n | \theta^*) d\beta_n \quad [2]$$

which is referred to as the Mixed Logit model or Random Parameter Logit. This is the integral of standard logit probabilities over a density of parameters, or, in other words, a weighted average of the logit formula evaluated at different values of beta. The weights are given by the density function $f(\beta_n | \theta^*)$. As probabilities in [2] do not have a close form, they must be approximated by simulation in order to obtain the simulated log-likelihood (SLL), and hence the maximum simulated likelihood estimator of the parameters θ that characterise the distribution of β_n . A detailed explanation of the simulation process required to estimate the model is contained in Train (2003, ch. 6).

5. Empirical results

We let random all the coefficients of the attributes except for cost and run the estimation using a 100 point simulation of Halton draws. In the model we insert also interaction terms, however, in their current formulation they do not appear significant. Table 4 below reports the outcome of the estimation for the simple mixed logit model. Only significant parameters are reported.

¹⁹ The random parameters model offers many modelling advantages over the standard probabilistic models, among others: i) it can be fitted using panel data and can, therefore, control for unobserved heterogeneity; ii) it allows estimated coefficients to vary across individuals, as outcomes from random draws. This means that the slope coefficient of a particular explanatory variable is not restricted to being identical across observations; iii) it does not require the 'independence of irrelevant alternatives' (IIA) assumption to hold.

²⁰ As the reader recalls we have assembled the dataset from adaptive stated preference experiments with J alternatives presented T times to N individuals and each choice exercise, t , faced by each respondent, n , represents one observation.

²¹ Excellent references for this class of models are, among others, Revelt and Train (1997), Hensher and Green (2003) and Train (2003).

Table 4 – estimation results

variable	coefficient (mean)	s.e.	stand.dev.	s.e.
cost	-0,0899	-6	-	-
time	-1,5797	-9,9	0,1249	6,33
frequency	1,6781	9,31	0,6898	2,67
reliability	0,0581	4,19	0,8181	3,89
new mode	1,959	-2,9	0,0895	3,45
LL	-1663,67			
ρ^2	0,1978			
n. obs.	760			

The value of the Pseudo-R square, which is a measurement of the goodness of fit of the model, is 20%, which, although not very high, according to Louviere et al. (2000) it can be considered indicative of good model fit. The mean and the standard deviation of all attributes are significant: this implies that there are unobserved preference heterogeneities in all the attributes that were allowed to vary and that these coefficients do indeed differ in the population²².

The coefficient of the attributes show the expected sign: they are negative for cost and time and positive for frequency and reliability. Using the estimated values of mean and standard deviation of the random coefficients we can infer that for all the respondents (100%) an increase in journey time is valued negatively while, on the contrary, an increase in the frequency of service is considered a positive factor. Table 5 reports the calculated distribution of preferences.

Table 5 - distribution of preferences

Variable	sign	distribution
Time	-	100%
Frequency	+	100%
Reliability	+	82%

With regards to reliability, we obtain that about 18% of the distribution is below zero. This implies that for about a fifth of the population, an increase in reliability seems to have a negative impact on the evaluation of the service. This can be interpreted, comparatively, with the other results, as a sign that, in relation to time and frequency, reliability is considered as being less relevant. This interpretation is supported also from the results in terms of trade-off.

From the mean of the estimated coefficients, we can calculate the willingness to pay for attribute variation. Table 6 contains the trade-off values.

Table 6 – trade-off values in euro/ton

Trade-offs	
VOT (h)	17,57
VOF (units)	18,67

²² For the parameters that are allowed to vary, they provide information on the share of the population that places a positive or negative value on the attributes of the transport service.

VOR (%)	0,64
NewServ	21,7

In particular, the respondents are willing to pay 17,6 euro per ton for an hour reduction in journey time; 18,7 euro per ton for a one step increase in the frequency of the service and about 0,64 euro per ton for an increase of 1% of reliability.

Reliability seems to have a very low value with respect to the other parameters, however, the result is not surprising. In fact, other studies focussing on areas with differing degrees of economic development underline a substantial difference in the valuation of operators among developed regions and less developed ones.

The calculated trade off values are of the current study are significantly different from previous studies conducted on EU countries' data (Bergantino and Bolis, 2008; Bergantino et al. 2006; Bergantino and Bolis, 2004; Bolis and Maggi, 2002 and 2003; Danielis and Rotaris, 2002; Maier and Bergman, 2002). In general, in fact, the dimension of the trade off is significantly smaller and, in most studies, reliability of service is valued more than time savings. Table 7 reports the results of some of these researches.

Table 7 – comparison of results

Studies	Maier and Bergman (2002)	Danielis and Rotaris (2002)	Bolis and Maggi (1999)	Bergantino and Bolis (2004)	Bergantino and Bolis (2008)	Bergantino (2007)	Bergantino (2007)	
<i>Countries</i>	<i>Albania</i>	<i>Austria</i>	<i>Italy North-East</i>	<i>Switzerland</i>	<i>Italy Center-North</i>	<i>Italy North</i>	<i>Italy North-West</i>	<i>Italy South-east</i>
VOT (h)	17,57	9,7	7,3	11,8	2,68	3,79	1,35	3,79
VOR (%)	0,64	46,5	10,7	14,9	8,82	4,6	3,75	4,63
VOF (units)	18,67	16,1	na	11,3	8,49	33,4	7,72	33,38

The differences in the values of the attributes, however, are not unexpected. In fact, they can be interpreted in the light of the different *status quo* conditions with respect to respondents operating with a more developed transport and logistic system. Similar results are reported, in fact, in a work comparing the values of service attributes for operators located in Southern Italy with those located in the North (Bergantino, 2007).

In the Southern areas, where infrastructure endowment and service supply are significantly lower than in more developed provinces of the North, improvements in the speed of consignment and in the frequency of service, can be assimilated to the deployment of additional services. Moreover, in these areas, the development of intermodal transport services and integrated networks is limited and therefore, reliability, which is an essential feature when these systems have to work, plays a much less relevant role²³. Overall, thus, the output is coherent with expectations: transition countries, with a low infrastructural and organisational endowment, at the borders of the European common market, tend to place more value on attributes which enlarge the accessibility of those markets (frequency of service and time of travel) rather than to those improving the quality of services, such as reliability. The latter is a *plus* which the current conditions of the transport system do not allow to place among the priorities.

Finally, the positive value and the significance of the coefficient of the dummy related to the new service with a different mode is indicative of a positive attitude towards service innovation. In

²³ Kreutzberger (2008), reports that often reliability, in EU countries, where intermodal transport and network integration is widespread, is overvalued compared to time and frequency attributes .

general, all else being equal, the availability of an alternative service, with a new mode, is evaluated at about 21,7 euro per ton. This can be interpreted as both a sign of operators' openness of mind towards new initiatives and a strong discontent for the current state of services. Of the respondents, only less than 24% were negatively influenced by the fact that the service was realised via a different mode.

6. concluding remarks

This paper provides an original contribution to the analysis of the value of transport service attributes and of logistic environment in a transition country. We use logit and mixed logit estimation techniques and two extensive and original database of Albanian firms.

We address two basic questions. First of all, we analyse the relevance of the factors influencing firms' choice with relation to alternative transport services and to the decision to carry out internally the organisation of the transport services rather than delegating to third party operators. Secondly, focussing on freight forwarders and third party logistic operators, we tried to understand the value that can be placed on improvements of the different transport service attributes identified as relevant in the first stage of the analysis.

While cost and security considerations rank highly for manufacturing firms organising in-house their transport services, from the analysis of indirect demand, it is confirmed that, as expected, time savings and frequency of service are the service attributes which receive the highest valuation. The relatively low value for reliability, defined as the capability of the alternative service to respect expected delivery time, is not surprising. The valuation assigned to reliability, in fact, should not be taken as a sign of lack of interest for this element for the overall quality of service. The calculated value should be analysed at the light of the current situation (status quo situation) of both the Albanian overall transport system and of its accessibility conditions with respect to the neighbouring areas. These results are in line with those of other studies carried out on less developed regions: additional frequency and lower journey time are seen as priorities given the current infrastructure and service endowment of the country.

On a policy perspective, the issue is of particular relevance for transition countries. The evaluation of measures directed to set up new services or reorganising existing supply, to planning new infrastructures and establishing improved and more reliable logistic frameworks should be based on detailed information on trade-off values among alternative measures on transport attributes. The estimated outcomes have strong implications for transport and infrastructure policy, in terms of both decision making with respect to new investment in infrastructure and optimal pricing of its use. Projects' impact on travel attributes should be part of cost-benefit analysis or of other techniques used for project evaluation and comparison. Further analysis should be carried out in order to enlarge the sample and to compare results among transition countries in order to obtain shared values for relevant variables. At the same time, however, great importance should be given to the heterogeneity in respondents tastes, since, as it has been shown through the use of mixed logit models, there are significant variations in respondents' preferences which should be properly taken account of.

7. References

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