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IMPACT OF THE CHANNEL TUNNEL: A SURVEY OF ANGLO-EUROPEAN UNITISED FREIGHT

Results of the Phase II Interviews

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ABSTRACT

The Working Paper reports the results of the second, and final, phase of an Economic and Social Research Council funded project (Ref R000234623) looking at the impact of the opening of the Channel Tunnel on the freight distribution market. This is the second of two Working Papers which, between them, present our findings. Our study was centred around Before (Phase I) and After (Phase II) surveys of a range of firms engaged in Anglo-Continental freight distribution. The main purpose of this Working Paper is to look at what actually happened to their traffic and try to explain this with the aid of models calibrated on the Phase I (Stated Preference) data. As such, it represents something of a validation study of Stated Preference methods. Pleasingly, the models performed quite well.

In addition to the above, we also review the forecasts of Channel Tunnel freight traffic that were made while the Tunnel was being built. In overall terms, these appear to have been well founded, though through rail services have not yet achieved the volumes predicted, partly due to the SNCF, and other, strikes. We report on the experience of our interviewed firms, and supplement this with the results from the postal survey. We also consider the impact of the Tunnel on the ferries and the ports, on the effects on the location of firms' depots and level of stockholding, and any other impacts.

1. BACKGROUND

This Working Paper reports on a study of unitised freight between the UK and Europe. It is based on before and after surveys to determine changes which have occurred following the opening of the Channel Tunnel. The work has been sponsored by the ESRC under the title of:

Understanding Freight Distribution:
The Channel Tunnel as a Case Study

It was intended that the study should address the behavioural aspects of managers decisions as to how freight is moved, with particular reference to choice of mode, quality of service, and route used.

The aims of the project were:

(i) To improve our understanding of the freight mode choice decisions of firms, in a rare context in which major new alternatives become available (Eurotunnel Le Shuttle, carrying driver accompanied lorries and intermodal rail services between terminals in the UK and on the Continent).

(ii) To monitor the impact of the Tunnel itself, in terms both of the impact on the present ferry ports and on firms' distribution systems and location decisions.

We also undertook to carry out a validation exercise between the stated preference (SP) and revealed preference (RP) parts of the study.

The first phase of the study is reported in Tweddle, Fowkes and Nash (1995) and was based on the results of a survey of manufacturers, international hauliers, and freight forwarders undertaken before the Channel Tunnel was opened to normal traffic. That survey used a combination of orthodox executive interviewing, to determine how firms transport their goods to the Continent, and a Stated Preference survey, to determine the likely effects of changes in the cost and service levels on the Short Sea routes following the opening of the tunnel. For that second part, a typical traffic flow was taken.

This paper reports on the results of the second phase of the study. This consisted of two parts:

(i) A repeat of the executive interviews to determine how firms had adjusted their Anglo-Continental traffics as a result of the Tunnel and the availability of new services, and in particular, what had happened will regard to the previously chosen typical flow.

(ii) A postal survey of a larger sample to expand the amount of data on the total quantity of freight moving, and how the volume being moved had been distributed between the main corridors.

2. HOW HAS THE OUTTURN MATCHED PRIOR FORECASTS OF CHANNEL TUNNEL FREIGHT TRAFFIC?

In this section we briefly consider the main official forecasts for freight traffic through the Channel Tunnel. The most important forecasts are those produced by the Channel Tunnel Group, this being the body that actually built the Tunnel. It was on the basis of these forecasts that the Channel Tunnel was built. Low and high freight forecasts for 1993 (which was expected in 1985 to be the first year of operation) and 2003 are shown in Table 2.1. Central forecasts quoted by the Channel Tunnel Group were just the average of the low and high forecasts. With slight variations due to the growth scenarios chosen, some 18% of cross-Channel freight was predicted to travel through the Tunnel in 1993, with slightly less than half travelling in the Shuttle trains. Roughly 10% of cross-Channel freight traffic was predicted to use the through rail service.

Subsequently, the British and French railway companies (BR and SNCF) as well as Eurotunnel, the body formed to operate the Channel Tunnel, produced estimates of the rail market share for 1993, showing rather smaller predictions. These are shown in Table 2.2.

Table 2.1 Forecast of cross-Channel freight traffic by mode (1985 forecast: thousands of gross tonnes)

	1993	%	2003	%
Low growth scenario				
Shuttle	5442	8.2	6075	6.8
Rail (unitised)	3558	5.4	5358	6.0
Rail (bulk)	2256	3.4	2713	3.0
New vehicle trains	528	0.8	911	1.0
Ro-ro ferry	15264	23.1	20834	23.2
Container ship	4796	7.2	6562	7.3
Bulk ship	34358	51.9	47212	52.7
TOTAL	66200	100.0	89665	100.0
High growth scenario				
Shuttle	6709	8.1	9373	6.6
Rail (unitised)	4465	5.4	8510	6.0
Rail (bulk)	2946	3.6	3953	2.8
New vehicle trains	721	0.9	1571	1.1
Ro-ro ferry	18733	22.6	31999	22.6
Container ship	5867	7.1	9893	7.0
Bulk ship	43490	52.4	76562	54.0
TOTAL	82931	100.0	141861	100.0

Source: Gibb (1994)

Table 2.2 Comparison of Channel Tunnel rail freight forecasts

	Rail total (2 way) million tonnes		Rail market share*	
Forecast by:	1993	2003	1993	2003
British Rail	6.1	8.5	6.7%	6.3%
SNCF	7.2	16.4	7.9%	12.1%
Eurotunnel	7.4	11.14	8.1%	8.4%

* *implied market share using Eurotunnel total market bases*
Source: Maunsell et al, (1989), table taken from Ling et al (1990)

Table 2.3 International rail traffic by UK region of origin/destination

Region	mt pa
London and South East	1.8
Midlands	1.1
North West and North Wales and Northern Ireland	1.4
South Wales and South West	0.6
Yorkshire and North East	0.7
Scotland	0.5

Source: BRB (1989)

Table 2.4 International rail traffic by country of origin/destination

Country	mt pa
Germany	1.8
France	1.5
Italy	1.2
Spain	0.9
Low Countries	0.5
Austria/Switzerland	0.2

Source: BRB (1989)

Of the British Rail forecast of 6.1m tonnes, a breakdown by UK region and European country was provided. (Tables 2.3 and 2.4). Though too small to generalise, our survey indicates that the rail services offered through the Channel Tunnel have been most successful in penetrating the Italian market, the French and Spanish services less so. Little impact has been made on flows to or from Northern Europe. Our survey also indicates that the intermodal services appear to have generated about 60% of volumes estimated in 1985.

Many of the independent forecasts were more optimistic regarding rail traffic through the Tunnel. Those prepared for the North West Region estimated a total of 12 million tonnes per year for the

UK as a whole, with the North West gaining 2 million tonnes of this traffic in 1993. These figures are 97% and 43% higher than the equivalent BR forecasts. (Ling et al 1990).

Though figures for the first year of Channel Tunnel operations have not yet been published, the surveys undertaken during this study indicate that the freight Le Shuttle service has attracted the level of patronage expected at the end of the first year of operations. The figures in Table 2.1 imply central estimates of 37500 trucks per month (based on an average payload of 13.5 tonnes) forecast for the year 1993 and 47680 for the year 2003. By the end of 1995, Le Shuttle was carrying about 45000 trucks per month.

However, it is almost certain that the forecast revenue generated by Le Shuttle has not been achieved. In 1985 this was estimated to be £10 per tonne in 1985 prices, based on a 10% to 12.5% discount on the ferry charges available at that time. Our survey has shown that, although the published tariff would generate £390 per lorry, the majority of operators using Le Shuttle have obtained discounts of between 60% and 70% on the tariff and some substantial users even larger discounts. As a result the revenue per tonne would be about £11 at 1995 prices (£7.36 at 1985 prices). The current level of rates charged by Le Shuttle and the Cross Channel ferries is unlikely to be sustainable in the long term.

When considering the railfreight services the revenue situation is more agreeable for Eurotunnel. In this case, revenues paid by the railway companies of the UK, France and Belgium are based on a contract under which Eurotunnel makes available 35 train paths per day for freight trains, plus a charge for every train actually operated. Unfortunately the through rail services have not generated traffic as quickly as the forecasts anticipated. While this only affects the variable charge element of the payments to Eurotunnel, the financial implications for the railway companies are more serious as they are paying for train capacity they are unable to use. The disruption of the French rail system due to strikes had a major impact on traffic during 1995.

Although through rail traffic has been slow to build up there are signs that more traffic will switch modes during 1996. The opening of a number of finished car handling terminals in the UK is the key to gaining this category of traffic. In the case of the intermodal traffic, the most successful services are those to Italy. Volumes on other routes are lower than anticipated, partly because the quality of service has not been up to shippers expectations. It appears doubtful whether rail can achieve the volumes to northern European destination suggested in Tables 2.3 and 2.4.

Rail is suffering from the severe competition on the Cross Channel corridor. While hauliers are gaining low rates from Le Shuttle and the ferries, rail pays the contract rates to Eurotunnel. The current situation gives road operators a cost advantage, at least in the short term.

In overall terms the forecasts for the volumes of Le Shuttle traffic have proved to be well founded, but the continuing heavy discounting of ferry rates was not anticipated and has led to a shortfall in revenue. The through rail services have not achieved the volumes forecast so far. The main reasons for this appear to be late opening of car terminals, the SNCF strikes, and the quality of the intermodal services.

3. THE PHASE II INTERVIEWS

As it was intended to compare the information on traffic flows with the survey undertaken before the Tunnel opened to normal traffic, part 1 and part 2 of the Phase II questionnaire simply repeated the same questions. A copy of the questionnaire is provided in Appendix 1. It established the total volume of European traffic handled by each company in the sample. In addition, much greater detail was obtained concerning one flow which could use Tunnel services, and which was thought to be fairly typical of the companies operations. The routes of these typical flows are presented in Figure 1.

Questions which were additional to those asked in Phase I determined whether or not any of the firms' current traffic did actually use the tunnel and by which service. In the case of the typical flow the interviewee was asked which route and mode would be used if the current service was not available, and what were the implications for cost and quality of service of having to do so. Where the typical flow was no longer passing, or were handled by another firm, an alternative flow was chosen as close as possible to the original.

Part 3 of the questionnaire was a repeat of part 2, but asked for detailed information concerning a second flow of traffic. In this case, if the flow provided in part 2 had switched to using a Channel Tunnel service, that in part 3 should be one that did not use the Tunnel. Where the typical flow had not switched to using the Tunnel since the phase I interview had taken place, then the sample flow requested for part should be one which did use the Tunnel. Ten of the interviewees could not provide answers to part 3, mainly because they did not have any traffic using the tunnel, or there were no suitable alternative traffics.

We also collected information on broader issues concerning the Tunnel. These related to changes in the location of distribution depots and the quantity and location of inventory. In addition, the effect on the balance of traffic and costs between the various corridors and between modes on those corridors was determined. Questions on these matters were contained in part 4.

The total usable sample for the Phase I executive interviews was 34. Of these 30 took part in the second phase. Of the others, one freight forwarder had ceased trading, one freight forwarder refused to take part, as did two manufacturers because their distribution personnel changed. The breakdown of firms interviewed by type and location are shown in Table 3.1. Although preparations were made to replace those firms which dropped out, and also to expand the sample by undertaking additional before and after survey interviews as part of phase II, it was concluded that 30 matched interviews were sufficient and the quality of the data might be spoilt if attempts were made to expand the sample. It would, in any event, have been very difficult to have found suitable flows without approaching many firms and spending a lot of time screening in likely matches.

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Table 3.1 Structure of SP sample by UK region and activity

Region	Manufacturers		Freight Forwarders		Hauliers		Total	
	I	II	I	II	I	II	I	II
South East	2	2	3	2	7	7	12	11
West Midlands	3	3	3	2	2	2	8	7
North	3	2	2	2	2	2	7	6
Scotland	4	3	1	1	2	2	7	6
Total	12	10	9	7	13	13	34	30

(Manufacturers, Freight Forwarders and Hauliers are grouped under "Activity Category".)

Note: Numbers of respondents from the two phases shown under I and II

Not all the Phase II sample were interviewed on their premises. Given that an adaptive SP was not being used, two interviews were conducted by telephone, and two interviewees completed questionnaires and returned them by post. It was clear that these firms felt that the Tunnel was a 'non-issue', just another way of crossing the Channel and did not feel a second meeting could be justified.

Of the thirty flows remaining in the SP sample, two flows had been lost by the transport operator. However, one provided details of how the traffic would be moved if it returned, while the other was able to provide details of the service which was being used in 1995. There had been changes to many other flows. These ranged from change of ferry operator on the same route, to change of mode or routeing the traffic through the Tunnel. These changes are discussed in more detail below.

4. QUALITATIVE RESULTS FROM THE PHASE II INTERVIEWS

The interview was structured in such a way that the interviewees could give their opinions and views on Anglo-European transport; a number of observations made were common to several firms.

4.1 Views of Hauliers and Freight Forwarders

The most important effect of the opening of the Channel Tunnel and the provision of the Le Shuttle services for HGV's has been to reduce the cost of HGV's using the short sea corridor from ports in Kent or through the Tunnel. Ferry rates have not generally increased in money terms, while capacity and sailings on some longer routes, notably from Portsmouth and the Tees, have increased. Discounts on longer crossings have only been applied selectively when traffic has diverted to Kent ports. Thus traffic normally using ferries from Portsmouth with a destination in the 'Centre' region of France may be attracted by lower rates on the short sea routes. The ferry operator may be willing to offer a discount for vehicles engaged on this work, but not for vehicles with a destination in Portugal, even when they are from the same operator.

Frequency of ferry sailings is an important factor considered by operators. Some traffic has been switched from the Humber to the Tees, and from the Portsmouth-Cherbourg to the Portsmouth-Caen route as sailings increased. The major attraction of Dover remains the number of sailings. For example there are 27 from Dover to Calais per day, whereas between Ramsgate and Calais there are only 3, and hauliers tend to prefer Dover as a result, even if the ferry operator on the Ramsgate route offers them slightly lower rates.

We are informed by operators that Eurotunnel has continued the practice of offering discounts to larger operators who provide large numbers of vehicles transiting the route. However, there remain discrepancies between the Continental and UK based operators. Because there is a higher proportion of small operators in mainland Europe they have historically been given the same or larger discounts below the standard tariff for the same number of vehicles crossing the Channel per year. UK operators have reacted to Eurotunnel in the same way as to the ferries by booking transits through Continental operators where they find there is a differential.

It seems that UK manufacturers and operators expect higher quality services than on the Continent, with the exception of Germany and Netherlands. This may result in the intermodal services having a greater market penetration for imports to the UK. This has implications for imbalanced operations in addition to the imbalance in trade. Competition for loads leaving the UK is much greater than for loads entering.

The extra capacity and reliability offered by Le Shuttle have prompted a number of hauliers to offer express groupage services to destinations much deeper into the Continent. Two of the flows given as a basis for the SP data had changed from being traditional driver accompanied to services where the trailer hardly stops moving, mainly as a result of using trailer switching techniques and setting up driver changeover points on the Continent. The drivers may be away from the U.K. for several weeks at a time. Examples of such services are as follows:-

> -Greater London to Duisburg in 11.5 hours seven days per week (traffic won from air and exempt from lorry bans).
>
> -Scotland to Northern Italy in 36 hours with two driver changeover points in France.

-South East UK to Northern Italy in 24 hours five days per week with one driver changeover in France.

Apart from the need for the provision of accommodation for drivers at the changeover points, such operations require:

(i) High quality vehicles with rapid access to repair facilities should a breakdown occur;

(ii) Replacement hired equipment being available, with or without driver;

(iii) Accounts with tyre and fuel agencies throughout the route. In other words, everything must be done to keep vehicles on these express services moving.

This type of express service clearly requires a high degree of organisation, and costs would appear to increase. However, the cost increase is contained to some extent by the fact that as the round trip time of the equipment is considerably reduced, the capital expenditure of the provision of the service is reduced, and the positive benefit is that they attract more traffic at higher rates, some switching mode from air freight transport.

Although many operators had reservations concerning the reliability of the Le Shuttle services when the first phase of this study was undertaken, by the time of the second phase they were considered to be superior in two respects. Firstly there is perceived improvement in time keeping and reliability during bad weather, particularly in winter. Secondly, they provide an improved night time service, when ferry sailings are reduced and some disruption may occur as a result of running repairs being undertaken on the ferries. It seems it is largely these factors which have given a few operators the confidence to introduce long distance express services and which use the Le Shuttle during the small hours. In years to come the Tunnel infrastructure may require more night time maintenance which will reduce this advantage.

Nevertheless, express services are the exception rather than the rule. For the vast majority of operators, the Le Shuttle services are merely an alternative to the Cross Channel ferries. Which they use depends primarily on the cost. Many have accounts with both the ferry operators and Eurotunnel Le Shuttle, and effectively play one against the other.

In any case, many traffics are not allowed on Le Shuttle. The most common of these are vehicles carrying hazardous material where only small quantities of low hazard, goods are allowed. Out of gauge loads cannot be accommodated on the trains, either because they are too high, too wide or too long. Such traffic forms a substantial proportion of the total. It seems from the qualitative evidence we have collected that at least 20% of groupage trailers carry some hazardous cargo and cannot use the Tunnel, before any consideration of lorries carrying loads which are subject to hazardous goods regulations (ADR) in their entirety.

Though we have not surveyed lorry drivers directly, operators inform us that the majority prefer the ferry. This is mainly because of the better facilities and food. It can also prove difficult to use the time on Le Shuttle to count as a break as required by the drivers hours legislation.

Another problem affecting a minority is claustrophobia. This applies to routeing vehicles through long tunnels on the Continent such as Mont Blanc, as well as the Channel Tunnel. Operators generally allocate such drivers work on other routes, or carrying hazardous goods which cannot in any case use the tunnels.

The Le Shuttle HGV services only compete for accompanied road goods vehicles. While there may have been a very small switch from unaccompanied operation on either the Cross Channel or longer ferry routes, our survey did not detect such a change. The other freight service using the Tunnel is the intermodal rail service, and this may have had more impact on unaccompanied traffic, and has certainly gained traffic which previously was taken to the Continent by road and then transferred to rail, using mainly lolo ferry services across the North Sea.

In general operators felt that the rates structure for intermodal was about right, but the service did not come up to the standard promised (even before the SNCF strikes of 1995). It seems that, in order to maintain reliability, some operators are promising a slow rail service, and moving part of a regular flow direct by road. This means that some goods are received by customers at regular intervals, at the expense of more inventory, and transport costs higher than anticipated by the operators when negotiating with their customers. Responses to the phase II survey confirm this strategy as the manufacturers generally quote higher reliability figures than the operators for traffic that the manufacturers think is moving intermodally.

The collection and delivery (c&d) charge structure limits the competitive radius surrounding terminals. One operator moves UK-Milan intermodally, but UK-Naples by road because the c&d charges from Milan to Naples are high (this may be because the trip involves a night out by the c&d vehicle).

There was widespread dissatisfaction with cartage operations in Italy, many UK firms having difficulty finding reliable operators. There is also a shortage of equipment to handle 'heavy' boxes (those which would exceed the 38 tonne GVW limit in the UK), and tipping frames in the UK and some other countries. Again Italy is one of these, but they just use what they have got, and in some cases it has been suggested that equipment provided is unsuitable or even illegal.

A number of operators thought some rail services did not have sufficient capacity. This may be partly because of strikes and other delays which extend the round trip time of the sets of intermodal wagons. Though many swap bodies and containers could be diverted to routes using rail from Zeebrugge or be hauled entirely by road, this did not apply to the large number of heavy units. As there is currently no alternative route for these units, since legally they must be taken to rail terminals and not to a port, many heavy units were having to wait several days before loading onto trains.

The most contentious issue related to intermodal services is the security regime. This results in rail being less attractive and more bureaucratic than road, even when the road vehicle uses the Le Shuttle services.

4.2 Views of Manufacturers

With regard to intermodal services, manufacturers' views generally closely followed those of operators. Many manufacturers are reluctant to register for security clearance, apparently because they do not think they should be required to do so for one mode and not another. It also requires them to take out insurance cover. If security inspectors have the right to inspect loading operations this leads to reduced flexibility and delays at the loading docks. It is not only intermodal which is having security problems; they have also arisen with the X-ray of sensitive materials travelling via Le Shuttle. Several interviewees commented on the perceived lack of security on the Continent.

Although the results of the SP part of the first phase of the study had shown manufacturers to be less willing to use the Le Shuttle services than operators, or at least requiring a greater discount to do so when compared to the services they were currently using, the attitude had changed. Virtually all were completely neutral.

4.3. Intermodal Traffic

Generally, manufacturers and operators have found the intermodal services too unreliable for high value goods, those in the production chain requiring reliable delivery, and groupage. In the case of the latter, only one consignment may require a reliable service, but that means the whole unit does. Some consignments are delivered 'on wheels' without being transhipped at a depot, and possibly en-route to minimise costs and maximise the number of services offered per week. A relatively large proportion of groupage trailers contain some hazardous goods and are unable to use Tunnel services.

Anglo-Italian traffic was chosen as either the typical flow of traffic for many of the firms interviewed, or as the secondary sample where the typical flow did not use the Tunnel. As a result detailed information on 17 flows of full load traffic between the two countries, 7 of which used intermodal services, were obtained. Figure 2 shows transit time in hours and reliability in terms of the percentage arriving on time. Comparison of the quality of service actually being achieved by the two modes on this route raises interesting questions concerning the various operators. As Figure 2 shows, the road transport operators offered shorter transit times on an origin to destination basis than did the intermodal rail services, except in a single case. Surprisingly even within the road movements, all of which were driver accompanied vehicles, operators providing the shortest transit times also offered the most reliable service (at a marginally higher price).

The quality of the intermodal service has been found to be very variable by shippers, 13 of our sample of 30 having tried the intermodal services through the Tunnel. Transit times are generally slower, but the main cause for concern was reliability which was, in half the cases, much worse than road. Reliability also showed large variations between individual flows. Clearly in these circumstances shippers will look on rail as an extension of the market, offering them a low cost but less attractive service than road, but feel unable to accept rail as a viable alternative.

Figure 2. Anglo-Italian Traffic Road/Rail Service Comparison

Many of the hauliers who have tried intermodal have withdrawn because of the quality of service. They have found that it is difficult to market both a high quality accompanied service and a lower quality and price rail alternative. Some now subcontract any traffic which their customers wish to send by rail. Operators who previously offered unaccompanied services have less problem in this respect.

Most of the traffic using inter-modal services seems to fall into one of the following categories:-

-Lower value goods which would only move at low rates.

-Goods forming substantial and regular flows where lead times can be extended by 1/2 days to overcome reliability problems.

-'Heavies' used to reduce unit costs using 44 tonne GVW vehicles to and from rail terminals (according to Rfd, these constitute around 50% of all traffic).

-Traffic using rail to avoid lorry bans/restrictions, eg delivery required in Milan on Monday morning

The 1995 French rail strike created particular problems for 'heavies' as they could not be diverted via Zeebrugge. Though RfD claims not to desire an alternative heavy box route to the Continent, there is clearly a need.

A number of problems have arisen at the rail terminals, apart from general congestion. The main complaints are that a box has not arrived when expected, which disrupts the plans and cost effectiveness of collection and delivery (c&d) operations. Terminal staff unable to find a box in the terminal have frequently kept (c&d) lorries waiting. Hauliers strongly object to this since many operate warehouses where they have to keep track of thousands of pallets, and so perceive the terminal operation as incompetent. It is possible that a suitable information technology (IT) system would solve this problem.

The stock of swap bodies and other intermodal units at terminals is high, partly because of imbalances in traffic but also because lead times have been extended to overcome unreliability, resulting in loaded units held for delivery, and loaded units awaiting slots on trains.

5. WAGONLOAD AND TRAINLOAD RAIL TRAFFIC

Another service operated through the Channel Tunnel is traditional rail freight in both wagon load and train load quantities. Such services were offered until the end of 1995 by the use of the Dover to Dunkirk train ferry, the *Nord Pas de Calais*. This carried about 0.9 mtpa (0.6 mtpa of which was imports to the UK) of rail freight for a number of years, and also had capacity for roro lorries. These tended to be unaccompanied trailers, as a result of the infrequent service when compared to the Dover-Calais route and the vessel spending more time in port loading rail wagons. The train ferry service was heavily loss making, but allowed the European railway operators to build up traffic prior to the opening of the Tunnel.

Of the rail traffic in 1995, around 30,000 tonnes was hazardous and could not be transferred to trains through the Tunnel. This traffic has been lost to rail entirely following the withdrawal of the train ferry. Nuclear fuel traffic for Sellafield had already been re-routed by sea to Barrow, from where it is tripped by rail (Modern Railways 1996). A few flows of low hazard material, such as corrosive material from Switzerland to Stafford have been routed through the Tunnel, while some flows of more hazardous material now use lolo technology to reach Zeebrugge by road and sea, with the units then being transferred to intermodal trains for movement on the Continent.

It is likely that the potential of the rail ferry for the carriage of hazardous goods had been undersold because it was expected for some time that the service would be discontinued following the opening of the Tunnel. As a result some shippers of hazardous materials were not encouraged to enter long term contracts, which may have involved the purchase of special rail wagons.

As a result of a market planning exercise for the Channel Tunnel, RfD envisaged that rail might compete successfully for certain niche markets using classic rail wagon. These included finished cars, where rail was seen as having an advantage for flows between the UK and France, Italy and parts of Germany. Other commodities forming niche market opportunities included white goods from northern Italy, certain flows of steel and other metals, and low hazard chemicals. In addition some flows of perishables and foodstuffs may be attracted to rail. Automotive components and sub-assemblies between a few major vehicle production centres were also a potential market, but in practice nearly all of these which use rail prefer to use intermodal technology because of its superior flexibility both in accessing the rail network and at times of strikes.

The survey undertaken as part of this study did not produce any evidence concerning the movement of commodities in trainloads through the Channel Tunnel, nor was it intended that it should. However, information was sought from firms and from Railfreight Distribution directly concerning the 'niche' markets, and these are reported next.

5.1 Automotive Traffic

A number of trains serving individual customers in the car industry are being operated, mostly completed cars. Regular movements are shown in Table 5.1.

Table 5.1 Automotive Trainload Traffic using the Tunnel

From	To	Manufacturer	Number per week
New cars.			
West Midlands	Northern Italy	Rover	3-5
Italy (various plants)	Avonmouth	Fiat	1 (2 in peak)
Genk, Belgium	Garston, Merseyside	Ford	5
Parts and sub-assemblies.			
Iberian plants	Dagenham	Ford	5 (intermodal)
Dagenham	Iberian plants	Ford	5 (intermodal)

A proportion of the sets of rail wagons used on the Italian and Iberian flows are loaded both ways. Italian built Fiat cars imported to the UK, are unloaded at Avonmouth for road movement to an existing distribution depot a few miles away from the railhead. The Spanish based freight forwarder and intermodal operator Transfesa has also won a major long term contract to move car components between Spain and the UK on behalf of Ford, using intermodal technology.

It is clear that rail has gained flows on routes where the alternative was a long sea journey to or from areas previously served using Mediterranean ports. In the case of the Ford trains, the large volumes allow efficient use of rail equipment. The rail flows may be supplemented by direct shipments by sea to a UK port with possible inland movement by rail.

Other flows of cars have been more spasmodic, rail tending to be used to build up stocks for the peak of UK sales related to the new registration letter on the 1st of August each year. About 30% of all UK new car registrations occur in one month. This means that manufacturers must produce to meet this demand over a period of several months and build up stocks in the UK, creating a peak in demand for transport. Some other manufacturers and distributors have undertaken trial movements by rail through the Channel Tunnel, or to meet the peak demand in the UK.

French car manufacturers tend to use 'in-house' distribution companies. GEFCO is part of the PSA group, which produces Peugeot cars and also handles Citroen cars. They have recently opened a £10 million car terminal near Corby in Northamptonshire on 65 acres of land, and capable of handling more than 11,000 vehicles per year. Following the opening of the depot in April 1996, substantial flows of cars from France have begun to be transported to Corby direct by rail.

Renault are in a similar position in using a subsidiary, CAT (UK), for distribution to the Britain. Unlike GEFCO, CAT do not own their own rail wagons so are possibly less committed to rail transport. Nevertheless, they are seeking planning permission to build a rail connected terminal on the site of Baddesley Colliery in Warwickshire. According to Planning Magazine, this would handle 12,000 cars on a 100 acre site, and require the 3 mile rail branch from Kingsbury to be re-laid.

Most car distribution terminals are located in port areas. This resulted from cars being imported by ship, often several marques having their own compounds, but sharing the same ship discharge berth at a port. Many use derelict port premises, which are available at low rents when compared to many inland sites near major metropolitan areas. Generally, although a site at the port is the natural break bulk explosion point in a distribution system where the trunk movement is performed by ship, they have the disadvantage that often half the theoretically potential delivery area is sea, and the inland distribution efficiency is limited. An exception to this is Portbury, situated at the head of the Bristol Channel giving good access to large part of southern England and Wales.

Having, in a number of cases, invested in port related terminals for distribution of cars, and established good working relationships with distributors, manufacturers may be reluctant to change their car delivery systems unless the use of rail promotes significant improvements in distribution costs or efficiency. Rail may only be able to gain flows when either costly terminal re-development becomes necessary, or a new ship has to be purchased or chartered.

For new cars, rail only performs the trunk haul within the distribution system. While the transit time savings on the flows to or from Italy may be significant, for a regular shipping service between the UK and the Low Countries the time saving by rail is likely to be much less. The efficiency of the operation from the car terminal to the dealers and customers is perhaps considered by manufacturers as being more important.

If the UK abandons the 1st of August registration system for an alternative which dampens peak demand then rail may become more attractive. This is partly related to the fact that if manufacturers do not have to build up large stocks, then they may consider attempting to produce to order. If this is the case, then shorter transit times which rail can provide become more attractive as part of a drive to minimise the overall order lead time of the production cycle.

5.2 Other Trainload Traffic

Mineral water from three French producers currently forms about 15% of the classic rail traffic through the Tunnel. Two of the firms (Evian and Volvic) already use trainload movements, while the third despatches substantial numbers of wagon loads.

Other trainload traffic has been in the form of large consignments for individual shippers. These have mainly carried metal products. For a short period stainless steel slab was moved to Sweden for rolling, and the coil returned to the UK. Other trainload movements consist of long steel sections which require runner wagons in order to accommodate lengths of up to 24 metres, mainly despatched from Shelton (near Stoke) and Lackenby (near Middlesbrough). A direct train of such products avoids double handling of the product which would be required for sea movement, where the destination is an inland location on the Continent. Rail competes with sea transport for such traffic.

Other products which may have potential to form trainloads in the future are white goods from Italy. However, the producers have a number of production sites, and the scattered origins mean train assembly is not straightforward, and a better strategy for the railway companies to adopt may be to use such traffics to form the basis of more frequent wagon load train services.

5.3 Wagonload Traffics

Apart from automotive traffic, most other railborne commodities move in wagonload quantities, though having the potential to be formed into trains direct from European countries. Currently there is the equivalent of a train load per day from scattered origins in Italy to the UK (which becomes a train not in Italy but at Somain, near Lille in Northern France), and almost as much volume in the southbound direction. At one time this would have been handled by the former Turin to Dunkirk train, but the traffic is now handled by trains on a number of routes and sorted at several marshalling yards. It is planned to incorporate Italy - UK traffic in the 'vialp' services, whereby Italian traffic would be routed to marshalling yards at Gevrey near Dijon, or preferably Sibelin near Lyon. From there a direct Lyon to UK service could be provided.

Less than trainload operation within the UK almost ceased completely with the demise of the Speedlink wagonload service in 1991. In order to retain international traffic for the train ferry, and to build up flows before the Tunnel opened, regular users of conventional wagons for international traffic were offered a dedicated UK rail service network. This was rebranded as 'Connectrail' in 1995. International wagonload trains are assembled at Wembley before transiting the Tunnel and being sorted in France for onward domestic French or international freight train services. The economics of the operation are not strong, and losses have been higher than forecast, leading to some contraction of the UK network served.

The main commodities using this service are steel and other metal products, low hazard chemicals, petfood, whisky, china clay, plus white goods and mineral water imported into the UK. This means that the rail operators have gained some of the traffic they had anticipated, though not in the volumes they had hoped for at this stage. Nevertheless, these were forecast as being the most likely traffic to use the wagonload rail services through the Tunnel.

Among other commodities which once formed large volumes of wagonload traffic are perishables and other foodstuffs. In the case of fresh fruit and vegetables large peaks in demand make rail operations difficult, and even spreading the peak by switching equipment from the Italian fruit to Spanish vegetables, rail may have difficulty in being cost effective when compared to road. Currently special reefer swap bodies are used to move perishable traffic to Germany from Iberia. These avoid the need for wagons with changeable axles in order to operate on Spanish (RENFE) network, and this intermodal technology may be considered for use on UK services at some time in the future. It also has the benefit of overcoming the problem of concentrating agricultural products, which tend to arise over large geographical areas, into volumes which can be dealt with as a section of a train, if not a trainload.

Some foodstuffs do move by rail through the Channel Tunnel. As mentioned above mineral water is by far the most important, and includes Evian from the French Alps, Volvic from the Massif Central and Perrier which is loaded near Nimes. Wines and beer (from Strasburg) are also imported and some whisky is exported in conventional wagons. Pet foods are moved in both directions on behalf of three producers.

Ideally, the economics of wagonload traffic benefit from being moved long distances without being re-sorted in a marshalling yard. This also helps reduce costs where volumes are sufficient to form long distance freight trains. However, many wagons reach their destination by using a number of train services, being staged between marshalling yards on the Continent.

In the UK such services are not available. Wagonloads can only be handled from terminals or sidings where an existing train operates, wagons for international movement being attached where the train has sufficient capacity, the wagon can be exchanged at a number of connecting points with a train for Wembley European Freight Operations Centre (WEFOC), and where the extra wagon or wagons can be handled at a cost which is not so high as to make the cost of the overall transit uncompetitive.

Major consignors of international wagonload traffic are served directly by Railfreight Distribution. 'Connectrail' services also call at a limited number of yards near major metropolitan areas such as Washwood Heath in the West Midlands, and Mossend near Glasgow. From these yards, wagons are either tripped to customers sidings or depots, or are forwarded on the back of trains operated by one of the three domestic rail freight companies, Loadhaul, Mainline, and Transrail. These three comparisons are shortly to merge with Rail Express Systems to become English, Welsh and Scottish Railways.

One of these domestic rail freight companies, Transrail, set up a limited less than trainload service on a small number of routes, though it does serve Exeter, London, Inverness and Teesside. The other two trainload freight companies operate a number of trains made up of traffic from more than one company, moving over the same route. International traffic can be attached to these services.

The future of the services offered by the three domestic rail freight companies is in some doubt at the time of writing, as they have all been sold to an American based transport group, Wisconsin Central. However, the latter have expressed a desire to extend less than trainload operations wherever this can be done cost effectively.

When wagons have been concentrated at various yards, such as Mossend, they are trunked direct to Wembley. After sorting for Continental marshalling yards, they are currently staged to Dollands Moor where diesel traction is changed for electric for movement to France. Eventually electric traction will be used throughout.

In 1993 SNCF rationalised wagonload freight operations, concentrating sorting of wagons on 22 yards, though the number of these yards will fall in line with any decline in wagonload traffic. Two of them are situated in the area around Lille because of the concentration of bulk traffic in the region and the international flows from Northern Europe. Lille is the fourth largest conurbation in France, after Paris, Lyon and Marseille. Other yards in France act as collectors for an area, and then despatch a trainload normally to the nearest sorting yard.

Most wagonload traffic from the UK is routed to the La Delivrance yard to the west of Lille. This marshalling yard collects traffic from the Low Countries and parts of Northern Europe which is bound for destinations in the south of Europe. Another marshalling yard, Somain located between Douai and Valenciennes, handles traffic in a northbound direction.

In effect traffic through the Channel Tunnel has been grafted on to an existing system. The disadvantage is that, while most of the traffic to and from the UK is for southern Europe, that which is to or from Northern Europe must be tripped the 50 km between the two yards, and then re-marshalled. This causes delays and increases costs, thereby making wagonload freight between the UK and Northern Europe less competitive.

In an ideal world, one marshalling yard in the Lille area would be the best long term solution for Channel Tunnel traffic. As the French rail network (SNCF) is moving to a position of providing long distance trunk rail haulage for the other European networks, minimising the number of times a wagon enters a marshalling yard would be to everyone's benefit.

6. COMPARISON OF OBSERVED CHOICE OF MODE IN 1993 AND 1995 WITH THE MODELLED PREFERENCES USING STATED PREFERENCE DATA FROM PHASE I

6.1 Introduction

It is notoriously difficult to 'validate' Stated Preference procedures against real world choices, particularly because so much is liable to change, including the preferences themselves, in the period between the Stated Preference survey being undertaken and the implementation of the scheme under review. However, if it were the case that a Stated Preference experiment could say *nothing* worthwhile in such circumstances, then there would be little point in conducting them. There has, consequently, recently been much clamour for SP validation studies.

Where both Revealed and Stated Preference data have been collected in a single interview, there has been good agreement between their estimates of attribute valuations (see, for example, Wardman, 1988). This is very strong evidence in support of the use of Stated Preference methods where RP methods are too expensive or are otherwise ruled out. In freight studies, data on actual choices is usually commercially very sensitive. In addition, RP cannot deal with modes that do not yet exist, as in our Before Survey, when the Chunnel was not yet open. When it comes to forecasting, unadjusted use of SP and RP results from data collected at the same time do give different predictions. Analysis has shown that this is overwhelmingly due to differences in estimated scale factors. In logit models, random variability in choices, for example due to day to day whim or due to non-modelled attributes, causes all the estimated attribute parameters to be scaled by an unknown amount. The greater the proportion of measured utility variation that is due to the random error, as opposed to the modelled attributes, the smaller are the estimated parameters. When valuing attributes, such as scheduled journey time or delay, in money terms, we divide the appropriate parameter estimate by the parameter estimate for cost. In that way, the scale factors exactly cancel out and so there is no problem. To forecast mode splits, for example for a newly introduced mode, we need the parameter estimates themselves, and so there is a problem.

It is usually held that respondents will have greater difficulty in making their SP responses than they will have in reaching real life decisions. The effect of this would be to depress the size of the estimated SP parameters. This in turn makes the modelled parameters less influential at the forecasting stage, with random error being given too prominent a role. At the extreme, if the parameter estimators became vanishingly small, we would only have 'error' and no information at all. In that circumstance, we would have no alternative but to allocate equal probability to each mode, ie. if there were four modes we would predict shares of 0.25 regardless of their attributes. The general effect of overestimating the error term, as has often been alleged for SP data, is to artificially raise the predicted shares for modes with below average shares and lower the predicted shares for modes with above average shares. In other words, predicted modal shares are all pulled towards equal shares.

The above problem can be circumvented in several ways, but here we shall consider allocating each respondent to that mode modelled to have highest utility. We are in an especially advantageous position here, since we have separate models for each respondent. Since the scaling is the same in the utility function for each mode, the predicted utilities for each mode on the basis of the modelled attributes will be (on the usual SP assumption) underestimated by exactly the same amount. Hence, if the Ferry utility is underestimated by 5%, then the 'Le Shuttle' utility will also be underestimated by 5%, *for that respondent*. Hence, if we work through respondent by respondent, looking for the alternative with the highest predicted utility, then we need not bother about the scale factor effect, and should reach conclusions in line with actual choices behaviour. We will follow that approach, albeit forming Confidence Intervals around our predicted utility differences. These Confidence Intervals are based on the error estimate, which if overestimated as expected, will give wider Confidence Intervals than necessary. We consider this a minor problem, which will probably just act to give us a little more 'safety' room in our predictions intervals, and so we will ignore it.

6.2 Data for the Predictions

The first phase of the study included a Stated Preference exercise (SP). This produced estimates of what change in rates would be required to induce an interviewee, or the average change for a group of respondents, to use either the Le Shuttle services or the intermodal services. Valuations were also obtained for changes in transit time and reliability. The details are produced in a previous Working Paper in this series (Tweddle et al, 1995).

These estimates have been used to predict whether a firm would use either of the new Channel Tunnel freight services. The predictions have been calculated for each of the new modes, taking account of the estimated mode specific constant together with the difference in the quality of service between the ferry and each of the new modes, thus if a haulier stated that by using Le Shuttle, as opposed to the Ferry, they saved 30 minutes on the journey then his valuation of thirty minutes would be added to the mode specific constant for that firm to produce a prediction of the generalised cost difference. Any observed changes in reliability would be dealt with in a similar manner.

Where lorries were not routed via the Cross Channel corridor in the Phase I of the study, an estimate of the extra time it would take to divert in order to use the Tunnel was added to the valuation. In the case of a lorry using the Dover-Zeebrugge route bound for a destination in Germany a time penalty of 1 hour would be assumed. In the case of a lorry bound for Iberia normally using the Portsmouth-Caen ferry the penalty would be 4 hours. The time penalties are intended to be typical penalties, as each operation would be slightly different, and the penalties dependent on whether a driver was able to take a break or rest period while crossing to the Continent.

As only a few of the sample flows had in fact switched to intermodal services, only a few predictions used data on the actual changes in quality of service for the flow in questions. For the majority of the sample an estimate of the changes in time and reliability was produced based on data collected from those respondents using the intermodal services for Anglo-Italian traffic.

The final element in determining whether or not the prediction is correct is to take into account any differences in the rates charged by the ferry companies and Le Shuttle. A prediction that a particular flow should use the ferry may be overturned if the operator is receiving a better rate from Le Shuttle.

In order to provide data to assess the effectiveness of the stated preference exercise, a substantial quantity of information concerning European transport was collected. In addition to checking with our respondents in Phase II the changes from the situation at the time of the first Phase I interview, details of an alternative flow were obtained where possible. This provided us with details of fifty full load movements. Analysis of this data provides a basis for understanding the demands of European shippers and transport operators.

6.3 Analysis of the Full Load Data

While the individual demands varied for each flow, it is clear that the most important factor determining rates charged by operators is the likelihood of a return load. The imbalance of UK trade currently favours exporters in that there is excess volume of transport equipment arriving in the UK looking for backloads. This applies in varying degrees to most types and modes of transport.

Import traffic paid, on average, 38% more than exports within the sample we obtained. The situation varied by country pairs, and by equipment used. This situation helps UK exporters compete in markets on the Continent, but the advantage will diminish if the volumes of trade (as opposed to the value) become balanced.

Table 6.1 shows that the imbalance is in fact concentrated in regions of the UK closest to the Continent. If weight is used as a proxy to reflect the number of units, then for every 10 outbound loads from London and the South East there are 22 inbound. Some of these units may obtain a load from the UK by being re-positioned to one of the more peripheral regions, and it may even be possible to undertake the re-positioning journey carrying a UK domestic load (for which foreign road transport operators require a cabotage permit). However, as the flow of domestic freight traffic is towards London, such opportunities are scarce.

Table 6.1 Balance of EC & short sea non-fuel trade 1991 (thousand tonnes)

UK Region	Imports	Exports	Excess of Imports	Ratio
London & South East	11,099	5,122	5,977	2.2:1
South West	2,105	4,058	✐1,953	1:1.9
Wales	2,266	3,683	✐1,417	1:1.6
West Midlands	3,729	2,002	1,727	1.9:1
North West	5,532	3,386	2,146	1.6:1
Scotland	3,503	4,919	✐1,416	1:1.4
North	2,758	4,878	✐2,120	1:1.8
Yorks & Humberside	6,504	4,028	2,476	1.6:1
East Midlands	2,630	1,870	760	1.4:1
East Anglia	2,326	2,245	81	1:1
N Ireland	2,988	2,862	126	1:1
Total above	**45,436**	**39,053**	**6,383**	**1.2:1**
Inland Movement to UK Port (including deep sea)				
By rail/swap body	3,094	3,342	✐248	1:1.1
Road	60,901	39,333	21,568	1.5:1

Source: Derived from Department of Transport (1993)

In practice, large numbers of empty vehicles and rail swap bodies return to the Continent empty. This is in addition to partially loaded vehicles, and those where capacity is under-utilised. For example, a groupage operator with two vehicles returning to France will not waste time stowing goods carefully in one vehicle if the goods can be loaded to the two vehicles in less time.

Based on the total tonnage of all regions, but including deep sea traffic, imports by road vehicle exceed exports by 50%. The tonnages for rail are more balanced, but include some movements of products, such as steel, to ports for shipment in bulk.

The second major factor thrown up by the sample flows related to on time reliability. In the case of the road based modes this was on average 93%, with some of the high quality express groupage operators claiming to achieve in excess of 98% on time arrival.

Intermodal services did not produce the same level of service. The mean on-time arrival was only about 70%, though it became clear that interviewees may have been basing their answers on different criteria. Some manufacturers were obviously receiving a slow but fairly reliable service, on a door to door basis, and so quoted high reliability levels. This may be partly because inter-modal operators were holding units at depots and terminals for delivery to the manufacturers at the required time. On the other hand, the operators tended to quote the reliability of the rail terminal to terminal journey, which was generally poor. It was clear that services which were more reliable cost more.

The average speed of inter-modal services was some 5 kph less than road based modes. The average speed of the latter tended to increase slightly with distance. This is due partly to the fixed time associated with collection and delivery operations at each end of the journey, and because the longer distance movements tended to include a larger proportion of express groupage traffic. The overall average speed of the sample was 24 kph in the case of traffic between UK and destinations within 500km of London, 27 kph in the case of destinations between 500km and 1000km from London, and 32 kph to more distant locations.

When the charges are expressed as a rate per kilometre, again the most significant factor is the direction of the flow. However, other factors for which higher rates could be charged by operators were transit time and reliability.

6.4 Modelling the attribute levels found in our data set

As a starting point, we have sought to base our predictions for individual flows on the attribute levels reported by respondents. For example, when considering the binary choice between the Ferry and the Shuttle, firm i might say that there was no difference in cost or reliability, but that the journey time by the Shuttle was 40 minutes quicker on average. Where we have no reason to disbelieve this information it is used for that firm. Where suitable such information is not available from respondents, we will seek to use values given by respondents in similar circumstances. In order to try to reduce the subjective element in this process, we have run regressions using actual reported information, with the various attribute levels both as dependent and independent variables, sometimes after transformations. This gave us some insight into typical levels of one attribute with all other attributes set to certain levels.

6.4.1 The freight rate per kilometre

Perhaps the most interesting of the regressions is the one we present in Table 6.2. Model 1 shows the expected results that the freight rate paid per km, falls as the percentage of late arrivals increases, falls as the journey distance increases, and is higher for imports to the UK than for exports. Not all of these effects are statistically significant, but they are all plausible. The average freight rate paid was £0.90/km, which includes the cost of the Channel crossing. Since this will be a fixed element in journeys of varying distance, this is one reason to expect the negative coefficient for distance. The negative coefficeint for late arrivals will be reflecting, to some extent, the lower rate offered for Swapbody services. Imports pay at least 30% higher freight rates compared to exports, reflecting the imbalance of traffic.

For the Ferry and Shuttle modes, we found very little variation in overall journey times, reliabilities or freight rate. In the case of the Swapbody service we did note some journey time, reliability and rate variations. However, when we tried to introduce a dummy for the Swapbody service into the equation of Table 6.2, it was very far from significant. We therefore tried a simpler model, shown as Model 2 in Table 6.2. The Swapbody dummy is still insignificant, but gives our best estimate of the rate differential. The Distance variable is included so as to allow for the fact that the rail traffic was all long distance, where rates per km will be lower anyway. The estimated constant and coefficient for Distance in Model 2 are similar to those in Model 1 and this gives some confidence in using the former. The implied Swapbody discount, of roughly 15% of the rate for the ENTIRE journey, looks rather high. It presumably reflects keen pricing by that mode whilst trying to build up traffic.

Table 6.2 Regressions of reported freight rates per kilometre on reported attributes for the flows on which we have data

Dependent variable: Cost in pounds divided by distance in kilometres (mean = 0.90)

Independent variables	Model 1		Model 2	
	Coefficient	t	Coefficient	t
Constant	0.748	2.7	1.230	11.3
Late arrivals (%)	-0.004868	-1.8		
Distance (km)	-0.000245	-3.4	-0.000235	-3.0
Imports	0.2345	2.3		
Swapbody			-0.1514	-1.2
R-sq	0.33		0.21	
R-bar-sq	0.29		0.18	

6.4.2 Total cost

Table 6.3 shows the results from a regression of reported total cost. Most variables tried turned out to be insignificant. The average cost was some £1100. Imports paid an average of £280 more than exports. This was after allowing for distance, where cost was found to increase by £0.67 for each kilometre, equivalent to £1.09 per mile. We regard these figures as very plausible.

Table 6.3 Regression of reported total cost

Dependant Variable: Total cost of journey (not just the cross-Channel portion), £, (mean= 1113.2)

Independent Variables	Co-efficients	t
Constant	184.9	1.5
Distance (km)	0.6745	7.8
Imports	283.6	2.3
R-Sq	0.59	

6.4.3 Speed

Table 6.4 investigates one of the key aspects of service quality, namely speed of travel. The average speed of travel was found to be 28.5 km/hr. Longer journeys were found to have higher average speeds, no doubt mostly through the advantage of trunk running, but also partly due to the fixed effect of the Channel crossing. For each additional kilometre, journey speed rose an average of 0.01 km/hr. Hence a long journey (say to Italy) which was 1000km further than a journey to a near Continent destination, would be 10km/hr faster, all else equal. In fact, all else was often not equal, since long distance traffic (especially to Italy) was more likely to travel by Swapbody mode, for which the regression model has an 8km/hr penalty.

We should also note that longer distance rates tend to be inflated by containing a higher proportion of high value, time sensitive, traffic. Our sample included two express groupage services to Italy, in both cases the operators used driver switching methods to minimise transit times.

Table 6.4 Regression of reported journey speed

Dependent Variable: Speed in km/hr (mean = 28.5)

Independent Variables	Co-efficients	t
Constant	16.16	4.5
Swapbody	-6.85	-1.6
Distance (km)	0.01004	3.8
R-Sq	0.24	

6.4.4 Reliability

In Table 6.5 we present a regression equation, looking at reliability. Here we express reliability as the percentage of deliveries that arrived on time. There is a somewhat nebulous concept, as opinions and practice will vary as to what constitutes an 'on-time' arrival. On a 2000 km international transit greater tolerance might be expected than for short distance deliveries. Here we merely look at how reported reliability varied as against other reported attributes. In fact, no significant effects were found other than, once again, a dummy variable effect for the Swapbody service. The average level of reported on-time deliveries was 90.3%, which split between 93% for the road based modes (Ferry and Shuttle) and a meagre 70% for the Swapbody service. Adding distance in as an extra independent variable resulted in a very insignificant coefficient. It should be added that the sample of Swapbody transits included in the regression database was small, being only 6 out of the 50 transits considered. One of the 6 had only 30% reliability, and has clearly dragged down the average. Half of these 6 flows achieved 90% reliability or better. Of course, the Swapbody service has been bedevilled by industrial problems, in particular the 1995 SNCF strike, and many potential users appear to regard a figure such as 70% as more typical for Swapbody reliability.

Table 6.5 Regression of reported reliability

Dependent variable: Percentage of deliveries on time (mean = 90.3%)

Independent Variables	Co-efficients	t
Constant	93.04	52.4
Swapbody	-23.04	-4.5
R-Sq	0.30	

6.4.5 Journey Time

To take further our consideration of the service quality offered by the Swapbody mode, Table 6.6 presents as model 1 a regression of journey time on mode and zone. Naturally, journey times vary with distance, and we here seek to (very roughly) standardise for distance by splitting our 50 transits into three groups based on straight line distance from London (up to 500km, 500km to 1000km and over 1000km). It is solely for the latter group that we have any Swapbody mode transits in our data set. Hence we can split transit times into four groups:-

	Destination	Mode	Transit Time
1.	Short Distance	Lorry	29.8 hr
2.	Middle Distance	Lorry	35.5 hr
3.	Long Distance	Lorry	57.2 hr
4.	Long Distance	Swapbody	68.5 hr
	All Distances	All	48.9 hr

Table 6.6 Regressions of reported journey time

Dependent Variable: Journey time in hours (mean = 48.87 hours)

Independent variables	Model 1		Model 2	
	Coefficient	t	Coefficient	t
Constant	57.22	18.3	20.92	3.5
Swapbody	11.28	1.6	14.39	2.1
Short Distance*	-27.42	-3.7		
Middle Distance*	-21.75	-4.5		
Distance (km)			0.0200	4.6
R-Sq	0.46		0.41	
R-bar-Sq	0.4199		0.3818	

**For definition of the geographic zones, see text. Broadly they are based on straight line distance from London, with short being up to 500km, and Middle between '500km and 1000km'. Where no distance dummy is present in model 1, the constant relates to Long distance, 'over 1000km'.*

It can clearly be seen that Swapbody transits took much longer than average, and this appears to be only partly accounted for by the greater distances involved. The indication is that Swapbody transits are 11.3 hr slower than lorry based transits after having allowed for distance.

Model 2 in Table 6.6 uses journey distance in kms rather than the three distance zones. The rho-bar-sq is marginally worse, suggesting that there was no loss of explanatory power by taking the grouping. The general picture is the same, but now the Swapbody penalty is shown as 14.4 hours compared to the 11.3 hours of model 1. We are inclined to believe model 1 in this regard, suspecting that the uniformly long transits in our Swapbody data set have caused harmful multicollinearity with the distance variable.

6.5 Modelling users' attribute valuations using the Stated Preference data collected in the Phase I (Before) Surveys

In Tweddle et al (1995), we presented some results from the Stated Preference exercise conducted during the Phase I surveys. Figures presented there were calculated as weighted medians, so as to present a representative figure for, sometimes, small groups of respondents. We here present weighted regression model estimates, which relate the attribute valuation to several conditioning variables. Such results are much more difficult for the general reader to interpret, but are ideally suited to our present purpose. The computer package used, SAS, actually prints out, for each of our 34 firms, the predicted attribute valuation and its associated standard error. We shall refer to these predictions, as derived in this sub-section, as the grouped valuations, or the attribute valuations from the grouped model. We shall use these in Section 6.6 alongside the individual valuations, and their associated standard errors, derived in Phase I for our 34 firms. It is this data, from the individual firm's models, which forms the data input for the work of this section, and explains why we refer to the process conducted in this section as 'grouping'. Effectively we are taking weighted averages. The weights, incidentally, were the reciprocals of the squares of the standard errors of the individual firm's modelled estimate of the attribute valuation.

6.5.1 Model for the value of transit time

In this case we have chosen a relatively simple model relating the value of one time unit (of which there are 9 per day) to various characteristics of the traffic. Only dummy variables are included in the equation, and about 28% of the variation in the data is explained by five of these. The model is presented in Table 6.7.

Table 6.7 Regressions of individual valuations of Travel Time Dependent Variable

Dependent Variable: Valuation of 1 unit extra travel time (mean = 6.1%)

Imports/Exports	Road/Rail	Corridor	% Penalty (per time unit)	S.E. of % Penalty
Exports	Road	Cross Channel	8.5	1.37
	Road	South Channel	21.8	8.82
	Road	North Sea	2.4	4.22
Exports	Rail	Cross Channel	5.5	2.76
Imports	Road	Cross Channel	4.0	1.96
Imports	Rail	Cross Channel	1.0	2.44

In our spreadsheet carrying out the calculations, the appropriate figures from the % penalty and S.E. of % penalty columns were entered alongside each of the 34 firms. Another way of looking at this is to say that for the valuation of transit time, the 34 firms were placed into 6 'groups'; hence our reference to the 'grouped' valuations.

6.5.2 Model for the value of reliability

In this case we take a rather complex model, explaining 24% of the variation in the data (see Table 6.8). One continuous variable is included plus 5 dummy variables. The continuous variable is the freight rate. The higher the freight rate paid the bigger the value of reliability. This freight rate is not adjusted for distance, ie it is not a per kilometre rate, so higher values are associated with longer distances. However, the first of the four dummy variables relates to transits over 1000 km, so this will soak up most of the distance effect, leaving the rate variable to reflect the value of the goods and urgency of the transit. Since the long distance (>1000km) dummy variable is the opposite sign to the rate variable, the likely interpretation is that reliability is less important for long distance traffic, but more important for high value and urgent traffic (as expressed by a higher freight rate within the distance bands).

The second dummy variable is for imports, showing importers to be less worried about reliability than exporters, all else equal. The third dummy is for current rail users, showing them also to be less worried about reliability than road users. The final two dummy variables show that both freight forwarders and manufacturers are more worried about reliability than are hauliers, all else equal.

Table 6.8 Regression of individual valuations of reliability

Dependent variable: Valuation of 1% less arriving on time (mean = -5.0%)

Variable	Estimate	S.E.
Constant	-3.641	4.3329
Freight Rate (£/unit)	-0.004501	0.0040041
Long Distance (>1000km)	9.357	4.0549
Imports	4.686	2.5745
Rail	6.944	4.4687
Freight Forwarders	-4.794	3.9853
Manufacturers	-5.922	3.8118

6.5.3 Model for the value of the Shuttle penalty

The rather complex Model 1 of Table 6.9 was considered for the crucially important matter of predicting the penalty demanded for using the Shuttle. It explains 26% of the variation in the data with one continuous variable and four dummy variables. The continuous variable is the number of hours taken by the current transit. Note that this is not measured in our time units, but in hours. Other variables were collinear with hours (eg. distance), and would have performed the same task, (ie showing that there was a bigger penalty the longer the transit), but not quite as well. This collinearity prevented these other variables being included together with hours. It was thought desirable to include four dummy variables, although none was statistically significant. We included an 'Imports' dummy to reflect that the penalty is higher for imports. We included a Freight Forwarders dummy to reflect that they also have a higher penalty. The remaining two dummies represent current users of non-cross-Channel corridors, which also had higher Shuttle penalties than for current cross Channel users, all else equal, as was to be expected since a lengthy diversion would probably be involved.

Table 6.9 Regressions of individual valuations of Shuttle penalty

Dependant variable. Valuation of using Ferry rather than Le Shuttle (mean = 6.4%)

	Model 1		Model 2	
Variable	Estimate	S.E.	Estimate	S.E.
Constant	-4.819	7.1405	49.623	26.4833
Hours	0.3333	0.12931		
Freight Forwarders	-8.211	5.9685		
Imports	-8.402	5.5666		
South Channel	-14.575	9.3069		
North Sea	-7.438	9.0961		
Current Reliability			-0.4804	0.29274
R-Sq	0.26		0.08	
R-bar-Sq	0.13		0.05	

However, when we came to make our predictions using the above as input, unacceptably wide error ranges about our predictions resulted. The reason for this was soon tracked down to the inclusion of non-significant variables in the modal penalty equations, including the Shuttle penalty equation above. The only sensible option for us was to successively cut out non-significant variables in the hope of achieving a model containing only significant variables. This target proved impossible to achieve, but the very simple model presented as Model 2 in Table 6.8 did give much smaller errors for the predicted attribute valuations, and so was used to give our grouped predictions. The only variable now included is the reported level of reliability which has a negative sign, indicating that currently reliable traffic have lower penalties for moving over to Le Shuttle. Only 8% of the variation in the individual valuations is explained by this model, but it seemed preferable to use it rather than either just taking the average penalty (6.4%) for all 34 firms, or using Model 1 and producing very inaccurate predictions. We realise, of course, that the latter course would have reduced the chances that observed mode choices would fall outside the range of our predictions.

6.5.4 Model for the value of the bimodal penalty

We had expected that this would have been the hardest variable to model, but the reverse was the case. On average our respondents wanted a 21% rate reduction in order for them to be willing to use the through rail Swapbody source, which we shall refer to as bimodal, all else equal, but there was a wide spread of response. Fortunately, this variability could be well modelled by the variables at our disposal. Nearly all our variables appeared to be playing a part, with almost 60% of the variation in the data explained, but we were concerned that there might be serious multicollinearity, since many of the variables were associated with the 'length' of the journey. Accordingly, we removed many non-significant variables, leaving a simplified model (Model 1 in Table 6.10) with 3 continuous variables and 3 dummy variables, explaining 50% of the variation in the data.

The first two continuous variables were distance (in km) and the freight rate (in £). These had opposite signs and so collinearity was suspected. However, reasoning rather as in 6.5.2 above, it seemed to us that it was reasonable for longer distance traffic to have a higher bimodal penalty, all else equal, whilst higher rated traffic would have a lower bimodal penalty expressed as a lower % of a higher freight rate. Accordingly, we retained both variables, but would advise caution in the interpretation of their coefficients.

The third continuous variable was the level of reliability (% arriving on time). The higher the level of reliability currently enjoyed the bigger the bimodal penalty. The first dummy variable was for rail users, and this showed them with a much lower bimodal penalty. The last two dummy variables were for the currently used corridor. Users of the South Channel and North Sea crossings had smaller bimodal penalties, all else equal, than cross Channel users.

Table 6.10 Regressions of individual valuations of bimodal penalty

Dependent variable: Valuation of using Ferry rather than the Swapbody service (mean = 21.0%)

	Model 1		Model 2	
Variable	Estimate	S.E.	Estimate	S.E.
Constant	-93.990	52.1871	1.4212	15.45442
Distance (km)	0.02913	0.009925	0.01788	0.009866
Rate (£)	-0.008552	0.0044037		
Current Reliability (%)	1.0918	0.53504		
Rail	-34.767	10.5471	-21.366	10.6836
South Channel	-16.394	14.5907		
North Sea	-31.881	14.1519		
R-Sq	0.50		0.27	
R-bar-Sq	0.39		0.23	

As in the case of the regressions for the valuations of the Shuttle penalty (see section 6.5.3), the predictions from Model 1 were found to be too uncertain to be useful to us in our overall prediction. This was despite the fact that Model 1 explained half of the variation in the individual estimates. We have chosen, instead, to use Model 2 (in Table 6.10) which only has two explanatory variables, the continuous distance variable and the dummy variable for rail movements. Both have coefficients the same sign as reported for Model 1, but rather smaller. Only 27% of the variation in the individual estimates is explained by Model 2. This evidence together suggests that Model 1 suffered from considerable mutilcollinearity.

In Model 2 the standard errors for the prediction are much smaller than for Model 1, although still rather large. Arguably, we should also have dropped the constant from Model 1, but this would have somewhat understated the uncertainty involved in the modelling, and might have caused some confusion. We accepted the predictions from Model 2 and their associated standard errors.

6.6 Predicting the 1995 mode choice

6.6.1 Overview

In this section we use the attribute levels from section 6.4 with the attribute valuation estimates from section 6.5, together with information supplied by respondents, to predict the 1995 mode choice. We must stress at once, though, that the After survey quite clearly revealed that the general view of actual Le Shuttle operation was much more favourable than had been the case at the time of the Before survey. It is likely that the Before survey reflects respondents' resistance to use an untried service, and their desire for an incentive before they are willing to use new services. This should be borne in mind when considering the results to be discussed below. Furthermore, although nearly all respondents had the possibility of choosing the Cross-Channel Ferry, about a quarter of our sample used ferries on other routes (North Sea or South Channel) against which Le Shuttle and Swapbody services are less direct competitors.

Table 6.11 lists the 34 firms we interviewed in the Before survey, and presents information relating to the typical flow chosen as the basis for the interview. Note that this 34 observation data set is not the same as the 50 observation date set investigated in Section 6.4. Table 6.11 shows the mode used in 1993 as:

- Accompanied Road Goods Vehicle (ARGV)
- Unaccompanied Road Goods Vehicle (URGV)
- Rail (in 1993 using the Rail Ferry) (RAIL)

and - Container Ship: Lift on Lift off (LOLO)

Data is also given on distance (in km), transit time (in hours), reliability (as % on time), direction (imports or exports from the UK) and corridor used:

- Cross Channel (XC)
- South Channel (SC)
- North Sea (NS)

Shown next in Table 6.11 are the 1995 attribute level differences first between the Shuttle and the Ferry, and secondly between the Swapbody and the Ferry, as derived in section 6.4. or from information provided by the respondent. Note that the time differences shown are in our 'time units' (9 per day) and not in hours.

The following 5 columns in Table 6.11 all give predictions, first for the Shuttle versus Ferry choice using individual models then the grouped model, then the Bimodal versus Ferry model (individual and grouped). On the basis of the detailed results, an overall prediction is then made.

The mode chosen for the typical flow in 1993 is shown in the penultimate column, although not all cases were clear cut. The mode chosen for a particular consignment might depend on consideration of driver's hours, and indeed the vehicle may return by a different route to the outbound journey. In the majority of cases, the mode chosen in 1995 is known from the After survey and is entered in the final column. In all, 30 of the 34 firms were recontacted, but in several cases the typical flow of traffic either did not still exist or had altered in some significant way. In these cases we enquired as to how the traffic would have moved in 1995 had it remained unchanged. This information is entered in the final column. In two of the four cases where we were unable to gain a Phase II interview, reliable information regarding the 1995 mode was available to us, and we have entered

Table 6.1 1 Predictions for our 34 firms this. For the cases where we were unable to say by what mode the traffic was moving in 1995 we entered a question mark.

6.6.2 Detailed description

We now comment on Table 6.11 column by column. The 'Mode 1993' column shows a variety of modes, but, as intended, we oversampled accompanied road goods vehicles (ARGV). We have screened out traffics that could not possibly use the Channel Tunnel (eg hazardous loads) and have tried to avoid low value bulks, for which the Channel Tunnel is not well suited. Our sample has been chosen to calibrate choice models and so we have sought out respondents who might realistically make a mode switch. Our sample is therefore not representative of all Anglo-Continental traffic, and since it has information from just one flow from each of the 34 firms, cannot reliably be grossed-up.

The second column shows that we have covered transits in the range 500 km to 2500 km, which gives us a good spread.

The third column shows that most of our flows already travelled by cross Channel routes in 1993 (including the train ferry) while four each went via the South Channel and North Sea corridors and one flow used bulk shipping. Although the Channel Tunnel is a much less good substitute for traffic on the other corridors, two of our four North Sea movements now regularly use the Channel Tunnel.

The fourth column shows the journey time in hours, which varies from 17 to 210, although most are in the range of 34 to 68 hours. The sixth column shows that most of our flows were exports with only four being imports. In reality, there are more import flows than export flows, but decisions on mode choice for the former are likely to have been taken largely on the Continent and it was impracticable for us to survey these.

The next three columns show the 1995 attribute difference between the Shuttle and Ferry modes. By Ferry we mean the best available Ferry, not necessarily a Cross-channel Ferry. In other words, it is the difference between the Shuttle and the best available Ferry alternative. A positive number indicates 'more for Shuttle', so the -9.5 in the cost % column indicates that that firm found the Shuttle to be 9.5% cheaper than the Ferry. No other respondents reported a difference, and our view is that, with little separating the Shuttle and Ferry on service quality grounds, competitive forces have kept Shuttle and Ferry rates very similar. There is much volatility in the market place, and this is swamping any small average difference there might actually be. It is perhaps surprising that we have not identified a cost difference between Shuttle and Ferries on other corridors (ie North Sea or South Channel). If traffic is unsuited, because of origin and destination, to the Channel Tunnel, this reflects itself in the time penalty required to divert that way, rather than as a cost penalty. It is possible that the heavily discounted Shuttle charges really do mean that the costs are now the same by the various corridors: this is certainly what our respondents implied in general.

Moving on to the time units difference column, in general we found a consensus that switching from a cross-Channel Ferry to Le Shuttle saved about 40 minutes, all else equal. This is equivalent to 0.25 of our time units, and this is entered (negatively) in most rows of the column. Some firms had a different experience, and this is entered where known. Some North Sea corridor traffic firms said that half a day would be lost by diverting to use the Shuttle, whilst 1993 rail users reported massive time savings (of over a day) if switching to the Shuttle. The column for reliability difference shows that none was generally identified, although a couple of firms said that they thought the Shuttle was slightly less reliable.

We move now to the next three columns, which compare the 1995 Ferry with the 1995 Rail service. By Rail we now include both the wagonload service, which now operates through the Tunnel rather than by Rail ferry, and the Bimodal Swapbody service. Most firms had no experience of the Bimodal service and so we are heavily reliant on the modelling of the 50 flow data set reported in sub-section 6.4. Whereas a dummy variable for Le Shuttle was always insignificant, where tried, a dummy variable for Bimodal transits was often significant. This was not so in the case of the freight rate, however, so in strictly statistical terms we could say that the Swapbody transits in our 50 flow data set offered no discount over the Ferry service. When we tried to force the Swapbody dummy into the regression equation, a variety of non-significant coefficients emerged. Model 2 of Table 6.2 shows a -0.15 Swapbody penalty compared to an average rate of 0.90, after allowing for distance. This is very difficult to interpret, particularly since the estimate is not significantly different from zero. We have decided to make the general assumption that Swapbody is offered at 10% less than the cost of using the Ferry. This is a rather large discount, but our knowledge of the underlying cost structures suggests that, given high load factors, such discounts should be possible. Conventional wisdom is that, for unit loads, intermodal begins to become cheaper than road for journeys over 400km, although perceived worse service quality by intermodal will normally make the competitive break-even distance somewhat greater. Our case is complicated by the cross-Channel element, and in particular the large payment by the railways to Eurotunnel. Nevertheless, it seemed sensible to build a 10% cost reduction for Bimodal, relative to the road modes into our prediction calculations. In some cases, though, we thought that the traffic might be considered sufficiently captive to rail that no rate discount would be offered. In three cases of backloaded Italian lorries we felt that using the Bimodal service would entail a large cost increase, which we have guessed to be of the order of 20%.

In terms of journey time, Model 1 of Table 6.6 showed a Swapbody dummy of (plus) 11.3 hours. Although this dummy was not quite significant at the 5% level, the larger value (14.4) found in Model 2 certainly was. We concluded that there certainly was a time differential, and have judged a good figure to use to be 12.5 hours (4.65 in our time units). Alternative values have been entered where they seem appropriate or have been directly reported to us. These mostly concern traffic using Rail or LoLo in 1993.

In terms of reliability, Table 6.5 reported a regression model showing that Swapbody reliability was 23% worse than by Ferry. As we said in sub-section 6.4, this result was affected very greatly by one of our 6 Swapbody transits (out of our 50 transit data set) having a reported reliability of only 30%.
Our 1993 data set contained 3 flows by rail wagon, having reliabilities of 95, 96 and 99%. For Table 6.11 we need a reliability figure for rail, incorporating both rail wagon and Swapbody. We have chosen to use a realiability figure of 90% for rail, while realising that some will regard this as ridiculously high. In fact, half of our sample of 6 Swapbody flows had reliabilities of 90% or higher. Taking these 6 together with our 3 rail wagon flows, the median rail reliability comes out as 95%. At the very end of our Phase II surveys, rail services were disrupted by the SNCF strike, and reliability levels nose-dived. It should be noted, however, that the observed choices that we shall be seeking to explain were all made before the SNCF strike and in anticipation of reasonable rail reliability levels.

In some cases we have particular reason to say there will be no reliability difference, while the three firms backloading Italian lorries would all experience a substantial gain in reliability if they switched to using Swapbody.

6.6.3 The predictions

Since the reported attribute differences, both for the Shuttle and Rail (as against Ferry) contain so many identical entries, and since we only know the actual choices in 32 cases, there is no possibility of performing a proper Revealed Preference model calibration. Instead, we shall derive a prediction interval of utility difference from (individual and grouped) SP models and note whether the observed choice conforms with the predicted utility difference.

The next four columns give the (binary) mode choice predictions for each firm from four different models. The first two relate to the Shuttle (SH) versus Ferry (F) choice and the second two to the Rail versus Ferry choice. In each case we have predictions from an individual (I) model and a grouped (GR) model. The individual models use valuations of journey time, reliability and mode specific constants derived for each of our 34 firms in Phase I, from Leeds Adaptive Stated Preference (LASP) interviews. While a major advantage of LASP is that it seeks to gain sufficient information with which to fit models separately for each respondent, it is recognised that the models will be estimated with generally poor accuracy. Once the models for several similar respondents are aggregated, satisfactory accuracy is usually achieved. Our usual method is to form a weighted average using the inverses of the variances of parameter estimates as weights. This is in effect what we have done for the grouped predictions, the derivation of the models for which was described in section 6.5.

Due to the imperfection of the individual models, the 95% confidence intervals for the advantage of Ferry over Shuttle usually straddled zero. A positive value would indicate that Ferry was preferred and a negative value that Shuttle was preferred, and we would enter F or SH respectively in the 'IND PRED SH v F' column. Where the 95% confidence interval straddled zero, we enter SH/F. While this is essentially saying that we 'don't know', it should be remembered that some firms do regularly use a mixture of both these models, or switch from one to the other in response to circumstances. The grouped model for Shuttle versus Ferry, while making good sense, also had 95% confidence intervals for each firm predicted benefit for choosing Ferry over Shuttle that generally straddled zero. This is partly the fault of our small sample size, but also the genuinely small differential between those two modes. To put a positive gloss on our predictions, we could say that we predict that most firms will be indifferent between the Shuttle and Ferry modes, the main exceptions being for traffic using the South Channel route in 1993, where the Shuttle does not appear to be competitive.

The predictions for Rail versus Ferry were much clearer cut, ie there were many fewer cases of 95% confidence intervals for predicted benefits of choosing Ferry over Rail straddling zero. There were few cases of Rail being shown as significantly better than Ferry, but many cases of the Ferry being significantly better than Rail. Traffics most favouring Rail were those already on Rail in 1993 (either by Train Ferry or by Rail/Sea transhipment), or which travelled by container (LoLo) or by unaccompanied road goods vehicle (URGV).

The next column attempts an overall prediction. Where 95% confidence intervals straddle zero in the models referred to above, the weight of evidence of the four models taken together may be clear and so a firmer prediction may be chanced. More often, the modules give divided counsel, and so vague prediction results. Although Shuttle and Rail were not directly compared in models, this did not cause too much difficulty in making the prediction. In two of the 34 cases, we could not confidently say anything about mode choice, and so have entered SH/RAIL/F.

The final two columns report the chosen mode in 1993 and 1995. The notation RAIL/SEA denoted traffic moving by rail on land, then by ship, as opposed to a Ferry. The notation RAIL in 1993 denoted traffic moving via the Train Ferry, while in 1995 it denoted traffic moving by the Bimodal Swapbody service. The notation SH/F in 1995 denotes that that firm uses both the Shuttle and the Ferry, depending on circumstances. One flow had transferred to ship, and is denoted SEA, and another had changed to North Sea Ferry, travelling unaccompanied and denoted F(NS-URGV). The notation ? in 1995 denotes those two firms for which the 1995 mode is not known.

If we ignore the last four mentioned flows (ie the two where the 1995 mode is unknown, the one transferred to SEA, and the one that switched ferry corridors) we have 30 flows on which we can judge the success of our predictions. If we count 100 where the prediction in the OVERALL PRED column corresponds exactly with the ACTUAL 1993 column, count 50 where we have split our prediction into two and one was correct (eg SH/F predicted and F chosen) and count 33 where we have predicted any of all the three modes, then the average score over the 30 flows is 80. This might be compared with a score of 33 if we had said we didn't know (ie SH/RAIL/F) for all 30. This is equivalent to random prediction. Alternatively, if we had predicted Ferry, the most popular mode, in all 30 cases we would have scored 65. We have clearly done a lot better in scoring 80. We are quite satisfied with this outcome. We conclude that, despite the changes in circumstances and perceptions that clearly took place between 1993 and 1995, the models based on the 1993 data do have something useful to say about mode choice in 1995.

7. THE POSTAL SURVEY

An attempt had been made in 1994 to undertake a postal survey, and this is described in Tweddle et al (1995). The response rate at that time was extremely low. The reason was thought to be the large number of similar surveys being undertaken at that time by market researchers, students as part of projects, and other academic institutions.

A simplified postal survey was launched in November 1995, and this was more successful. It produced 90 usable responses from 780 despatched. Questionnaires were sent to hauliers and freight forwarders in all regions of the UK, mainly using Yellow Pages as a source. In the case of hauliers, only those known to undertake, or thought to undertake, international movements were targeted. The number of units moved by the firms who responded totalled 11,921 per month in 1993. This represents 3.5% of the 4.1 million units in short and near sea trade to Europe (with the exception of Eire) during the whole of 1993 (DoT 1995). The number of units in the sample for 1995 is 17,166 per month.

The questionnaire, an example of which is contained in Appendix 2, asked for details of total traffic per month in 1995, then a breakdown by corridor and mode. Similar details were obtained for the same companies for 1993. Some companies did not operate in 1993 or had expanded their traffic, whereas we could not obtain balancing figures from companies no longer in business. As a result, the sample shows an expansion in traffic of 20% per year compared to Government estimates of some 8% per annum in recent years.

The results of the postal survey show that the Channel Tunnel has had a significant impact on the Cross Channel corridor. Based on the international hauliers in the sample, the Le Shuttle services were carrying more than half the vehicles on this corridor. However, the sample under represents very small operators, in particular owner drivers. Based on comments made during the executive interviews, it seems that this sector of the haulage industry see little benefit in using the Tunnel.

The results of the survey are confirmed by figures released by Eurotunnel showing that by the end of 1995 Le Shuttle was carrying about 45,000 trucks per month. It had managed to carry 3,286 trucks in one day when the port of Calais was closed (Freight 1996).

Given that the Le Shuttle operation only caters for accompanied road goods vehicles, and that the rates structure based on one road vehicle per rail shuttle car (which prices off small goods vehicles), Eurotunnel are proving to be successful in the segment of the market in which they compete (Table 7.1). Residual traffics such as hazardous goods and out of gauge loads continue to use the short sea ferries, as does a limited amount of unaccompanied trailer traffic.

The major findings from the postal survey are that Anglo-European unitised traffic has increased on all corridors, but within the total there has been a swing towards use of the Cross Channel corridor (to Belgian ports and French ports eastward to Dieppe), which increased by 5%, whereas the North Sea routes' share declined 3%, and South Channel by 2% (Table 7.2). This supports our findings that rates on the Cross Channel corridor have declined, by some 15% in the case of accompanied vehicles, while those on the longer sea routes have remained at their previous levels. Even this reflects a fall in real terms allowing for UK inflation.

Table 7.1 Routing of Anglo-European unitised traffic (1993/1995) per month from Postal Survey

Route/Mode Choice	Total (90)	Area 1 South East (47)	Area 2 Midlands (31)	Area 3 Scotland & North (12)	International Hauliers (64)	Freight Forwarders Multi-modal Operators (26)
Ferries (1993)						
Cross Channel	8004	6109	1800	95	2238	5766
South Channel	1322	378	923	21	745	577
North Sea	2595	2380	107	108	2165	430
Total (1993)	11921	8867	2830	224	5148	6773
Channel Tunnel (1995)						
Le Shuttle	2943	2328	556	59	2057	886
Intermodal	1360	1352	0	8	0	1360
Rail Wagon	40	40	0	0	0	40
Ferries (1995)						
Cross Channel	8053	6009	1928	116	1962	6091
South Channel	1542	605	733	204	763	779
North Sea	3228	2958	144	126	2930	298
Total (1995)	17166	13292	2805	446	5655	7168
of which						
Cross Channel	12396	9729	2484	183	4019	8377

Note: Sample size in brackets. Entries in table show number of units.

Table 7.2 Percentage Routing of Anglo-European Unitised Traffic (1993/1995)

Route/Mode Choice	Total (90)	Area 1 South East (47)	Area 2 Midlands (31)	Area 3 Scotland & North (12)	International Hauliers (64)	Freight Forwarders Multi-modal Operators (26)
Ferries (1993)						
Cross Channel	67	69	64	42	13	85
South Channel	11	4	33	9	14	9
North Sea	22	27	4	48	42	6
Channel Tunnel (1995)						
Le Shuttle	17	18	17	12	27	9
Intermodal	8	10	0	2	0	14
Rail Wagon	0.2	0.3	0	0	0	0.4
Ferries (1995)						
Cross Channel	47	45	57	23	25	64
South Channel	9	5	22	40	10	8
North Sea	19	22	4	25	38	3
Cross Channel (1995)	72	73	74	37	52	87

Note: Sample size in brackets

Table 7.3 Direction of Anglo-European unitised traffic in Postal Survey

Route/Mode Choice	Total (90)	Area 1 South East (47)	Area 2 Midlands (31)	Area 3 Scotland & North (12)	International Hauliers (64)	Freight Forwarders Multi-modal Operators (26)
Number of units (1995)						
Exported	8443	6563	1610	270	3812	4631
Imported	15685	12160	3257	268	10857	4828
Total	24128	18723	4867	538	14669	9459
Percentage						
Exported	35	35	33	50	26	49
Imported	65	65	66	50	74	51

Within the Cross Channel corridor, competition has been split between the ferries and the new services. Le Shuttle has won 17% of the unitised Anglo-European traffic, including 24% of the traffic on Cross corridor Channel from ports in Kent. Intermodal traffic made an encouraging start, and achieved an 8% share of unitised traffic. However, the postal survey does not fully reflect the impact of the SNCF strikes. On the other hand, the through rail wagon services have had only an minimal impact, less than 1% of unitised traffic using this mode.

The data from the postal survey was broken down in various ways. Because the number returned from most individual economic regions was small, these were grouped together to form three areas, based loosely on distance from the English Channel. Thus London, the South East and East Anglia were grouped together (forming area 1), as were Scotland, the North of England and Northern Ireland (area 3). The remaining regions formed area 2. Responses were zoned based on the location of the firm, though it is unlikely that all the traffic would in fact have an origin or destination in that region. A few responses were from large operators with headquarters in the South East and much of their traffic would have involved other regions in the UK. The sample was also split by international hauliers and other types of firm, freight forwarders and multi- modal operators.

This analysis produced some differences in traffic patterns. Areas 1 and 2 had imbalanced flows, with imports exceeding exports by about 2 to 1, whereas the northern area had international traffic which was balanced. The Cross Channel corridor was less attractive to those firms located in area 3, with less than 40% using the corridor. However, this result is affected by the fact that within a small sample one respondent had a large increase in traffic using the South Channel corridor. If this response is removed about half of the area 3 traffic uses the Cross Channel corridor. In comparison, firms located in areas 1 and 2 sent nearly three quarters of their traffic via the Cross Channel corridor. There is some evidence that traffic to or from those regions furthest from mainland Europe tend to favour the longer sea corridors.

Expansion of unitised traffic using the Cross Channel routes has been at the expense of the ferries on both the North Sea and South Channel corridors. The rapid expansion of the market means that traffic on all corridors is in fact increasing, though the Cross Channel routes have expanded more rapidly than others.

8. THE IMPACT OF THE TUNNEL ON THE FERRIES AND THE PORTS

Because of the rapid expansion of unitised trade with Europe the study has found that the long sea routes, and the ports they serve, have in general seen an expansion rather than a decline in traffic since the Tunnel opened. Nevertheless, it is the Cross Channel corridor which has expanded its traffic much more rapidly for a number of reasons:

i) Greatly increased capacity on the Dover-Calais route when combined ferry and Tunnel services are considered.

ii) Reduced rates resulting from severe competition between the Cross Channel ferries and Eurotunnel.

ii) Increased reliability of the Tunnel in poor weather and at night attract more traffic, some won from air.

iv) Through rail services have won traffic from longer sea routes carrying lolo and URGV traffic.

The number, and more importantly, the size of ferries on some routes to the Continent have changed in the period before the Tunnel opened (Table 8.1). Operators on longer routes anticipated that the Tunnel would have little impact on their traffic, while those on the Cross Channel routes wanted to have in place vessels capable of offering a competitive service in terms of comfort, even if they were unable to match the Tunnel for speed.

During the year the Tunnel opened, 1994 (compare 1993 and 1994 in Table 8.1), there was a 14% increase in the number of roro ferry sailings from the ports of Great Britain, though this is to all destinations not just Europe. Though published statistics do not show separately the number of roro vessels arriving from the Continent, the ports listed individually in Table 8.1 predominately serve this trade, and the number of vessels arriving at them increased by 17%. More importantly, the number of larger vessels, those of between 5,000 and 20,000 dead-weight tonnes, increased more rapidly. These figures indicate that the annual vehicle carrying capacity on roro ferries to the Continent by all routes increased by more than 17% in 1994, due to an increased frequency of sailings combined with an expanded fleet of generally larger vessels.

Table 8.1 Roro vessel arrivals at selected GB ports 1991-94

	1991		1993		1994	
Deadweight tonnes	1-4999	5000-19999	1-4999	5000-19999	1-4999	5000-19999
Port/Port Group						
London	712	1269	690	1138	913	1213
Medway	391	1052	691	716	779	583
Ramsgate	3076	8	3505	3	6547	-
Dover	15082	6628	20490	2625	20210	3835
Folkestone	2567	-	451	-	2386	-
All Sussex & Hampshire	5351	593	6034	974	5775	1614
Poole & Plymouth	2737	10	1205	539	1187	600
Tyne	208	57	251	59	442	106
Tees	490	313	241	594	148	498
Hull	61	1004	243	1052	680	1020
Grimsby & Immingham	389	1142	340	1295	442	1536
All Wash & NE Anglia	822	-	183	-	343	-
Felixstowe	886	1004	901	927	1107	916
Ipswich	7	546	1	550	-	549
Harwich	1586	791	1659	556	1606	800
Sub Total	34365	14417	36885	11028	42565	13270
All ports of GB	48677	15359	55261	11772	61679	14669

Source: Derived from Port Statistics, Department of Transport, various years

Though the expansion in roro services was large in 1994, it continued the pattern set throughout the 1991-94 period. The change in the number of vessels on particular routes varied, partly as some operators switched sailings from one port to another. Expansion at Dover (the largest roro port in Great Britain) was mainly as a result of the introduction of new larger ferries, whereas Ramsgate almost doubled its vessel movements as a result of the introduction of the RMT services. On the other hand the withdrawal of the Olau Lines service from Sheerness to Vlissingen adversely affected the figure for the Medway ports.

Of the longer sea routes, those from the Humber ports and the Tyne have seen large increases in the frequency of sailings. On the South Channel routes, expansion has been mainly by the introduction of larger ferries replacing smaller vessels.

In recent years many ports have also increased their capacity to handle roro traffic. This has been done mainly by installing additional link spans and ramps at berths from which the ferries operate such as those at Hull, or by installing high capacity spans with loading at two levels such as those at Dover. Before introducing roro ferries on a route the operator must ensure that the port infrastructure is compatible with the design of the individual ferries involved. The vessel must also be of a suitable category for the sea conditions found on a particular route. This limits to some extent the flexibility of the ferries, though if traffic levels in the UK make them surplus to requirements it is possible for them to be used elsewhere in the world, unlike the Tunnel.

In addition to the increased number of ferry sailings, the opening of the Channel Tunnel provided a further boost to capacity on the Dover/Folkestone to Calais route. The trains through the Tunnel comprise through EPS passenger trains, through freight trains, and Le Shuttle trains operated by Eurotunnel for both tourists and HGVs between the Cheriton and Frethun terminals.

The capacity of the latter is determined by the number of train sets on the service, and the number of HGV transporter wagons each set is composed of. The initial order for this equipment was 228 transporters, 33 loading vehicles, and 9 club cars, in which the lorry drivers travel (Abbott 1993). These were formed into 8 sets of 28 transporters plus loading vehicles and a club car.

It is possible for each commercial vehicle Le Shuttle to complete the cycle in 2 hours. That is travel time each way of 35 minutes, plus loading and unloading of 25 minutes at each end (Heaton 1996). The current service offered is three trains per hour producing an hourly capacity of the system of 84 HGV units of 16-18 metres in length, at one per transporter. This system means that one set is always in reserve in order to cover dislocation of service and to provide for unexpected peaks.

If it assumed that a typical roro ferry on the Dover Calais route would carry between 70 and 100 articulated lorries if it was completely filled with HGV's, an average of 85 vehicles, and the ferry cycle time is 3.5 hours (including a sailing time of 1.25 hours each way, plus a 30 minute turnaround time at each end) the hourly capacity of a ferry is 24 HGV vehicles. Thus the current Le Shuttle freight operation is adding the equivalent capacity of about three and a half roro ferries on the Cross Channel corridor, though only one sailing each way per hour. If the Le Shuttle freight service was to be expanded to five per hour, each carrying 30 vehicles (RGI 1996), this would be the equivalent of six ferries on the route but only 1.75 sailings per hour.

The capacity of the Le Shuttle will be increased when recently ordered additional transporter vehicles are delivered. It may also be possible to reduce the turnaround times at the terminals, at least for part of the day, in order to increase the number of departures to 4 per hour on a reliable basis. Currently Eurotunnel is offering a minimum two freight Shuttles per hour, throughout the day and all week. The number of commercial vehicles per month is about 45,000, while on one day in November 1995 3,286 trucks were conveyed (Freight 1996). At least sixty Shuttle trains each way would be required to achieve this total, the result of the port of Calais being closed.

As the HGV shuttles form a smaller unit than a ferry (30 vehicles compared to 70) they have the advantage in being able to operate cost effectively, with reasonable frequency, when traffic volumes are low. As a result, Le Shuttle offers a more frequent service at night.

In order for the capacity currently on offer to be utilised to the same extent as in 1991, traffic between the UK and the Continent traffic would have had to expand more rapidly than it has. Table 8.2 shows roro traffic has been increasing by 6% to 8% per annum, while other unitised traffic (mainly containers, only a small number of which travel on roro ferries) has increased at a slightly faster rate.

Table 8.2 Unitised traffic at selected GB ports 1991-94

Year	1991		1993		1994	
Type of services (thousand units)	Roll on	Other	Roll on	Other	Roll on	Other
Port/port group						
London	282	276	236	292	268	315
Medway	72	92	62	138	26	161
Ramsgate	176	-	229	-	267	-
Dover	997	-	1132	-	1181	-
Folkestone	36	-	16	-	35	-
Chunnel (estimated)					19	
Portsmouth	205	6	241	-	285	3
Southampton	8	318	19	349	24	402
Poole	94	-	98	-	86	-
Tyne	n/a	n/a	n/a	n/a	15	8
Tees & Hartlepool	74	59	88	77	101	90
Hull	180	61	195	91	225	97
Grimsby & Immingham	235	38	255	15	292	23
Felixstowe	258	914	323	1087	331	1187
Ipswich	118	78	114	59	114	74
Harwich	187	100	158	70	177	39
Sub Total	2922	1942	3166	2178	3427	2399
All ports GB	3779	2355	4163	2614	4502	2860

Source: Derived from Port Statistics, Department of Transport, various years

In general the Cross Channel corridor has gained roro traffic at a greater rate than the longer sea routes. On most routes capacity has been increased. An exception to this is the Tees where the number of vessels declined, while the roro traffic increased by 37% between 1991 and 1994.

The overall result of changes in capacity has been much more significant on the Cross Channel routes than elsewhere. This is partly due to the intense competition between ferry operators from the ports of Dover, Ramsgate, and Folkestone for traffic to Calais, Dunkirk, Ostend and Zeebrugge. Eurotunnel has entered this market, and effectively bought its share of the traffic by offering competitive rates together with introductory offers on Le Shuttle services.

During 1995 P&O European Ferries reported an increased throughput on the Dover-Calais route of 25% for both cars and freight, although rates over the full year declined by over 10%. The aim of maintaining a return on capital employed of over 15% was achieved during 1995.

The strength of the performance of P&O Ferries on the Dover-Calais route (despite the opening of the Tunnel) was not matched elsewhere. Though volumes remained generally satisfactory (Dover-Zeebrugge freight carryings declined slightly), the pressure on rates for the companies' 24 ships operating on 8 routes is reflected in the decline in operating profit of 34% comparing 1995 with 1994 (P&O 1996).

The result has been that both ferries and the Le shuttle trains are under-utilised. During the period of our Phase II survey it was clear that the special offers being made to operators were not sustainable. Given the financial position of Eurotunnel, and long term concern about the financial strength of some of the ferry operators, rates on the Cross Channel routes may have to rise if all the players are to co-exist. The alternative is that one or more operators will be forced out of the market.

The ferry companies have already asked the Government for permission to operate a joint service between Dover and Calais, but this has been rejected. However, it is in the ferry companies' best interest that Eurotunnel should remain in business. If it were to be the subject of financial collapse, the Tunnel would be sold to another company at a commercial value, and the new operators would be able to offer even lower rates.

It was clear from the Phase II survey that the savings road transport operators were making on the ferry crossings were not being passed on to their customers. The reasons for this are that the ferry and Tunnel charges were unstable, most operators taking the view that they would rise, or at least the special offers would cease. In addition the savings on the Cross Channel corridor are more than outweighed on many routes to northern Europe by the introduction of the Vignette system under which lorries require a period licence in order to use the motorways in Belgium, Holland and Germany. There is also the general increase in the level of fuel duty in most European countries. For many flows of traffic these additional costs partly or wholly outweigh the savings made in crossing the Channel.

Pressure on rates as a result of over-capacity in Anglo-European unitised trade will have an impact on services offered over the next few years. The changes will take the form of either reduction or withdrawal of services on some routes; P&O European Ferries withdrew passenger services on the Felixstowe-Zeebrugge route in 1995 while North Sea Ferries withdrew their Ipswich-Rotterdam freight service. This may indicate that services close to the Tunnel, but a longer sea crossing, are most at risk.

Another impact may be on the introduction of new or replacement vessels as ship owners experience a fall in return on capital. The situation will be redressed as trade volumes expand to take up spare capacity over the next few years. The survival of all the ferry companies depends on their financial resources.

9. EFFECT ON THE LOCATION OF DEPOTS AND LEVEL OF STOCK HOLDING

Respondents to the Phase II interviews claimed that there had not been any changes to their stock holding or location strategies as a result of the opening of the Channel Tunnel. However, some alterations had taken place but the reasons for them were stated to be either as a result of the Single Market, or the introduction of lean production techniques.

The Tunnel has not yet had any perceivable effect on locational decisions, and may never have any significant effect. Even with the price competition on the cross Channel corridor the cost of crossing the Channel remains a very high percentage of any Anglo-European movement. Although the prices have fallen from say £220 to £180 (and much greater reductions in some instances), they still represent 18% of the cost of sending a lorry to Italy and 25% in the case of central France.

There is also the effect of the crossing on average speeds for a journey. This limits the area which can be served within a driver shift. The combination of cost and time means that few firms will be able to substantially alter their distribution network. Some will expand the area of delivery for depots in Pas de Calais to include Kent and possibly London.

Although depot locations have not changed, the routeing of many flows of freight have altered. The main reason is the lower rates currently obtainable on the Cross Channel corridor. Some firms are reducing the number of stock holding locations within Europe. Whereas they may hitherto have had one warehouse in each country, the current philosophy is to reduce the number, either by having regional centres serving two or three countries, or one warehouse serving the whole of Europe as is the case of DuPonts's European Transit Centre located at Genk in Belgium. The latter type of operation means that lead times are increased as customers become more remote from the centre. Customers in France, Germany or the UK may be reached in 1-3 days whereas as those in Spain fall in the range of 2-5 days.

Other factors are more important in location decisions than the Tunnel. These include the effects of the completion of the Single Market, and the spread of just in time production techniques. The availability of development and other grants is important to location decisions.

10. CONCLUSIONS FROM THE STUDY

As anticipated, the main impact of the opening of the Channel Tunnel has been overcapacity offered on the Cross Channel corridor. This has resulted in underutilisation of assets, potential financial problems for Eurotunnel and to varying degrees the ferry operators (P & O European Ferries, Stena and Sally Line), and a decline in roro traffic through the port of Dover.

The beneficiaries have been the road transport operators and their customers. The additional capacity and frequency of the combined ferry and Le Shuttle freight services provide them with greater choice, and less chance of delay and congestion at peak periods. The lower rates resulting from the competition have primarily benefited the operators, at least in the short term.

The additional capacity has encouraged the expansion of express groupage services, such services now reaching as far as Italy. The throughout road movement of airfreight and air mail has also been extended to destinations a greater distance from Calais than before, resulting in a small switch in mode from air to road transport, and producing an unexpected late evening peak demand for Le Shuttle HGV trains.

In the case of the through rail services, the trainload and classic wagonload services have retained most of the traffic which was using the train ferry during the last year of operation. This provides a basis for expansion of these services for non-hazardous commodities, and development of new markets, notably related to the automotive industry.

Intermodal freight services have not proved to be as satisfactory to shippers as had been hoped for in the planning stage. The main problem is maintaining a level of reliability which is acceptable for the movement of high value consumer goods and those intermediate goods in the production chain. The main impact has been in the lower value goods, and in traffic which benefits from movement in heavy units in order to minimise unit costs, such as steel and some chemicals. The main intermodal flow is the Italian market where traffic has been won from accompanied road goods vehicles, or traffic which was formerly moved by road and sea to Zeebrugge for onward rail carriage. On other routes the volumes have been lower, with a greater tendency to switch traffic from unaccompanied road operations and a large proportion of the units being classified as heavy.

Though the opening of the Tunnel has decreased transport costs and transit times it has only done so by a small proportion of the overall costs and times of moving goods to the Continent. The cost per mile across the Channel remains several times the cost per mile on road. The average speed of an HGV on an uncongested motorway is 50mph, whereas the transit between the British and French motorway systems normally takes 90 minutes by Le Shuttle or 2 hours by ferry, achieving about 20mph or 15mph respectively.

Respondents to our survey clearly thought these improvements were too small to have any effect on inventory holding policies or depot location of firms. In future there will no doubt be some exceptions to these findings in cases where firms find they can obtain some benefits from the small savings offered, and the benefits of optimising the firm’s international operations are judged to outweigh the costs of domestic logistics within the UK. The majority of firms are in the position of receiving only small benefits from the opening of the Tunnel, and this is only applicable to a small part of their business activity.

Other objectives of the study lay in testing the SP methodology. Here we have successfully validated predictions from the Phase I Stated Preference survey against the observed Phase II results. For the three mode choice (Ferry, Shuttle, Rail), on a scale from 0 to 100, where 33 indicates random choice or saying ‘don’t know’ and where always predicting the majority mode (Ferry) would have scored 65, our predictions scored 80. This was notwithstanding the fact that Phase II interviews found that attitudes towards the Shuttle had shifted since the Phase I interviews, when a discount against the Ferry cost was required, no doubt because of uncertainty regarding the new mode. In the event, our respondents found the service by Shuttle and Cross Channel Ferry equally good, with no discount required. Lorry drivers prefer the Ferry, but rarely make the choice of mode. In order for the Bimodal Swapbody service to attract substantial traffic, it would appear to need to offer a modest discount on the through cost, and improve its reliability to that of its competitors.

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APPENDIX 1

U.K. EUROPE FREIGHT ROUTE CHOICE SURVEY -
PHASE II QUESTIONNAIRE

U.K. Europe Freight Route Choice Survey – Phase II

Questionnaire: Interviewer: Date: No:

Part 1 - Background Information and comparison with 1994 data.

1. Company Name: Interviewee:

Position

Telephone

2. UK-European traffic per month during 1995/96 (determine units)

a) Imports ….. b) Exports …..

c) % Cross Channel via Tunnel ….. d) % Cross Channel via ferry …..

e) % South Channel (w. of Dieppe) .... f) % North Sea …..

g) % Hazardous …..

3. Most important European flows (O/D, volume, commodity, method)

a)

b)

c)

Do any use Cross Channel routes? Via Tunnel....... Via ferry …..

4. Current methods used for transport of European traffic

a) Accompanied RGV% ….. e) Rail% …..

b) Unaccompanied RGV% ….. f) Other% …..

c) LoLo% …..

5. Has your company negotiated

a) rates for Le Shuttle movements y/n b) for through rail services using the tunnel y/n

Part 2 Details of the typical European flow which could possibly use Channel Tunnel services from Phase I. How is this currently routed.

HAS A FLOW USED IN PHASE I BEEN: Lost / Discontinued / Substantially altered.

If so, provide details on basis of how the Phase I flow would have moved (if moved by a competitor, are reasons for switch know).

6. Route

a) Origin ….. b) Destination …..

c) Sea route ….. d) Method (eg LoLo) …..

e) Volume ….. f) Cost/Unit …..

g) Distance *(*m/Km*)* .....

7. Commodity information

a) Type of goods ….. c) Consignment weight …..

b) Value/unit ….. d) Consignment volume …..

e) Is vehicle weight or volume constrained (W/V) …..

8. Service requirements: Current method Tolerance

a) Departure on day A

b) Arrival time and day

c) Reliability (% on time)

d) Restrictions

9. Alternative(s) considered for the typical flow.

a) Second best route/method.

b) Cost/unit of second choice.

c) Differential in service quality.

Part 3. Details of a second flow. If flow in Part 2 uses tunnel, choose a flow which has not switched. If typical flow does not use the tunnel choose a flow which does use the Tunnel. If there are NO Tunnel flows, go to Part 4.

10. Route

a) Origin	…..	b) Destination	…..
c) Sea route	…..	d) Method (eg LoLo)	…..
e) Volume	…..	f) Cost/Unit	…..
g) Distance *(*m/Km*)*			…..

11. Commodity information

a) Type of goods	…..	c) Consignment weight	…..
b) Value/unit	…..	d) Consignment volume	…
e) Is vehicle weight or volume constrained (W/N*)*			…..

12. Service requirements :	Current method	Tolerance
a) Departure on day A		
b) Arrival time and day		
c) Reliability (% on time)		
d) Restrictions		

13. Alternative(s) considered for the typical flow.

a) Second best route/method.

b) Cost/unit of second choice.

c) Differential in service quality.

14. What is the main reason for USING/NOT USING the Channel Tunnel services?

a) Cost b) Time c) Reliabilty d) Frequency e) Other

Part 4. - Broader implications of the Channel Tunnel on freight flows.

15. Has the opening of the Channel Tunnel changed any of the following:

. a) Location of transport/distribution depots.

b) Location or volume of stock held.

c) Balance of traffic between Cross Channel and other corridors.

d) Balance of traffic between road and rail modes..

16. Effect on UK-European transport costs and rates.

a) Change in Cross Channel ferry charges.

b) Change in ferry charges on North Sea routes

c) Change in ferry charges on South Channel routes.

d) Change in charges for through rail transport.

17. To what extent is the Tunnel competitive in terms of cost and service for your European traffics (%).

a) Shuttle services.

b) lntermodal rail services.

c) Rail wagonload services.

d) Are there any barriers to
using b) or c).

18. Any other comments on the Channel Tunnel and its effect on UK-European transport.

APPENDIX 2

IMPACT OF THE CHANNEL TUNNEL - POSTAL SURVEY QUESTIONNAIRE

IMPACT OF THE CHANNEL TUNNEL - POSTAL SURVEY.

Could you please tell us about your traffic between the U.K. and Europe during 1995. with some comparisons with 1993. We would also ask you to provide information on the extent to which you use services through the Channel Tunnel. Only approximate data are required. .

		Outward from UK	Inward to UK	Measure (units/ tonnes)
1.	Quantity per month (all European traffic)	……	……	……

2. During 1995 which of the Channel Tunnel services,if any, does your freight use per month?

		Units pcm	Tonnes pcm
a)	Le Shuttle (accompanied lorries)		
b)	Intermodal through rail services		
c)	Classic rail wagon services'		

3. During 1995 which ferry services,if any, does your freight use per month?

		Units pcm	Tonnes pcm
a)	Cross Channel (to Belgium ports and French ports to Dieppe)	…..	…..
b)	South Channel (to ports west of Dieppe)	…..	…..
c)	North Sea (to Dutch ports northwards)	…..	…..

4. Which routes did similar traffic to that in Q3 a)-c) use during 1993.

		Units pcm	Tonnes pcm
a)	Cross Channel (to Belgium ports and French ports to Dieppe)	…..	……
b)	South Channel (to ports west of Dieppe)	…..	……
c)	North Sea (to Dutch ports northwards)	…..	……
d)	Traffic did not move in 1993		

5. Please give your name: .... Position: ....

Company name & address: .... Do you require a copy of the results:

…... Yes / No

Thank you for completing this questionnaire. Please return it to Institute for Transport Studies, University of Leeds, FREEPOST LS3018, Leeds LS2 IYY using the envelope supplied.