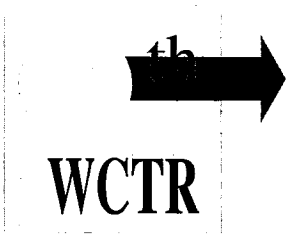

THE PRIVATISATION OF PASSENGER RAIL SERVICES IN GREAT BRITAIN: AN EVALUATION OF COMPETITION FOR THE MARKET AND COMPETITION IN THE MARKET

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Abstract

The background to the research reported here is the reorganisation and privatisation of passenger rail services in Great Britain. This process, enacted by the 1993 Railways Act, made provision for competition in the supply of passenger rail services by fostering competition *for* the market through a process of franchising, and competition *in* the market by allowing for the possibility of on-track competition. The attempt to couple both forms of competition is novel and complex, and warrants investigation.

In this paper we provide a background to the privatisation process and report on the results of models that we have developed to predict and assess the outcome of off-track and on-track competition. On this basis we highlight the principal gains and losses brought about as a result of the regulatory changes and make some suggestions of how rail privatisation could be improved.

INTRODUCTION AND OBJECTIVES

The last 15 years of industrial policy towards nationalised industries in the UK has been dominated by the related trends of deregulation, commercialisation and privatisation. The 1993 railways Act extended this process by providing for the privatisation of the former British Railways. In a bid to foster competition in the supply of rail services, the Act led to a series of complex changes involving the vertical separation of operations from infrastructure, the horizontal separation of passenger railway services into 25 train operating units, the franchising of these units and the sale of assets through stock market floatation in the case of infrastructure and through outright sale for rolling stock. These changes, coupled with a provision in the Act for the lifting of entry controls, create a novel environment in which it is possible for both competition *for* the market through franchising and competition *in* the market through open access operation to coexist. The combination of these two forms of competition is novel and warrants investigation. It is therefore the aim of this paper to assess the privatisation process with particular reference to both forms of competition and to evaluate how future events might unfold.

In the following section we present the background to privatisation, documenting what was done and why it was done. This examination will make particular reference to horizontal and vertical separation and open access, where we will review the first round of franchising and the sale of other former British Rail businesses. In Section 3 we outline the research methodology used to assess on-track and off-track competition. Here we describe an extensive data collection exercise involving 428 interviews and 1,531 self completion questionnaires. In Section 4 we explain the structures of our econometric models, define a set of plausible competitive scenarios and show their simulated outcomes. The results are shown in terms of changes in overall economic welfare together with a disaggregation of the principal gains and losses with particular reference to the taxpayer, the consumer and the operators. Where possible, model forecasts are validated on actual events. In conclusion, we list the most important lessons that can be learned from the privatisation process.

BACKGROUND

The rationale behind privatisation was to introduce competition into the rail industry; the idea being to promote efficiency and innovation as well as transferring the heavy financial burden of rail investment from the Treasury to the private sector. In short, this process involved the restructuring of the rail industry into potentially profitable units which were privatised by outright sale and non-profitable units which were privatised by franchising. For the passenger business, this policy had three main implications. These are discussed in turn.

Vertical Separation of Infrastructure from Operations

British Rail was vertically separated, with separate bodies established for infrastructure and signalling (Railtrack), for rolling stock leasing (the ROSCOs), for train and track maintenance and for a host of other functions. These separate bodies came into being on 1 April 1994 and are now in the private sector. Railtrack was floated on the stock exchange on 28 May 1996 raising an estimated £1.96 billion. The sale of the rolling stock leasing companies (ROSCOs) raised £1.8 billion and the sales of the infrastructure supply companies (ISCOs), the trainload freight companies, the train maintenance companies and the service companies were sold for an estimated £775 million. In total, the successful sale of these businesses is thought to have generated more than £4.5 billion for the Treasury.

In addition to creating a profitable set of supply companies that could be sold to the private sector - one of the main aims of the British reforms (Foster, 1994) - the separation of infrastructure from operations and the use of operating contracts for rolling stock, considerably reduce the start-up costs of providing passenger rail services. This reduction to barriers of entry and exit is likely to increase the attractiveness of franchises and open access operation but it is not without drawbacks. Firstly, infrastructure is under monopoly control which needs tight regulation and secondly there are considerable problems in determining track access charges, especially if open access is permitted.

Horizontal Separation and Franchising

A unique aspect to British Rail's privatisation was the transfer of businesses to the private sector that had little chance of making a profit. In 1993/4 British Rail's passenger business as a whole only covered 72% of its costs (BRB, 1994). Moreover, subsequent changes to the charging regime for infrastructure and rolling stock led to the belief that only one passenger business (Gatwick Express) was profitable at the outset of the privatisation process (Dodgson, 1994). The solution to this problem was one which was first proposed in general terms by Chadwick (Chadwick, 1859), namely to hold an auction for the subsidy required to operate the rail services. For rail, this process has become known as franchising.

The passenger business of British Rail was horizontally separated into 25 geographically based train operating companies. These businesses were then privatised via a franchising regime administered by the Office of Passenger Rail Franchising (OPRAF). The announcement of the first franchises to pass into the private sector was made in December 1995, whilst the announcement of the completion of the franchising process was made in February 1997.

Once certain specific quality thresholds were met, franchises were awarded to those companies that asked for lowest amount of subsidy. The results of this process are presented in Table 1. The main feature of this Table is that subsidy in the first year is forecast to be around £2.1 billion. This compares to the £545 million subsidy the industry received in 1993/4 (Public Service Obligations and Section 20 payments from Passenger Transport Executives). By the end of the franchise periods (which range from 2003 to 2012) the subsidy will be reduced to around £530 million (i.e. very close to the 1993/4 level).

Although a relatively small number of organisations were involved in the bidding, it had the appearance of being very competitive, with typically four serious bids per contract. The successful bidders which have gained franchises are predominantly bus operators, (15 out of 25 franchises) with a small number of management buyouts (four franchises). Virgin, a French conglomerate (Companie Generale des Eaux), Sea Containers and a consultancy-led company (GB Rail) were the other successful purchasers. The dominance of bus companies has raised concern about the lack of competition where the new railway franchise operator is also the major bus operator in particular districts. However, it should also be noted that this situation has opened up some opportunities for single companies to run interconnecting train and bus services where previously such routes were not provided (Willich, 1996). An example is in the Oxford area where the Go-Ahead Group operates Thames Train services and the main bus companies in the area.

It is interesting that the franchising and privatisation processes have resulted in a major concentration of ownership amongst a few operators. By revenue, the largest operations are Connex, Virgin, National Express and Stagecoach, accounting for 54% of all revenue. However, Virgin and National Express are both partners in London and Continental Railways, the consortium that bought European Passenger Railways. Moreover, Great Western Holdings and First Bus are partners. If these alliances are taken into account the top four operators become Virgin/National Express, Connex, Great Western/Firstbus and Stagecoach with 69% of all revenue.

Table 1 - The Franchise Awards (Current Prices)

Franchise	Franchisee	Franchise Length (years)	Subsidy Year One (£m)	Subsidy Final Year (£m)
Great Western	MEBO with 3I and FirstBus	10†	61.9	28.3
South West Trains	Stagecoach Holdings Plc	7	63.3	35.7
East Coast Main Line	Sea Containers	7	67.3	0
Midland Mainline	National Express	10†	17.6	-10.2
Gatwick Express	National Express	15†	-4.1	-23.1
LTS Rail	Prism	15†	31.1	11.7
South Central	Connex	7	92.8	35.9
Chiltern Railways	MBO with 3I and John Laing	7	17.4	3.3
South East Trains	Connex	15	136.1	-1.3
South Wales & West	Prism	7yrs 6mths	84.6	39.2
Cardiff Railways	Prism	7yrs 6mths	22.5	13.6
Thames Trains	Go-Ahead with MBO	7yrs 6mths	43.7	0
Island Railways	Stagecoach	5	2.3	1.8
North Western	G&W Holdings	7yrs 1mth	192.9	125.5
Regional Railways North East	MTL	7yrs 1mth	231.1	145.6
North London Railways	National Express	7yrs 6mths	55.0	15.8
Thameslink	GOVIA	7yrs 1mth	18.5	-28.4
West Coast Main Line	Virgin	15	94.4	-220.3
ScotRail	National Express	7	297.1	202.5
Central	National Express	7yrs 1mth	204.4	132.6
CrossCountry Trains	Virgin	15	130.0	-10.3
Anglia	GB Railways	7yrs 3mth	41.0	6.3
Great Eastern	FirstBus	7yrs 3mth	41.3	-9.5
West Anglia & Great Northern	Prism	7yrs 3mth	72.6	-25.5
Merseyrail	MTL	7yrs 2mth	87.6	60.8
TOTAL			2102.4	530.0

Notes:
Negative Subsidies indicate payment of a premium.
† conditional on delivery of franchise plan commitments on rolling stock investment
Source: OPRAF Annual Reports and Accounts 1996-97

Open Access and On-track Competition

With regard to open access, the Rail Regulator has so far limited competition to routes accounting for less than 0.2% of a franchisee's revenue or on which no through service is operated. He is currently consulting on a proposal that this should rise to 20% in 1999; a further review of policy with the possibility of continued incremental change would take place in 2002 (ORR, 1997). Actual on-track competition in the privatised market has therefore been restricted to areas where franchises overlap and areas where parallel routes exist. Here, competition has largely centred on innovative ticketing (e.g. group travel tickets) and marketing schemes (e.g. EXCEL rail miles).

The possibility of open access competition has continued to stimulate a considerable amount of discussion. Early analysis of the Rail Regulator's consultation process on the future of rail competition shows that there is significant support for relaxing the existing restraints so long as tight regulation is maintained (LTT, 2 January 1998). Although the conclusions of the consultation exercise are not expected until March 1998, early reports indicate that there is support for the view that existing competition rules may be preventing the emergence of new services.

If on-track competition does arise, we believe that rail operators are likely to take pre-emptive action to deter new entrants and compete fiercely where entry occurs. Among the competitive strategies likely to be adopted are: improved service frequency, fare reduction, greater customer care and on-board facilities,

improved brand loyalty and restricted access to common ticketing arrangements. Indeed, arguably these strategies are already embodied in many of the franchise bids. The implications that these strategies will have on economic welfare and operator profitability are explored in Section 4.

METHODOLOGY

The starting point of our research centred on extensive data collection. This exercise involved undertaking 428 stated preference interviews and collecting 1,532 revealed preference questionnaires. The aim being to focus on two forms of competition: competition for the market (off-track competition) and competition in the market (on-track competition).

Off-Track Competition

Between May and November 1995, we conducted in-depth interviews with 38 potential franchisees; 20 of whom were directors of British Rail Train Operating Units, 7 from large bus companies and 11 from other rail-based institutions (e.g. OPRAF, Railway Industry Association, Railtrack). Although somewhat biased towards former British Rail directors, on analysis our sample includes decision-makers from 8 of the 13 successful bidders. The purpose of the interviews was to obtain bidding preferences for alternative franchise specifications in a hypothetical bidding experiment as well as discussing more generally issues arising from the privatisation of British Rail. The overall objective was to identify what would make for an attractive franchise from a franchisee's perspective.

From earlier review work, we identified four attributes of a franchise that were worthy of detailed quantitative analysis in a Stated Preference (SP) bidding experiment. These were:

(i) subsidy requirement;
(ii) contract length;
(iii) exclusivity (with and without open access competition); and
(iv) degree of regulatory control.

The design was customised in that respondents could choose from experiments for five different franchises: South West Trains, Chiltern, Inter City East Coast (ICEC), Inter City West Coast (ICWC) and ScotRail. This, in effect, meant that a fifth attribute, that of contract type/size, could be examined. This work is described in detail by Preston and Whelan, 1995, 1996, and Preston *et al.*, 1996.

On-Track Competition

The second tranche of survey work was aimed at the development of a rail operations model and evaluator to be used in the analysis of on-track competition. To facilitate an assessment of the demand implications of open access competition we need to be able to forecast how rail travellers will respond to changes in train timetables, fares, ticket availability, journey time and interchange requirement. This information will allow us to assign any given person with given desired outward and return leg departure times to particular services and ticket type.

Information on passengers' ideal departure times for both outward and return legs of their journey and information on passengers' sensitivity to a host of rail attributes were gathered via an extensive data collection exercise involving a self completion questionnaire and two computerised stated preference (SP) interviews.

The self completion questionnaire survey was conducted on board all trains operating on the study route on Tuesday 27 May 1995. "Top-up" surveys for missed trains were conducted on Tuesday 5 September 1995. A total of 1531 responses were obtained. This survey provides the data for our revealed preference (RP) models and provides the basis of our forecasting procedure which is based on sample enumeration.

The first of the two SP experiments was aimed at assessing passengers' choice of ticket type. It involved two sections. Firstly, introductory questions sought information on preferred departure times for both legs of the journey, ticket type and other socio-economic characteristics. This information was then used in the design of a stated preference exercise presented in the second section of the questionnaire. This exercise asked respondents to choose between open, saver and apex tickets, each offering different fares, advanced purchase requirement and time restrictions on usage, and not travelling by train.

The second of the two SP experiments was aimed at assessing passengers choice of class and mode of travel. Once again the experiment involved two sections. The first section collected background information on journey and individual characteristics as above, but also on class of travel and access times to stations. The second section of the questionnaire presented a stated preference exercise offering a choice between train first class, train standard class, car and either air for business travellers or coach for non-business travellers.

The overall approach thus involved SP data on choice of mode, SP data on ticket type, and RP data on choice of ticket type and mode.

RESULTS

Off-Track Competition

Our assessment of off-track competition draws on data collected during the in-depth interview process conducted with potential franchisees and described above. In total, the hypothetical bidding game yielded a data set of 511 preferences and 1022 bids from 33 respondents. This data was analysed using a multinomial logit model in order to establish managers' preferences with respect to contract size and length, exclusivity, and the degree of regulatory control. The results from the model are shown in Table 2.

Table 2 - Results of the Franchising SP Experiment

VARIABLE	Coefficients and associated t-statistics (in brackets)				
	ICEC	ICWC	SCOTRAIL	CHILTERN	SOUTH WEST
Franchise Dummy	-3.181 (3.1)	-6.295 (3.6)	-35.78 (8.6)	-11.68 (8.2)	-11.68 (8.2)
Subsidy	0.1118 (4.1)	0.1118 (4.1)	0.1931 (8.8)	0.3568 (9.1)	0.1931 (8.8)
Franchise Length	0.0776 (2.0)	0.1750 (2.3)	0.01718 (0.4)	0.3083 (5.4)	0.1084 (3.1)
Exclusivity	0.6220 (2.3)	1.222 (6.0)	1.222 (6.0)	1.222 (6.0)	1.222 (6.0)
Regulation	-0.4922 (2.6)	-1.282 (4.1)	-1.282 (4.1)	-2.495 (5.4)	-0.4922 (2.6)
Percentage of responses	30	7	18	17	28
No. of Observations	1022				
Rho Squared (q)	0.1690				

The model has a respectable overall fit and has intuitively correctly signed coefficients that, with one exception, are significant at the usual 5% level. Parameter estimates show that there is a preference for longer franchises. We estimate that extending franchises by five years (from 7 years to 12 years) would reduce subsidy requirements for an average franchise by around £3.8 million per annum. There was a strong preference for franchises to be exclusive, as this would reduce the subsidy required for a typical franchise by around £6.5 million per annum. There was some evidence to suggest that open access competition (i.e. non exclusivity) is most expected on InterCity routes. The proposed regulatory regime was seen by our interviewees as being excessive. It is estimated that a more liberal regime would lead to reductions in subsidy for a typical franchise of around £6.4 million per annum. Overall, our analysis suggests that a move to longer (12 year), exclusive and loosely regulated franchises could lead to an annual subsidy reduction of up to £415 million compared to the proposed regime (a decrease in the total subsidy bill of some 21%) . In the event, seven of the 25 franchises have been awarded for 10 years or more, whilst some form of exclusivity has been guaranteed until 2002.

Analysis of data from the in-depth interviews told us that competition for franchises was expected to be relatively intense with 3 to 5 bids per franchise, one of which would be a Management Buy-Out (MBO) - this has indeed been the case. A period of consolidation was expected with the industry re-agglomerating into around four groups. This is already happening in that the 25 franchises have been won by 11 separate organisations. This may have implications for off-track competition in the future. Our analysis suggests that if there are only one or two bids per franchise subsidy requirements are likely to increase. Our results suggest that bidders prefer relatively self-contained and/or recently upgraded routes, and that routes which require substantial investment are particularly problematic. Routes of this type turned out to be the last ones to be franchised. Our interviews also indicated that those from outside the industry were more bullish about the prospects for cost reductions and revenue increases than insiders. This has been validated by subsequent events in that only three of the 25 franchises have been won by MBOs.

Winning bid forecasts based on up-to-date financial information were estimated and validated with data on actual bids. Initially forecasts were made for the five franchised outlined in the experiment but subsequent forecasts have been made for all franchises. For franchises not covered in the experiment, forecasts were made by applying the parameter estimates of a closely resembling "experiment franchise" and adjusting the franchise specific constant to take account of pre-privatisation base subsidy requirement. Table 3 shows the results of this exercise.

It can be seen that franchises let at the outset of the franchising program were generally awarded for less than their forecast "market" value, whereas franchises awarded towards the end of the process were awarded for substantially higher that their forecast market value. Anecdotal evidence explaining this phenomenon suggests that the degree of risk associated with making a bid during the initial franchising tranches was high due to high levels of uncertainty surrounding the process. Potential franchisees therefore needed to be compensated for bearing this risk. As the franchising process advanced, however, players began to understand the system thereby reducing uncertainty. This reduced risk, coupled with an increase in the likelihood that if potential franchisees were unsuccessful they may have to wait seven years to bid for another, lead to bids becoming progressively more optimistic.

The hypothesis that subsidy levels decrease with the order of letting was tested by regressing actual average subsidy required over the length of the franchise against forecast subsidy requirement and order of letting. The results of the regression are show in the equation below (t-statistics shown in brackets).

$$\text{Actual Average} = \underset{(14.881)}{0.889}\ \text{Forecast Average} - \underset{(1.859)}{1.972}\ \text{Order of Letting} \qquad (\text{Adj } R^2\ 0.9374)$$

It can be seen that the order franchising is almost significant at the 5% level and other things equal, the tenth group of franchises let require £18 million less subsidy per annum than the first group. This finding is similar to that detected by Harris (1997) who noted that the potential for growth, the award of longer franchises to those bidders offering new trains and the order of letting provide significant explanatory power in determining subsidy requirements.

On the basis of this analysis the winner with the biggest task appears to be Virgin. We estimate that the subsidy they will receive from Government falls short of what might be required by as much as £130 million per annum. The biggest gainer is Stagecoach who, we estimate, are receiving around £27 million per annum more than is required.

Table 3 - Forecasts of Winning Bids (£m)

FRANCHISE	Forecast Winning Bid	Actual Average	Actual - Forecast	Order of Letting
Great Western	23.37	45.10	21.73	1
South West Trains	28.85	49.50	20.65	1
Gatwick Express	-21.10	-13.60	7.40	2
East Coast Main Line	26.71	33.65	6.94	2
Midland Mainline	-10.79	3.70	14.49	2
LTS Rail	15.87	21.40	5.53	3
South Central	75.35	64.35	-11.0	3
Chiltern Railways	23.97	10.35	-13.62	4
Cardiff Railways	15.60	18.05	2.45	5
Island Railways	-3.39	2.05	5.44	5
South East Trains	101.58	67.40	-34.18	5
South Wales & West	81.34	61.90	-19.44	5
Thames Trains	35.06	21.85	-13.21	5
Anglia	29.90	23.65	-6.25	6
Cross Country	102.14	59.85	-42.29	6
Great Eastern	24.33	15.90	-8.43	6
West Anglia & Great Northern	49.85	23.55	-26.30	6
Merseyrail	73.10	74.20	1.1	7
Central	193.59	168.50	-25.09	8
North London Railways	37.45	35.40	-2.05	8
Regional Railways North East	221.45	188.35	-33.1	8
Regional Railways North West	198.62	159.20	-39.42	8
Thameslink	0.52	-4.95	-5.24	8
West Coast Main Line	25.16	-62.95	-88.11	9
ScotRail	313.16	249.80	-63.36	10
TOTAL	1661.69	1316.20	-345.49	

On-Track Competition

To facilitate an assessment of the impact of on-track competition, a rail operations model and evaluator was developed. On the demand side, the three different data sets described in 3.2 were analysed so as to build a disaggregate demand model examining the choice of ticket type, class of travel and mode of travel.

On the supply side, an accountancy cost model detailing both capital and operating costs was specified on the basis of earlier work at Leeds by Galvez (1989) and Worsey (1994). The two models coupled together provide a methodological base for the assessment of on-track competition. To the best of our knowledge a model of this scope and level of detail has not been developed before. In particular, we have calibrated a model with both RP and SP data, we have linked our model with the overall demand for rail travel, we have considered apex fares and we have considered both legs of the journey whereas previous models just look at one leg.

The template for the operations model is an actual rail line in Great Britain. For ease of modelling we have made some simplifying assumptions. The route is treated as a self contained unit incorporating eight stations with no infrastructure capacity constraints. The resultant eight by eight demand matrix is based on actual point to point demand information obtained from ticket sales data. Appropriate adjustment of these figures was taken using survey data to account for passengers travelling on the route for only part of their journey.

To simplify modelling, individuals are assumed to make their travel decisions at three linked stages (Figure 1).

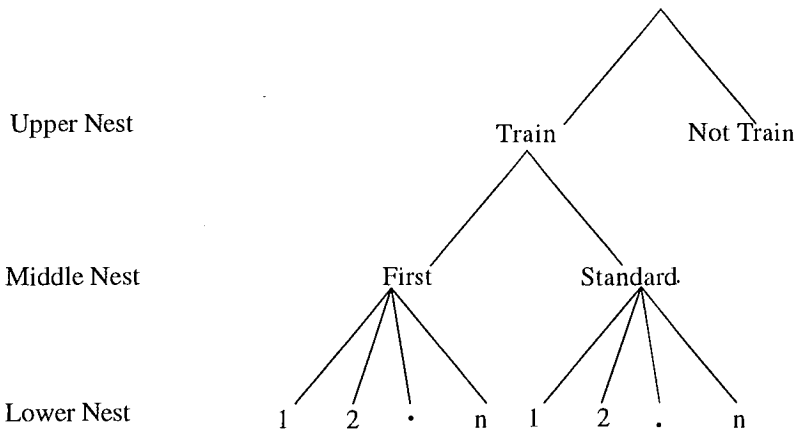

Figure 1 - Schematic representation of the final demand models

At the first level (lower nest) travellers' choice of service and ticket type is modelled using a multinomial logit model. To avoid so-called independence of irrelevant alternatives (IIA) problems, this is done by identifying the best nine return trip services available to each individual. Each return trip combination is then allocated a "utility" weight - based on fare, adjustment time (this is the difference between each respondent's most desired departure time and the actual departure time of services. Respondents can have different preferences for departing earlier or later than their most desired departure time on both legs of their journey), journey time, advanced purchase requirement and interchange. Choice probabilities are then estimated for each of the nine return trip combinations. The relative values of journey attributes for business and non-business travel are derived from all three surveys and are shown in Table 4.

The modelling process was complex and included many novel features, not least in the coupling of outward and return legs of the journey and the incorporation of advanced purchase (APEX) tickets.

Having developed models explaining the choice of service and ticket type, the next stage was to examine the choice between first and standard class travel. This was done by transforming the information required for the choice of service and ticket type in the lower nest to information that can be used in the choice between first and standard class travel by way of scaling coefficients. These so-called theta values are estimated by calculating representative utilities for each class of travel in the lower nest (expected maximum utilities) and estimating new logit models for business and non-business travel in the middle nest. These theta values are shown by Table 5.

Table 4 - Lower Nest Relative Attribute Values

	BUSINESS	NON-BUSINESS
	Value (pence)	Value (pence)
Fare	N/A.	N/A.
Adjustment time out-early (minutes)	62	13
Adjustment time out-late (minutes)	46	37
Adjustment time return-early (minutes)	117	13
Adjustment time return-late (minutes)	27	37
Advanced Purchase (days)	173	30
Journey Time (minutes)	54	2
Interchange	781	150

Table 5 - Theta Values

	Business		Non-Business	
	Parameter	t-statistic	Parameter	t-statistic
Theta	0.1134	10.3	0.2993	14.0
No. of Observations	866		584	
Rho Squared (q)	0.3827		0.0834	

The final stage to the demand modelling process is the choice between travelling by train and not travelling by train. While the lower and middle nests of the model have centred on assigning travellers to services and ticket types, the upper nest determines the size of the overall market. This is done using information relating to first and standard class travel, which in turn is related to the level of service and cost of travel, to form an expected maximum utility (or level of attractiveness) of travelling by train. Initially this model was estimated on British Rail's ticket sales data (CAPRI) covering 344 origin/destination pairs and time periods. Although this process yielded plausible results for the rail market as a whole, the process yielded inappropriate estimates for the business and non-business markets. An alternative approach was therefore taken in which the fare elasticities of demand for business and non-business travel were constrained at -0.5 and -1.0 respectively. These values were taken from the Passenger Demand Forecasting Handbook used widely in the industry and a recent competition study conducted on behalf of the MMC (Wardman, Toner and Nash, 1996).

The rail operations model and evaluator combines both demand and cost elements under a user-friendly "front end". The analyst is free to specify any combination of services from up to three operators, each having different fares and ticketing restrictions. Model output includes demand and revenue for each service, service costs, operator profit, consumer surplus and economic welfare estimates. Examples of the model's output are given by Table 6.

Table 6 - Sample Simulation Results (£ per day)

Run	Fare Entrant	Entrant Service Pattern	Inter-availability of tickets	Incumbent Profit	Entrant Profit	ΔCS Business	ΔCS Leisure	Welfare Change
11	0	1*	Y	30815	1267	1529	82	-9051
12	0	1*	N	31962	-847	891	82	-10657
19	-20%	1*	Y	12419	16670	4686	791	-8178
20	-20%	1*	N	17799	10379	3510	512	-10544
31	0	2*	Y	804	-15280	8436	3747	-36208
39	-20%	2*	Y	-33880	4514	14308	6726	-37000
61	0	2*	Y	-14004	-471	8436	3747	-36208
69	-20%	2*	Y	-60165	30800	14308	6726	-37000

Notes:
1* Entrant provides four additional return peak period services
2* Entrant matches incumbent's services, effectively doubling frequency.
11 cream skimming in the peak (0 fare discount) with transferable tickets
12 cream skimming in the peak (0 fare discount) without transferable tickets
19 cream skimming in the peak (20% fare discount) with transferable tickets
20 cream skimming in the peak (20% fare discount) without transferable tickets
31 head-on competition (0 fare discount) with transferable tickets
39 head-on competition (20% fare discount) with transferable tickets
61 head-on competition (0 fare discount) with transferable tickets, entrant only pays marginal costs
69 head-on competition (20% fare discount) with transferable tickets, entrant only pays marginal costs
The incumbent's forecast base profit is 42745.

Taking the incumbent's existing service pattern and fare structure as the base situation we attempted to look at three possible scenarios for on-the-track competition: cream skimming, major head-competition and price war. After over 100 simulation runs our work has suggested that, whilst head-on competition will be unprofitable for the entrant, cream skimming entry with a few key trains and some fare discounts may be profitable. It is possible for both operators to make a profit without discounting fares, however the entrant can improve his standing by offering discounted travel. If this were to happen it is likely that the incumbent would retaliate. Scope for head-on competition may be limited by lack of track capacity unless incumbents are forced to surrender train paths. The route being considered has major capacity constraints at both ends.

The fall in the incumbent's profit means that overall welfare is reduced in spite of an increase in consumer surplus in all competitive scenarios examined. We interpret this as follows. In the current regime, the incumbent is able to exhibit a high degree of price discrimination. In economic efficiency terms, this means that the resultant fares/service combination is close to being optimal, although there may be undesirable equity implications as the operator gains at the consumers' expense. Competition reduces the incumbents ability to price discriminate and this leads to reductions in economic efficiency. This of course assumes that competition does not have any significant effect on costs. If competition leads to a reduction in operating costs of 30% in line with the experience of industries such as refuse collection, hospital domestic services and local bus services (Domberger et al., 1986, 1987, Heseltine and Silcock, 1990), then this will more than outweigh any loss of consumer surplus. However much of the cost reduction in these industries was due to competitive tendering and arguably the franchising process will have already led to these reductions in rail costs.

A number of other issues were examined using our operations model. Firstly, although interavailable ticketing increased consumer surplus and welfare, there would be commercial incentives for the introduction of non interavailable tickets. On-the-track competition could lead to the loss of some network benefits. Secondly, our initial model runs were based on a fully allocated costing system for rail infrastructure, which results in a decline in access charges for the incumbent following entry. An alternative set of model runs were undertaken in which the entrant was only charged for the marginal cost of the infrastructure. This charging system would make head-on competition more likely, but would still lead to decreases in welfare. Thirdly, we examined quality competition by examining the prospects for a slow but cheap service operating on a parallel route. In these circumstances, the entrant could capture a significant market niche, namely early morning non-business travellers. With fares at 50% of those of the incumbent, the entrant could capture 25% of the rail market. We were not able, however, to undertake a full welfare assessment of this option as this would require data on the demand and cost characteristics of the parallel entrant.

CONCLUSIONS

Our work has suggested that off-track competition can reduce subsidy for most franchises, whilst maintaining current services and fare levels and is thus likely to be welfare positive. Larger franchises, looser regulation and protection from competition will all reduce subsidies although they may have other disadvantages. Further subsidy reductions can be achieved, but they may be at the expense of fare increases and service reductions, with uncertain welfare implications.

Our work has suggested that the most likely form of on-track competition is cream skimming. This can increase benefits to users but reduces welfare because of reductions in producer surpluses. There may be some instances where on-track competition leads to benefits due to innovative pricing and/or services but they do not feature in the tests we have run. We conclude that on-track competition is likely to be welfare negative unless it is very carefully regulated to prevent cream skimming behaviour. Moreover, the interaction with off-track competition is likely to lead to higher subsidy requirements.

However, we would acknowledge that is too early to make pronouncements on the success or otherwise of the privatisation process. If the current reform programme is maintained there will be major changes in the beginning of the next millennium as open access is reviewed, franchises come up for renewal and the ROSCO and Railtrack access contracts come to an end. It will be another ten years before we can tell whether the current reform programme has worked or not.

ACKNOWLEDGEMENTS

This work was undertaken as part of an Economic and Social Research Council Project entitled *The Privatisation of Passenger Rail Services: Analysis and Monitoring* [R000234735]. We would like to thank our colleagues Tony Fowkes, Jeremy Shires, Stephen Clark, Yim Ling Sui, Mark Cobbett, David Taylor and Jeremy Toner who assisted in various ways in developing the ideas expressed in this paper. We would also like to thank all those who participated in the surveys who, for reasons of commercial confidentiality, must remain anonymous .

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