1 Introduction

1.1 Evolution of the privatised freight railway in the UK

The traditional view of the railway industry was that of natural monopoly, in that the technical conditions of supply allowed BR as a vertically integrated operator to supply rail markets at a lower cost than multiple operators. However, work by Starkie (1986) on opportunities for developing contestable markets in rail transport established that the natural monopoly elements of the industry (such as track and signalling) were associated with the provision of infrastructure and not with the provision of rail services which were regarded as being potentially contestable even when actual competition was minimal. The best way in which competition could be increased was, it appeared, to divide ownership of infrastructure from service provision; the privatisation of the new railway undertakings was considered an adjunct to such reforms.

1.2 Railways Act 1993

The cornerstone of rail privatisation policy in the UK was the Railways Act 1993 which led to the following important changes in the structure of rail freight markets:

- the vertical separation of infrastructure from rail freight operations and the formation of Railtrack;
- the sale of various BR freight businesses to the private sector;
- the establishment of ‘open access’ rights onto the Railtrack network for independent rail freight operating companies;
- the creation of a regulatory framework (designed to influence the behaviour of key industry players as well as protecting freight users’ interests) and the formation of an Office of the Rail Regulator (ORR).

1.3 The privatisation of BR’s trainload freight operations

BR’s freight businesses have been sold to two freight operating companies, each with its own portfolio of customers:

- English, Welsh & Scottish Railways (EWS) has acquired BR’s trainload freight, Royal Mail, Channel Tunnel and Distribution services. EWS is a consortium whose principal partner is the Wisconsin Central Transportation Corporation, a major US ‘Regional Railroad’
- Freightliner is responsible for the inland distribution of both deep sea and domestic containers by rail to and from ports and container terminals. Sold to management-buy-out group ‘Management Consortium Bid Limited’ in May 1996, the company currently enjoys something of a monopoly position given that its existing routes were ringfenced on privatisation. This position is under threat with EWS now beginning to operate intermodal services between key locations.

1.4 ‘Open access’ competition

In its proposals for privatising BR’s rail freight activities, the then government expressed an interest in developing competition within the industry stating that:

‘the introduction of open access to the rail network is central to the government’s aim of stimulating competition and customer choice in the supply of rail freight services’

(Department of Transport, 1993, p.25).

This paper examines competition in the UK rail freight industry since privatisation, particularly competition from new ‘open access’ operators. The first section of the paper sets out the research context, in terms of the evolution of the privatised freight railway in the UK. The research is set against the background of the economic Theory of Contestable Markets, which suggests that the likelihood of competition depends critically on the strength of barriers to entry into the market. If barriers to entry are high, then market entry strategies must centre on how such barriers can be overcome and the costs incurred in overcoming them. The paper therefore proceeds to identify the key barriers to entry and their significance, using the following approaches: a priori reasoning as to likely barriers in the light of the Theory of Contestable Markets and the inherent nature of rail freight networks and operations; findings from a survey of the UK rail freight industry on perceived entry barriers and likely methods of market entry, undertaken at the time of privatisation; case study analysis of the two UK examples of ‘open access’ market entry to date, concentrating on the important entry barriers in each case. These two case studies are further developed to examine how barriers to entry were overcome and how successful the entry strategies have proved to be. Similarities and contrasts between the entry strategies of the two ‘open access’ operators are emphasised. Synthesis of the findings from these approaches allows some final observations to be made regarding the success or otherwise of UK rail privatisation as a catalyst for competition in the rail freight market, particularly through the emergence of new ‘open access’ operators.

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In reality, the government had little choice but to adopt the provisions of various EU directives in this respect, such as 91/440 on the development of the Community's railways, and more recently Directives 95/18 (on operator licenses) and 95/19 (on charging for track capacity). Anxious to divert attention away from critics who questioned the wisdom of breaking up and selling off BR, the government publicly embraced on-rail competition as a way in which efficiency levels could be increased and rail's (poor) market position improved.

To date, however, only two companies have taken advantage of the 'open access' rights granted under Section 17 (1) of the Railways Act. These cases are discussed in sections 4 to 6 below.

1.5 Contestable markets: rail freight operations and likely barriers to entry

The relevance and potential application of the Theory of Contestable Markets to the rail freight market has been discussed in detail in previous papers (Brewer, 1994, Brewer, 1996b). The broad conclusion from these papers is that the rail freight market is somewhat less than fully contestable, due to the existence of significant numbers of barriers to entry, some of which are relatively severe. This paper discusses the most significant of these barriers, under three headings:

- barriers identified through a priori reasoning (discussed in section 2 below)
- barriers identified by respondents to a questionnaire survey (discussed in section 3)
- barriers substantiated through case studies of 'open access' operators (sections 4-6).

2 Barriers to entry a priori

The decision to vertically separate rail infrastructure from rail freight operations theoretically points to contestable rail freight operations in the UK. Inspection of the rail industry reveals several characteristics which run counter to the basic tenets of market contestability, however. Brewer (1996b) identified a number of potential impediments to the development of contestable markets in UK rail freight transport, a priori, and these are dealt with here briefly under the following sub-headings.

2.1 Experience

Experience would appear to be important at all levels from senior management experience to train planning, driver route knowledge, locomotive maintenance etc. Both EWS and Freightliner have considerable knowledge and experience in all aspects of rail freight transport, and to acquire such experience potential entrants are likely to incur substantial sunk costs.

2.2 Technology

Broadly defined, this would cover a wide range of issues, including:
- the virtually non-existent market for second-hand engines certified for Railtrack use
- the lack of an effective leasing market for locomotives
- the restrictive UK loading gauge and the incompatibility of power supplies and infrastructure, preventing the use of continental European traction in the UK
- long lead times in purchasing traction
- the difficulties and costs involved in obtaining a 'safety case' and an operators licence
- the likelihood that larger established operators can benefit from economies of scale with respect to traffic density and the benefits of fleet standardisation.

2.3 Pricing, regulation and charging for track access

At the outset, the level of prices, the methods of pricing and the allocation of track capacity were all regarded as presenting serious barriers to entry for possible market entrants. Prohibitively expensive track access charges were anticipated, given the requirement of Railtrack to achieve a target rate of return on its capital. Its decision to adopt a pricing regime based on negotiation between users and itself, and not on a public tariff, was also considered by some potential operators and users as providing the basis for undue discrimination. Furthermore, such operators considered themselves at a disadvantage when it came to acquiring train paths for freight services, given perceived track capacity bottlenecks.

All these a priori barriers listed above suggest that 'hit and run' entry in rail freight markets is highly unlikely, and indeed none has occurred to date.

3 Barriers to entry: questionnaire survey findings

3.1 Survey of the rail freight industry

This section summarises the results of a survey of rail freight users and other relevant organisations on likely industry conditions post privatisation. This survey, undertaken at the time of privatisation, sought to establish respondents' views on the nature and likelihood of impediments to contestable rail freight markets. Full survey results are to be found in Brewer (1996b).

From a list of 23 potential barriers to entry and exit (derived from the initial a priori analysis) respondents were asked to state whether or not they believed that these were indeed barriers. If respondents positively identified factors as barriers, they were then asked to estimate that barrier's importance using a Likert scale of 1 (most important) to 5 (least important).

3.2 Survey findings

Respondents generally believed that a significant number of barriers existed. Sixteen separate barriers were all cited by more than half of the respondents to the survey. Of particular importance to respondents was the fact that EWS, the incumbent rail freight operator, had been granted first choice over ex-BR traction.

In terms of the perceived severity of barriers to entry, some 20 barriers were given an average weighting of less than 3 (the mid-point of the Likert scale). The five most severe barriers all featured amongst the 15 most commonly cited bar-
riers, signifying that several barriers were both commonly accepted and regarded as important. On this basis, the following barriers appeared to be particularly important:

- technical restrictions imposed by Railtrack as part of rolling stock registration
- perceived level of track access charges
- method of charging for track access
- economies scale with respect to traffic density
- expense and lead times associated with the purchase of new traction
- exemption of private siding facilities from track agreements
- incumbent cross-subsidises contracts within existing portfolio of traffics
- access to appropriate train paths
- the need to obtain trained drivers and staff
- cost and/or time involved in obtaining a ‘safety case’ and operators licence.

As part of the exercise, survey respondents were given the opportunity to suggest additional barriers to entry. The following barriers were suggested:

- increased bureaucracy in the market (i.e. the imposition of extensive contractual arrangements between operators and the different elements of the industry)
- the need to obtain (and update) route knowledge for drivers
- risk and uncertainty in the market place and its concomitant effects on investment decisions and market entry
- the impact of Railtrack having to achieve a target rate of return on its capital
- a lack of management expertise in various technological, commercial and operational aspects of rail freight transport.

3.3 Interpretation of results

There are a number of important caveats when interpreting the findings from this survey:

- Standard deviations of the weights attached to certain barriers are relatively large in comparison to the mean values, indicating that for some barriers little confidence can be attached to the values for barrier heights. The barriers relating to the expected pricing policies of EWS, to Railtrack’s method of charging for track access and to EWS having first choice of ex-BR traction are the three primary examples of barriers with high co-efficients of variation
- Relatively high correlations between the weights attached to certain pairs of barriers.

Nevertheless, the following broad conclusions can be drawn:

- barriers to entry and exit are regarded by respondents overall as being commonplace, and in many cases are likely to pose significant impediments to most potential operators
- there is broad consensus that certain barriers are very significant
- most respondents considered entry conditions to be either ‘not very easy’ or ‘not at all easy’, although two-thirds believed there would be some ‘open access’ entry, coming from organisations completely new to the industry, operating on a sub-contract basis
- as a result it is very unlikely that EWS will be susceptible to ‘hit and run’ entry given the absence of many of the conditions required for such entry to take place in the industry.

The survey findings demonstrate that in general terms rail freight markets are not structurally contestable and that many of the theory’s strict assumptions do not hold. Although the industry has become more contestable since its reform, Railtrack is unlikely to achieve its target of having 10% of its rail freight revenue generated by ‘open access’ operators within five years unless certain key network barriers are overcome. The extent to which potential competition can influence the levels of efficiency, profitability and technical innovation in the current market will undoubtedly remain limited as long as such impediments to entry exist.

Despite the various difficulties one may encounter in using contestability theory for such empirical research, the theory provides a valuable framework for analysing the effects of liberalisation. It highlights the importance of sunk costs, barriers to entry and the pricing practices of incumbent operators as key determinants of entry, and emphasises the beneficial role that potential competition can play in improving rail freight performance. Where barriers to entry remain, however, the threat of entry is unlikely to constrain the behaviour of dominant incumbents.

4 Case studies of ‘open access’

4.1 National Power

4.1.1 Introduction

National Power plc is both the country’s largest supplier of electricity to the National Grid (with approximately 60% market share of coal burnt in 1997/98) and EWS’ biggest freight customer. The company operates coal-fired stations in addition to several gas, oil, hydroelectric and wind powered plants.

National Power was the first rail user to take advantage of the rights of ‘open access’ to the Railtrack network. As a result of changes brought about by the privatisation of both the electricity generating and railway industries, the company decided to invest £20 million in its own rail freight operation, with its first train running in November 1995 (Railway Gazette International, April 1996). Although the company’s foray into rail operation was short-lived, with its sale to EWS taking place in April 1998, it is nonetheless important to record the company’s experiences with ‘open access’ entry.
The company uses rail extensively for the movement of coal to its various coal-fired power stations. The movement of coal from the Selby coalfield to the company's Drax Power Station in Yorkshire (the largest in Western Europe) represents the largest single flow of coal moved by rail in the UK (Railway Gazette International, April 1996). Rail is also used to move coal to the Yorkshire power stations from Scotland and North East England.

Since commission of a flue gas desulphurisation plant at Drax power station, large amounts of limestone have been moved by rail from quarries in the Peak District.

Between November 1995 and April 1998, National Power ran its own network of coal services linking the Selby and South Yorkshire coalfields with the company's Drax and Eggborough power stations. By the end of March 1998, traffic levels had amounted to some 7.5 million tonnes. Towards the end of the 'open access' operation, National Power trains were also used to move coal to Yorkshire from North East England. National Power trains also delivered limestone to Drax from the Peak District, although this flow used EWS train crews.

4.1.2 Reasons for market entry

The principal reason why National Power became a rail operator was to reduce rail transport costs and gain a competitive advantage over PowerGen in the electricity generation market. The movement of coal to power stations has, in the past, represented a near captive market for rail with British Rail generating substantial profits from such traffic. Since privatisation of the electricity generation industry, companies have had to review costs constantly in order to remain competitive. Rail transport accounts for around 10% of the delivered cost of a tonne of coal, hence the costs associated with moving coal by rail have come under close scrutiny in recent years (Railway Gazette International, April 1996).

National Power secured significant savings in its rail transport costs on those flows handled by its own-house rail operation, with major improvements in service quality. Investment in high performance traction and rolling stock and the adoption of flexible crew operating practices made major contributions towards these cost savings.

The long-term contract signed with BR had stipulated the movement of minimum tonnages of coal. Given that the volume of coal required for burning was often in excess of that stipulated minimum, National Power was able to honour the terms and conditions of the original contract whilst at the same time running its own trains. The company ran trains in place of those trains which were provided by BR on a 'spot-bid' basis. The ability to serve power stations with its own trains acted as a powerful bargaining tool during contract renewal negotiations with EWS and was the primary reason why EWS bought out the operation in 1997.

4.1.3 EWS services since April 1998

The acquisition of National Power's rail operation by EWS in April 1998 coincided with the commencement of the company's new contract with RJB Mining for the purchase of coal. The new agreement involves the purchase and movement of considerably smaller tonnages of coal by rail than under previous arrangements. There are three reasons for this reduction, namely:

- Structural changes within the electricity generating industry. As part of a policy by the Electricity Regulator to reduce excess generating capacity in the industry, the company's rail served power stations at Aberthaw, Ironbridge and Rugeley, with a total capacity of 4,000 MW, were sold in April 1996.
- Greater substitution of gas for coal. Recently the energy market has been characterised by the greater use of gas fired capacity (the 'dash for gas'). Despite the low cost of UK mined coal, National Power has constructed several new gas-fired plants to replace some of the company's smaller coal-fired stations. Gas burning stations, in comparison, are both considerably cheaper to build and run and do not require the installation of expensive flue gas desulphurisation equipment.
- The need to maintain globally agreed pollution standards. International agreements to limit atmospheric pollution will militate against the continued use of coal-fired power stations which are not fitted with flue gas desulphurisation equipment.

4.2 British Nuclear Fuels Limited (BNFL)

4.2.1 Introduction

BNFL is the state owned nuclear waste reprocessing organisation based at Sellafield in west Cumbria. Its principal rail freight flows are as follows;

- transport of flasks of spent fuel to Sellafield from some ten UK nuclear power stations
- rail movement of imported flasks of spent fuel to Sellafield from Barrow Docks
- nitric acid to Sellafield from Cheshire
- low-level radio-active waste (such as contaminated equipment and various solids) from Sellafield to nearby Drigg.

In 1994 against the background of impending rail freight privatisation, BNFL decided to establish its own rail freight subsidiary entitled Direct Rail Services (DRS). Commercial operations commenced in January 1996 when DRS took over the flows of nitric acid from Cheshire. Later that year the company's track access agreement was extended, firstly to cover the movement of empty wagons to Barrow Docks and subsequently to cover the return workings of loaded trains to the processing plant.

4.2.2 Reasons for market entry

Two key factors influenced the BNFL decision to establish DRS:

- Opportunities presented by 'open access' entry. For various reasons, the company considered itself to be a cap-
tive BR customer, susceptible to high rail haulage rates for its traffics. With current contracts for the Barrow, Drigg and Cheshire flows due to expire at the end of December 1995, BNFL identified an opportunity to commence in-house rail services. By obtaining a 'safety case', operators licence and track access agreements, as well as purchasing and reconditioning old locomotives and employing teams of multi-skilled staff to operate services, the company has been able to reduce its rail transport costs.

- The need to maintain a vital link in the company's global supply chain. The rail service linking the BNFL import terminal at Barrow to the Sellafield plant represents a strategically important part of the company’s global supply chain for nuclear waste. With a significant proportion of the company’s business being generated abroad, BNFL was anxious to guarantee the future of this rail link to its plant.

4.2.3 Expected developments
From April 1999 DRS will assume control of the rail flows of spent fuel flasks from UK nuclear power stations to Sellafield. DRS also hires out surplus locomotives to operators such as Freightliner in order to boost revenue during periods of inactivity. Such business may prove lucrative given the undeveloped second-hand market for Railtrack registered motive power.

Looking further ahead, DRS has expressed an interest in the commercial operation of freight trains for other companies in the west Cumbria area (such as British Steel, Albright and Wilson Ltd and possibly the provision of traction for the rail services being planned by road haulier Eddie Stobart Ltd).

5 Case studies: identified barriers to entry and how they were overcome

5.1 National Power
A number of barriers to entry were identified by National Power whilst establishing its rail operation. These barriers and the strategies used to circumvent them are discussed below.

5.1.1 Access to traction and rolling stock
On privatisation, incumbent operators were granted first choice of BR locomotives and wagons. In the absence of available locomotives (and wagons) registered to run over Railtrack’s network National Power was forced to invest heavily in new traction and rolling stock. The magnitude of such investment represented a very significant barrier to entry.

A second-hand market for registered traction was practically non-existent. A Vendor Unit was established by the Department of Transport to dispose of any traction and rolling stock which was surplus to the requirements of BR. National Power was unsuccessful in obtaining suitable second-hand locomotives registered to run over the Railtrack network because BR deliberately withheld such stock in case future traffic levels justified their re-use. With no opportunities to hire suitable locomotives, the company incurred significant costs in buying new traction and rolling stock.

The company undertook a comprehensive financial appraisal to determine the feasibility of using purpose built locomotives and rolling stock. Data was collected on the performance of such stock as well as the stock used by EWS on National Power traffic, for various scenarios. Such analysis established that the running costs of the EWS equipment were considerably higher than the costs of running new stock. These cost savings were discounted over a 10 year period and compared against the initial capital costs of construction. A positive NPV was identified. Cost savings were attributable to two factors: savings on maintenance costs, and the inferior payload capabilities of EWS traction and rolling stock. With investment funds available at a preferential rate of interest and a guaranteed minimum traffic base-load in the early part of the project’s life (minimising the degree of risk associated with the project), the company proceeded to acquire new stock.

The need to purchase new traction and rolling stock appears to contravene one of the features of the theory of market contestability, that of simultaneous entry into a market when a potential entrant identifies a profitable opportunity. The fact that National Power faced a delay before entering the market indicated that the incumbent operator had some time to prepare a competitive response to entry when it took place.

Lead times associated with the purchase of new traction are relatively long. In 1992, National Power issued tenders for a heavy freight locomotive design, with stringent performance related specifications, to operate its limestone trains. The contract was awarded to General Motors Inc. of Canada. The first locomotive entered service on this traffic in April 1994. With no suitable BR locomotives available to operate its 'open access' coal trains, the company invoked an option to purchase a further five locomotives, with the first of these being in service by December 1995. Similar locomotives were already in use in the UK, enabling National Power to avoid the crippling costs and delays associated with registration (Railway Gazette International, April 1996).

Given that the company was not attempting to enter rail freight markets as an opportunistic operator (entry as characterised by the theory of contestability), having to wait for new rolling stock did not prove to be a significant barrier to entry.

5.1.2 Issues concerning access agreements, access charges and regulation
After an extensive validation process undertaken by Railtrack lasting many months, National Power was finally awarded its 'safety case'. The award demonstrated to Railtrack and others that the company met certain minimum standards of competence and safety.

A validated ‘safety case’ was essential before the National
Power could be awarded an operators licence by the Rail Regulator. The process involved the collection of basic operational data, the completion of a risk assessment of its operations, a safety policy statement and stated arrangements for monitoring of standards.

Various aspects of the "safety case" procedure were singled out by the company as being demanding, including locomotive and wagon safety and technical validation (required for rolling stock registration), validation of maintenance procedures for locomotives and wagons, and the maintenance of all equipment to Railtrack and "Engineering Link" standards. The costs involved in such activities (and therefore in acquiring an operators licence and 'safety case') were high. Consultants were employed to help prepare and submit the company's 'safety case' to Railtrack. Significant opportunity costs were also incurred in seconding a member of senior management to work on the 'safety case' over an 18 month period.

Another important issue that arose during the validation process concerned the costs of securing appropriate third-party insurance cover. Data made available on the premium payable by the company suggests that such insurance represented the largest single revenue expenditure item after track access charges.

These barriers relating to 'safety cases' and operator licences were considered to be significant impediments to market entry.

The issue of track access charges was perceived by the company as being an important impediment to entry before it began detailed negotiations with Railtrack in 1995. In the run-up to rail freight privatisation National Power, like other potential rail freight operators, feared that any efficiency savings brought about by 'open access' operations would be eliminated by Railtrack's excessive and non-transparent access charges.

Negotiations between National Power and Railtrack took place against a background of considerable uncertainty, and the company found little scope for reductions in track access charges. With National Power being the 'prime-user' on many of the routes it used in the Yorkshire area, the level of charges set reflected this fact although a modest discount was given because the company used low track force bogie wagons (which inflicted less wear and tear on track than conventional coal wagons).

The prospect of high access charges and general uncertainty surrounding the future of Railtrack were considered to be important constraints on National Power's future investment plans.

5.1.3 Presence of economies of scale

Locomotives, rolling stock and train crews tend to be subject to indivisibilities and high fixed costs and therefore maximising asset utilisation is key to achieving operational cost efficiency. An operator may be able to reduce short-run rail costs, and thus enjoy economies of density, if it is able to make more intensive use of its fixed assets.

A review of recent empirical evidence on economies of density in European and US railway networks suggests that some networks are subject to economies of density (Nash and Preston, 1992). Research on class I railroads in the US tentatively suggests that the underlying causes of density effects vary, but operating longer and heavier trains and achieving better utilisation of traction and crews appear to be important. The operation of merry-go-round services between coal mines and power stations would seem to be a prime example of an activity with such characteristics.

National Power secured cost savings on its coal flows by operating an intensive timetable of heavy payload trains. Whilst constraints existed on the company's ability to reduce costs (such as the irregular nature of demand for coal and its inability to be stored above ground for any length of time), the company maximised asset productivity by matching wagon types to different flows, by adopting 'life-cycle' maintenance procedures for rolling stock and by utilising flexible labour practises.

The requirement of the company to maximise asset utilisation appears to have been a fairly important barrier to market entry.

Maintenance and repair facilities may also exhibit economies of scale. Successive reductions in rail freight traffic in recent years have resulted in the rationalisation of the number of depots around the country. By concentrating workloads at a small number of locations EWS has been able to enjoy economies of scale in maintenance and repair costs. At such locations, the company has also been able to achieve economies of operation through the use of specialised staff and equipment.

By acquiring a fleet of virtually maintenance free traction and rolling stock, National Power's investment in maintenance and repair facilities was minimised. 'Life-cycle' maintenance procedures for traction and rolling stock ensured maximum stock productivity, with minimal capital expenditure involved in setting up the company's depot (most component overhauls and examinations being contracted out to third parties). As a result, any cost disadvantages suffered by the company were likely to be minimal.

EWS, as a large national operator, has stand-by locomotives, wagons and crews to maintain its services in the event of breakdowns and can hold a smaller proportion of its fleets in reserve than National Power needed to do. However this appears to have been a relatively minor consideration. Rolling stock purchased by National Power was of a significantly higher specification than that used by EWS, with little need for provision of stock on stand-by. In the event of locomotive failure, traction could be hired from EWS.

5.1.4 Issues relating to experience

The issue of recruiting key personnel with knowledge of the routes used by freight trains was initially perceived by the company as being a major problem. Unsurprisingly, the three BR trainload freight companies (via the British Rail Board) refused to grant access to their locomotives for the
purpose of route learning, although recruiting staff with appropriate experience in operational and engineering matters was less of a problem.

National Power sought to minimise the sunk costs associated with recruiting drivers with appropriate route knowledge by using both ex-BR and National Power employees. Given the generally poor quality of the ex-BR candidates which applied for advertised vacancies, the company was forced to recruit most drivers from within the company. As a consequence, significant training costs were incurred.

Many staff responsible for the planning and control of the company's train services (which required a detailed understanding of the BR TOPS computer system), were former BR employees. With attractive remuneration packages on offer, the company had few difficulties in recruiting staff for the small number of vacancies available. Staff employed in maintenance positions were recruited or seconded from various private sector rail organisations (including the wagon manufacturer, as such stock was under warranty).

Previous experience in running freight trains was also potentially important. When EWS acquired the three trainload freight companies from British Rail in February 1996, it inherited organisations with well-developed capabilities for the movement of bulk traffics such as coal.

The need to acquire knowledge has imposed significant sunk costs on the company. The existence of 'innocent barriers to entry' due to EWS's experience in running coal trains on a busy mixed traffic railway network has implied that it has enjoyed important post-entry advantages relating to experience.

The lessons learnt by Mendip Rail in running its own trains were of great relevance to National Power, given the similarities between the two companies' rail operations. Particular help was forthcoming in the drafting of rolling stock and maintenance procedures (where accreditation formed an essential part of the company's 'safety case'). Issues relating to the need to accumulate experience were considered to be important barriers facing the company.

5.2 BNFL

A number of barriers to entry appear to have been significant in the case of BNFL, and these are discussed in turn in the sections below.

5.2.1 Insurance for third-party liability

This factor was regarded by the company as being the single biggest impediment to market entry. All train operators are required to have third-party liability insurance, with the Rail Regulator stipulating from the outset that all operators must have sufficient cover for claims of up to £155 million (Railway Gazette International, April 1996). BNFL was critical of the amount of cover required, given that the Clapham Junction rail disaster in 1988 resulted in claims of 'only' £32 million. The need for such high cover has resulted in very high premiums per train mile along what is a comparatively isolated section of the Railtrack network.

The company attempted to reduce its insurance costs by arguing that cover should be bought by all parties involved in rail freight activities whose negligence could give rise to an insurance claim (for example, wagon builders and locomotive repairers). This action by the company proved unsuccessful and it was left to the experience and expertise of the company's insurance brokers to reduce premiums to an acceptable level.

5.2.2 Route learning and familiarisation

With route knowledge resting with train drivers and traction inspectors employed by the train companies, and with BR charging up to £80,000 per year for the services of traction inspectors, DRS had no option other than to employ ex-BR drivers with recent knowledge of lines it traversed.

The company successfully recruited ex-BR staff to run its trains, but this proved to be only a partial solution to the problem. The need to have an access agreement for every route it wishes to use means that it is not easy for DRS staff to maintain comprehensive route knowledge. Such knowledge is deemed lost if a driver has not used a line for over six months, and can result in the company having to pay EWS for the services of its traction inspectors.

5.2.3 Signing a track access agreement

Whilst the company experienced no particular difficulties in signing track access agreements with Railtrack for the Drigg, Barrow (empty) and Cheshire flows in 1995 (in terms of both paths made available and their cost), some eighteen months elapsed before agreement was reached to move loaded flasks from Barrow Docks to Sellafield. The company was frustrated at the slow rate of progress being made in signing an agreement for what was a relatively straightforward movement and publicly criticised Railtrack for its apparent lack of urgency. A ruling was sought from the Rail Regulator on the appropriate level of track charges. Furthermore, disagreements arose over both the cost of track access and payments made in respect of a link with BR's "Total Operations Processing System" (TOPS)(Modern Railways, December 1995).

A track access agreement for the Barrow flow was eventually signed in 1996 but only after the company had incurred considerable sunk costs in terms of management time spent on negotiations with Railtrack and legal advice from the company's team of lawyers.

6 'Open access' operators: key barriers to entry and appropriate entry strategies

6.1 Key barriers to entry

From the two case studies of 'open access' operation discussed in sections 4 and 5 above, four broad groupings of barriers to entry appear to have been particularly important in both cases:

- various barriers relating to access to Railtrack and the pricing of such access
6.2.3 Economies of traffic density: intensive diagramming of services and the use of Rail Equipment Operatives

In the light of indivisibilities and high fixed costs, maximising asset utilisation was deemed essential to the minimisation of unit operating costs. To achieve efficiency gains above those already achieved through the use of the merry-go-round system of operation, National Power had to maximise the use of its locomotive and rolling stock fleets. Maximising asset utilisation was also regarded as important by BNFL, but for different reasons. Unlike National Power, BNFL’s flows tend to be irregular, moving over long distances with minimal trailing loads. Such traffic often results in low asset utilisation and higher unit costs. To improve the overall viability of its rail operation the company is now seeking additional (non nuclear) traffic.

Both companies have attempted efficiency improvements through the operation of intensive diagrams of services. In the case of National Power, this was achieved by using modern traction and rolling stock to operate a continuous pattern of high volume services, with minimal maintenance down time and optimal rolling stock use. BNFL has sought to maximise asset productivity by avoiding empty running and by lodging crews away from Sellafield wherever feasible.

The use of Rail Equipment Operatives (REOs) to maximise train crew productivity is another strategy which both operators have employed. With the source of some economies of density being attributable to staff productivity, the use of multi-skilled REOs generates considerable cost savings over an operation based on a traditional demarcation of duties.

6.2.4 The need to recruit staff: ex-BR personnel

Given BR’s unwillingness to grant access to locomotives for route learning purposes (and the very high charges for the use of ‘pilotmen’ to supervise trainee drivers), both companies were forced into the lengthy process of recruiting staff. Both have employed ex-BR staff with appropriate industry knowledge to minimise the substantial costs involved in staff training. Ex-BR staff have been employed in a variety of non-operational roles such as train planning, in contrast to engineering functions where both companies tended to recruit from outside the rail industry.

6.3 Contrasts in approaches to circumventing key barriers

6.3.1 National Power

It is clear that availability of capital helped National Power to overcome several of the key barriers to entry. In addition to the points concerning track access charges discussed above, the major investment in fleets of state-of-the-art locomotives and rolling stock helped the company to achieve the economies of density required. Furthermore, funds were available to offer very competitive terms and conditions to prospective employees in the rail operation.
6.3.2 BNFL
In contrast to National Power, BNFL felt the need to invoke the services of the Rail Regulator in its dispute over appropriate track charges. More significantly, it has identified opportunities for undertaking third-party freight transport and locomotive hire as solutions to the need to achieve economies of traffic density.

6.4 Contrasts in approaches to circumventing other barriers to entry

6.4.1 Locomotives
For the National Power traffic requirements, no suitable ex-BR locomotives were available and the company had no option but to make a major investment. In the event, the company's financial analysis demonstrated that investment in new traction was more cost effective than the use of ex-BR alternatives had they been available.
BNFL on the other hand, with its lighter trains, was able to purchase and renovate locomotives last used in connection with the construction of the Channel Tunnel.

6.4.2 Obtaining track access agreements, 'safety cases' and operator licences
For National Power, the need to meet Railtrack's minimum standards for safety and performance of locomotives and rolling stock constituted a major barrier to entry and led to considerable start-up costs. In contrast, BNFL experienced few difficulties in obtaining its 'safety case' given its experience in undertaking risk assessment. Moreover, as the company was using rolling stock vested with 'grandfather rights', such stock could be used without the need to undergo costly validation checks.
BNFL did however experience difficulty in signing a track access agreement with Railtrack for its flow of loaded flasks of uranium and plutonium from Barrow to Sellafield. The company was worried that future negotiations would be equally drawn out, although no evidence exists to suggest that this has happened. The cause of such a delay is not known. National Power's negotiations were less protracted.
In summary, the different approaches followed by the two 'open access' operators reflected differences in the nature of the companies involved and their respective freight transport requirements, including:

- the size of rail operations (in terms of the volume and regularity of traffic and average lengths of haul)
- the company's bargaining position with Railtrack
- the technology employed by each operator
- access to appropriately qualified staff from outside BR
- the nature of each company's trading activities (including scale and regularity of production)
- the aspirations of each operator with regard to its future rail operations (i.e. purely own account or a combination of own account and third party).

7 Conclusions: lessons for potential operators from case study experience
Whilst the two case studies of 'open access' have examined the experiences of each operator regarding entry barriers and strategies, the very small number of such operators precludes the establishment of clear relationships between variables. It has, however, been possible to reach the following tentative conclusions regarding 'open access' activity:

- The viability of own account operations for the movement of bulk traffics has been clearly proven. National Power successfully reduced its unit rail costs by investing in a fleet of new traction and rolling stock, whilst at the same time strengthening its bargaining position with both Railtrack and EWS. Although the number of major trainload users in the UK is strictly limited, there may be some scope for future market entry in this sector. The extent to which entry is likely depends on many factors including the terms, conditions and duration of existing contracts with EWS, future EWS behaviour with respect to pricing and service quality, the availability of funds for investment, etc.
- Both operators have succeeded in moving only a part of their rail traffic on own account, although in the case of National Power traffic levels may have increased significantly had the rail operation not been sold to EWS. For BNFL's DRS operation, future nuclear waste traffic levels will be higher but product diversification will continue.
- The viability of own account operations for non bulk traffics would appear to be highly suspect, and future entrants in this sector (if any) may have to consider diversifying into multi-user operations or locomotive hire. This prediction is based on the current behaviour of EWS which is aggressively seeking new rail business in the low density / short distance wagonload sector, the small number of users whose contracts with EWS are due for renewal and the continued existence of major barriers to entry.
- Both entrants needed to make significant investments of capital prior to commencement of services, and faced delays before those services came to fruition. It is probable that potential 'open access' operators would face the same challenges.
- It is apparent that neither entrant really wanted to become an 'open access' operator but were forced to enter into rail freight transport by circumstances at the time of rail freight privatisation. Those circumstances were different in each case, but neither company would have voluntarily incurred the substantial costs and risks of failure associated with market entry. This finding has important implications for the understanding of 'open access' entry.

From a slow start, the rail freight industry in the UK is undergoing (and will continue to undergo) a process of evolution which will affect the structure of the market and conditions of...
<table>
<thead>
<tr>
<th>Most significant barriers</th>
<th>High level of track charges</th>
<th>Excessive insurance cover</th>
<th>Economies of density</th>
<th>Need to recruit staff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entry strategies used ↓</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to capital</td>
<td>✓</td>
<td>n/a</td>
<td>NP</td>
<td>NP</td>
</tr>
<tr>
<td>Appeal to Rail Regulator for ruling on track prices</td>
<td>BNFL</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Use of specialist insurance advice</td>
<td>n/a</td>
<td>✓</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Intensive diagramming of services</td>
<td>n/a</td>
<td>n/a</td>
<td>✓</td>
<td>n/a</td>
</tr>
<tr>
<td>Use of Rail Equipment Operatives</td>
<td>n/a</td>
<td>n/a</td>
<td>✓</td>
<td>n/a</td>
</tr>
<tr>
<td>Diversification of business</td>
<td>n/a</td>
<td>n/a</td>
<td>BNFL</td>
<td>n/a</td>
</tr>
<tr>
<td>Employment of ex BR staff on favourable terms and conditions</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Key:**

✓ Indicates that barriers to entry are regarded as important by both operators and that similar methods of overcoming such barriers have been adopted;

NP shows the existence of a factor as a barrier to entry to National Power and indicates the entry strategy adopted by that company;

BNFL shows the existence of a factor as a barrier to entry to BNFL and indicates the entry strategy adopted by that company.

Table 1: Degree of commonality in responses given by operators to entry strategies and entry barriers

entry. Change will come about as a result of factors specific to the industry itself (such as the industry's regulatory framework), factors relating to government policy (promoting rail rather than road freight transport, for example) and a range of external influences. Clearly, the extent to which market entry occurs in the future will be influenced by the effects of such changes on barriers to entry and their associated costs.

REFERENCES


