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"Some Case Studies of Local Bus Competition in Britain"

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SOME CASE-STUDIES OF LOCAL BUS COMPETITION IN BRITAIN

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still awaiting certain details of the bus services and fares
in some case-studies. Some of the figures are therefore
provisional.

SUMMARY

Following deregulation of bus services in Britain in 1986, "on the road" commercial competition has not become the norm, but it has occurred in a variety of places, and lasted a long time in some. This paper presents data and interpretation of developments in six case-studies of such competition, covering either whole areas or else collections of routes. The most interesting general conclusion is there may be competitive equilibria in which operators are able to preserve pre-existing fare scales in real terms, even under intense competition and even when the fares are relatively high. This conflicts with the expectations both of the Government (Department of Transport, 1984) and of the author (Evans, 1987) that fares would be lower on high-demand than low-demand routes, and possibly also lower on competitive than non-competitive routes.

1. INTRODUCTION

This paper presents some empirical case-studies of "on-the-road" commercial bus competition in Britain, following deregulation in October 1986. The paper is part of a project to interpret the process of competition in economic terms. The project is not yet complete, but the data presented here are sufficient to illustrate some major features of the process of competition, and to inspire interpretation.

The three principal case-studies are the bus services in the cities of Hereford, Lancaster, and Stockton-on-Tees. In addition, we refer to three other case-studies: selected inter-urban routes in the Rhymney Valley and from Newport in South Wales, the inter-urban routes serving Lancaster, and the Blackburn-Accrington route in East Lancashire. The three cities have all seen continuous commercial competition on many routes from October 1986 until the time of writing (February 1989); the three other case-studies all include routes with commercial competition, although not necessarily covering the whole period. The case-studies were chosen precisely because they have had commercial competition, but in this respect they are untypical of Britain as a whole, where "on-the-road" competition is not the norm, although it is not uncommon.

The particular case-studies were chosen for the following reasons. Hereford was the site of experimental deregulation from 1981, and has previously been studied by the author (Evans, 1988). It still has competitive routes, including two which have had continuous competition between the same two operators for over five years. Lancaster, Stockton, and the South Wales routes were all chosen by the Transport and Road Research Laboratory (TRRL) as case-studies of competition in their general programme of monitoring deregulation. The TRRL carried out passenger surveys in these areas both before and after deregulation. The author has arranged with the TRRL to have access to the survey data, although it is not available yet; that is one reason why this project is incomplete. The inter-urban bus services serving Lancaster were a natural extension of the Lancaster city study, and involve the same two operators. Finally, the Blackburn-Accrington route was one of a few instances of commercial competition occurring within the TRRL's area-wide studies of bus deregulation. It was surveyed and studied by Cross *et al* (1988) of the Cranfield Institute of Technology within that programme.

The paper continues as follows. Section 2 outlines the case-studies in more detail, and describes the basis of analysis. Section 3 presents data on competition and service levels. Section 4 discusses fares. Section 5 briefly considers other data. Section 6 considers the economic interpretation of the developments in services and fares. Section 7 presents the conclusions.

2. THE CASE-STUDIES AND BASIS OF ANALYSIS

Table 1 gives basic information about each of the case-studies.

The first column of Table 1 indicates whether each case-study covers all the local routes in its area, or just a selection. Full coverage is more informative, because it allows one to analyse such matters as the extent of competition, the relative roles of different operators, and the effect of competition on service and fare levels as a whole as well as on individual routes. Full coverage also enables one to compare competitive and non-competitive routes, as does partial coverage. The principal case-studies, Hereford, Lancaster and Stockton, all have full coverage, as does the Lancaster inter-urban case-study, which has only four routes, but South Wales and Blackburn are only partial. Cross et al (1988) give a full description of the Blackburn area, although in different terms from this study.

The principal unit of analysis below the level of an area as a whole is what we have called the route. As used here, a route represents a local market, and different routes serve different markets. This means that the routes here may differ from the routes defined by local operators: an operator's single route is counted here as two or more routes if, for example, it runs from one suburb into a city centre and out to another suburb; on the other hand, an operator's two routes are counted here as one if they are only slight variations of each other. Defining routes in this way requires judgement, based mainly on maps and timetables. Many routes are self-evident, but there are a few difficult cases where markets overlap, such as where the same terminal points are linked by two services with different intermediate routes, and a judgement must be made on whether to count the services as two routes or one. The definitions of routes are important because they determine which services are regarded as competing with each other and which are not.

All the analysis in this paper is based on the recurring standard hourly patterns of bus services; all variations from these patterns, including peak-only and occasional services, are ignored. In general, a route is admitted only if it has a standard frequency of at least one bus per hour throughout the daytime. This excludes little in practice in the urban areas, since there are few services with lower frequencies; it excludes rather more among inter-urban services, and we have in fact admitted two inter-urban routes with two-hourly headways in the South Wales case-study, purely for the purpose of increasing the information about fares on non-competitive routes in the area. The second column of Table 1 gives the number of routes in each case-study. In the case-studies with full coverage, this number is obtained by enumerating all the routes in the area according to the criteria above; in case-studies with partial coverage, the number has no significance beyond indicating the number of routes that happen to be included in the study. Appendix Tables A1 to A6 give details

of all the 76 routes studied, including the end points, length, operators, and each operator's daytime service frequency on a number of dates. These appendix tables tell the story of service competition on each route. They were compiled from maps and timetables.

The third column of Table 1 gives the date of deregulation, which was October 1986 in all case-studies except for Hereford, where it was October 1981. This paper looks at each route on the basis of an "annual snapshot", and records the frequencies and fares as they were in each successive November, starting in November 1985 for all case-studies except Hereford. November 1985 is taken to represent the pre-deregulation position on each (non-Hereford) route; November 1986 represents the immediate post-deregulation position, and November 1987 and 1988 show developments since then. At the time of writing (February 1989) there are still a few gaps in the data, but we expect to be able to fill them, and in due course update the data to November 1989 and beyond. In the case of Hereford we have generally adjusted previously-published data (Evans, 1988) for other times of year to successive Novembers from 1981 to bring Hereford into line with the other case-studies, but it has been necessary to retain September 1981 as the date of the pre-deregulation benchmark, and we have also kept the data for January 1984.

Working on the basis of an annual snapshot has the advantage of facilitating comparisons between case-studies, and of reducing the detail arising from more frequent analysis. On the other hand, a year is a long time on a competitive bus route. An annual snapshot runs a risk of missing important developments (although in these cases the author is not aware of any) and also it gives a misleading impression that services are more stable than they are. Service changes on competitive routes in these case-studies have in fact been very frequent, sometimes necessitating new public timetables every month or two, although minor route changes and time changes are more common than major route changes and frequency changes. Nevertheless, this instability must make the services more difficult to use; other writers have made similar comments about competition elsewhere (Mackie and Preston, 1988, on Preston; Tyson, 1988, on the metropolitan areas).

The remaining columns of Table 1 give information about the characteristics of the areas of the principal case-studies. Hereford is a free-standing city of 48,000. Lancaster, which includes Morecambe, Heysham and Carnforth, is a free-standing cluster of adjoining towns with a total population of 130,000. Stockton, including Billingham and Thornaby, with a population of 176,000, is part of the Teesside industrial conurbation, and borders the neighbouring city of Middlesbrough. The car ownership rates and population densities are surprisingly similar in all three areas, although Stockton has a somewhat higher density and lower car ownership than the others. The number of bus routes in the three areas broadly reflects their populations.

3. COMPETITION AND SERVICE LEVELS

Table 2 gives the numbers of routes in the full-coverage case-studies with and without competition on the various dates. The total number of routes varies slightly from time to time, as routes are introduced or withdrawn. Table 3 gives the number of bus journeys per hour in the daytime with and without competition. The proportion of bus journeys with competition is generally higher than the proportion of routes with competition, because competitive routes generally have higher frequencies than non-competitive routes. Table 4 gives hourly vehicle-kilometres in Hereford, Lancaster and Stockton in the daytime and in the evening.

Hereford

As described in Evans (1988), Hereford had no competitive routes before deregulation, and only limited competition in the following two years. However, in 1983 and 1984 three small entrants challenged the incumbent, Midland Red West, a subsidiary of the National Bus Company (NBC), provoking Midland Red West to increase service levels itself. The peak of the competition was in January 1984, when 6 of the 8 routes were competitive, accounting for 33 of the 37 hourly bus journeys (Tables 2 and 3). Bus-kilometres were then more than twice their pre-deregulation level (Table 4). Midland Red West saw off two of the three challengers, but the third survived on two routes, and was still surviving in November 1988, almost five years later. Service levels fell with the departure of the challengers, but Midland Red West retained the higher frequencies which it had introduced to counter the competition. In 1988 Midland Red West converted its services to minibus operation, resulting in another dramatic increase in frequencies and bus-kilometres. Another entrant began commercial operation in 1988, so that in November 1988, there was competition on 3 out of 9 routes, accounting for 28 out of the 61 hourly bus journeys (Tables 2 and 3), and bus-kilometres were more than three times their pre-deregulation level (Table 4). In relation to population, service levels in Hereford have moved from being the worst of the three cities studied before deregulation to the best of the three in 1988, (and, as we shall see below, with the lowest real fares). Evening services remained fairly poor and stable from deregulation until the introduction of minibuses, when they more than doubled (Table 4).

Lancaster

Before deregulation Lancaster's local bus services were provided jointly by Lancaster City Transport (LCT), a municipal operator, and Ribble Motor Services, a subsidiary of NBC. LCT operated 44.5 per cent and Ribble 55.5 per cent of the joint non-seasonal bus-kilometres. The services were so integrated that, in the words of LCT's Managing Director, "neither operator had services that it could call its own". Moreover, LCT was given legal advice that it could not

continue a dialogue with Ribble before deregulation (Knowles, 1987). The result was that both operators registered much of the previous joint network. In November 1986 12 of the 17 routes were competitive, accounting for 59 of the 66 hourly bus journeys (Tables 2 and 3), and daytime bus-kilometres had risen by 57 per cent (Table 4). Service levels have subsequently increased further, partly because in 1987 Ribble converted some routes to minibus operation with increased frequencies. In November 1988, bus-kilometres were almost two and a half times their pre-deregulation level (Table 4), and 90 per cent of the bus journeys were on competitive routes (Table 3). Evening services have also increased, but to a lesser extent. The city remains a duopoly.

Stockton

Two operators provided Stockton's local bus services before deregulation: Cleveland Transit, a municipal operator owned jointly by three district councils, and United Automobile Services, a subsidiary of NBC. United provided most of the inter-urban services to and from Teesside, and it also had an important local role, particularly in Middlesborough and to a lesser extent in Stockton. Although United and Cleveland Transit had no identical routes before deregulation, some routes were sufficiently close to be regarded as competitive on the criteria of this paper. Five out of Stockton's 31 pre-deregulation routes were thus competitive, accounting for 21 out of the 95 hourly bus journeys (Tables 2 and 3). Following deregulation, United and Cleveland Transit have avoided much further commercial competition, but strong competition, particularly to Cleveland Transit, has come from new entrants. The principal entrant is Trimdon Motor Services, who previously operated a few inter-urban services. Trimdon has expanded rapidly since deregulation, and has also entered the commercial market in Tyne and Wear. Trimdon operated on 13 Stockton routes in 1986 and on 17 routes in November 1987. In addition to Trimdon, three small operators have entered the Stockton market: Delta, Robsons, and Beestons. They operate on few routes, but some have seen acute competition. Twenty-one out of 35 routes were competitive in November 1987, accounting for 130 out of the 154 hourly bus journeys (Tables 2 and 3). Daytime bus-kilometres in Stockton had risen by about 60 percent in November 1987 (Table 4); this is less than elsewhere, mainly because Trimdon had confined the frequencies on most of its routes to two buses per hour, which did not necessarily match Cleveland Transit's. Evening services declined a little after deregulation, and many are subsidised. For further information on Stockton, see Walshaw (1988).

South Wales

The principal competitive route in this partial case study runs from Newport westward to Caerphilly, up the Rhymney Valley through Bargoed to Rhymney, and then across the heads of the valleys either east to Tredegar or west to Merthyr. Before deregulation the route was operated jointly with two

buses per hour (one to each destination) by the NBC subsidiary National Welsh and the Rhymney Valley District municipal operator, now called Inter-Valley Link (IVL). After deregulation, both operators provided the same frequency, thereby doubling the service level, although National Welsh did not serve Merthyr and reversed alternate buses at Bargoed. The Rhymney Valley to Merthyr section was therefore operated by IVL without competition. This was still the position in November 1988, although IVL was then in financial difficulties, and was sold to National Welsh in March 1989. (Bus Business, 8 March 1989). This will bring the competition to an end. In addition to the Rhymney Valley route, we have also included in the case-study the corridor from Newport to Pontypool, Abergavenny, and Crickhowell or Hereford to provide evidence of National Welsh's non-competitive fares. However, the Newport-Pontypool section became competitive in 1988 when IVL provided its own service on this route, along with several other routes in the area.

Lancaster Inter-urban

The four principal inter-urban routes to Lancaster were served by Ribble without competition both before and after deregulation. However, with the intensification of competition between Ribble and Lancaster City Transport (LCT), LCT entered each route one by one in 1987, and all were competitive in November 1988, with twice their pre-deregulation frequencies.

Blackburn-Accrington

This route was one of a few competitive routes in Cross et al's (1988) study of the East Lancashire area, carried out for the TRRL. Before deregulation the route was jointly operated by Blackburn and Hyndburn municipal operators with a frequency of four buses per hour, supplemented by an occasional long distance Ribble service. A small independent operator, Accrington Coachways, entered the market on deregulation, with two buses per hour, provoking the incumbents, who still operated a joint timetable in 1988, to increase their frequency to six. Accrington Coachways withdrew in 1988, but Ribble increased its frequency, and the route remains competitive, with twice its pre-deregulation frequency.

4. FARES

In general competing operators on the same route have had matching fares. There are occasional differences, but they tend to be small and short-lived, and we have ignored them here. There are more variations in return fares than in single fares, and in travelcards of various kinds; we have also ignored these. Appendix Tables A7 to A12 give single fares for each of the 76 routes in this study at each date. (At the time of writing there are still a few gaps.) These form the data for this section.

Changes in Fares since Deregulation

Table 5 gives real fare indices since deregulation for each case-study for all routes and for competitive and non-competitive routes separately. The all-route indices were constructed by comparing the weighted average fare for all routes at each date with the corresponding weighted average fare at the base date (September 1981 for Hereford; November 1985 for the remainder). The indices were then deflated by the Retail Prices Index. The weights for the routes were taken to be their relative frequencies in November 1985, with the exception of Hereford, for which the weights are the relative frequencies in November 1986 (because that appears to be the most stable recent period for Hereford). This weighting implies that routes which were not operated in November 1985 (or November 1986 for Hereford) have zero weight. There are only a few such zero-weighted routes.

The separate indices for the competitive and non-competitive routes were constructed by comparing the weighted average fare for those routes which were, say, competitive on the specified date with the weighted average fare for the same routes in the base year. The weights were the same as described above. This implies that the set of routes on which the sub-indices are based may change from time to time as routes change their status from non-competitive to competitive or vice versa, and the sub-indices may change for this reason as well as for the usual reason that fares change. The main purpose of constructing the sub-indices was to compare the competitive and non-competitive indices for the same period rather than to look at their changes through time.

We look first at the all-route indices. We should recall for comparison that fares nationally rose approximately in line with inflation between November 1985 and November 1987. In the preceding four years they rose slightly more than inflation in the non-metropolitan areas. In our case-studies fare movements have been very variable. First, Hereford's average fare fell to 36% of its pre-deregulation level at the time of maximum competition in November 1983, but then slowly rose to 74 per cent of its pre-deregulation level in November 1987. However, the November 1988 figure shows a slight real fall, to 72 per cent of its pre-deregulation level, because of recent fare cuts on two competitive routes. Lancaster's fares have risen approximately in line with inflation, and so have the Lancaster inter-urban fares, with the same operators. Stockton's fares have also generally risen in line with inflation, although the November 1988 figure shows a slightly greater rise. The real average fare for the South Wales routes had fallen to 77 per cent of its pre-deregulation level in November 1987, and that for Blackburn-Accrington to 85 per cent. It should be remembered that the last two are partial case-studies, so these figures are not representative of their areas as a whole.

Competitive and Non-competitive Routes

Table 6 contrasts the fares indices for competitive and non-competitive routes by giving the difference between the competitive index and the non-competitive index as a percent of the non-competitive index at each date. This difference is zero by definition in the base year. The table shows striking differences between the case-studies. However, a common feature is that where the indices differ, the competitive index is almost invariably less than the non-competitive index. The table shows that fares on competitive routes fell relative to those on non-competitive routes substantially in Hereford, in South Wales, and between Blackburn and Accrington; they fell slightly in Stockton; and they fell not at all in Lancaster. We now consider these cases in a little more detail.

In Hereford, the fare movements on individual routes have been very variable at times. Nevertheless, the movements in the fares on competitive routes have on average been well below those on non-competitive routes, with statistically significant differences on most dates.

In South Wales, the differences between the competitive and non-competitive routes are also statistically significant, but again the story is not entirely straightforward. The average fare on the (mostly competitive) routes from Newport up the Rhymney Valley fell by about 40 per cent after deregulation, while those on the other (non-competitive) routes in the case-study remained the same in money terms. However, as mentioned previously, the section of the Rhymney Valley route to Merthyr (represented here by the Bargoed-Merthyr route) remained non-competitive after deregulation, but nevertheless had a fare reduction similar to the rest of the Rhymney Valley. This reduces the difference between the competitive and non-competitive indices and increases the variability within the non-competitive routes. A further point is that when competition between Inter-Valley Link and National Welsh spread elsewhere in 1988, there were apparently no fresh fare reductions.

On the Blackburn-Accrington route, the difference between the competitive and non-competitive fare indices is based on the report in Cross *et al* (1988) that the fare charged on the route in the daytime, when it was competitive, was less the fare charged in the evening, when it was not.

In Stockton, Table 6 shows that the difference between the competitive and non-competitive fare indices was 4 per cent in November 1987. This difference is due entirely to a fall on one competitive route (out of 21 competitive routes and 35 routes in the area), namely Stockton-Hardwick. Without this maverick there would be no difference between fares on competitive and non-competitive routes in Stockton, and the all-route fare index for Stockton would be 3 per cent higher. The fall was the result of a fares war between an independent operator (Delta) and the incumbent, Cleveland Transit.

Otherwise, the incumbents and the major entrant in Stockton, Trimdon, have all retained the pre-deregulation fare structure.

Finally, in Lancaster there has been no difference at all between fares on competitive and non-competitive routes. The pre-deregulation fare structure has been perfectly preserved, with the exception of some skirmishes on return fares (Knowles, 1987).

Fares and Distances

Before deregulation, local bus systems often had fares which were related to distances: the further you went, the more you paid. This relationship could be expected to survive deregulation to some extent because operating costs are related to distance and fares should reflect costs, but the relationship could also be eroded if operators adopt fares which reflect the different market conditions on each route. Table 7 investigates broad relationships between fares and route lengths by giving correlation coefficients for four of the case-studies for selected dates.

The table has some surprises. In Hereford, the correlation coefficient of fare and route length before deregulation was only 0.21, which is not even significantly different from zero. The relative fares on the different routes in Hereford were therefore almost unrelated to distance, and it is not clear in retrospect what the rationale for the fares was. Perhaps that is partly why the city was vulnerable to entrants. In January 1984 the fares were determined entirely by whether routes were competitive or not, and were unrelated to distance. However, following the period of maximum competition, the reconstructed fare scales were much more distance-related, with a coefficient of 0.72 in November 1987. In the latest period, there has been a reassertion of competitive pricing, reducing the coefficient to 0.57.

Lancaster is a contrast. It had a classic finely-graduated distance-related fare scale before deregulation, with a correlation coefficient of 0.95. This has been perfectly preserved under competition. Stockton also had a distance-related fare scale before deregulation, although the coefficient at 0.85 was lower than Lancaster's, partly because the fare scale was more coarsely graduated, partly because fares rose less with distance than in Lancaster. This fare scale has also been preserved under competition, with the exception of the route mentioned above. Finally, the fares on the South Wales routes were also largely distance-related before deregulation (coefficient 0.92). Following deregulation, the Rhymney Valley had a different fare scale from elsewhere; both fare scales are distance-related, but if they are put together the coefficient is only 0.77.

Fare Levels

Table 8 gives real average fares in 1985 pence for urban and inter-urban journeys of different lengths in each of the case-study areas. The figures were estimated from the regression equation of fare on distance for each area at each date. (Note that the route lengths given in Appendix Tables A1-A6 are round trip lengths, and should be divided by 2 to get average one-way distances.) The degree of scatter in individual fares about the average varies from place to place, as is implied by varying correlation coefficients discussed above. On the Blackburn-Accrington route, the fare shown is just the average fare for that particular journey, whose length is just over 8km.

The table shows some wide variations between different places in fares for similar distances. Hereford's urban fares were low at most dates for all distances, and Lancaster's were high, especially for the longer distances. For example, Lancaster's average fare for 8km was twice that of Hereford in November 1988. Stockton's fares were in the middle, and so were both the competitive and non-competitive fares on the Blackburn-Accrington route. Among the inter-urban routes, the operators had broadly similar fares before deregulation, but the Rhymney Valley fares were much lower for all distances after deregulation.

5. OTHER DATA

We have presented and summarised data for our case-studies on services and fares at the route level. For a full understanding and welfare assessment of bus competition in these case-studies, two other classes of data are needed. First, we need information on bus operating costs. The author sees no prospect of obtaining non-confidential cost information for these case-studies, so that in due course we will have to make intelligent guesses about costs, using nationally published averages.

The other class of data covers patronage, and the response by passengers to the service and fare changes described. As mentioned in the introduction, the TRRL carried out passenger surveys over an 18-month period from before deregulation until a year after deregulation in Lancaster, Stockton, and on the Rhymney Valley routes. These should provide crucial information on market shares and on the responses of passengers to the service and fare changes. Since these data will be available, there seems little point in attempting a welfare assessment of our case-studies at this stage. Apart from Hereford, the only one of the case-studies on which patronage data have been published so far is the Blackburn-Accrington route (Alamdari and Cross, 1988). Their results showed a surprising and alarming fall of 7 per cent in patronage on the route between November 1985 and May 1987, in spite of the increase in frequency and the fall in fares. In Hereford, Mills (General Manager of Midland Red West) (1985) and Fairhead and Balcombe (of TRRL) (1984) published patronage

data, which Evans (1988) uses. Mills' data shows an increase in patronage of 20 per cent in Hereford on Midland Red West alone at the height of the competition (which was nevertheless not nearly enough to make the services viable at the prevailing low fares). Therefore passenger responses to competition seem mixed, and we can only await further data.

6. INTERPRETING THE COMPETITION

If one is interested in the process of competition, the data we have are probably more interesting than the data we do not have, because fares and services are the major strategic instruments within the control of operators. Therefore the way in which they use these instruments is the main public manifestation of their strategies. The evidence presented above, particularly on fare changes under competition, suggests that operators do indeed have strategic choices, and that different operators have exercised their choices in different ways.

Equilibrium and Disequilibrium

One important distinction arising from theoretical consideration, and also from the evidence, is between strategies in which operators aim to force their competitors to withdraw, and strategies in which operators acquiesce in the presence of their competitors, and then make the best of it in some sense. By definition, the former strategies do not lead to equilibria, at least as long as both competitors survive; the latter strategies may do so. The former strategies typically result in losses to both operators, which the stronger may be willing to incur in the expectation of being able to earn superprofits after the competitor is forced out. This in turn requires the possibility of equilibria in which superprofits are possible without provoking fresh entry. Some such battles can last a long time. For a number of reasons, economic analysis tends to focus on states of equilibrium, and this section will be no exception. First, equilibrium is simpler than disequilibrium; the conditions for equilibrium are stringent, and one does not have to worry about the many possible transient states. Secondly, it is arguable that the long term properties of competitive regimes are determined by their possible equilibria. Thirdly, the possibilities for equilibria may influence operators' strategies; for example, it was suggested above that operators would only engage in loss-inducing wars if they could expect to benefit in the subsequent equilibrium state.

The data we observe in the case-studies could either represent snapshots of competitive battles with the services out of equilibrium, or they could represent snapshots of the actions of operators seeking, or possibly close to, competitive equilibrium. It is not generally obvious which of these two any particular snapshot represents, and in any case the distinction between the two is less clear cut in practice than the theoretical discussion would suggest. However, the data sometimes contain strong clues, and the clues would be

stronger with data on patronage and costs.

Even without much data on patronage and costs, it was obvious that a competitive battle took place in Hereford in 1983 and 1984, and that the services were out of equilibrium then, because of the very low fares. It is also possible to deduce from the data on fares and services that Midland Red West has subsequently twice changed its strategy with regard to its surviving competitor on the Tupsley and College Green routes. On the Tupsley route, Midland Red West's hourly frequencies in successive Novembers from 1985 to 1988 were 5, 2, 2, and 8, with fares in current prices of 15p, 20p, 22p, and 16p. (Appendix Tables A1 and A7). These data strongly suggest that Midland Red West changed from an aggressive to an acquiescent strategy between 1985 and 1986, and back to an aggressive strategy between 1987 and 1988. If we couple this discussion with our previous analysis of Hereford (Evans, 1988), we conclude that Hereford was out of equilibrium in 1983-1985, was in equilibrium in 1986-1987, and was out of equilibrium on this pair of routes in 1988, on which it seems likely that both operators were losing money. The mystery in this case is how the small competitor has survived the phases of disequilibrium. In the rest of Hereford, the main question in 1988 is whether the high service levels, even with minibuses, are in equilibrium with fare levels well below those in the other case-studies. If they are in equilibrium, one would characterise it primarily as a single-operator equilibrium rather than a competitive one, even though one other route is competitive.

With the benefit of hindsight we may deduce that the services and fares in the Rhymney Valley and on the Blackburn-Accrington route were out of equilibrium in 1986 and 1987, because Inter-Valley Link and Accrington Coachways have withdrawn or are about to withdraw. At the time this would not have been obvious from our data, although with hindsight we can point to suggestive features in the data we have. In the Rhymney Valley, the large competitive fare reductions suggest that the operators may have been loss-making; on the Blackburn-Accrington route, the suggestive feature is the poor passenger response to increased service levels found by Alamdari and Cross (1988).

The Lancaster Model

That leaves Stockton and Lancaster as examples of bus services which possibly are in competitive equilibrium. They have much in common, and also possibly much in common with cases elsewhere in the country. Their common features are the following:

(1) there is substantial and continuing "on the road" competition, covering many (but not all) routes;

(2) there has been a large increase in service levels since deregulation; and

(3) the pre-existing distance-related fare structure has remained intact, with the fares raised in line with inflation.

Lancaster is a particularly clear and graphic example of this kind: it is a pure duopoly; it has had a very large service increase since deregulation (140 per cent); and it has high fares. In what follows, we shall refer to services with features (1) to (3) above as the Lancaster model, or, less formally, as the likes of Lancaster. The position in Stockton is similar, though less graphic, and is complicated by the presence of three major and three smaller operators. This has produced a maverick route, but there again the major operators have maintained intact the pre-existing distance-related fare scale. The obvious question is: can we account for the likes of Lancaster with an economic model? We might guess that the answer is yes, in which case we would be interested in the model's welfare properties. The author has not developed a complete model yet, but we can take the discussion further.

A Horizontal Product Differentiation Model of Bus Competition

The author's starting point for interpreting competition is the route-level theoretical model in Evans (1987) in which bus departures at different times are treated as horizontally different products. This model shows that under certain assumptions, competitive equilibrium at the route level is possible. Some of the properties of the theoretical equilibrium are the following.

(1) On any route, there is a competitive equilibrium frequency, which in combination with the competitive equilibrium fare enables operators either to break even or to make modest superprofits. If any operator attempts to increase the frequency above the competitive level, the result will be losses to all operators on the route.

(2) The competitive equilibrium combination of frequency and fares is not the welfare-maximising combination. Both the frequency and the fares are too high.

(3) Competitive equilibrium fares are lower on high-demand routes than on low-demand routes.

(4) If a route already has the competitive equilibrium frequency, then it is unattractive to entrants, because entry is profitable only if the entrant can force one of the incumbents to withdraw or reduce frequency. This is true whether the service is initially provided by a single operator or by more than one. If the service is initially provided by more than one operator, then competition between them will force the fare down to the competitive level. However, if the service is initially provided by a single operator, there is nothing to prevent that operator charging a higher fare, up to the monopoly level, to make a larger superprofit, and threatening to reduce the fare to the competitive level if entry should occur. This threat has some credibility, because, short of withdrawal and in the absence of collusion,

it represents the optimal strategy by the incumbent after entry has occurred. If operators adopt this strategy, we would see lower fares on competitive routes than on otherwise similar non-competitive routes. The possibility of this strategy implies that bus routes are not perfectly contestable in the technical sense (Baumol et al, 1988), even though they may be contested in the everyday sense of the word. The reason that they are not technically contestable is that incumbents are able to alter fares instantly in response to threatened entry, and are not vulnerable to undercutting, as theory of contestable markets requires.

The author has previously argued (Evans, 1988) that this model accounts reasonably well for some of the features of Hereford, although we should bear in mind that Hereford has obviously been out of equilibrium at times. The model accounts for the following:

(1) the retention by the major operator of high service levels on non-competitive, but possibly formerly competitive, routes in order to pre-empt further entry; and;

(2) the low fares on competitive routes relative to non-competitive routes, shown in Table 6, which have persisted in the acquiescent phases of the competition as well as in the competitive battles.

(3) The model also demonstrates a rationale for operators to engage in loss-making competitive battles, which have obviously occurred not only in Hereford but elsewhere.

Elsewhere, the model offers at least a partial explanation of the widely-noted tendency for competition to promote increased service levels rather than lower fares (See, for example, Tyson, 1988, and Mackie and Preston, 1988). Panzar (1979) advanced a similar argument for airlines, only recently discovered by this author.

The Lancaster Model and the Theoretical Model

Although the high service levels in the Lancaster model are consistent with the theoretical model above, the fare structure is not. The theoretical model predicts that:

(1) fares will be lower on high demand routes than on low-demand routes; and

(2) fares will be lower on competitive than non-competitive routes.

In contrast, the Lancaster model has no discrimination in fares on account of demand or competition, and it has equal fares on routes of equal length. It follows that an economic model which accounts for the likes of Lancaster must be different from the theoretical model above.

The obvious modification of the previous theoretical model to account for the likes of Lancaster is to suppose that operators are more far-sighted than in the previous theoretical model, which would not be unreasonable. In the previous model, operators were presumed to choose fares so as to maximise profit, assuming that competitors maintained their own current fares. If operators instead presume that competitors will respond to their own fare changes, then they might choose fares differently. We could imagine that operators are in a repeated Prisoners' Dilemma game, in which the cooperative strategy in each game is to respect the current fare structure, and the defecting strategy is to break away from it, for example by lowering fares on high-demand routes. In the previous model, we assumed the operators would adopt the defecting strategy, because it brings greater short-term profits. However, it is also likely to bring a matching response in the next round, and if operators expect this, they may play the cooperative strategy just so long as their competitor does. Such tacit cooperation between the operators on fare-setting is made much easier by the presence of a pre-existing fare structure: this provides a prominent solution, in Schelling's (1963) sense, to what might otherwise be a difficult problem of tacit coordination. For this purpose, it probably does not much matter exactly what the fare structure is, provided that it is reasonably related to costs. We should note, however, that the preservation of the fare scale requires active, not just passive, tacit cooperation, because fares have to be increased from time to time to keep up with inflation. This story does not explain why operators keep to the pre-existing fare scale even on non-competitive routes, which are of no direct concern to their competitors. This may be because fares are set on network basis rather than on individual routes (though that was not so in Hereford); or it may be that operators wish to signal to competitors their full commitment to the existing fare structure.

In addition to this major question of whether the maintenance of the pre-existing fare scale is an equilibrium strategy for the operators in the Lancaster model, two other requirements must be met if bus services in the Lancaster model are to be in competitive equilibrium. First, the operators must be at least breaking even, and, secondly, there must be no profitable opportunities for entrants. With our existing data we are not able to judge whether these requirements are met in the particular cases of Lancaster and Stockton, but it is plausible in principle that they could be met. On the first requirement, it is possible that a large decrease in operating costs after deregulation, combined with a positive passenger response to increased service levels, could permit a large service increase to be viable at the old real fares. On the second requirement, it is possible that current service levels are so high that there are no viable gaps for entrants.

As mentioned previously, with our existing data we are also not able to estimate the welfare properties of the current bus services in Lancaster and Stockton. However, it

seems unlikely that frequencies and fares were at an optimal level both before and after deregulation. If frequencies and fares were optimal before deregulation, then they were almost certainly too high afterwards, especially in Lancaster. On the other hand, if they were optimal afterwards, then they were probably too low before.

The Lancaster Model and the Australian Domestic Airlines

Because this paper is written in Australia, it is tempting to note the parallel between the pre-deregulation position of the Lancaster bus services, and the current position of the Australian domestic trunk airlines, which are to be deregulated in 1990. In both places the pre-deregulation services were or are provided jointly on a roughly 50/50 basis by two major operators, destined to become competitors. In both places there is a pre-existing distance-related fare structure, common to both operators. If the Australian airlines follow the Lancaster model, they will provide service improvements, but they will succeed in maintaining the basic fare structure after deregulation. However, there is probably a greater range of passenger preferences between high frequencies and low fares for air travel than for local bus travel, or, equivalently, a greater range of values of travel time. This difference in the market means that the parallel is not likely to be exact.

7. CONCLUSIONS

Empirical Results

1. In all six case-studies, competition brought a large increase in service levels. Where competition subsequently ceased, the surviving operator(s) often maintained higher service levels than they had provided before the competition started.
2. In Hereford, South Wales, and Blackburn-Accrington, competition also brought a fall in real average fares, but in Lancaster, in Stockton, and on the Lancaster inter-urban routes, there was no (or almost no) such fall.
3. In the places where the real average fare fell, fares on competitive routes fell relative to those on non-competitive routes. In the other places there was no difference between fares on competitive and non-competitive routes, and there was no difference between fares on high demand and low demand routes.
4. Many places have distance-related fare scales. There are wide variations between the urban areas in fares for similar distances. These differences apply on both competitive and non-competitive routes.

Interpretation

5. We can distinguish in theory between configurations of services and fares which are in economic equilibrium and sustainable in the long run, and those which, for one reason or another, are not. The distinction is less clear cut in practice, and it is not generally obvious whether a particular configuration at a particular time is close to equilibrium or not. However, the data sometimes contain clues either at the time or retrospectively, and there would be more clues if data were available on costs and patronage. Competitive battles, in which the strategy of one or more operators is to force the other(s) to withdraw, by definition give non-equilibrium configurations.

6. We have concluded with hindsight that the services and fares in the Rhymney Valley and on the Blackburn-Accrington route were out of equilibrium for most of the period since deregulation in 1986. Hereford has had phases both of equilibrium and of disequilibrium since it was deregulated in 1981. Lancaster and Stockton may be in equilibrium, in which case they represent an interesting general case of competitive equilibrium.

7. Of Hereford, Lancaster and Stockton, only Hereford, in its equilibrium phase of 1986-87, has had a configuration of services and fares which seems reasonably consistent with the author's (1987) theoretical model of competitive equilibrium, in which buses at different times are treated as horizontally different products. The fares in Lancaster and Stockton have not been consistent with this model.

8. Throughout the period of competition, the major operators in Lancaster and Stockton, whether entrants or not, have preserved the pre-existing distance-related fare scales in real terms. This is not consistent with the competitive model above, which predicts lower fares on high-demand routes, and lower fares on competitive routes. We have interpreted the preservation of the fare scales as the result of forward-looking tacit cooperation among the operators. Such tacit cooperation is made much easier by the pre-existence of the fare scales.

9. If the preservation of the fare scales is indeed a dynamic equilibrium strategy for the operators, then Lancaster and Stockton may represent competitive equilibria. This would require in addition that the operators are breaking even, and that there are no profitable opportunities for further entrants. We do not know whether these other conditions are met, but it is possible that they are.

10. The equilibria represented by Stockton and Lancaster (if they exist) are almost certainly not welfare-maximising ones.

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TABLE 1. CASE-STUDIES

	Full or Partial Cover- age of Area?	Features of Routes			Features of Areas		
		Number of Routes	Urban or Inter- urban?	Date of Dereg	Popu- lation	Percent Without Cars	Weighted Av Pers/ Hectare
Principal Case-Studies							
Hereford	Full	9	Urban	1981	48,000	26.9	26.9
Lancaster	Full	19	Urban	1986	130,000	31.7	24.5
Stockton	Full	35	Urban	1986	176,000	34.9	30.1
Other Case-Studies							
South Wales	Partial	8	Inter	1986			
Lancaster							
Inter-Urban	Full	4	Inter	1986			
Blackburn- Accrington	Partial	1	Urban	1986			

TABLE 2. NUMBER OF BUS ROUTES WITH AND WITHOUT COMPETITION

	Hereford			Lancaster City			Stockton			Lancaster Inter-urban		
	C*	NC*	All	C	NC	All	C	NC	All	C	NC	All
Sep 1981	0	8	8									
Nov 1981	1	7	8									
Nov 1982	1	7	8									
Nov 1983	6	2	8									
Jan 1984	6	2	8									
Nov 1984	4	4	8									
Nov 1985	2	6	8	0	18	18	5	26	31	0	4	4
Nov 1986	2	6	8	12	5	17	19	13	32	0	4	4
Nov 1987	2	6	8	12	5	17	21	14	35	3	1	4
Nov 1988	3	6	9	12	7	19				4	0	4

*C = Competitive routes; NC = Non-competitive routes.

TABLE 3. BUS ROUND TRIPS PER HOUR WITH AND WITHOUT COMPETITION

	Hereford			Lancaster City			Stockton			Lancaster Inter-urban		
	C*	NC*	All	C	NC	All	C	NC	All	C	NC	All
Sep 1981	0	16	16									
Nov 1981	3	13	16									
Nov 1982	3	13	16									
Nov 1983	25	4	29									
Jan 1984	33	4	37									
Nov 1984	22	10	32									
Nov 1985	14	19	33	0	48	48	21	74	95	0	4	4
Nov 1986	8	19	27	59	7	66	103	26	129	0	4	4
Nov 1987	8	20	28	82	10	92	130	24	154	6	1	7
Nov 1988	28	33	61	89	12	101				8	0	8

*C = Trips on competitive routes; NC = Trips on Non-competitive routes.

TABLE 4. HOURLY BUS-KILOMETRES

BUS-KILOMETRES IN STANDARD HOURS

	Daytime			Evening		
	Here- ford	Lanc- aster	Stock- ton	Here- ford	Lanc- aster	Stock- ton
Sep 1981	154.2			62.2		
Nov 1981	152.1			49.7		
Nov 1982	153.3			49.7		
Nov 1983	273.0			67.6		
Jan 1984	336.2			67.6		
Nov 1984	298.8			66.3		
Nov 1985	286.9	451.7	921.5	49.8	231.4	594.5
Nov 1986	243.1	709.8	1250.4	49.8	284.8	528.7
Nov 1987	252.6	959.4	1485.8	49.8	348.6	553.7
Nov 1988	486.4	1084.7		113.6	375.7	

INDICES OF BUS-KM PER HOUR (PRE-DEREGULATION = 100)

	Daytime			Evening		
	Here- ford	Lanc- aster	Stock- ton	Here- ford	Lanc- aster	Stock- ton
Sep 1981	100.0			100.0		
Nov 1981	98.6			79.9		
Nov 1982	99.4			79.9		
Nov 1983	177.0			108.7		
Jan 1984	218.0			108.7		
Nov 1984	193.8			106.6		
Nov 1985	186.1	100.0	100.0	80.1	100.0	100.0
Nov 1986	157.7	157.1	135.7	80.1	123.1	88.9
Nov 1987	163.8	212.4	161.2	80.1	150.6	93.1
Nov 1988	315.4	240.1		182.6	162.4	

TABLE 5. REAL FARE INDICES (PRE-DEREGULATION = 100)

	Hereford			Lancaster City			Stockton		
	C*	NC*	All	C	NC	All	C	NC	All
Sep 1981	100	100	100						
Nov 1981	98	98	98						
Nov 1982	115	101	102						
Nov 1983	27	112	36						
Jan 1984	43	111	51						
Nov 1984	45	66	52						
Nov 1985	42	69	61	100	100	100	100	100	100
Nov 1986	47	79	70	97	97	97	97	97	97
Nov 1987	49	84	74	100	100	100	99	102	100
Nov 1988	58	87	72	101	101	101			103

	South Wales			Lancaster Inter-Urban			Blackburn-Accrington+		
	C	NC	All	C	NC	All	C	NC	All
Nov 1985	100	100	100	100	100	100	100	100	100
Nov 1986	63	88	78		97	97	78	97	84
Nov 1987	62	87	77	101	103	101	81	93	85
Nov 1988				103		103			

*C = competitive routes; NC = non-competitive routes
 +Comparison is between daytime fare when route was competitive and evening fare when it was non-competitive.

TABLE 6. DIFFERENCES BETWEEN FARE INDICES ON COMPETITIVE AND NON-COMPETITIVE ROUTES

	Competitive Route Fare Index minus Non-Competitive Route Index as Percentage of Non-Competitive Index						
	Hereford	Lancaster	Stockton	South Wales	Lanc'r Inter-U	B'burn-Acc'n	
Sep 1981	0*						
Nov 1981	0%						
Nov 1982	14%						
Nov 1983	-76%						
Jan 1984	-62%						
Nov 1984	-32%						
Nov 1985	-39%	0*	0*	0*	0*	0*	
Nov 1986	-41%	0%	0%	-28%	n.c.	-19%	
Nov 1987	-41%	0%	-4%	-29%	n.c.	-12%	
Nov 1988	-32%	0%			n.c.	n.c.	

*Zero by definition; n.c. = no comparison possible.

TABLE 7. CORRELATION COEFFICIENTS OF FARES AND ROUTE LENGTHS

	Here- ford	Lanc- aster	Stock- ton	South Wales
Sep 1981	0.21			
Jan 1984	0.04			
Nov 1985	0.55	0.95	0.85	0.92
Nov 1987	0.72	0.95	0.84	0.77
Nov 1988	0.57	0.95		

TABLE 8. AVERAGE REAL FARES (1985 PENCE)

	Sep 1981	Nov 1985	Nov 1987	Nov 1988
<u>URBAN</u>				
3km Single Journey				
Hereford	33	20	23	24
Lancaster		34	34	34
Stockton		31	30	
5km Single Journey				
Hereford	35	23	28	29
Lancaster		51	51	51
Stockton		40	40	
8km Single Journey				
Hereford	38	27	35	38
Lancaster		76	75	76
Stockton		54	55	
Blackburn-Acc'n		57	48	
<u>INTER-URBAN</u>				
10km Single Journey				
Lanc'r Inter-urban		95		99
Rhymney Valley		83	53	
Other South Wales		87	80	
20km Single Journey				
Lanc'r Inter-urban		123		128
Rhymney Valley		124	77	
Other South Wales		127	118	
30km Single Journey				
Lanc'r Inter-urban		152		157
Rhymney Valley		166	101	
Other South Wales		168	156	

APPENDIX TABLES

TABLE A1. FREQUENCIES ON PRINCIPAL LOCAL ROUTES IN HEREFORD

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour									
			Sep '81	Nov '81	Nov '82	Nov '83	Jan '84	Nov '84	Nov '85	Nov '86	Nov '87	Nov '88
Hereford-Credenhill	17.5	MRW+	-	-	-	2	2	3	3	3	3	6
		YE+	2	2	2	-	-	-	-	-	-	-
		SR+	-	-	-	2	2	1	-	-	-	-
Hereford-Bobblestock	9.5	MRW	2*	2*	2*	2	2	2	2	2	3	5
		FL+	-	1	1	-	-	-	-	-	-	-
Hereford-Moor Farm	7.1	MRW	2	2	2	2	2	2	2	2	2	6
Hereford-Newton Farm	8.7	MRW	3	3	3	3	6	6	6	6	6	8
		PR+	-	-	-	3	3	2	-	-	-	-
		OT+	-	-	-	-	-	-	-	-	-	4
Hereford-Belmont	8.4	MRW	-	-	-	-	-	-	-	-	-	4
Hereford-Redhill	6.7	MRW	2	2	2	2	4	3	3	3	3	6
		SR	-	-	-	2	2	-	-	-	-	-
Hereford-Putson	7.4	MRW	2	2	2	2	3	3	3	3	3	6
		SR	-	-	-	1	1	-	-	-	-	-
Hereford-College Gn	4.2	MRW	2	2	2	2	3	2	5	2	2	4
		SR	-	-	-	1	1	-	-	-	-	-
		PR	-	-	-	1	-	-	-	-	-	-
		WE+	-	-	-	-	-	2	2	2	2	2
Hereford-Tupsley	7.5	MRW	3	2	2	2	4	4	5	2	2	8
		SR	-	-	-	2	2	-	-	-	-	-
		WE	-	-	-	-	-	2	2	2	2	2

+MRW = Midland Red West; YE = Yeomans Motors; SR = Stretton Coaches; FL = Flashes Coaches; PR = Primrose Motors; OT = Orion Travel; WE = Western Coaches

*Not a separate service.

TABLE A2. FREQUENCIES ON PRINCIPAL LOCAL ROUTES IN LANCASTER

Route	Round Trip Length (km)	Frequency of Buses in Standard Daytime Hour				
		Joint Service	Separate Services			
			Nov 1985	Operator	Nov 1986	Nov 1987
Overton- Heysham	7.1	1	LCT+	1	1	1
Heysham- Morecambe	11.5	8	LCT RIB+	5 4	7 10	9 10
Morecambe- Bare	4.2	4	LCT RIB	2 2	2 4	3 4
Morecambe- Carnforth	20.0	1	LCT RIB	1 1	1 1	1 -
Morecambe- Westgate	9.0	2	LCT RIB	1 -	1 3	1 4
Morecambe- Branksome	5.0	1	LCT RIB	1 -	- -	- 1
Morecambe- Lancaster	12.5	4	LCT RIB	5 5	4 6	5 6
Lancaster- Bare	10.6	2	LCT RIB	2 -	2 4	3 4
Lancaster- Westgate	9.7	1	LCT RIB	- -	1 -	1 1
Lancaster- Carnforth	21.2	1	LCT RIB	2 1	2 1	2 3
Lancaster- Vale	6.7	2	LCT RIB	2 2	2 6	2 5
Lancaster- Ryelands	6.2	1	LCT RIB	2 2	- 6*	- 4*
Lanc-Halton or Beaumont Gn	12.7	3	LCT RIB	1 1	1 4	2 2
Lancaster- Ridge	6.3	4	LCT RIB	2 2	- 6	- 5
Lancaster- Moor Hosp	7.4	2	LCT RIB	2 2	2 -	2 -

+LCT = Lancaster City Transport; RIB = Ribble Motor Services.
*Not a separate service.

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TABLE A2 (CONT). FREQUENCIES ON PRINCIPAL LOCAL ROUTES IN LANCASTER

Route	Round Trip Length (km)	Frequency of Buses in Standard Daytime Hour				
		Joint Service	Separate Services			
			Nov 1985	Operator	Nov 1986	Nov 1987
Lancaster-Marsh	5.0	4	LCT+ RIB+	2 -	2 6	3 4
Lancaster-Primrose	6.3	-	LCT	-	-	2
Lancaster-Hala or University	15.5	6	LCT RIB	5 6	4 6	5 6
Carnforth-Warton	5.5	1	LCT RIB	1 1	1 2	1 3

+LCT = Lancaster City Transport; RIB = Ribble Motor Services.

TABLE A3. FREQUENCIES ON PRINCIPAL LOCAL ROUTES IN STOCKTON

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour			
			Nov 1985	Nov 1986	Nov 1987	Nov 1988
Stockton-Port Clarence	17.2	CT+	1	1	1	
Stockton-Billingham via Portrack	18.5	CT	1	1	1	
Stockton-Albany Estate	7.4	CT	-	-	1	
Stockton-Billingham via Norton Rd	14.3	CT U+ TMS+	4 2? -	4 2 4	6 2 4	
Stockton-Norton Gn or NTH++ via Norton Rd	12.5	CT TMS D+	6 - -	6 - 1	6 2 -	
Stockton-Blue Hall	7.0	CT	2	2	2	
Stockton-Glebe Estate	11.4	R+	-	-	1	
Stockton-Roseworth via Ragworth	11.0	CT TMS	4 -	4 2	6 2	
Stockton-Roseworth or NTH via Ragpath La	8.9	CT TMS	4 -	4 -	2 2	
Stockton-Durham Rd or NTH via Durham Rd	7.8	U	4?	4	4	
Stockton-Hardwick	9.6	CT D R	7 - -	7 1 2	6 6 2	
Stockton-Tithebarn	11.3	CT TMS	2 -	2 2	2 2	
Stockton-Salters Lane	8.5	CT R	1 -	1 -	- 1	
Stockton-Elm Tree Fm-Bishopgarth	12.0	CT TMS	2 -	2 2	2 2	
Stockton-Elton Pk via Bishopton Rd	10.8	CT TMS	4 -	4 2	4 2	
Stockton-Green Vale via Oxbridge	9.3	CT TMS	4 -	4 2	4 2	

+CT = Cleveland Transit; U = United Automobile Services; TMS = Trimdon Motor Services; D = Delta Taxis; R = Robsons.
 ++NTH = North Tees Hospital.

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TABLE A3 (CONT). FREQUENCIES ON PRINCIPAL LOCAL ROUTES IN STOCKTON

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour			
			Nov 1985	Nov 1986	Nov 1987	Nov 1988
Stockton-Hartburn or Orch Est via Oxbr La	16.8	CT+ TMS+	2 -	2 -	3 2	
Stockton-Hartburn via Hartburn La	7.5	CT U+	2 2?	2 2	1 1	
Stockton-Yarm or Willey Flatts	17.7	CT U TMS	3 2? -	3 2 -	2 3 2	
Stockton-Cunningham Drive direct	8.7	CT TMS	2 -	2 -	2 2	
Stockton-Ingleby Barwick direct	12.9	CT	-	-	1	
Stockton-Thornaby Cen via Thornaby Rd	7.9	CT TMS	3 -	3 2	3 -	
Stockton-Thornaby Cen via Thorntree Rd	7.1	CT TMS	3 -	3 2	4 2	
Stockton-Thornaby Cen via Diamond Rd	8.2	CT TMS	2 -	2 2	2 2	
Billingham-Portrack (-Middlesborough)	12.5	CT U	2 2?	2 2	2 2	
Billingham-Pt Clarence	9.6	CT	1	1	1	
Billingham-Low Grange via Knole Rd	6.7	CT TMS	4 -	5 2	7 2	
Billingham-Low Grange via Campus School	7.2	CT TMS	4 -	3 2	3 2	
Billingham-High Grange	7.8	CT	-	1	1	
Billingham-Wolviston Court Estate	5.1	CT U	- 4?	- 4	- 4	
Billingham-N Tees Hosp	17.4	CT	1	1	1	
Hartburn-N Tees Hosp	9.6	CT	2	2	2	

+CT = Cleveland Transit; U = United Automobile Services; TMS = Trimdon Motor Services.

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TABLE A3 (CONT). FREQUENCIES ON PRINCIPAL LOCAL ROUTES IN STOCKTON

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour			
			Nov 1985	Nov 1986	Nov 1987	Nov 1988
Thornaby Centre- Bassleton Court	4.5	CT+	2	3	3	
		TMS+	-	2	2	
Thornaby Centre- Cunningham Drive	4.2	CT	2	2	6	
		TMS	-	2	4	
Thornaby Centre- Ingleby Barwick	7.6	CT	1	1	1	
		U+	1?	1	1	
		B+	-	-	1?	

+CT = Cleveland Transit; U = United Automobile Services; TMS = Trimdon Motor Services; B = Beestons.

TABLE A4. FREQUENCIES IN SOUTH WALES

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour			
			Nov 1985	Nov 1986	Nov 1987	Nov 1988
Newport- Caerphilly	38.3	JT+	2	-	-	
		NW+	-	2	2	
		IVL+	-	2	2	
Caerphilly- Bargoed	28.6	JT	2	-	-	
		NW	-	2	2	
		IVL	-	2	2	
Bargoed- Tredegar	34.8	JT	1	-	-	
		NW	-	1	1	
		IVL	-	1	1	
Bargoed- Merthyr	40.2	JT	1	-	-	
		IVL	-	1	1	
Newport- Pontypool	29.4	NW	4	4	4	
Pontypool- Abergavenny	32.8	NW	1	1	1	
Abergavenny- Crickhowell	19.8	NW	0.5	0.5	0.5	
Abergavenny- Hereford	67.4	NW	0.5	0.5	0.5	

+JT = Service operated jointly by Inter Valley Link and National Welsh; NW = National Welsh; IVL = Inter Valley Link

TABLE A5. FREQUENCIES ON LANCASTER INTER-URBAN ROUTES

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour			
			Nov 1985	Nov 1986	Nov 1987	Nov 1988
Lancaster-Kendal	74.0	LCT+	-	-	-	1
		RIB+	1	1	1	1
Lancaster-Preston	69.8	LCT	-	-	1	1
		RIB	1	1	1	1
Lancaster-Blackpool	86.2	LCT	-	-	1	1
		RIB	1	1	1	1
Lancaster-Hornby	29.2	LCT	-	-	1	1
		RIB	1	1	1	1

+LCT = Lancaster City Transport; RIB = Ribble Motor Services.

TABLE A6. FREQUENCIES ON BLACKBURN-ACCRINGTON ROUTE

Route	Round Trip Length (km)	Operator	Buses in Standard Daytime Hour			
			Nov 1985	Nov 1986	Nov 1987	Nov 1988
Blackburn-Accrington	16.5	JT+	4	-	-	-
		BBT+	-	3	4	4
		HYN+	-	1	2	2
		RIB+	-	1	1	2
		ACC+	-	2	2	-

+JT = Joint service of Blackburn Borough Transport and Hyndburn Transport; BBT = Blackburn Borough Transport; HYN = Hyndburn Transport; RIB = Ribble Motor Services; ACC = Accrington Coachways.

TABLE A7. BUS FARES IN HEREFORD

Route	Single Fare (pence)									
	Sep '81	Nov '81	Nov '82	Nov '83	Jan '84	Nov '84	Nov '85	Nov '86	Nov '87	Nov '88
Hereford-Credenhill	30	30	35	5	15	15	25	33	36	40
Hereford-Bobblestock	20	20	25	25	25	25	25	27	30	33
Hereford-Moor Farm	15	15	20	20	20	20	20	22	24	25
Hereford-Newton Farm	32	32	34	10	15	18	25	33	36	38
Hereford-Belmont										38
Hereford-Redhill	32	32	34	10	15	18	25	27	30	33
Hereford-Putson	32	32	34	10	15	18	25	27	30	33
Hereford-College Gn	23	23	25	10	15	15	15	15	16	16
Hereford-Tupsley	34	34	37	10	15	15	15	20	22	16

TABLE A8. BUS FARES IN LANCASTER

Route	Single Fare (pence)			
	Nov 1985	Nov 1986	Nov 1987	Nov 1988
Overton-Heysham	43	43	46	49
Morecambe-Heysham	58	58	63	67
Morecambe-Bare	26	26	28	30
Morecambe-Carnforth	95	95	100	108
Morecambe-Westgate	43	43	46	49
Morecambe-Branksome	35	35	38	41
Morecambe-Lancaster	65	65	70	75
Lancaster-Bare	58	58	63	67
Lancaster-Westgate	65	65	70	75
Lancaster-Carnforth	95	95	100	108
Lancaster-Vale	35	35	38	41
Lancaster-Ryelands	26	26	28	30
Lancaster-Halton	65	65	70	75
Lancaster-Ridge	26	26	28	30
Lancaster-Moor Hosp	35	35	38	41
Lancaster-Marsh	26	26	28	30
Lancaster-Primrose	26	26	28	30
Lancaster-University	65	65	70	75
Carnforth-Warton	43	43	46	49

TABLE A9. BUS FARES IN STOCKTON

Route	Single Fare (pence)			
	Nov 1985	Nov 1986	Nov 1987	Nov 1988
Stockton-Port Clarence	55	55	60	65
Stockton-Albany Estate			33?	36
Stockton-Billingham	55	55	60	65
Stockton-Norton Green	30	30	33	36
Stockton-Blue Hall	30	30	33	36
Stockton-Glebe Estate			44	48?
Stockton-Roseworth	40	40	44	48
Stockton-N Tees Hosp	40	40	30	48
Stockton-Hardwick	40	40	30	36
Stockton-Tithebarn	40	40	44	48
Stockton-Salters Lane	30	30	33	36?
Stockton-Bishopgarth	40	40	44	48
Stockton-Elton Pk	40	40	44	48
Stockton-Green Vale	30	30	33	36
Stockton-Orchard Estate	50	50	55	60
Stockton-Hartburn	30	30	33	36
Stockton-Willey Flatts	60	60	65	70
Stockton-Cunningham Dr	50	50	55	60
Stockton-Ingleby Barwick			60	65
Stockton-Thornaby Centre	40	40	44	48
Billingham-Portrack	50	50	55	60
Billingham-Port Clarence	50	50	55	60
Billingham-Low Grange	30	30	33	36
Billingham-High Grange	20	20	22	25
Billingham-Wolviston Ct	?	?	12	15
Billingham-N Tees Hosp	55	55	60	65
Hartburn-N Tees Hosp	50	50	55	60
Thornaby C-Bassleton Ct	20	20	22	25
Thornaby C-Cunn'ham Dr	20	20	22	25
Thornaby C-Ingleby Bar'k	30?	30?	33	36

TABLE A10. BUS FARES IN SOUTH WALES

Route	Single Fare (pence)			
	Nov 1985	Nov 1986	Nov 1987	Nov 1988
<u>Rhymney Valley</u>				
Newport-Caerphilly	140	75	80	
Caerphilly-Bargoed	68	64	60	
Bargoed-Tredegar	125	75	80	
Bargoed-Merthyr	137	70	90	
<u>Other</u>				
Newport-Pontypool	90	90	90	
Pontypool-Abergavenny	125	125	125	
Abergavenny-Crickhowell	90	90	90	
Abergavenny-Hereford	175	175	175	

TABLE A11. BUS FARES ON LANCASTER INTER-URBAN ROUTES

Route	Single Fare (pence)			
	Nov 1985	Nov 1986	Nov 1987	Nov 1988
Lancaster-Kendal	181	181	?	215
Lancaster-Preston	170	170	185	200
Lancaster-Blackpool	180	180	195	210
Lancaster-Hornby	105	105	115	125

TABLE A12. BLACKBURN-ACCRINGTON FARES

	Single Fare (pence)			
	Nov 1985	Nov 1986	Nov 1987	Nov 1988
Blackburn- (week daytime)	57	46	50?	
Accrington (other times)	57	57	57?	