

Are urban bus services natural monopolies?

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Abstract:

Although Britain's local bus service has been open to free competition for more than three years, most have continued to be operated as monopolies by the original incumbents. Some competition has occurred, but the incumbents have usually driven off entrants. This paper uses findings from case-studies of competition and from deregulation generally to consider whether monopoly operation has inherent advantages over competitive operation. If so, urban bus routes would be natural monopolies. The evidence suggest that they are, because single-operator services are more convenient for users.

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Introduction

Britain deregulated its local bus services in October 1986. Before deregulation most bus routes were operated as licensed monopolies with fares approved by the licensing authority. Most operators were relatively large. Each operator had its own territory, and operated almost all the routes in that territory. The territories and routes of neighbouring operators often met or intermingled, and sometimes boundary or cross-boundary routes were operated jointly by two operators, but there was no active competition. The main provision of the deregulation legislation was to change this by allowing operators to provide any commercial services at any fares they choose, and to compete freely anywhere except in London.

Following deregulation, the pattern of local bus operators has remained remarkably unchanged. Although there has been competition on a large number of routes in total, the great majority of commercial routes have continued to be operated as monopolies. There are no precise figures on the extent of competition, but it is widely accepted that the proportion of bus-kilometres that were directly competitive was about 3 per cent immediately after deregulation; it rose to a maximum of about 10 per cent in 1987 and 1988; and it has now fallen. Moreover, most competition has been unstable. An entrant has come on to a route; there has been a competitive struggle; then one of the contestants has retired, so that the route has reverted to being a monopoly.

This paper is concerned with why local bus services have remained so monopolistic, and whether it matters. In particular, is it because the services started as monopolies at the time of deregulation, or does monopoly operation have inherent advantages, making local bus services natural monopolies? The paper continues as follows. The next section presents some key empirical results from bus deregulation. The following section considers the structure of the urban bus market before and after deregulation, and on monopolised and competitive routes. The following section discusses the question of whether bus routes are natural monopolies. The final section contains conclusions and policy implications.

Some results from deregulation: costs, fares, service levels, and patronage

In this section we consider the main developments in local bus services after three years of deregulation. We are interested particularly in the unsubsidised commercial services, because these are determined by the market rather than by a public authority. The empirical information presented in this section comes partly from national statistics which are based on confidential returns from operators to the Department of Transport, and partly from the three best-documented case studies of large-scale competition. These case-studies cover competition in three towns: Lancaster, Stockton-on-Tees, and Preston. The first two of these were studied by the author (Evans, 1990) and the last by Mackie and Preston (1988). The national statistics apply to financial years, of which the latest published is 1 April 1988 to 30 March 1989, centred on 1 October 1988, about two years into deregulation (Department of Transport, 1989). Data are available for the author's

case-studies up to November 1989, three years into deregulation. Data are available for Preston only for the year in 1987-8 for which active competition lasted. The national statistics quoted apply to the non-metropolitan areas of England, which include a mixture of towns and cities with populations up to about 500,000, and rural areas. The reason for excluding the statistics for the metropolitan areas is that they reflect other changes in addition to deregulation, particularly a large reduction in subsidy. However, there is no reason to suppose that conclusions would be different for the metropolitan areas.

Operating costs

The most significant effect of deregulation was a reduction in bus operating costs. Table 1 gives average costs per vehicle-kilometre for the non-metropolitan areas at 1988-89 prices. The figures show a fall of 30 per cent in real terms since the last complete year before deregulation. However, some of this reduction is due to the increasing proportion of vehicle-kilometres operated by minibuses, whose operating costs were only 60 per cent of those of a full-size bus. White and Turner (1990) have estimated that about one third of the fall in operating costs is due to minibuses, which suggests that costs in real terms fell by about 20 per cent on a like-with-like basis.

Table 1 Bus operating costs: England

Date relative to start of deregulation	Cost per bus-km excluding depreciation	
	(pence at 1988-1989 prices)	Index (pre-deregulation = 100)
Before (1985-6)	85	100
During (1986-7)	75	87
1 year after (1987-8)	65	76
2 years after (1988-9)	60	70

Source: Department of Transport (1989, table 4.1). The data are for the English operators outside London excluding the metropolitan public transport companies.

Fares

In spite of the fall in bus operating costs, real fare levels did not fall. Table 2 gives real fares indices for the English non-metropolitan counties, and for Lancaster and Stockton, where there was intense competition for the three years following deregulation. Fares nationally rose a trifle more than inflation; fares in the case-study towns rose similarly, and latterly somewhat faster. Fare structures also changed very little following deregulation. Most towns had distance-related fare scales before deregulation, with the same scale applying on every route. These fare structures changed little both in places with competition and in places without (Balcombe *et al.*, 1988). This is surprising, because both the government and economic theory predicted that fares would fall on high-demand routes relative to those on low-demand routes. Competing operators generally had the same fares and adopted the pre-existing fare scales.

Table 2 Real fare indices

Date relative to start of deregulation or competition	English non-met. counties	Lancaster	Stockton
Pre-deregulation/competition = 100			
Before (Nov 1985)	100	100	100
Just after (Nov 1986)	102	97	97
1 year after (Nov 1987)	102	100	99
2 years after (Nov 1988)	101	101	102
3 years after (Nov 1989)	-	105	104

Sources: England: Department of Transport (1989, table 3.1); Lancaster and Stockton: author's calculations from faretables

Service levels

Service levels increased substantially after deregulation. Table 3 gives indices of vehicle-kilometres for the English non-metropolitan counties, and for Lancaster, Stockton, and Preston. The overall increase in service levels in the non-metropolitan counties was 24 per cent. This average covers a wide range of increases in different places. Some had no increases at all, or even reductions, and some had much larger increases. Table 3 shows that services typically doubled in the case-study towns with active competition. Elsewhere, some large service increases occurred in places where standard buses were replaced with minibuses.

Table 3 Indices of scheduled bus-kilometres

Date relative to start of deregulation or competition if different	English non-met counties (bus-km/year)	Lancaster (daytime bus-km/hour)	Stockton (daytime bus-km/hour)	Preston (all bus-km/week)
(Before deregulation/competition = 100)				
Before	100	100	100	100
2 months after	112	157	135	231
1 year after	119	219	157	200
2 years after	124	240	173	
3 years after	-	162*	171	

* Competition ceased.

Sources: England: Department of Transport (1989, Table 1.2); Lancaster and Stockton: author's calculations from timetables; Preston: Mackie and Preston (1988, table 1)

Patronage

Table 4 gives estimated changes in patronage. The exact form of these measurements differs from case to case, and the estimates for the author's case-studies could be subject to fairly large errors. The table shows that the response of patronage to the increases in bus-kilometres was unexpectedly dismal, both at the national level, and in the case-study towns. Patronage in the non-metropolitan counties fell by 7 per cent over the three years from 1985-6, in spite of the increase of 24 per cent in bus-kilometres and almost static real fares. Most of the 7 per cent decline can be attributed to the long-term downward secular trend in bus patronage, but even when this is taken out, we are left with a response of zero to an increase in service level of 24 per cent. In all the case-study towns, the change in patronage was apparently not far off zero, in spite of the doubling of bus-kilometres under competition. As a consequence, average bus occupancy fell by about 25 per cent in the non-metropolitan counties and by about 50 per cent in the case-study towns.

Table 4 Changes in service levels, patronage and bus occupancy

Area or route	Patronage %	Service level %	Bus occupancy %	Source (see below)
<i>English non-met counties</i>				
1985-6 to 1988-9	-7	+24	-25	(1)
<i>Case-studies: before competition compared with during competition</i>				
Preston	+4	+118	-52	(2)
Stockton	0	+76	-43	(3)
Morecambe*	-2	+107	-53	(3)
Lancaster	-8	+111	-57	(3)

* Morecambe is a seaside resort near Lancaster. It was analysed separately from Lancaster here because it has a different seasonal pattern of bus use.

Sources: (1) Department of Transport (1989);

(2) Preston and Mackie (1988);

(3) Evans (1990)

Summary

A broad summary of the empirical consequences of bus deregulation is the following.

- (a) Bus operating costs fell by about 20 per cent.
- (b) Real fares changed little over the first two years, and increased slightly in the third year in the case-study towns
- (c) Service levels, as measured by bus-kilometres, increased by 24 per cent in the non-metropolitan counties between 1985-6 and 1988-9; service levels doubled in the case-study towns subject to competition.
- (d) Patronage remained approximately unchanged when secular trends are allowed for, both in the non-metropolitan counties as a whole, and in the case-study towns subject to competition.
- (e) As a consequence of (c) and (d), average bus occupancies fell substantially.

The structure of local bus markets

Before deregulation

As mentioned previously, local bus services before deregulation were provided by a series of local monopoly operators. The fares of each operator were largely distance-related, and in most towns all routes had the same fare scale.

The economics of individual routes largely depended on the density of demand, that is the number of passengers per hour. This can vary greatly from route to route (and time to time). Although high demand routes had higher bus frequencies than lower demand routes, the variation in frequency between routes was less than the variation in the density of demand, so that average bus occupancies were higher on high density routes than on lower density routes. Because the fare per passenger was similar on all routes, revenue per bus-kilometre was higher on high density routes, and therefore so was profitability. Indeed, in some towns almost all the profit came from one or two prime routes.

Most of the profits on the high density routes were used for cross-subsidy, that is to make up losses on other services. In addition, there was usually some external subsidy, but the external subsidy was often much less than the internal cross-subsidy. The amount of external subsidy was determined by negotiation between the incumbent monopoly operator and the local authority paying the subsidy. The evidence on cross-subsidy comes from a number of pre-deregulation studies summarised in the White Paper *Buses* (Department of Transport, 1984):

"[the evidence] suggests that...cross-subsidy measured on a route by route basis could be three or more times as important as direct subsidy as a source of support for unremunerative routes." (page 54.)

This author (Evans, 1990) also concluded that high density routes were earning excess profits (or "super-normal" profits in economists' terminology) before deregulation from the analysis of patronage and costs on high density routes in the case-study towns. This market structure, with standard fares, internal cross-subsidy between routes, and some external subsidy, is commonplace in regulated local transport systems in developed countries.

The British Government argued in the White Paper *Buses* that this cross-subsidy was undesirable and that it was a consequence of regulation.

"First, users of good routes are being penalised by being made to pay excessive fares in relation to the costs of providing the service they use...There is no reason why travellers who happen to live along well-trafficked routes should in effect be taxed...Through the regulatory system, the development of public transport has been held back where it has a comparative advantage...The second main reason against cross-subsidy is that it leaves to operators for decision matters which should not be so left." (page 55.)

Although a good case can be made against the proposition that cross-subsidy is undesirable (see, for example, Gwilliam *et al*, 1985), few people would have disagreed at the time that cross-subsidy was a consequence of regulation. This is because that it seemed obvious that operators would not be able to earn super-normal profits on any route if routes were open to competition. Any operator who attempted to do so would be undercut by a competitor, and lose all his or her passengers. The obvious manner in which the existing super-normal profits were expected to disappear was through the emergence of route-specific fares, with lower fares on high density routes and higher fares on low density routes. In the event this has not happened.

After deregulation: non-competitive routes

As mentioned above, the pattern of services and fares changed surprisingly little after deregulation. Most services continued to be operated as monopolies by the previous incumbent operators. On these services the practice of having standard fare scales applying to all routes continued, and fare levels remained about the same in real terms. The most important general change was the average fall in operating costs of about 20 per cent. Service frequencies were increased in some places, and patronage declined in line with the long-term secular trend.

It follows that, because high density routes were earning super-normal profits before deregulation, they will have continued to do so afterwards. The increase in frequencies on some of these routes and the secular decline in patronage will have acted to decrease these profits, but the effects of these were probably more than counterbalanced by the decrease in costs. Overall profits of bus operators have not increased since deregulation (White and Turner, 1990), so it is likely that the super-normal profits have continued largely to be used for cross-subsidy as they were before.

How can incumbent operators continue to earn super-normal profits on high density routes when these routes are open to competition, and there is no shortage of competent potential competitors? Why are the incumbents not forced to reduce their fares on high density routes?

It is clear immediately that the market cannot be a perfectly contestable one in the economic sense, because in contestable markets the threat from potential entrants prevents incumbents from earning super-normal profits (Baumol *et al*, 1988). There are two main theoretical requirements for a market to be contestable. These are, first, that entry and exit should be costless, implying that entrants have no sunk costs, and, secondly, that incumbents cannot change their prices immediately in response to entry. It is often argued that sunk costs are approximately zero in bus and airline markets, because the costs of buses and

aircraft are not sunk, but can be recovered through sale or alternative use if a service is abandoned. However, the other requirement for contestable markets is clearly not met in either market, because it is obviously easy for incumbents to change fares in response to entry. In the case of British bus markets, this is particularly easy, because operators are allowed to change fares without notice, but they must give six weeks' notice of service changes. Therefore there is nothing to prevent monopoly incumbents charging fares designed to reap super-normal profits on high density routes, safe in the knowledge that they could immediately match any entrant's fares if necessary.

It is worth noting at this point that although the threat of entry does not prevent monopoly incumbents charging fares which earn super-normal profits on high density routes, it does force all operators to reduce operating costs. This is because, although fares can be lowered immediately if necessary, costs cannot be. Forsyth (1989) has made the same point in relation to airline deregulation in Australia. Costs depend on wages and working practices, and these can be changed only slowly. Therefore high cost monopoly operators would be effectively threatened by lower cost entrants, and it is to meet this threat that most large operators acted to reduce their costs from pre-deregulation levels.

We have discussed how monopoly operators have been able to continue earning super-normal profits on high density routes, but not how they have been able to retain their monopolies in a deregulated market. Given that monopolists have continued to earn super-normal profits, and given the presence of competent potential entrants, why do the entrants not enter to gain a share of these profits? Before attempting this question, we must first consider what has happened on competitive routes.

After deregulation: competitive routes

The number of competitive routes has been small in relation to the number of monopoly routes, but it has been large overall, so there has been a lot of experience of competition. Competition has taken many forms, as operators' strategies have differed. We consider here the form of competition in the three case-study towns introduced above. This form of competition has been perhaps the most long-lasting and stable form among large and serious operators. Its characteristics are the following.

First, there was a dramatic increase in service levels. Table 3 shows that bus-kilometres typically doubled overall in the case-study towns, and most of the increases were on high density routes. The increases occurred partly because the entrant's initial services would be superimposed on the incumbent's services, and partly because there were sometimes subsequent rounds of moves and counter-moves in which services were increased further. Secondly, the competitors generally all charged the same fares, and adopted the pre-existing distance-related fare scale. Therefore fares were the same on competitive routes as on non-competitive routes, and, as elsewhere, were the same on high density as on lower density routes. Competitors kept their fares in step by tacitly coordinating their periodic fare increases. They raised their fares at least as fast as inflation; the operators in Lancaster and Stockton latterly raised their fares somewhat faster than inflation.

Table 5 Economics of illustrative competitive routes

	Pass- engers per hour	Fre- quency buses per hour	Cost per bus-km (p)	Cost per hour (£)	Profit per hour (£)	Pass wait time/ hour (£)	Change in wel- fare per hour (£)*
<i>Route A</i>							
Before deregulation	200	4	85	40.8	23.0	107.2	
During competition	200	8	68	65.3	-1.5	58.0	+24.7
<i>Route B</i>							
Before deregulation	250	6	85	61.2	18.5	89.3	
During competition	250	10	68	81.6	-1.8	58.0	+10.9

* compared with before competition.

Source: Evans (1990)

Table 5 gives our estimates of the economics of two typical high density routes subject to competition of the form above. The table compares the position before deregulation with that during competition. It was extracted from Evans (1990), which explains in full the basis of the estimates. Before deregulation both routes were earning substantial super-normal profits for the reasons discussed above. During competition, the combined frequencies of the competing operators rose to the level at which these super-normal profits were wiped out. The wiping out of these profits, together with the reduction in operating costs, allowed the dramatic increases in frequencies of the order shown in Table 3, while still enabling the operators to earn enough revenue to pay the direct costs of operation, though probably not enough for vehicle replacement, and certainly not enough to earn super-normal profits. The final two columns of Table 5 give estimates of the net benefits of competition. The benefits in theory take the form of reduced waiting times for passengers as a consequence of the increased frequencies. Table 5 shows that the values of these time reductions (valued at standard values of time) are greater than the reductions in operators' profit, and therefore that competition brought net welfare increases and a transfer of welfare from operators to users. However, this conclusion is seriously qualified below.

What are the strategies of operators that lead to these outcomes? First, at any given fare level, each competing operator has an incentive to increase his or her own frequency to the maximum possible extent consistent with earning enough revenue to meet the direct operating costs. This is because they can reasonably expect their market share to be proportional to their share of the frequency; also because if they do not run the maximum frequency, they can expect their competitor to do so. Secondly, for any service level, operators generally have no incentive to reduce fares. This is because they have good reason to expect that any

fare reduction they might make would be matched by their competitors. Some operators indeed have a publicly-announced policy of matching any fares of their competitors. In that case operators would not expect to gain any passengers from their competitors by reducing fares, which implies that fare reductions would simply lead to reduced revenue. Therefore the only reason for fare reductions would be as a predatory move. Such fare reductions did occur under competition in many places, but were generally not instigated by operators who wished to stay in business

If fare reductions lead to reduced revenue, would not fare increases lead to increased revenue? In that case, why do competing operators not raise fares? The reason why they do not is that each is less confident that a unilateral fare increase would be matched by competitors than that a unilateral fare reduction would be. If fare increases were not matched, then the instigating operator could lose passengers to competitors, and perhaps lose revenue. However, all operators have a recognized mutual interest in periodic increases, and therefore they tacitly coordinate them. This process means that fares under competition are largely historically determined: they are what they were at the time of deregulation, plus whatever real increases the operators have tacitly coordinated

The conclusion from this analysis of competition is that although high density routes are capable of earning super-normal profits when operated as monopolies, they do not do so when operated competitively. Therefore the main aim of competitive entrants has not been to earn profits while the competition lasts, but to capture all or part of the possible super-normal profits by displacing the incumbent or reaching an agreement with the incumbent to share the route. We now consider whether entrants have been successful in this aim.

How entrants have fared

There is no comprehensive evidence on the fortunes of entrants, but the piecemeal evidence available suggests that entrants have generally failed to get established and capture a share of the super-normal profits. Among the case-study towns, in Preston the entrant sold out to an incumbent after about a year, and in Stockton the main entrant sold out to an incumbent after three years. In Lancaster, both competitors were incumbents who had formerly provided joint services. They ceased competition and reverted to joint operation after three years. Elsewhere, *Bus Business* (88, 18 October 1989) summed up the results of major entry in this way:

"The frontal assaults - the introduction of a rival network of services against an established operator - failed, virtually without exception"

and, on entry by smaller operators

"As with 'frontal assaults', the strength of an established operator has told: it has either had the resources to see off the challenge, or buy it."

Why have the entrants generally not succeeded? It is not entirely clear, but there seem to be two main reasons, one tactical and one strategic. The tactical reason is that incumbents generally have better local knowledge about any or all aspects of providing the services than entrants, and so make better tactical decisions. An indication of the importance of local knowledge is that entrants often hire former staff of incumbents so as to reduce their disadvantage in

information: they did so in both Stockton and Preston, although in those cases it was still not enough.

The strategic reason is that incumbents tend to have weaker bankruptcy constraints than entrants, and are able to survive a profitless or loss-making battle longer than entrants. The simplest case of this is where the incumbent is simply bigger and has a "longer purse"; the incumbent may have routes elsewhere which earn super-normal profits which can be used to cross-subsidise competitive routes. Another case is where the incumbent is not required to make profits, as may be so if it is owned by a local authority; although such operators are not allowed to be subsidised by their owners, they may still have a weaker profit requirement than privately owned operators.

In addition to these main reasons for the failure of entrants in competitive battles, there may be others which are important in some circumstances. The incumbent may have a larger network than the entrant, and so be able to offer more attractive area-wide tickets than entrants; the incumbent may be better known; the incumbent may have more convenient terminal positions than entrants, although county councils are under an obligation to be even-handed between operators.

Reasons why entrants might lose competitive battles are also reasons why potential entrants may choose not to enter. They are therefore entry barriers. There could also be other barriers: the most obvious one is sunk costs, which are costs not recoverable on exit. Once an entrant had paid these, they would not affect subsequent events, so they do not explain why entrants tend to be the losers in competitive battles, but they could explain why many entrants are deterred in the first place. We noted above that sunk costs are low in the bus industry, but they are not zero. The main ones are publicity, training, and the cost of acquiring enough local knowledge to take on the incumbent.

Most of the past competition stemmed from entrants who entered soon after deregulation, without the benefit of learning from the experience of other entrants. The experience now available is an additional deterrent to today's potential entrant, unless the entrant has some specific advantage. In that case, the entrant might do better exploiting the advantage in negotiation rather than competition. Active competition therefore seems likely to continue to decline.

Conclusion on market structure

Monopoly incumbent operators have been able to continue to earn super-normal profits on high density routes in spite of deregulation. This is because the mere threat of entry by competitors is not sufficient to force them to reduce fares to eliminate these profits. In addition, although actual competition eliminates super-normal profits so long as it lasts, most monopoly incumbents have been able to see off any competitive challenges they have had to face. The main reasons seem to be their better local knowledge and their stronger financial resources. However, it is not clear whether the market structure which has emerged from local bus deregulation in Britain is a consequence of the specific conditions there, particularly the highly monopolised starting position, or whether such a market structure is inherent in local bus operation. We now consider this

Are urban bus services natural monopolies?

Bus operating costs

The standard explanation of the need for and existence of natural monopolies is that for some goods and services the total production costs of the relevant level of output are lower if the product is produced by one firm than if it is produced by more than one. Public utilities are classic examples. In that case production by more than one firm would unnecessarily increase costs; also, if two firms were competing, the smaller firm would be likely to have higher costs than the larger firm, and it therefore probably would not be able to survive. Monopoly is both the likely and the desirable result. However, monopolists are able to raise prices and exploit their customers if not controlled, so that natural monopolies are usually either regulated or in public ownership.

A number of studies have been undertaken to investigate whether the unit costs of operating buses are related to firm size. Windle (1988) is a recent American study which also reviews many earlier ones. The accepted conclusion in both America and other countries is that unit costs are not related to the size of the operating company. Large operators have no cost advantage or disadvantage relative to small ones. It follows that bus operating costs are no higher if the services are provided by several operators than by one. British bus deregulation has so far produced no evidence which contradicts this. Therefore there is no reason on these grounds why urban bus operation should be monopolised.

User costs and integration

A less-debated reason why urban bus services might be natural monopolies is that one operator may be able to provide a better service to passengers than several operators deploying the same combined resources. A "better" service is one with lower average user costs. In the case of one route, the schedule of one operator might be more convenient for passengers than the combined independent schedules of more than one operator. In the case of a network of routes, a single operator's services might provide more convenient connections and ticketing than several operators' combined services. In a word, a single operator's services might be better integrated.

In the *Buses* White Paper, the British government took the view that integrated services would be provided even if there was more than one operator.

"It is certainly obvious that the traveller wants to make convenient journeys, to travel throughout the urban areas, to rely on comprehensive information about the services available. But if they are to stay in a free market operators will have to meet the needs of the customers as the demand arises. They will be alive to those needs and will strive to provide for them."
(Page 13.)

Others, such as Nash (1988), took a different view, pointing out that sometimes operators would have an interest in not integrating services with other operators.

The evidence after three years of deregulation suggests that for urban bus services integration is more difficult to achieve in a free market than was anticipated by the government. First, evidence from our case-study towns (Evans, 1990) shows that scheduled headways (i.e. time intervals between buses) are more

haphazard on competitive routes than on monopoly-operated routes. This means that average passenger waiting times are longer than they need be in relation to the frequency provided, or, equivalently, the current average waiting times could be achieved with fewer resources if the services were better integrated. The proportion of bus-kilometres which are thus wasted is of the order of 5-10 per cent: not great, but not negligible.

Much more serious, and much more unexpected, is the evidence on bus patronage presented in Table 4. This shows that, even after allowing for the long-term secular decline, the response of patronage to the increases in bus-kilometres following deregulation was much less than would be expected on the basis of past experience. In the non-metropolitan counties as a whole, the increase in patronage was about zero after allowing for the trend, in response to a service increase of 24 per cent; in the case-study towns, the increase in patronage was also about zero, in response to service increases of the order of 100 per cent. On the basis of a conventional service elasticity of 0.4, one would have expected patronage increases of 10 per cent and 40 per cent respectively.

The reasons for the shortfall in patronage are not clear, but the most plausible explanation so far advanced (White, 1990; Evans, 1990) is that the new services are not benefiting passengers as much as would be expected. Increases in frequencies usually benefit passengers by reducing passenger waiting times or "rescheduling" times (the time wasted in arranging other activities to fit in with the bus schedule). Passengers usually respond to these reductions by travelling more. In this case they have not done so, from which we may plausibly deduce they have received no benefits. The reasons are not only that some of the bus-kilometres are wasted through the scheduling inefficiency discussed above, but also that competing services are inconvenient for passengers in other ways. Haphazard headways are difficult to remember; complete information may be less easily available; competing schedules are frequently changed; competing buses may be more likely to run off-schedule; tickets of competing operators are not inter-available. If competitive services result in higher average user costs than equivalent monopoly services, then monopoly is more efficient, and bus routes are natural monopolies.

To illustrate this point further, we could imagine an extreme case, in which each bus on a high density route was operated by a different firm. Such a service would be very inconvenient for passengers, even though the bus operating costs might be no different from the costs if the buses all belonged to one firm. In that situation, some operators could provide a better service to passengers, and thus increase patronage and revenue, if they combined to provide a joint service, either by forming a single firm or through an operating and marketing agreement. There is no obvious point short of encompassing all the buses at which this process would stop. The route would thus become monopolised, and indeed would be a natural monopoly. There might also be similar reasons for operators on different routes to combine, especially in complex urban areas, but that case is weaker.

There is a parallel between this argument that bus routes are natural monopolies because monopoly bus routes have lower user costs even if they do not have lower producer costs, and Mohring's (1972) argument that bus routes have economies of scale because user costs fall with increasing patronage even if producer costs do not.

We should note here that if we accept the deduction that passengers have received no benefits from the increases in frequencies on competitive services, the welfare analysis summarised in Table 5 collapses. This is because the theoretical benefits to passengers from reduced waiting times vanish, either because passengers do not wait less in practice, or because there are other offsetting

disbenefits. We are left simply with the higher costs of the high frequency service as a welfare loss.

Buses and airlines

If urban bus routes are natural monopolies, why are not air routes, which are economically similar? In contrast to British bus services, most air routes in the United States were competitive both before and after deregulation, and the success there of airline deregulation largely rests on this fact. In this context, the main difference between urban bus services and airlines is that user costs represent a much higher proportion of the total cost of a typical urban bus trip than of an airline trip. For urban bus trips, this proportion is about three-quarters, mainly in the form of walking, waiting and in-vehicle time. Integration directly affects these user costs, and because user costs are more important for buses than airlines, so is integration. Nevertheless, integration is also an issue for airlines, and one of the benefits claimed for airline mergers is the convenience to passengers of being able to complete journeys on a single airline. However, the balance of advantage between integration and competition is very different for buses and airlines.

Summary: what's new?

The argument that integrated monopoly urban transport services are more efficient than competitive ones is old and contentious. So, what's new? The new points are the evidence from bus deregulation in Britain. First, we may deduce from the evidence on bus patronage that competitive services at the route level appear to be less convenient for passengers than a service of a single operator deploying the same resources. This means that competition increases average user costs, and it suggests that urban bus operation, at least at the route level, is a natural monopoly. The second point is that, in spite of the removal of legal barriers to competition, most urban bus services have in fact remained monopolies. Moreover, where competition has occurred, it has in most cases sooner or later come to an end, and the routes have reverted being monopolies. This again suggests that urban bus routes may be natural monopolies.

Policy implications and conclusions

The main conclusion is that the evidence from bus deregulation in Britain suggests that the integration of urban bus services is valuable to passengers, at least at the route level, and is difficult to achieve if a route has more than one operator. This makes bus routes natural monopolies.

The main policy implication is that if this is so public intervention may be required to prevent monopoly operators from exploiting users, and possibly also to discourage "on the road" competition. Traditional bus regulation has these objectives, but the evidence that operating costs fell substantially following deregulation suggests that regulation had allowed operators to exploit their monopolies by inflating costs. Comprehensive competitive tendering or franchising is the fashionable answer to this problem, because it combines the benefits of integration with at least some competitive pressure on operators. On

the other hand, the efforts of the Office of Fair Trading to promote "on the road" competition seem futile, both because they are unlikely to be successful, and because they would lead to increased user costs if they were.

If bus routes were contestable markets in the economic sense, less intervention would be required, because monopoly incumbents would always be effectively threatened by potential entrants, even if the routes were natural monopolies. However, the evidence is that bus routes, like air services, are not contestable markets

Bus services in Britain are now deregulated, not contestable in the economic sense, and highly monopolised. In this situation, there seems little to prevent the operators from exploiting their monopolies. In one sense they are indeed exploiting them, by continuing to earn super-normal profits on their high density routes in the traditional way. However, they do not seem to be taking these profits to the bank. It seems that they are continuing to cross-subsidise more marginal routes, perhaps to preserve their traditional territory. If they were to cease doing this, or if they were to raise fares in real terms, both of which seem possible, the case for more public intervention would become stronger.

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