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CONTESTABILITY IN THE PROVISION OF BUS SERVICES – EVIDENCE FROM THE BRITISH DE-REGULATED MARKET.

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INTRODUCTION

Much has been written and published in the academic literature on the short and medium term, and to a lesser extent the longer term, effects of the British Transport Act 1985. This act deregulated and privatised the British bus industry in the mid 1980s and introduced free market principles into the provision of bus services in Great Britain. Most of this research tends to be negative, with the main issues highlighted as over-bussing, considerable price increases, under investment, market consolidation and constant timetable changes. When taken together, all of these issues would suggest that the free market is not the means by which bus services should be provided. Put a more technical way, whilst in theory the industry apparently closely resembles the economist's model of perfect competition, and hence one in which competition should be sustainable and deliver economic efficiency, in practice it breeches several of the required characteristics of the model which results in imperfectly competitive market structures.

As will be seen later in the paper, most of this research completely ignores the issue of contestable markets and the effect this might have on the economic efficiency of bus service provision. This paper therefore examines the issue of contestability in bus markets and looks for evidence of its existence in the British de-regulated market. In order to bring the issue of the contestable market into focus, we begin with a brief overview of the theory behind the contestable market.

THEORETICAL FRAMEWORK

The idea of the contestable market was first introduced by William Baumol in his American Economic Review article of 1982 (Baumol, 1982). The main principles are best introduced by firstly examining the difference between the two free market extremes of perfect competition, where the level of competition is maximised, and monopoly, where the service is provided by a single operator. These two market structures are compared in Figure 1.

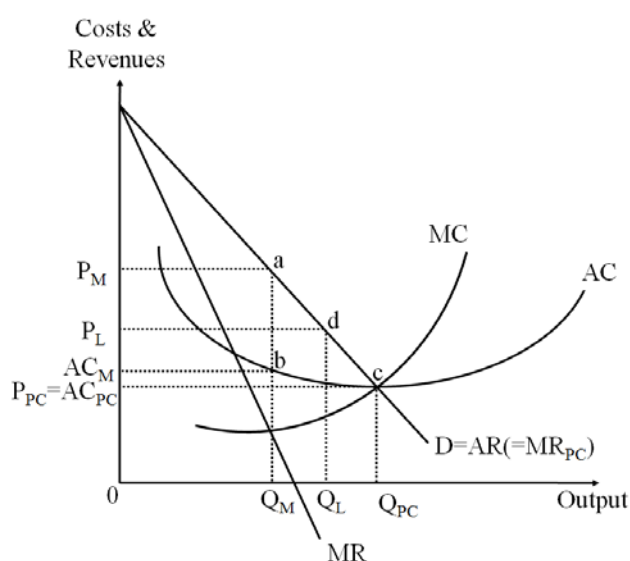*Figure 1: Monopoly v Perfect Competition*
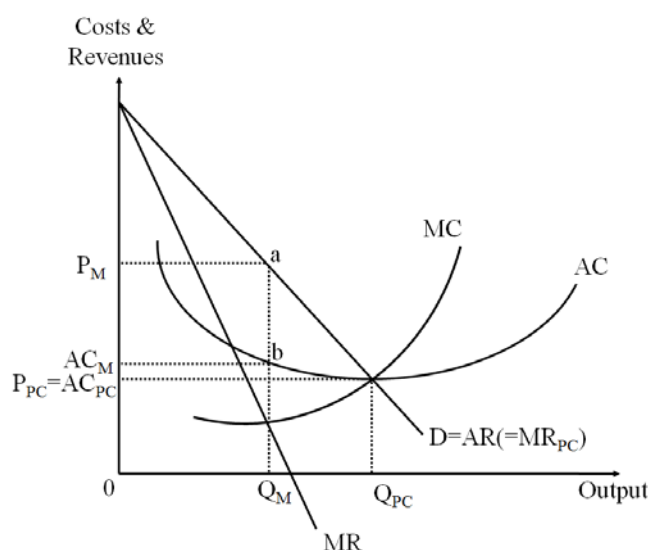
In Figure 1, cost curves and revenue conditions are assumed to be the same under both market structures. Hence the average cost curve follows the theoretical pattern of being u-shaped, thus as the level of output increases the firm firstly experiences economies of scale up to the minimum efficiency scale (MES) at which point average costs are minimised. Beyond the MES point diseconomies set in and average costs rise. The marginal cost curve, which shows the cost of the last unit produced, cuts the average cost curve at its lowest point. Added to the cost curves on Figure 1 is the demand curve, which follows the usual theoretical downward sloping curve from left to right. Beginning with the monopolist, as they have a degree of monopoly power the marginal revenue curve, that is the additional revenue from selling one more unit of production, is always lower than the average revenue. This is because in order to sell one more unit the monopolist must reduce the price of all units sold. Profits are maximised where marginal revenue equals marginal cost, which on figure 1 occurs at output level Q_M. Under monopoly therefore, the market price would be P_M. Note also that at this level of output the level of profit is given by the area outlined by AC_M, P_M, a, b, which would be known as abnormal or monopoly profits.

In the perfectly competitive market, the operator can sell as much as they want at the prevailing market price, hence at each level of output the marginal revenue equals average

revenue. As before, profits are maximised at where MR = MC, which for the perfectly competitive firm occurs at output level Q_{PC}. At this level of output the price charged would be P_{PC}, and only normal profits would be made. Note also that in the long run each firm would be producing at the MES point, hence productive efficiency is achieved. Note also that the consumer is paying the lowest possible price that will ensure that this good or service is produced. It is for these reasons that competition is generally viewed as a 'good' thing, i.e. because unlike monopoly, it ensures economic efficiency.

Baumol argued however that it was not only perfectly competitive markets that would produce efficient market behaviour, such as that illustrated in figure 1. Where a monopoly provider faced the 'threat' of potential competition then this would force the incumbent to act as if under a perfect (or near perfect) market structure. The monopolist would therefore only seek to achieve normal profits in order to deter market entry rather than maximise profits in the pursuit of monopoly profits. If the firm failed to maintain economic efficiency in terms of the price charged and the costs incurred in providing the service, it would become vulnerable to entry by a lower cost operator that would eventually take the whole market and drive other operators out of business. In order to be contestable however, entry to the market must be free and exit costless. It is also argued that there must be no structural barriers to the entry of firms in the long run. Like perfect competition therefore, such criteria are almost always too restrictive to exist in reality and thus very few, if any, markets are perfectly contestable. What is more likely however is that a monopolist in a potentially contestable market will set its level of output somewhere between Q_M and Q_{PC} in figure 1 dependent upon the level of barriers to entry. This can be illustrated by introducing the idea of Bain's limit price (Bain, 1956), which is illustrated in figure 2.

Figure 2: The contestable market and Bain's limit price

The output position of a monopolist facing a perfectly contestable market would map directly on to the perfect market position at point c on figure 2, hence producing economically efficient market behaviour. The higher the level of entry barriers however, then the further away from this market position the monopolist will behave. It will thus move towards point a on the figure. Ultimately, if the market barriers are of such an extent that the market is not contestable in any form, then the output position will map directly onto the monopolist's position at point a on figure 2. If we take output level Q_L as representing a potentially contestable market, then at the associated market demand position of d the price will be set lower than the monopolist price at P_L, average costs will also be lower and by implication productive efficiency will be higher. One final point to note, although not clear from figure 2, is that theoretically the level of profits, whilst abnormal, will be less than monopoly profits.

From the above analysis therefore, three hypotheses can be specified to test for the existence of the contestable market in the British bus industry. Namely:

H1: $\quad \overline{P}_L < \overline{P}_M$

H2: $\quad \overline{TE}_L < \overline{TE}_M$

H3: $\quad \overline{\pi}_L < \overline{\pi}_M$

Thus average prices (H1) and average profit levels (H2) will be lower in the contestable market, whilst average technical efficiency levels (H2) will be higher. Note that with regard to this last hypothesis, differences in technical efficiencies should be more clearly defined as differences in scale efficiencies, as the basic assumption of figure 2 is that all firms face similar cost conditions; hence differences in costs are only due to monopolists not being forced to produce at the MES point. In the following analysis however, it is differences in technical efficiency that will be tested for, as this will also consider the possible existence of x-inefficiency (Leibenstein, 1966). This is said to occur where the absence of competitive pressures leads to a general management slack, and hence cost curves may not be as low as they should be.

What should also be noted is that the above three hypotheses are not being used to find evidence of the perfectly contestable market, but rather evidence of non maximisation of (monopoly) profits through the imposition of a limit price due to the contestability of the market. In order to be tested however, this first requires criteria to be specified to identify a contestable market in bus services

CONTESTABILITY IN BUS SERVICES

The contestable market is normally introduced into bus services through some form of regulated system, and thus constitutes what is more generally known as Demsetz competition. London was one of the first to introduce this approach, when it moved from a model of complete public sector provision to one of public/private provision. Using the S-T-O

framework to explain this further, prior to reform all three functions were performed by the public sector. Demsetz competition was introduced into the market by retaining the S and T functions in the public sector, and effectively contracting out the O function to the private sector. Hence Transport for London specifies the routes, fares and frequencies to be operated, and private sector firms operate the services under two to three year absolute cost contracts. Under a free market system however, S is a function of public and private decisions, with T and O held wholly in the private sector. This is no different whether the market is contestable or not. That does however raise the issue as to what actually constitutes a 'contestable' market in deregulated bus services. The main criteria used in this analysis are with regard to entry barriers, market dependence and ownership form.

Thus a contestable market in bus services is said to exist where market entry is possible without the fear of retaliatory action by the incumbent; this would constitute a relatively low entry barrier and is one that would not spark off a national price war throughout the country. Hence for example in 2001, First entered the Edinburgh market to compete directly with the incumbent operator, Lothian Buses, and it did so without fear of Lothian entering First 'strongholds', such as Glasgow. If however it had chosen to enter the Newcastle market in direct competition with Stagecoach, it faced a very real threat of retaliatory action from Stagecoach in one of its own 'strongholds'.

The second criteria used is dependence upon the market, which in this context is fairly straightforward. Hence in the example given above, whilst the future of First was not dependent upon obtaining a strong presence in the Edinburgh market, the future of Lothian Buses was entirely dependent upon holding onto its market share. Thus dependence on a single market means it is contestable.

The final criteria used is ownership form/type. Firms that operate in contestable markets are generally private limited companies or publicly owned, hence both are usually stand alone companies with few if any subsidiaries. The common denominator is that these firms are locally owned. Whilst this is very similar to dependence upon a single market, it does allow the differential to be made between operating companies that are subsidiaries of one of the major operators as opposed to those which are effectively the main holding company. It also helps to commonly identify contestable markets which are dominated by a single operator, such as with Lothian Buses in Edinburgh, and ones in which the firm is not dominant but completely dependent upon the share of the market that it does posses, such as is the case with Ipswich Buses.

To summarise and simplify, a contestable market in bus services is said to exist where there is a single identifiable market which a locally owned incumbent is entirely dependent upon retaining a significant market share.

LITERATURE REVIEW

A key article in this area, in fact one of the very few on the subject of contestability in land based forms of public transport, is Landridge and Sealy (2000). They examined the extent to which the structure created on privatisation of the British bus industry by the Transport Act 1985 constituted a contestable market or not. The authors suggest that in the period immediately following deregulation and privatisation, former National Bus Company subsidiaries on the whole held on to their strong market positions whilst at the same time lowered operating costs and received significantly reduced levels of subsidy. This came about as awareness of the potential threat of competition was heightened during that period. As a result, it was not direct competition that produced such effects but rather the extent to which an incumbent's market share could be contested by new entrants. With significantly increased market concentration in the 1990s however, this initial response was replaced by (tacit) collusion brought about by market stability and hence contestability was lost. Their overall conclusion, based on a whole market overview, is that the British bus market is neither contestable nor competitive.

Far more research exists on the issue of contestable markets in airline services, however these have tended to find little evidence of contestability. For example, Joesch and Zick (1994) looked at the existence of contestable markets in US airline services through an examination of the relationship between market concentration and fare levels at 19 destination specific markets – if this was found to be positive, this would suggest uncontested markets, whilst if no relationship was found, this would suggest contestability in the market. What their results showed was that over the period 1983 to 1990 the relationship had changed from statistically insignificant to strongly positively significant, suggesting that contestability of the market had been compromised. This they put down to the implementation of strategic barriers in the form of control of passenger departure gates, the rising importance of reservation systems and frequent flyer programmes. This is largely consistent with Landridge and Sealy, where following deregulation of the market firms initially compete on the basis of the contestable market, however in the medium to longer term seek to reduce contestability through imposing strategic barriers to entry. Dominaco (2007) reports similar action in European airline markets from incumbents to tighten up the market following regulatory reforms, hence again compromising the contestability of the market. Finally Baumol et al (1988) (cited in Dominaco) report that numerous studies have on airline services found a positive correlation between market concentration and profitability, hence casting some doubt on the applicability of contestable theory to the airline market.

Most research concerning contestable markets in land based forms of transport relate to where it has been introduced through regulation, identified above as Demsetz competition. Much of this research has come from the Thredbo series of conferences and its participants, as this has been a major forum that draws on a wide range of international experience for the discussion of reforms in the organisation and operation of public transport services. For example, Hauge (1999) found considerable savings in the subsidies required to maintain Norwegian ferry

links, where the introduction of competitive tendering on a limited number of routes had led to reductions in subsidy, improved efficiency and a better organised transport ferry operation. Van de Velde (2003) similarly found that the introduction of market reforms had led to considerable supply side consolidations across a number of countries examined, as well as savings in the level of subsidies required to support local transport services even after an upward trend in contract prices in subsequent bidding rounds. Preston (2001), in a review of bus and light rail systems across Europe, estimated that competitive bus markets had costs per vehicle kilometre some 23 per cent lower than limited competitive markets and 51 per cent lower than regulated markets. This would generally be consistent with the theory outlined earlier.

Bray and Wallis (2008) reviewed the impact of reforms in the form of competitive tendering in the provision of bus services in Adelaide over the period 1994/5 to 2006/7 in terms of operating costs, bus boardings and public finance. What they found was that there had been a 4.1% p.a. turnaround in bus boardings from earlier trends and that operating costs had declined by 26% as a result of competitive tendering. Based on a counterfactual scenario, they estimated that this had led to a savings on public finance of $30.2m in 2006/7 and $224m over the whole period reviewed. Interestingly in the current context, Hensher and Stanley (2003) compare the cost of bus operations in Norway with Sweden and Denmark, where in the former only 7% of bus services had been competitively tendered but over 80% in the other two. What they found was that bus services in Norway were no less cost effective than in their Scandinavian counterparts. The authors cite Carlquist (2001) as identifying that it is the threat of the more widespread introduction of competitive tendering in Norway which appeared to have motivated the reduction in costs.

Past literature therefore would seem to suggest that pure contestable markets in transport services are very seldom found, and where they have been identified incumbent operators have been able to erect strategic barriers to prevent the threat of potential competition in the longer term. Where contestability has been introduced through regulation however, or even the threat of such measures being introduced, this has produced results broadly consistent with the theory.

DATA AND RESULTS

Due to data availability, data could not be collated for a cross section for a single point or period of time, thus different aspects of the above framework are examined at different points in time. The examination of prices is based on fares at the end of April 2009, whilst analysis of profit margins and efficiency are over the periods 2002 to 2005 and 2000 to 2005 respectively. The identification of 'contestable' markets was made based on factors present in the market in 2009. This therefore requires an assumption of consistency over the time periods used. With regard to firms identified as operating in contestable markets in 2009, as no major structural change (in terms of the criteria specified above) occurred in these markets over that period, this assumption is deemed to be valid. With regard to 'dominant markets',

closer examination of the operators involved revealed that, for those for which data was available, two had changed ownership in the intervening period (from stand alone operator to becoming part of one of the majors), these were removed from the profit margins and efficiency aspects of the analysis.

This results are presented under the three headings of price, profit margins and efficiency analysis.

Prices

Information relating to prices was gathered directly from the internet. Pricing information for around 90 bus subsidiaries was gathered, however this tended to vary in the quantity of information available. The most complete websites quoted fares for single trips (staged and flat fare), return trips, day tickets, weekly tickets, monthly tickets and annual season tickets, however the level of consistency tended to vary. As a consequence, finding a single fare basis for comparison proved problematic. Virtually all sites however provided quotes for day, weekly and monthly tickets, hence all three are used in the following analysis. It should be noted however that particularly with regard to weekly tickets, some evidence was found of direct market pricing. In some markets therefore, fare levels may not reflect the level of potential or actual competition faced by the firm. As an example, Blackpool Transport Ltd charges a far higher fare for its weekly ticket than most other companies identified as operating in a contestable market, with this higher fare mainly reflecting the high degree of tourists in that particular market. Nevertheless, such 'anomalies' are typical of quantitative research and the whole point of basing findings on a reasonably sized sample.

The second factor when comparing fares between markets is that variations in fare levels may represent different 'typical' journey lengths, hence any price disparities may reflect these differences rather than dissimilarities in market conditions. This is the main reason why individual fares could not be compared, thus what is used in this analysis are 'open' tickets, i.e. tickets with unlimited use, such as a day ticket. Whilst this to some extent will still represent differences in 'typical' journey lengths, this issue will be minimised and also lessened further due to the sample size which should even out any such differences between the markets identified.

Due to the availability of data, three types of market are compared in this and the next section. Along with the dominant market (virtual monopoly) and contestable markets, a competitive market is also examined. This is where a company is operating in direct competition with another major operator. Thus for example in Coventry, National Express West Midlands faces strong competition from the Stagecoach subsidiary Midland Red South (Stagecoach Warwickshire). Thus the latter is classified as operating in a competitive market. As we will see later however, whilst fares between bus markets can be separately identified and hence compared, profit margins and subsidiary efficiency cannot, as 'competitive' bus operations could not be separated from the rest of the company. The inclusion of competitive markets in

this section relating to prices does nonetheless provide an interesting comparison in this one aspect of the analysis. Table 1 therefore compares the prices of daily, weekly and monthly tickets in the three different market types.

Table 1 – Fare level comparisons, weekly and monthly tickets prices in April 2009.

Summary Table	Summary Statistics		
	Day Tickets	Weekly Tickets	Monthly Tickets
Dominant			
Mean	3.56	13.63	47.31
Median	3.50	13.75	45.00
Maximum	4.60	18.00	64.00
Minimum	2.20	9.50	33.30
Standard Deviation	0.50	2.01	7.81
Number	50	54	60
Contestable			
Mean	3.09	11.91	42.12
Median	3.00	12.00	44.00
Maximum	3.80	16.00	54.00
Minimum	2.50	8.00	32.00
Standard Deviation	0.38	2.63	7.47
Number	17	17	17
Competitive			
Mean	3.20	12.32	42.14
Median	3.00	12.00	40.00
Maximum	4.50	15.00	53.00
Minimum	2.70	10.00	34.00
Standard Deviation	0.48	1.79	6.37
Number	11	11	11
T Statistics	T Values and Probabilities		
Dominant V Contestable	3.9669	2.5011	2.5954
Prob (2 tails)	0.0003	0.0199	0.0149
Dominant v Competitive	2.2418	2.1940	2.4764
Prob (2 tails)	0.0395	0.0433	0.0241
Contestable v Competitive	-0.6115	-0.4862	-0.0071
Prob (2 tails)	0.5485	0.6309	0.9944

Examination of the summary statistics presented in the top half of Table 1 strongly indicate that with regard to pricing, there is evidence of contestability in the market, with mean and median fares tending to follow the general pattern of dominant, competitive and then contestable in descending order. What is also interesting to note, but not of direct relevance to this study, is that a full set of fares were available on the internet for all companies identified as operating in contestable or competitive markets, but not for those identified as having dominant markets.

The T statistics find that these differences in fare levels between dominant and contestable/competitive markets are statistically significant, however no statistical difference is found between contestable and competitive markets. Consistent with the theory, this suggests that in terms of pricing levels, the threat of competition to the firm in the contestable market will force it to behave as if it did face actual competition.

Profit Margins

Whilst profit margins do not equate with profit maximisation, they are used in this analysis in order to provide a directly comparative measure of the level of profit derived from bus operations. Furthermore, restricting supply, a measure consistent with monopolistic behaviour, would be entirely consist with obtaining a higher level of profit. Therefore profit margins are believed to be an appropriate proxy for a comparison between profit levels for contestable, competitive and dominant markets. In Table 2, average values and related t statistics are presented over a five year period . These were all taken from the relevant Bus Industry Monitor (see for example TAS 2005).

Table 2: Profit Margins, 90 Major Bus Subsidiaries, 2002 to 2005

	2002	2003	2004	2005
Means				
Dominant	9.63%	8.91%	6.71%	5.27%
Contestable	5.40%	4.67%	2.41%	2.80%
Competitive	9.37%	7.61%	7.61%	1.70%
T Statistics:				
Dominant v Contestable	2.8943	2.2012	1.5401	1.2792
Prob (2 tails):	0.0070	0.0396	0.1392	0.2148
Dominant v Competitive	0.1453	0.6589	-0.4295	0.8645
Prob (2 tails):	0.8863	0.5214	0.6730	0.4076
Contestable v Competitive	-2.0010	-1.1447	-1.1884	0.2500
Prob (2 tails):	0.0592	0.2636	0.2458	0.8068
Medians:				

Dominant	9.97%	9.30%	7.19%	6.37%
Contestable	4.37%	4.61%	3.46%	4.60%
Competitive	11.39%	9.53%	9.27%	7.25%

Table 2 shows less of a clear difference between the dominant, contestable and competitive markets than Table 1 which looked at prices. At the beginning of the period examined, there are clear differences between the contestable and dominant markets, with significant t differences in the first two years. In the last two years whilst the differential remains fairly consistent at around 4%, the lower level of margins gained in these years means that the t values are not statistically significant. The competitive market is far more difficult to isolate in this case, as competition occurs at the borders of bus territories, hence most of these subsidiaries operate as dominant operators in their strongholds, but compete at the margins. Nevertheless, there is some evidence based on (mean) descriptive statistics that profit margins are lower in competitive markets, but this is very marginal and certainly not true of figures based on median values.

Efficiency Analysis

The last of the above hypothesis to be tested is that firms operating in contestable markets have higher efficiency levels. Efficiencies were calculated using data envelopment analysis (DEA – see Cooper et al (2000) for a full description of the method) for 44 firms, which were those for which the required data was available. This also included those identified as partly operating in competitive market firms, however due to the low number of data points (only four) , no meaningful statistical analysis could be carried out on this aspect.

When carrying out technical efficiency assessments the inputs and output need to be specified. Inputs in this case are fairly straightforward, as at the most basic level in the production of bus services/trips only two inputs are required – labour and buses. Both of these figures for each subsidiary are readily available, with the main source again being the Bus Industry Monitor. Specification of an output however is far more problematic. In this case two measures of output have been used in separate DEA specifications; the number of passengers carried and the number of vehicle kilometres produced. This data was obtained directly from the Department of Transport and the most up-to-date date available to the author (after much difficulty!) covers the period 2002 to 2006.

Results from the efficiency analysis are presented in Table 3, which are broken down into those based on vehicle kilometres, often referred in DEA terms as measuring (technical) efficiency, and those based on passengers, again often referred to in DEA terms as 'effectiveness', although in the current context this closely resembles allocative efficiency.

Table 3: Average efficiencies, contestable, dominant and competitive bus companies

	2000	2001	2002	2003	2004	2005
Vehicle Km Contestable	55.5%	56.5%	59.1%	62.4%	60.3%	61.2%
Dominant	69.5%	66.7%	70.3%	71.5%	70.4%	71.6%
T Statistic	3.3677	2.7043	3.2736	3.0992	2.7391	3.2135
Prob:	0.0022	0.0113	0.0027	0.0043	0.0104	0.0032
Passengers Contestable	67.2%	72.6%	68.3%	64.1%	75.5%	66.3%
Dominant	54.7%	62.0%	59.2%	55.2%	62.9%	60.3%
T Statistic	-2.3026	-1.8118	-1.4788	-1.7521	-2.0358	-1.0295
Prob:	0.0307	0.0831	0.1528	0.0931	0.0534	0.3140

The two sets of results provide an interesting contrast. When vehicle kilometres are used, in all six years presented, dominant firms are found to be significantly more efficient, although some 'catch up' did occur during the period, with a 14% difference found at the beginning and a 10% difference at the end. In the carriage of passengers on the other hand, firms operating in contestable markets are generally found to be significantly more efficient – differences are found at least at the 10% level of significance in four of the six years presented. Firms in such markets therefore would seem to be better at targeting services to passengers needs, even although this may come at the cost of technical efficiency. This would also clearly suggest that the passenger to vehicle kilometre ratio is far larger in these firms, and this is indeed found to be the case with an average of 21.5 passengers per vehicle km versus an average of 15.4 for dominant firms.

This analysis, whilst not clearly conclusive, would nevertheless strongly indicate that firms operating in contestable markets are more (allocatively) efficient than firms in dominant markets, a result entirely consistent with the theory outlined earlier.

CONCLUSIONS AND CLOSING DISCUSSION

The only conclusion from the preceding analysis is that across the three measures used there is clear evidence of the contestable market in the British bus industry. This results in lower passenger fares, higher efficiency levels and lower profit margins for the operator. It does appear therefore to provide an 'efficient' free market solution to the provision of bus services.

That conclusion however tends to avoid the real issue, which is the extent to which contestability is widespread throughout the whole market. Out of some 105 major bus subsidiaries operating in the market, only 15 were identified as operating in a contestable market. When expressed in revenue shares, this only represents 8.6% of revenue. Furthermore, this share has been decreasing over time as the process of merger and particularly acquisition has continued into the long run. Thus, whilst there may be evidence of the contestable market in the industry, it can hardly be described as widespread.

A second point to note is how this situation came about. Unlike most other privatisations at the time, no single bus regulatory was set up but rather it was proposed that the industry be regulated like all others by the competition agencies, namely the Office for Fair Trading and the Monopolies and Mergers Commission (and now its successor, the Competition Commission). It was through these bodies, particularly the latter, that competition would be maintained. The research presented in this paper suggests that if this had been successful, then the outcomes in terms of lower fares, improving efficiency and better meeting consumers needs, may have been obtained. In other words, whilst competition in the market may not be possible due to violation of the assumptions of perfect competition, competition for the market, based on free market rather than Demsetz principles, should be attainable if the competition authorities are able to maintain a competitive industry.

The British experience would tend to suggest however that such a position is simply unattainable, as the market is far stronger than the regulatory bodies – regulation, after all, would not be generally referred to as a 'second best' solution without a good reason. Cowie (2009) has also suggested that as the level of competition increases, from for example national to international, then lower levels become far less competitive. Thus whilst the move towards a single European market in bus services would increase competition across the EU, it will lead to a reduction in competition within individual Member States.

Whilst there are many potential benefits in the free market provision of bus services, due to market imperfections these will always remain unrealised. The only 'sensible' model therefore is in the form of Demsetz competition where contestability is introduced through regulaton, where by and large the strategic and tactical levels remain the preserve of the public sector, and the operational level is maintained by the private sector. How that is achieved, by competitive tender, through negotiated contracts or some combination of the two, is a whole other issue.

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