

Incentive modelling

Profit incentives modelling methodology

1. As discussed in paragraph 6.52 of the main report, the profit incentive to increase coach fares or reduce service levels arises from the parties to the joint venture having common ownership and control¹ of some of the possible alternative coach services on a specific flow. This allows them to recapture revenues from some of the passengers lost as a result of a fare increase who then transfer to another service controlled by the parties.
2. This appendix discusses our approach to modelling these profit incentives as a result of the joint venture, with regard to the pricing and service delivery of (a) Scottish Citylink and megabus or Motorvator services within the joint venture, and (b) the Stagecoach Retained Business services outside the joint venture. We consider:
 - (a) the modelling approach to fare increases and service level reductions;
 - (b) the modelling inputs;
 - (c) model assumptions; and
 - (d) model outputs.

Modelling approach

3. Our modelling analysis seeks to determine whether, as a result of the merger, there would be a profitable incentive for the joint venture and/or Stagecoach to increase fares or reduce service levels on any of the overlap services under their control. We modelled the profit incentive for each of the overlap flows and/or routes and route groups remaining after second-stage filtering (see Appendix G for discussion of filtering methods used).
4. In relation to fare increases, we modelled the following cases where relevant:
 - (a) Where Stagecoach megabus or Motorvator coach services overlap with the pre-joint venture Scottish Citylink flows:
 - (i) increase in Scottish Citylink fares only; or
 - (ii) increase in megabus or Motorvator fares only.
 - (b) Where Stagecoach Retained Business services overlap with any flows within the joint venture:
 - (i) increase in Scottish Citylink fares only;
 - (ii) increase in megabus or Motorvator fares only; or

¹Stagecoach holds a 35 per cent stake in the joint venture and is in charge of the day-to-day management of the joint venture. The board of the joint venture is, however, controlled by the majority shareholder, Braddell.

- (iii) increase in Stagecoach retained business fares only.
5. In relation to both fare increases and service reductions, we analysed the following routes and route groups:²
- (a) the Glasgow–Edinburgh route;
 - (b) the Glasgow–Aberdeen route;
 - (c) the Edinburgh–Inverness route; and
 - (d) the Saltire Cross route group, comprising the Glasgow–Aberdeen and Edinburgh–Inverness routes.
6. For each of these routes and route groups, we modelled the following cases where Stagecoach’s megabus or Motorvator coach services overlapped with the pre-joint-venture Scottish Citylink services:
- (a) increase in Scottish Citylink fares only; or
 - (b) increase in megabus or Motorvator fares only; or
 - (c) decrease in Scottish Citylink service levels only; or
 - (d) decrease in megabus or Motorvator service levels only.

Fare increases

7. Following an increase in fares, some existing or new³ passengers will travel at the higher fares, while others will cease to travel on that service. Of those who cease to travel on that service, some may shift to another service on the same overlap flow controlled by the joint venture (or in the case of overlaps with the Stagecoach Retained Business, by Stagecoach). The remaining passengers may use another bus/coach service not controlled by the parties or a different mode of transport, or cease to travel altogether, any of which result in a loss of revenues for the joint venture.⁴ The overall impact on the parties’ revenues will depend on the combination of these effects, and on any differences in relative fares between the two overlapping services controlled by the parties. As long as costs are not increasing (eg assuming excess capacity is available on existing services), increases in revenues will be translated into increases in profits.⁵

²Profit incentives in relation to service levels on individual flows are not assessed. This is on the basis that service levels on flows cannot be adjusted independently of the route of which they form part. Similarly costs cannot be reduced at flow level, and need to be reduced at route level.

³New passengers will be those previously rationed out at the discounted quota levels. See the Appendix M discussion of yield management (paragraphs 50 to 66) for further details.

⁴For the purpose of the profit incentive modelling, it does not matter whether they switch to another mode of transportation or whether they cease to travel. We are only interested here in services controlled by parties to the joint venture.

⁵There may also be flows which are loss-making pre-joint-venture, on which losses might be *reduced* as a result of a fare increase post-joint-venture. Such flows may continue to be operated for reasons that may not become apparent from the flow-by-flow analysis; for example, they might contribute significant passenger numbers interconnecting to other flows in the network, more than offsetting any losses incurred on the individual flow. This may relate to flows within the Saltire Cross in particular. In considering incentives to increase fares, we considered both the Saltire Cross routes and the Glasgow–Edinburgh route as a whole as well as individual flows on these routes.

Service level reductions

8. Following a decrease in service levels, some existing or new passengers will use the same operator's services at the reduced service level, while others will cease to travel on them. Of those passengers who cease to travel on the affected operator's services, some may switch to another service controlled by the parties to the joint venture. The remaining passengers will either cease to travel altogether or switch to using another bus or coach service not controlled by the parties or another mode of transport (any of which result in a loss of revenues to the parties). The overall impact on the parties' revenues will depend on the combination of these effects, on any differences in relative fares between the overlapping services controlled by the parties, and, importantly, on any reductions in costs arising from the reduction in service.
9. The profit incentive modelled in relation to service levels concentrates on three main routes: Glasgow–Edinburgh, Glasgow–Aberdeen, and Edinburgh–Inverness, including distinctive routes within them, eg Perth–Aberdeen.

Modelling inputs

Elasticities and diversion ratios

10. Own fare and own service level elasticity estimates are used to measure the proportion of passengers who would switch away from an operator's service, given a fare rise or service reduction. Diversion ratio estimates are used to measure passenger switching rates between services operated by the parties to the joint venture. Definitions of these terms are included in paragraphs 3 to 10 of Appendix M. Our approach to obtaining the elasticity and diversion ratio estimates that have been used as inputs to the incentive modelling are explained in paragraphs 36 to 47 of Appendix M.
11. The parties expressed reservations about the construction of the estimates of own price elasticities and diversion ratios used in our incentive modelling. The parties also expressed reservations about the use of price elasticities to estimate the revenue effects of a price or service level change in a yield managed environment. These reservations are commented on in paragraphs 48 to 81 of Appendix M. We considered further the type of yield management practised by the parties and the impact it would have on our analysis, and concluded that it might affect the magnitude of the own fare elasticities, making both the passenger response and the revenue response to a price increase likely to be less elastic than in the absence of yield management.⁶

Cost data

12. In addition to the elasticity and diversion ratio estimates used in the modelling, estimates of possible cost savings as a result of a service level reduction for coach services are generated from a review of financial information and discussion with Stagecoach. Cost data for Scottish Citylink and Retained Business flows is derived from costing data provided by the parties. Cost data for Motorvator and megabus is

⁶This depends to a large extent on whether there exists a supply of previously rationed purchasers at lower steps of the yield management pricing structure, who would buy some of the tickets made available by passengers ceasing to use the service after a price increase.

based on the current subcontractor rates of £[~~xxx~~] for Motorvator and £[~~xxx~~] for megabus.⁷

Revenue data

13. We used revenue and passenger journey data supplied by the parties. This data is described further in Appendix J, paragraph 4.

Model assumptions

14. Our model makes the following assumptions:
- (a) There is sufficient capacity on each service to cope with any increase in passenger numbers as a result of a change in fares without requiring any additional cost (ie buses or coaches, drivers, fuel).⁸ Likewise any reduction in passengers as a result of changes in fares will not lead to a reduction in costs, regardless of whether it occurs in peak or off-peak periods.
 - (b) In relation to service changes, it is assumed that all costs are linear. As such, any reduction in service will lead to a cost reduction on a simple cost-per-mile basis. There are no step reductions.⁹
 - (c) Service reduction is calculated on a mileage reduction basis. This is felt to be a good proxy for headway adjustments given the linear assumption on costs. The parties noted that this approach to costs was likely to lead to an overstatement of profitability of service reductions. In particular, the cost savings would be less than proportionate if a service reduction did not allow a reduction in the number of vehicles operating on a route. Therefore, to be more realistic, each individual service level change may require adjustment to take into account the step-wise nature of coach capacity, ie a 5 per cent reduction in service may not equate to a practical level of vehicle withdrawal. In interpreting the results, we therefore considered whether such a service reduction was feasible.
 - (d) The model shows only an economic incentive to increase fares or reduce service levels. It does not show the ability to carry through the changes. We took this qualification into consideration in our competitive analysis by considering constraints from third parties and the possibility of entry.

Consideration of the model outputs

15. The model output shows the profit incentive, if any, created by the joint venture on each flow over a range of elasticities and diversion ratios. The model is not designed to consider the profit incentives for actions by Stagecoach that are independent of the merger situation. Rather, it allows examination of (a) actions which were unprofitable pre-joint-venture but become profitable as a result of the joint venture, and

⁷Using a per mile rate does not capture the step function in which, beyond some level of passenger decline, an operator chooses not to run the coach or to operate a single- instead of a double-deck coach. However, the megabus model is currently to use double-deck coaches on all services. A per mile rate also does not account for any margin of profit included in these rates.

⁸The parties objected to this assumption, stating they had made extensive use of duplicate vehicles post-joint-venture, suggesting that some services were operating near capacity. However, the parties could not provide data on flow level load factors which took account of duplications. In any case we noted that the fare increases and service reductions under consideration would *reduce* passengers and may in turn *reduce* the need for duplication services. In such cases, our results would be likely to underestimate the profit incentive.

⁹The parties also objected to this assumption, stating that there would be no significant savings unless a vehicle could be eliminated or made to work on two routes at once.

- (b) actions which were profitable pre-joint-venture but become more profitable as a result of the joint venture.
16. The results of the model for a range of elasticities and diversion ratios are set out in the flow-by-flow analysis in Appendix J. These are based on a 10 per cent fare increase or a 5 per cent reduction in service. The model output indicates the change in the parties' incentives as a result of the joint venture to increase fares or decrease service levels on an individual flow or route or route group. Where this figure is positive, the incentive to increase fares or reduce service levels has increased as a result of the joint venture. However, this incentive needs to be examined in conjunction with whether the action of increasing fares or reducing service levels both before and after the joint venture is profitable or not:
- (a) Where the incentive for a fare increase or service level reduction was already positive prior to the joint venture (ie these actions would have been profitable) and becomes more profitable post-joint-venture, the figures are presented in black.
 - (b) Where the incentive for a fare increase/service level reduction was negative prior to the joint venture (ie these actions would have been unprofitable) and it becomes profitable post-joint-venture, the figures are presented in red.
 - (c) Where the incentive for a fare increase/service level reduction was negative prior to the joint venture (ie these actions would have been unprofitable) and it remains negative post-joint-venture, the figures are presented in blue.
17. Therefore, those figures in red show the strongest impact of the joint venture (ie making it profitable to raise prices or reduce service levels where it would have been unprofitable to do so pre-joint-venture). Those in black indicate an increased incentive to change fares or service levels. Those in blue mean it remains unprofitable, but less so than pre-joint-venture, to change fares or service levels. However, one needs to look at flows in the wider context of their respective routes (since changes may be profitable on a route level but not a flow level).
18. The model results need to be considered in the context of whether post-joint-venture there is the ability to increase fares or reduce service levels. Restrictions on this ability include:
- (a) Stagecoach Retained Business fares may be common across a wide network of non-overlapping flows, restricting the ability of Stagecoach to increase these fares independently on the overlap flows.
 - (b) Coach fares and service levels may be constrained by entry and expansion.
 - (c) The parties may not be able significantly to reduce the frequency or scheduling of services (for example, the parties note that a reduction in service may lead to a disproportionate reduction in passengers, which might then lead to further pressure to reduce service levels, ie a 'vicious circle' will develop).
 - (d) Coach service frequencies may be constrained by the requirement to inter-connect with other services and may be justified by the network revenue generated.¹⁰

¹⁰The parties told us that we should also consider that the parties might be constrained by the prospect of expansion of coach operators that were already active on the overlap flows, and the entry of new competitors, as well as by competition from rail and car. We considered that the elasticity estimates and diversion ratios already captured the constraining effect of existing coach operators, rail and car, and we considered the likelihood of entry and expansion generally and on a flow-by-flow basis separately in our competitive assessment (see Appendix J).

19. The parties also told us that, in their view, our incentive modelling relied on an assumption of short-term profit-maximizing behaviour, [§]. They submitted that a positive profit incentive pre-joint-venture to raise fares or reduce service levels meant that either the parties were not short-run profit-maximizing, or the model did not adequately assess profit incentives; in either case they considered that this invalidated the results.
20. We considered (see paragraph 6.56 of main report for further discussion) that some time might be required for an operator to assess the need for, and put into effect, price and service level changes. As such, we considered that a positive incentive could exist pre-joint-venture and still be increased further as a result of the joint venture. We also considered that our use of ranges for elasticities and diversion ratios necessarily produced a range of values for the increased incentive created by the joint venture, some of which might be based on a positive pre-joint-venture incentive. However, given the uncertainty surrounding these estimates, we preferred to consider a range of estimates rather than relying on point estimates. We then looked for an incentive to exist over a wide range of elasticities and diversion ratios, which we considered stronger evidence than where it existed only over a narrow range. Finally, we noted that in interpreting our results, as stated in paragraph 17, we considered that the impact of the joint venture was strongest where the incentive was negative prior to the joint venture and positive post-joint-venture.