Quantitative assessment of competition in MOLA rolling stock

Introduction

1. In this appendix we examine the factors that have caused changes in capital rentals. In particular, we test the hypothesis that competition between ROSCOs is a major driver of changes in capital rentals.

2. This appendix is structured as follows:

   (a) We set out the data used in our analysis and the assumptions underpinning our approach.

   (b) We analyse the relationship between our preferred measure of the extent of competition between ROSCOs and capital rental changes using a simple scatter plot and test whether any statistical relationship exists.

   (c) We conduct an econometric analysis of the relationship between changes in capital rentals and the extent of competition between ROSCOs.

   (d) We then repeat the analyses in *(b)* and *(c)* above to test whether other measures of alternative ROSCOs display a similar relationship with changes in capital rentals.

   (e) We summarize Angel's and the DfT's analyses of the relationship between competition and capital rental changes.

Data used and assumptions in our approach

Data

3. Our analysis focused on explaining capital rental changes on subsequent leases agreed for MOLA rolling stock at franchise re-lets.

4. As set out in Appendix 4.3, we excluded from our data leases relating to franchise extensions, leases agreed following an early franchise termination and with section 54 undertakings, and leases which could not be matched to a single previous lease. We also excluded 21 leases relating to post-MOLA rolling stock, which we considered may not be directly comparable with the capital rental changes for MOLA rolling stock. This left a dataset of 121 leases covering MOLA rolling stock at franchise re-lets.

Dependent variable—changes in capital rentals

5. In our assessment of changes in capital rentals we also made adjustments for additional capital expenditure (capex) and short-term leases due to the effect these have on comparability of capital rentals from one lease to the next. We explain these adjustments in Appendix 4.3, but in brief:

   (a) Additional capex. We adjusted changes in capital rentals to take account of additional capex by ROSCOs, eg where a rental increase of £120 per vehicle per month (pvpm) included £100 pvpm of rentalized additional capex we treated this as a £20 pvpm increase in capital rental for the purposes of calculating percentage changes. Failing to correct for the effect of capex would ignore the impact that this has in driving changes in capital rentals.[1]

   (b) Short-term leases. We excluded short-term leases[2] because they generally involve a premium[3] that leads to higher capital rentals and so are not directly comparable with leases lasting for the length of the franchise. Our dataset contained 28 leases that were shorter than five years.

[1]If additional capex was more likely to be forthcoming from the ROSCO in situations where the incumbent fleet faced the threat of displacement due to competitive pressures, then failing to adjust for capex would bias the results against finding a negative relationship between the number of alternative ROSCOs and changes in capital rentals.
[2]Short-term leases are those that are shorter than the franchise length. Given some uncertainties in our data over the exact end dates of leases, we used 60 months as a guide for leases that were shorter than the franchise.
[3]See Appendix 4.2.

6. We considered that changes in capital rentals adjusted for additional capex and short-term leases were likely to be the most accurate reflection of capital rental changes from one lease to the next. However, given some concerns around the reliability of these adjustments, as set out in Appendix 4.3, we tested whether our results were sensitive to these adjustments by examining changes in capital rentals with and without each of these adjustments.

Independent variable—proxy for competition

7. To assess the drivers for changes in these capital rentals, we considered the usefulness of the measures of alternatives set out in Appendix 4.1. We considered that competitive pressures are driven by the extent to which franchise bidders collectively considered potential alternative fleets that were owned by other ROSCOs, because ROSCOs will not be incentivized to compete against their own fleets. This is preferable to the number of ROSCOs included in bids, as even those fleets owned by other ROSCOs and considered by bidders but not included in franchise bids are likely to impose some competitive constraint on pricing for the fleet that is eventually chosen and, in particular, to affect the capital rentals offered by ROSCOs.

Assumptions

8. Our analysis assumes that the initial capital rentals at privatization were artificially set independent of competitive pressures from potential rival MOLA fleets.[4] We assume that, although these rentals were designed to be set at the competitive level, the process was not an effective substitute for competition. Any bias in setting capital rentals at privatization is therefore assumed to be systematic across fleets.

[4]We discuss how capital rentals were set at privatization in Appendix 4.3.

9. In this way we are able to test whether the level of competition between ROSCOs at franchise re-let has determined changes in capital rentals. The stronger the competition, in terms of the number of alternative ROSCOs considered, the more downward pressure there should be on capital rentals. Other things being equal, this should manifest itself in larger decreases (or smaller increases) in cases where we observe more alternative ROSCOs.

Simple comparative analysis

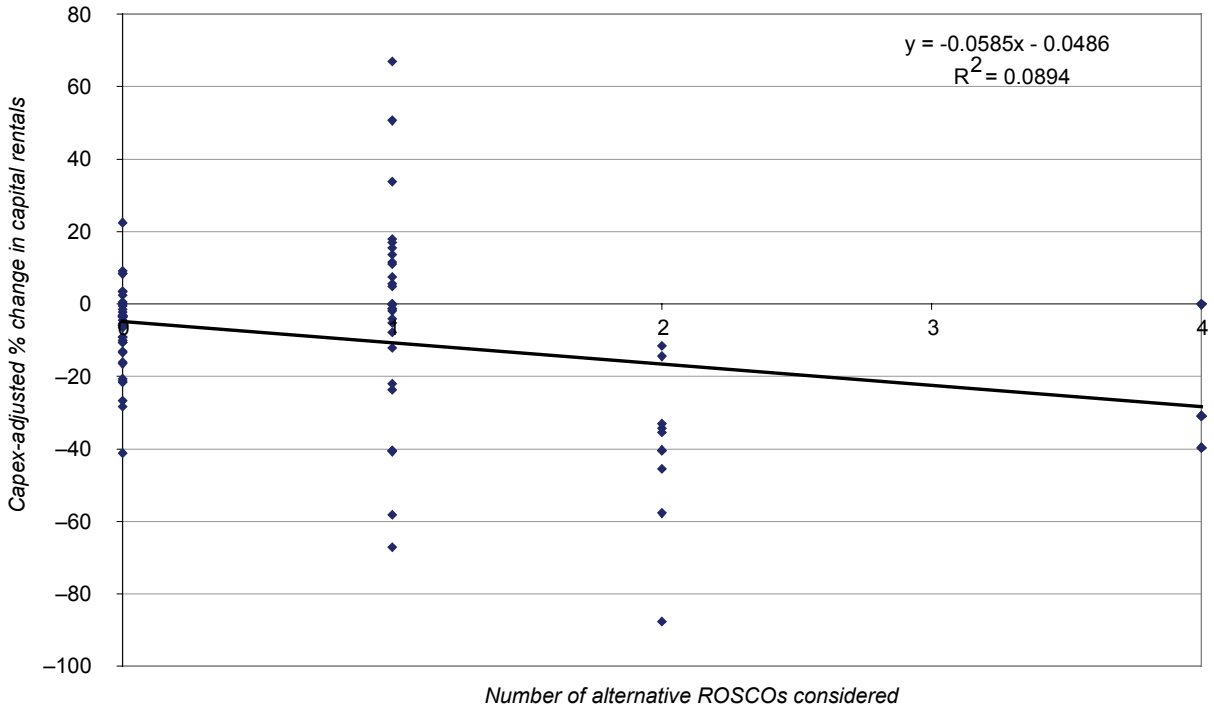
10. In our initial analysis, we looked at the relationship between changes in capital rentals and the number of alternative ROSCOs considered in isolation. At this stage, we did not control for any of the factors that may influence capital rentals, for example lease length or the number of vehicles in the lease, as we deal with these in our econometric analysis.

11. Our initial analysis took the form of a scatter plot and a simple bivariate regression to establish whether any apparent relationship was statistically significant. We expected that, other things being equal, the number of alternative ROSCOs considered would have a statistically significant and negative relationship with changes in capital rentals. Given the expected relationship, we expected to observe a downward slope in the data points.

12. Figure 1 presents the relationship between our preferred measure of competition, the number of alternative ROSCOs considered, and percentage changes in capital rentals and shows the regression line, fitted using Ordinary Least Squares (OLS), which gives us a line of best fit to describe the relationship between our explanatory variable and our dependent variable—ie between the number of alternative ROSCOs considered by franchise bidders and changes in capital rentals.

FIGURE 1

Alternative ROSCOs considered and capex-adjusted changes in capital rentals, with short-term leases excluded



Source: CC analysis.

13. We found a clear negative relationship between the number of alternative ROSCOs[5] whose rolling stock was considered by bidders, whether or not it was eventually included in franchise bids and changes in capital rentals.[6]

14. Table 1 summarizes the results of our simple analysis of the relationship between the number of alternative ROSCOs and changes in capital rentals. We present the slope coefficients and the corresponding p-values.

[5]The cases where there were third and fourth alternative rolling stock lessors related to [✂] and [✂]—bearing in mind that when Angel, HSBC and Porterbrook are involved this will typically represent *one* ROSCO owning the fleet that was leased and *two alternative* ROSCOs.
[6]The slope coefficient is –0.0585 and is significant at the 1 per cent level.

TABLE 1 **Results of relationship between the number of alternative ROSCOs considered and the percentage change in capital rentals**

Dependent variable: percentage change in capital rentals	*Slope coefficient*	*p-value*
Capex-adjusted and excluding short-term leases	–0.0585***	0.004
Sensitivities:		
Capex-adjusted including short-term leases	–0.0593***	0.002
Unadjusted and excluding short-term leases	–0.0622***	0.005
Unadjusted including short-term leases	–0.0625***	0.002

Source: CC analysis.

Note: Level of significance: *** = 1%, ** = 5%, * = 10%.

15. It is clear from Table 1 that we can identify a statistically significant negative relationship between the number of alternative ROSCOs considered and percentage changes in capital rentals. We see that the slope coefficient is just under –0.06 and is statistically significant at the 1 per cent level. This implies that an increase of one in the number of alternative ROSCOs considered by franchise bidders, on average, leads to a drop of almost six percentage points in the capital rental for the lease in question. For example, this implies that in cases where two alternative ROSCOs have been considered by bidders, capital rentals fall by, on average, six percentage points more than if there was only one alternative ROSCO.

16. Table 1 also presents the relationship between the number of alternative ROSCOs considered by franchise bidders for three other measures of capital rental changes. The results suggest that neither the inclusion of short-term leases nor the use of capital rental data that has not been adjusted to take account of additional capex makes any material difference to our results. The slope coefficient on the number of additional alternative ROSCOs considered by bidders is still in the region of –0.06.

Econometric analysis of capital rental changes and competition

17. While our simple analysis above pointed to a pattern in the relationship between the number of alternative ROSCOs considered by franchise bidders and capital rental changes, this relationship was based on the assumption of other things being equal,

which is unlikely to be the case. There are a large number of factors, other than competition between ROSCOs, which drive changes in capital rentals. Some of these are observable, for which we collected relevant data, for example lease length, number of vehicles in the lease or the age of the vehicles being leased. Some of the other explanatory factors are unobservable, in the sense that it is not possible, or at least very difficult, to collect the relevant data, eg reputational issues (such as flexibility of the ROSCO), relationships between TOCs and ROSCOs, non-price terms and maintenance arrangements.

18. We conducted an econometric analysis focusing on the relationship between our competition measure and changes in capital rentals, while controlling for other observable and measurable factors, which are likely also to be drivers of capital rental changes.[7] In this section, we first specify the econometric model and present the dependent variable, our preferred competition measure and other control variables used in our analysis before presenting our results.

Specification and variables

19. Our analysis adopted a relatively simple specification, with our (price-related) dependent variable expressed in terms of percentage changes. Our explanatory variables were a mixture of continuous variables and binary (or dummy) variables, as presented in Table 3. We did not specify log-log relationships, as many of our explanatory variables contained large numbers of zero observations. Our model is estimated using ordinary least squares (OLS), which gives us a line of best fit to describe the relationship between each of our explanatory variables and, in this case, our price variable.

[7]We have not conducted an econometric analysis of the relationship between our measures of competition and profitability, as Angel/Oxera have done in their submission. We do not think it is particularly useful to attempt to link whole-life margins with measures of competition at a specific franchise re-let.

20. Table 2 sets out the variables we have used in our analysis and briefly describes and defines them.

TABLE 2 **Variables used in econometric analysis**

Variable name	*Type of variable*	*Description*
Dependent variable		
Capex-adjusted % change in capital rental with short-term leases excluded	Continuous	Percentage change in capital rental from previous to current lease, adjusted for additional capex and excluding short-term leases
Competition variable		
Total number of other ROSCOs considered	Continuous	Number of alternative ROSCOs owning fleets put forward in bids and those considered by bidding franchise bidders
Control variables		
'Switched' dummy	Binary	Whether the fleet being leased has been switched from another franchise
New rolling stock in bids dummy	Binary	Whether new rolling stock was included in bids to DfT
Lease length (months)	Continuous	Length of the lease in months
Number of vehicles	Continuous	Number of vehicles covered by the lease
Vehicle age at lease	Continuous	Approximate age of the vehicles at the lease start date
DMU dummy	Binary	Whether the fleet are Diesel Multiple Units
EMU dummy	Binary	Whether the fleet are Electric Multiple Units
Other dummy	Binary	Whether the fleet are locos or coaches
Angel dummy	Binary	Whether the fleet is owned by Angel
HSBC dummy	Binary	Whether the fleet is owned by HSBC
Porterbrook dummy	Binary	Whether the fleet is owned by Porterbrook
Year dummies for 2004–2007	Binary	Whether the lease begins in the particular year

Source: CC analysis.

Dependent variable

21. As outlined above, we took percentage changes in the level of capital rentals as our price variable in this analysis and adjusted for additional capex and excluded short-term leases. We then conducted sensitivities without these adjustments.[8]

Measure of competition

22. Our measure of competition, the number of ROSCOs considered, was constructed by looking at the total fleets considered by bidders and counting the number of owning ROSCOs. This variable took a value of zero, where no alternative fleets to the incumbent fleet were included in bids or where any alternative fleets proposed were owned by the incumbent ROSCO.

[8]In our regressions where short-term leases were not excluded, we controlled for the effect that the length of the lease may have on changes in capital rentals by including a binary variable to indicate whether the lease is less than five years long.

23. Our measure of competition related to cases where an existing fleet of rolling stock was considered or actually put forward by franchise bidders. A further possible competitive constraint on the level of capital rentals at franchise re-let is the threat of introduction of new rolling stock. We therefore also used a binary variable, new rolling stock in bids, which took a value of one when new rolling stock was proposed in franchise bids to the DfT. It took a value of zero otherwise.

Other control variables

24. There are a large range of other issues that are likely to influence changes in capital rentals at franchise re-let. We attempted to control for these in so far as these were observable and data was available. Specifically, our analysis included variables relating to:

(a) 'Switched'. We included a binary variable to indicate whether the fleet in question was switched from another franchise.

(b) Type of vehicle. We constructed three binary variables to control for any effects that may be specific to vehicle type. These were for DMUs, EMUs (both AC and DC) and for others (locos and coaches).

(c) ROSCO. To control for any ROSCO-specific effects, we employed three binary variables to indicate which ROSCO owned the fleet being leased, one for each of Angel, Porterbrook and HSBC.[9]

(d) Short-term lease. We controlled for the effect that the length of the lease may have on changes in capital rentals by including a binary variable to indicate whether the lease is less than five years long.

(e) Number of vehicles. We controlled for the size of the fleet included in the lease by including a variable for the number of vehicles covered by the lease. There are a number of possible ways in which the size of the lease may affect the capital

[9]None of Voyager Leasing's rolling stock is MOLA so it has been excluded from our analysis. We have not requested lease information in relation to the small amount of rolling stock owned by EWS or public bodies, such as Transport Wales or West Yorkshire PTE.

rental. ROSCOs may discount for larger leases to ensure the whole fleet is on lease. ROSCOs may compete more vigorously for larger leases. On the other hand, large fleets may be difficult to displace so that the incumbent ROSCO does not face a competitive constraint from existing fleets.

(f) *Vehicle age*. We controlled for vehicle age simply in terms of years.

(g) *Year lease begins*. All the leases in our dataset begin between 2003 and 2007, so we include year dummy variables to control for any temporal effects. Our price data is all in nominal terms and the year dummies provide some control for inflation between these years. In addition, the inclusion of year dummies goes *some* way towards controlling for variations in interest rates and any possible effect that these may have on pricing decisions. These dummies should also help to control for any other temporal effects that are not explicitly included in our data, such as any changes in franchising policy.

Expected signs of explanatory variables

25. The expected signs of our explanatory variables were as follows:

(a) We expected the number of alternative ROSCOs considered to have a negative effect on capital rental changes.

(b) We expected the inclusion of new rolling stock in bids to have a negative relationship with changes in capital rentals.

(c) We expected lease length to have a negative relationship with changes in capital rentals because shorter leases tend to attract a premium.

(d) We expected a negative coefficient on the age of the vehicles, as very old rolling stock may be most at risk of going off lease and so we might expect to see more depressed capital rentals among older stock.

(e) We did not have any prior expectations in relation to our other control variables—those for the number of vehicles in the lease, time effects and vehicle type.

26. Table 3 presents some summary statistics in relation to the continuous variables in our econometric analysis.

TABLE 3 **Summary statistics of our main variables**

Variable	*Obs*	*Mean*	*Std dev*	*Min*	*Max*
Dependent variables					
Capex-adjusted % change in capital rental excluding short-term leases	93	–9.9%	22.8%	–87.6%	67.1%
Capex-adjusted % change in capital rental including short-term leases	121	–8.0%	22.0%	–87.6%	67.1%
Unadjusted % change in capital rental excluding short-term leases	93	–7.8%	24.7%	–87.6%	111.5%
Unadjusted % change in capital rental including short-term leases	121	–5.8%	23.1%	–87.6%	111.5%
Control variables					
Lease length (months)	121	86.63	48.66	9	213
Number of vehicles	121	52.81	68.99	1	364
Vehicle age at lease	121	19.61	6.16	3	38

Source: CC analysis.

Results

27. Table 4 presents the results for our main regression, with the results for our preferred measure shown in the first column.

TABLE 4 **Number of ROSCOs considered regressions**

Dependent variable		*Capex-adjusted percentage change in capital rentals—excluding short-term leases*	*Unadjusted percentage change in capital rentals—excluding short-term leases*	*Capex-adjusted percentage change in capital rentals*	*Unadjusted percentage change in capital rentals*
Number of alternative ROSCOs considered		–0.0607*	–0.0803**	–0.0477*	–0.0608*
New RS in bids		0.0990**	0.0863*	0.0924**	0.0640*
Switched		Not stat significant	Not stat significant	Not stat significant	Not stat significant
Short-term lease		Not included	Not included	Not stat significant	Not stat significant
Vehicle age		Not stat significant	Not stat significant	Not stat significant	Not stat significant
Number of vehicles		0.0006**	0.0006**	0.0004**	0.0004*
ROSCO	[✂]	0.101**	0.091*	0.091**	0.089**
	[✂]	0.234***	Not stat significant	0.228***	0.135**
Vehicle type	DMU	Not stat significant	Not stat significant	Not stat significant	Not stat significant
	EMU	Not stat significant	Not stat significant	Not stat significant	Not stat significant
Year lease begins		Yes	Yes	Yes	Yes
Constant		–0.320*	–0.290	–0.253**	–0.260*
R-squared		0.334	0.276	0.314	0.239
Prob>F		0.0000	0.0000	0.0000	0.0002
Breusch-Pagan and Cook-Weisberg test for heteroskedasticity		Prob>Chi-2: 0.0002 Robust standard errors are used	0.0054 Robust standard errors are used	0.0002 Robust standard errors are used	0.0021 Robust standard errors are used
Ramsey RESET test for omitted variables		0.4739	0.1338	0.4028	0.0291

Source: CC analysis.

Note: Level of significance: *** = 1%, ** = 5%, * = 10%.

28. We found a statistically significant relationship between our preferred measure of capital rental changes—capex-adjusted and excluding short-term leases—and our measure of competition. We estimated a slope coefficient in the region of –0.06 on the number of alternative ROSCOs among alternative fleets considered by franchise bidders. This coefficient is about the same size as the coefficient we had found in the simple analysis above, as presented in Table 1. It implies that an increase of one in the number of alternative ROSCOs considered by franchise bidders, on average, leads to a drop of six percentage points in the capital rental for the lease in question.

29. We found that the inclusion of new rolling stock in franchise bids had a *positive* and statistically significant effect on changes in capital rentals. The slope coefficient was 0.1, suggesting not only that the threat from new rolling stock is not a very effective constraint on the capital rentals for MOLA fleets, but that the inclusion of new rolling

stock alternatives in bids is associated with upward pressure on capital rentals—of the order of ten percentage points.

30. Most of our other explanatory variables were not found to have a statistically significant relationship with changes in capital rentals. There were two notable exceptions:

(a) Looking at our ROSCO dummies, there was a positive relationship between changes in capital rentals and whether the lease related to [✂] and [✂]. As we used [✂] as our control for these two dummies, these coefficients imply that, controlling for other observable factors, leases where [✂] was the owning ROSCO displayed smaller increases and/or larger decreases in capital rentals.

(b) We found that the number of vehicles had a very small, but statistically significant, positive relationship to changes in capital rentals. The coefficient is 0.0006, implying that the effect of the number of vehicles is extremely small.

31. We test for the presence of heteroskedasticity using the Breusch-Pagan/Cook-Weisberg Test.[10] The figures presented in Table 4 are p-values, with low values (less than 0.1) implying that heteroskedasticity is present in our model. To make our models 'robust' to this heteroskedasticity, we estimate heteroskedasticity-consistent standard errors or White standard errors.

32. The Ramsey regression specification error test (RESET) is used to test that we have specified the correct functional form for our regression model, in particular testing for the presence of omitted variable bias.[11] Low values (less than 0.1) of the p-values

[10]One of the assumptions under which OLS regression works well is that errors are homoskedastic, meaning that for any given value of an explanatory variable the variance of the error terms are the identical. If this is not the case, then errors are said to be heteroskedastic, meaning that they have different variances for different values of the explanatory variables. This means that the OLS estimator is not 'efficient', so that the estimated coefficients have large standard errors and so wide confidence intervals.

[11]An auxiliary regression is estimated with the powers of the fitted values of the dependent variable included as additional explanatory variables. The test statistic is an F-test, with the null hypothesis that the coefficients on the higher powers of the fitted values of the dependent are zero.

presented imply that we may not have correctly specified our model, often due to the omission of relevant variables from our model. Our preferred model did not display any evidence of misspecification or of omitted variables.

33. We found an R^2 figure of 0.3, which means that our econometric model explains about 30 per cent of the variation in capital rentals. This may seem low, but there are likely to be many lease-specific issues and other unobservable drivers of changes in capital rentals that we have not been able to take account of in our model.

34. Our results did not change significantly when looking at the three other measures of changes in capital rentals (unadjusted for additional capex and short-term leases and including short-term leases). The coefficients on our competition proxy were all in the range –0.05 to –0.08.

Consideration of other possible measures of alternative ROSCOs

35. Having tested the relationship between our preferred measure of competition and changes in capital rentals, we wanted to test whether the effect of the number of ROSCOs considered was related to there just being at least one alternative ROSCO. To do this we created a *binary* variable, taking a value of zero where the total number of alternative ROSCOs considered was zero and taking a value of one where this was more than zero.

36. We also wanted to test whether the threat of just considering an alternative ROSCO was the best measure of competition or whether the threat needed to be credible such that the franchise bidder was serious about including the alternative ROSCO's fleet in its franchise bid. To do this, we created two further variables:

(a) *Number of ROSCOs in bids.* This measure was constructed by looking at the fleets put forward in bids and counting the number of owning ROSCOs.[12] This variable had a value of zero, where no alternative fleets to the incumbent fleet were included in bids or where any alternative fleets proposed were owned by the incumbent ROSCO.

(b) *More than one ROSCO in bids.* This was a *binary* variable which took a value of zero where the number of alternative ROSCOs in bids was zero. It took a value of one where there was one or more alternative ROSCO supplying the rolling stock for bids.

37. We repeated our econometric analysis using these other measures of alternatives in place of the number of alternative ROSCOs considered.

38. Table 5 presents some summary statistics for these measures of alternatives.

TABLE 5 **Summary/descriptive statistics**

Variable	*Obs*	*Mean*	*Std Dev*	*Min*	*Max*
More than one alternative ROSCO considered	91	0.53	0.50	0	1
Number of other ROSCOs in bids	91	0.80	1.19	0	4
More than one ROSCO in bids	91	0.44	0.50	0	1

Source: CC analysis.

39. The econometric modelling results are presented in Table 6.

[12]There are a small number of cases (three) where we were unable to ascertain which ROSCOs were the relevant owners for fleets included in bids, there were more than one owning ROSCO for the class mentioned. In these cases we have assumed the maximum number of ROSCOs. For example, where we know Class 150s were included, but not whose fleets, we count this as two ROSCOs.

TABLE 6 **Regressions using other measures of the extent of alternatives and capex-adjusted capital rental data**

Dependent variable		*Capex-adjusted percentage change in capital rentals—excluding short-term leases*	*Capex-adjusted percentage change in capital rentals—excluding short-term leases*	*Capex-adjusted percentage change in capital rentals—excluding short-term leases*	*Capex-adjusted percentage change in capital rentals*	*Capex-adjusted percentage change in capital rentals*	*Capex-adjusted percentage change in capital rentals*
Competition measure		More than one ROSCO among total considered	Number of ROSCOs in bids	More than one ROSCO in bids	More than one ROSCO among total considered	Number of ROSCOs in bids	More than one ROSCO in bids
Coefficient for competition measure		Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant
New RS in bids		0.0868*	0.0856*	0.0805*	0.0859**	0.0826**	0.0891**
Switched		Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant
Short-term lease		Not included	Not included	Not included	Not stat significant	Not stat significant	Not stat significant
Vehicle age		Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant
Number of vehicles		0.0006**	0.0006**	0.0005**	0.0005**	0.0005**	0.0005**
ROSCO	[✂]	0.113***	0.114**	0.114**	0.102***	0.102***	0.098**
	[✂]	0.298***	0.300***	0.314***	0.265***	0.278***	0.281***
Vehicle type	DMU	0.139*	0.140*	0.153**	Not stat significant	Not stat significant	0.119*
	EMU	Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant	Not stat significant
Year lease begins		Yes	Yes	Yes	Yes	Yes	Yes
Constant		–0.266*	–0.263	–0.270*	–0.224*	–0.222*	–0.244**
R-squared		0.303	0.303	0.313	0.293	0.295	0.310
Prob>F		0.0004	0.0001	0.0004	0.0003	0.0003	0.0003
Breusch-Pagan and Cook-Weisberg test for heteroskedasticity		0.0000 Robust standard errors are used	0.0000 Robust standard errors are used	0.0002 Robust standard errors are used	0.0000 Robust standard errors are used	0.0000 Robust standard errors are used	0.0001 Robust standard errors are used
Ramsey RESET test for omitted variables		0.7134	0.6964	0.8416	0.2075	0.4729	0.5426

Source: CC analysis.

40. We did not find a statistically significant relationship between our other measures of the extent of alternative ROSCOs and changes in capital rentals. None of the other measures display the statistically significant negative relationship that we observed in the case of our preferred competition proxy—the number of alternative ROSCOs considered.

41. Otherwise, these results are quite similar to those presented in Table 4.

42. There are a number of possible reasons why these measures do not display a negative and statistically significant relationship with capital rentals changes. It could be that:

(a) The measures based on alternative ROSCOs in bids may not effectively capture the effect of competition if it does not matter whether the ROSCO considered is going to be formally proposed in a franchise bid. The mere consideration of the alternative ROSCO is enough to impose a competitive constraint on pricing, whether the alternative ROSCO is included in the final bid or not.

(b) The binary measures are not found to be statistically significant, suggesting that assessing whether there is more than one alternative ROSCO does not adequately capture the competitive constraint that a number of competing ROSCOs impose.

Conclusion on econometric analysis

43. Our analysis found a clear relationship between our preferred competition proxy and changes in capital rentals. We found a negative and statistically significant relationship with changes in capital rentals in relation to the number of alternative ROSCOs considered by franchise bidders.

44. We can, however, identify a number of limitations to our analysis:

(a) Our measure of the extent of competing ROSCOs may not adequately capture the extent to which other aspects of competition constrain pricing.

(b) Changes in capital rentals may not reflect the extent of competition because our assumption relating to previous capital rentals is wrong—initial capital rentals may have contained unsystematic errors across fleets, with some rentals being too high and some too low.

(c) Unobservable non-price factors, such as maintenance arrangements or other non-price lease terms, play a major role.

(d) A number of variables that we had expected to play a role in driving changes in capital rentals were not found to be statistically significant in our model. This suggests that it is quite difficult to model adequately every aspect of the drivers of capital rental changes. This is not surprising given the extent to which the determinants will vary across different lease negotiations. Our R^2 figures were all in the region of 0.3, meaning that our model explained 30 per cent of the variation in our dependent variable—change in capital rentals.

Competitive analyses submitted by the parties

Angel's econometric analysis

45. Angel submitted a report prepared by economic consultants, Oxera, entitled *Further analysis of competition in the rolling stock leasing market*. This submission included an econometric analysis, broadly similar in approach to our work, which examined the relationship between a number of measures of competition and a number of 'outcomes' of lease negotiations. Specifically, its analysis employed two dependent variables:

(a) percentage change in capital rentals for each lease; and

(b) forward-looking IRR in relation to each fleet.

46. These were modelled as a function of:

(a) the number of available used alternatives;[13] and

(b) whether the *class* in question has previously 'switched'.[14]

47. The analysis also includes a number of control variables, many of which are similar to those used in our econometric analysis:

(a) additional enhancements in the new lease contract;[15]

(b) additional enhancements as a percentage of the NBV of the fleet;

(c) a binary variable for leases that have switched from soggy to dry leases;[16]

(d) a binary variable for lease extensions;

(e) a binary variable for short-term leases;

(f) a binary variable for DMUs;

(g) a binary variable for MOLA rolling stock;

(h) a binary variable for leases that were subject to section 54 undertakings; and

(i) a binary variable to indicate whether the lease was the first re-lease after privatization.

48. Oxera estimated its model using 55 observations relating to Angel's leases.[17] The analysis is similar to our econometric analysis in so far as it estimated a number of models treating changes in capital rentals as a function of competition measures, while controlling for other factors that may be relevant in driving capital rentals, as outlined above. The analysis was also quite similar to our work in that it estimated a comparatively simple OLS model.

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[13]The analysis also employs a binary variable to indicate whether there are any available alternatives in relation to a given fleet.
[14]This refers to whether or not the *class* in question has seen switching before. In contrast, our 'switched' variable refers to whether the specific *fleet* covered by the relevant lease has just come from a different franchise.
[15]This aims to control for additional capex included in leases. We control for this by adjusting changes in capital rentals to take account of additional capex. In this way, we adjust our dependent variable, rather than including a separate explanatory variable to deal with the issue.
[16]This is because Angel has told us that it normally increases capital rentals when the rolling stock switches to dry leases to recover overheads.
[17]Our dataset includes 42 Angel leases. Angel's data set has 55 leases, because it includes franchise extensions, fleets that were subject to section 54 undertakings and post-MOLA rolling stock.

49. However, the analysis differed in a number of important ways too:

(a) the dataset only covered Angel leases;

(b) it included lease extensions and fleets which were subject to section 54 undertakings;

(c) it included post-MOLA rolling stock;

(d) it did not control for the size of the fleet;[18] and

(e) it had a different measure of competition and no data in relation to the presence of new rolling stock proposals in franchise bids or among the stock considered by franchise bidders.

50. While Oxera concluded that its 'analysis has not identified any clear patterns or relationships between competition conditions for individual leases, on the one hand, and competitive outcomes (price changes, additional investment and profitability) for individual leases, on the other', it did find that 'in some model specifications, the change in price (capital rentals) between leases has a statistically significant relationship with the availability of alternatives (negative coefficient), the amount of investment in enhancements (positive coefficient), and a number of other explanatory variables'. Its work suggested that it was quite difficult to model the outcomes of lease negotiations in a robust econometric analysis. Like our analysis, it found that many of the explanatory variables did not display statistically significant coefficients. Also, like our econometric work, a number of the regressions displayed evidence of heteroskedasticity,[19] but, as Oxera noted, 'this is expected given the number and type of explanatory variables used'.

[18]We find that the number of vehicles covered by the lease has a small, but statistically significant, positive effect on changes in capital rentals, suggesting that bigger fleets are more likely to see smaller decreases (or larger increases) in capital rentals.
[19]As explained in paragraph 31. Oxera estimated heteroskedasticity-consistent or 'robust' standard errors in its econometric analysis.

The DfT's competitive analysis

51. The DfT provided us with a simple competitive analysis of MOLA and post-MOLA rolling stock involved in lease negotiations at 11 franchise re-lets since privatization.

52. The DfT classified fleets involved in franchise re-lets into four (mutually exclusive) groups:

(a) section 54 undertakings applied or the fleet was specified in the ITT;

(b) no realistic alternatives existed (in the DfT's opinion);

(c) very limited realistic alternatives existed; and

(d) there were available existing alternatives, but the incumbent fleet was chosen.

53. Combining this assessment with the DfT's own data on changes in capital rentals, the DfT analysed the relationship between the availability of used rolling stock alternatives and changes in capital rentals.[20] Table 7 shows the results.

TABLE 7 **DfT analysis of changes in capital rentals and the availability of alternatives**

per cent

ROSCO	*Change in capital rental*		
	Section 54 undertaking or specified in ITT	*No realistic alternatives*	*Existing alternatives were available*
Angel Porterbrook HSBC	✂		
Average	0.7	5.0	(6.7)

Source: DfT analysis.

54. As Table 7 shows, the DfT's analysis found that for all three ROSCOs capital rentals fell, on average, by 6.7 per cent where there were existing rolling stock alternatives available. This was in contrast to the average rise in capital rentals of 5 per cent observed for fleets where there were no realistic alternatives. For fleets that were

[20]We considered that the DfT's competitive analysis was based on a small amount of available data. For example, the category 'existing alternatives were available' included very few fleets.

specified in the franchise ITT or were subject to section 54 undertakings, the analysis showed that capital rentals increased on average, but to a much smaller degree. The DfT considered that this was likely to be due to the rentalization of additional capex and that leases for section 54 undertakings would not have increased under a like-for-like comparison.