



Seventh Annual Rail Research UK Workshop

Determining the optimal industry structure in the presence of decreasing costs: the case of passenger train operations

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- Competition generally expected to be beneficial
- On-track competition in Britain beneficial
- Competition for the market (tendering) – more mixed
- Optimal structure from cost and competition perspective?
- Economies of density (no franchise overlaps or open-access)
- Economies of scale (fewer, large franchises)



- To provide new evidence on the scale and density properties of passenger train operations in Britain (a vertically separated structure)
- With a view of answering the following (cost perspective)
- Should franchise overlaps be reduced, and open-access limited, to give franchised TOCs exclusive monopolies on routes / regions?
- Should we have fewer, larger TOCs?
- View this in part through some actual franchise mergers

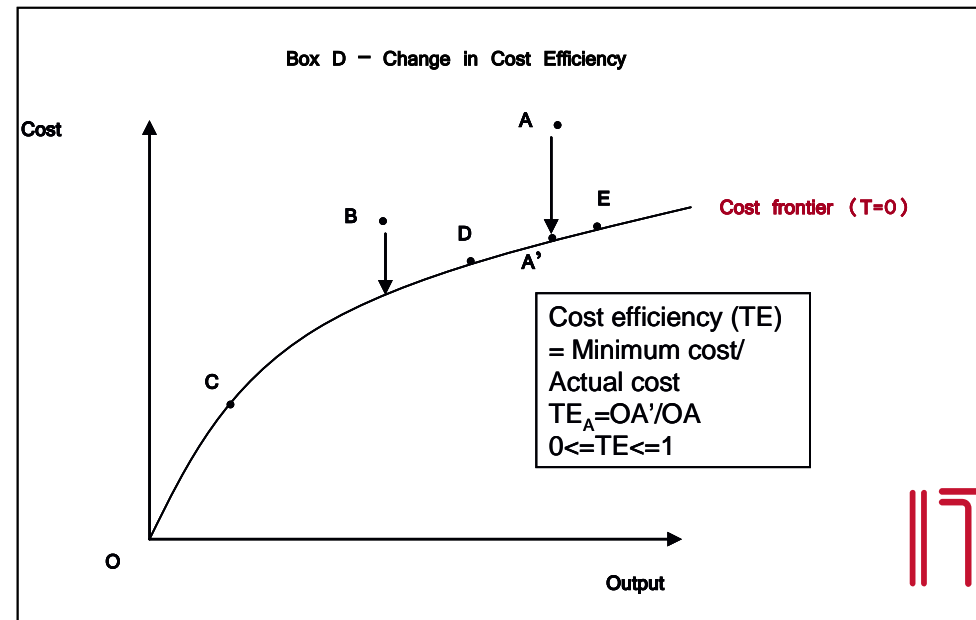
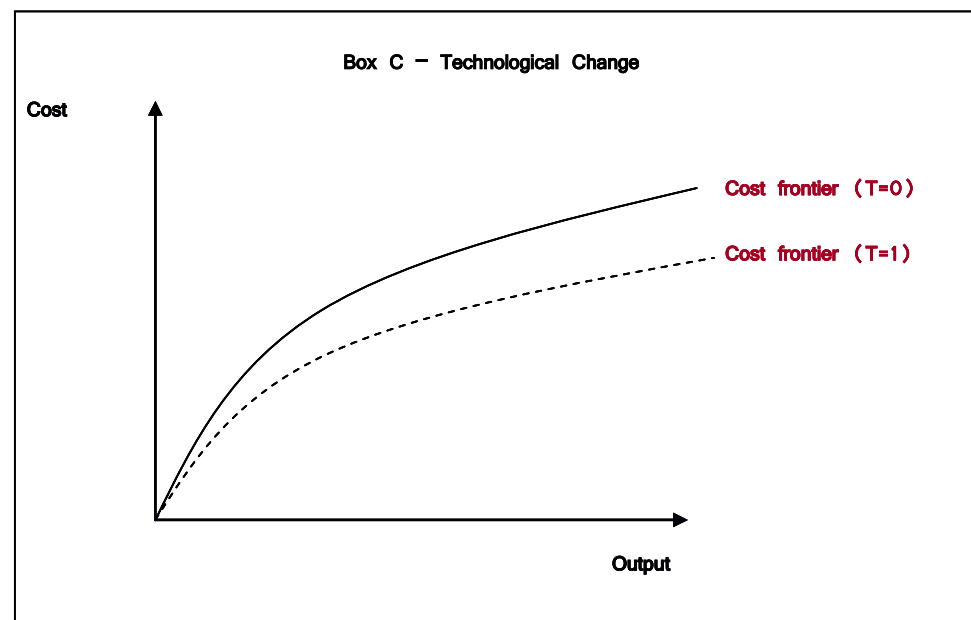
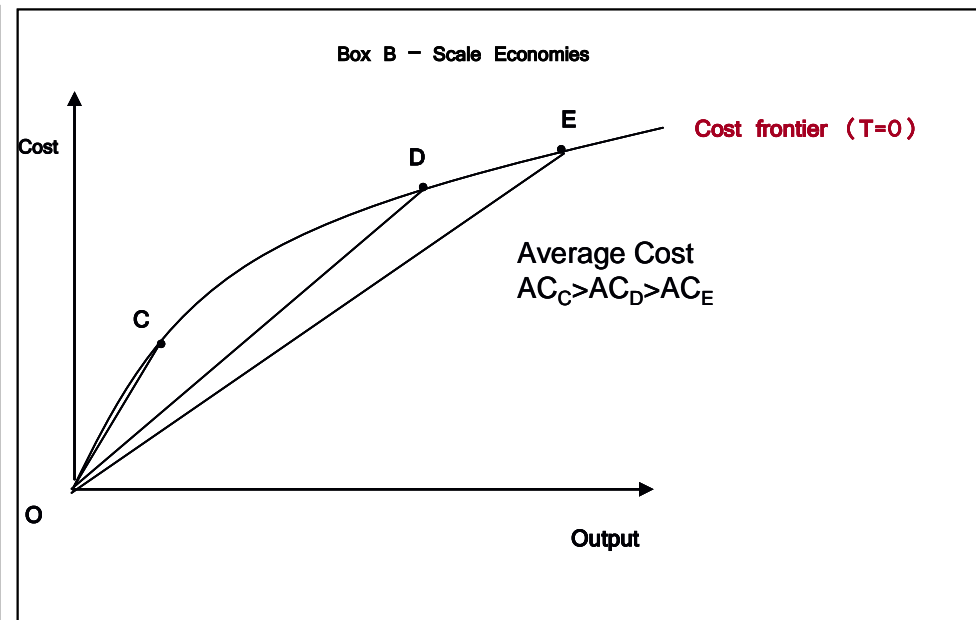
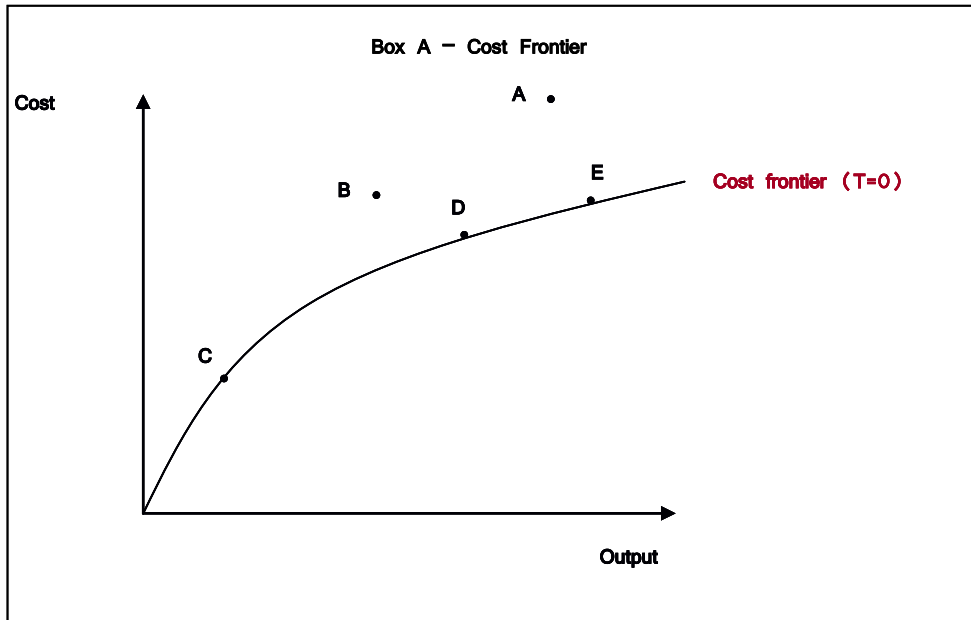


- Time period: 1999/00 to 2007/08
- Sources: published sources and industry
- Data on:
 - TOC costs (excluding access charges)
 - Route-km; stations operated
 - Volume (train-km; vehicle-km; average speed)
 - Rolling stock age and characteristics
 - Wages
 - Sector dummies
 - Contract dummy variables and time trends

Economic concepts



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Stochastic Frontier Model



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- Decompose error into inefficiency and random noise
- Now have a stochastic frontier:

$$C_{it} = \underbrace{f(Y_{it}, P_{it}; \beta)}_{\text{Deterministic Frontier}} + \underbrace{v_{it}}_{\text{Noise}} + \underbrace{u_{it}}_{\text{Inefficiency}}$$

Stochastic Frontier

- Each firm has its own frontier comprising a deterministic component and an unexplained (random) component

- **Returns to scale (RTS) at the sample mean: 1.02**
- Implication: simply making franchises larger will not necessarily reduce unit costs
- Implication: conversely, simply making franchises smaller will not necessarily increase costs

- **Returns to density (RTD) at the sample mean: 1.44**
- Implication: reducing franchise overlaps may reduce unit costs

Returns to density – Specific TOC Mergers



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Merged TOC	Estimate	Un-Merged TOC	Estimate
Greater Western	1.479 ***	Great Western	1.207 *
		Great Western Link	1.677 ***
		Wessex	2.431 ***
Northern	2.100 ***	Arriva Trains Northern	2.028 ***
Trans Pennine Express	1.964 ***	North Western	1.953 ***
ONE	1.303 **	Anglia	1.462 ***
Great Northern (WAGN)	1.375 **	Great Eastern	1.247 *
		WAGN	1.486 ***

*, ** and *** statistically significantly different from unity at 10%, 5% and 1% level respectively

- RTD all above unity (and statistically significantly so)
- Suggests large savings from reducing franchise overlaps (though note, point estimates)

Cost effects of mergers – pre-efficiency effects



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Merged TOC name(s)	Unmerged TOC names	Year modelled evaluated	Cost Saving (£m 2003/04 prices) from updated model	Updated model Cost Saving as % of Total Cost*#	Updated model Cost Saving as % of relevant Unmerged TOC Cost#
Greater Western	Great Western, Great Western Link, Wessex	2005/06	£ 39.90	1.16%	9.59%
Northern, Trans Pennine Express	North Western, Arriva Trains Northern	2003/04	-£ 30.88	-0.96%	-9.21%
ONE, Great Northern (WAGN)	Anglia, Great Eastern, WAGN	2003/04	-£ 35.70	-1.11%	-10.57%

* Total cost is the estimated frontier cost for all TOCs in the year. # Costs are evaluated excluding any management contract or last year of franchise issues.

- “Pure” merger (several TOCs into one) – savings of up to 10%
- Caveat – merged services need to be compatible to some extent
- When not pure merger, costs may go up or down



Cost effects of mergers – post-efficiency effects



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Merged TOC name(s)	Unmerged TOC names	Year modelled evaluated	Using gross efficiency scores			Total Saving as a proportion of Relevant TOC cost
			Frontier Cost Saving (£m 2003/04 prices)	Efficiency Saving (£m 2003/04 prices)	Total Saving (£m 2003/04 prices)	
Greater Western	Great Western, Great Western Link, Wessex	2005/06	39.9	13.5	53.4	12.84%
Northern, Trans Pennine Express	North Western, Arriva Trains Northern	2003/04	-30.9	39.1	8.3	2.47%
ONE, Great Northern (WAGN)	Anglia, Great Eastern, WAGN	2003/04	-35.7	10.8	-24.9	-7.37%

- Greater Western –Wessex was on management contract (pre-merger)
- Northern/TPE: ending of management contracts (Northern and NW)
- ONE/GN: “WA” services transferred to ONE were on management contract



Cost effects of mergers – wage effects



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Merged TOC name(s)	Year of merger	Real terms growth per annum								
		Staff Costs			Head Count			Average Salary		
		2001/02	2003/04	2005/06	2001/02	2003/04	2005/06	2001/02	2003/04	2005/06
		to	to	to	to	to	to	to	to	to
		2003/04	2005/06	2007/08	2003/04	2005/06	2007/08	2003/04	2005/06	2007/08
Greater Western	2006/07	2.1%	6.0%	2.5%	-3.5%	2.1%	0.1%	5.8%	3.8%	2.4%
Northern, Trans Pennine Express	2004/05	5.5%	4.0%	5.6%	3.7%	2.3%	0.0%	1.7%	1.7%	5.6%
ONE, Great Northern (WAGN)	2004/05	4.4%	5.9%	3.1%	1.1%	2.9%	0.4%	3.3%	2.9%	2.7%
Rest of Sector		10.3%	5.4%	0.9%	4.2%	4.8%	-0.7%	5.8%	0.6%	1.6%

- Greater Western: wages rising faster than sector immediately before the merger – trend continued (though less so) after the merger
- Northern/TPE: wage growth below sector pre-merger, but rises much faster post-merger (with a lag)
- ONE/GN: wage growth below sector pre-merger, but rises faster post-merger



- New evidence presented on RTS and RTD and relative efficiency of passenger TOCs in Britain
- New, updated and industry sourced dataset
- Evidence on RTD suggests that mergers may reduce unit costs (though compatibility of services issue)
- Evidence on RTS implies mergers won't necessarily reduce unit costs; or that smaller franchises won't increase costs

- For pure merger (Greater Western) unit costs fall
- But costs could go up or down for more complex cases (as in Northern/TPE and ONE/GN)
- So, re-mapping franchises won't necessarily reduce costs
- Recent mergers have also reduced costs through efficiency improvements (coming off management contracts)
- But some evidence that mergers may put upward pressure on wage growth