Adverse impact on the benchmark

Introduction

1. Section 5 of our report discusses whether the merger may be expected to remove a company that is expected to form the benchmark and hence adversely shift Ofwat's statistically estimated technical efficiency benchmark in its combined econometric models for operating or capital maintenance expenditure. This appendix presents the results of our analysis.

Operating expenditure

2. We looked at changes in the water services operating efficiency rank of 22 WoCs and WaSCs from 2001/02 to 2005/06. Our results are shown in Table 1.

TABLE 1 **Transition probabilities (and number of transitions) for changes in operating expenditure efficiency rank, 2000/01 to 2005/06**

per cent

	Change in rank in next year		
Change in rank in current year	*Rank worsens*	*Rank remains the same*	*Rank improves*
Rank worsens	21 (7)	15 (5)	64 (21)
Rank remains the same	35 (6)	12 (2)	53 (9)
Rank improves	61 (23)	13 (5)	26 (10)

Source: Ofwat and CC calculations.

Notes:
1. Transition probabilities estimated for 10 WaSCs and 12 WoCs from 5 Ofwat annual 'Water and sewerage service unit costs and relative efficiency' reports, giving 88 transitions in total.
2. Number of transitions in parentheses.

3. Table 1 compares three years' ranks and is interpreted as follows. Consider row 1 for operating expenditure: this shows what happened, on average, to companies that suffered a worsening in operating expenditure efficiency ranking from year 0 (the base year) to year 1 (the current year).[1] Of these companies, 21 per cent suffered a continuing worsening in rank from year 1 to year 2 (column 1), the rank of 15 per cent remained unchanged from year 1 to year 2 (column 2) and nearly 64 per cent improved their rank from year 1 to year 2 (column 3).[2] (And 21 per cent + 15 per cent + 64 per cent = 100 per cent.)

4. Row 2 in the table shows what happened, on average, to companies whose operating expenditure efficiency rank remained the same from year 0 to year 1: the rank of 35 per cent worsened in year 2 (column 1), the rank of 12 per cent stayed the same in year 2 (column 2) and the rank of 53 per cent improved in year 2 (column 3). (And 35 per cent + 12 per cent + 53 per cent = 100 per cent.) Lastly, row 3 in the table shows what happened, on average, to companies whose operating expenditure

[1]Here, year 0 is 2000/01, 2001/02, 2002/03 and 2003/04. Year 1 is 2001/02, 2002/03, 2003/04 and 2004/05.
[2]Here, year 2 can be 2002/03, 2003/04, 2004/05 and 2005/06.

efficiency rank improved from year 0 to year 1: the rank of 61 per cent worsened in year 2 (column 1), the rank of 13 per cent was unchanged (column 2) and the rank of 26 per cent improved again (column 3). (And 61 per cent + 13 per cent + 26 per cent = 100 per cent.)

5. We looked at the operating efficiency band (from A to E) of 22 WoCs and WaSCs from 2000/01 to 2005/06. From this, we estimated the probability of a company moving from operating expenditure efficiency band B (where it was not likely to form the benchmark, regardless of its precise rank) to band A (where it was more likely to, again regardless of its precise rank). Our results are given in Table 2.

TABLE 2 **Transition probabilities (and number of transitions) between operating expenditure efficiency bands 2000/01 to 2005/06**

per cent

	*Opex band in next year**				
*Opex band in current year**	*A*	*B*	*C*	*D*	*E*
A	81 (21)	19 (5)	0 (0)	0 (0)	0 (0)
B	19 (8)	69 (29)	10 (4)	2 (1)	0 (0)
C	3 (1)	48 (15)	45 (14)	3 (1)	0 (0)
D	0 (0)	0 (0)	67 (6)	33 (3)	0 (0)
E	0 (0)	0 (0)	50 (1)	0 (0)	50 (1)

Source: Ofwat and CC calculations.

*A is best, E is worst.

Notes:

1. Transition probabilities estimated for 10 WaSCs and 12 WoCs from 6 Ofwat annual 'Water and sewerage service unit costs and relative efficiency' reports, giving 110 transitions in total.
2. Number of transitions in parentheses.

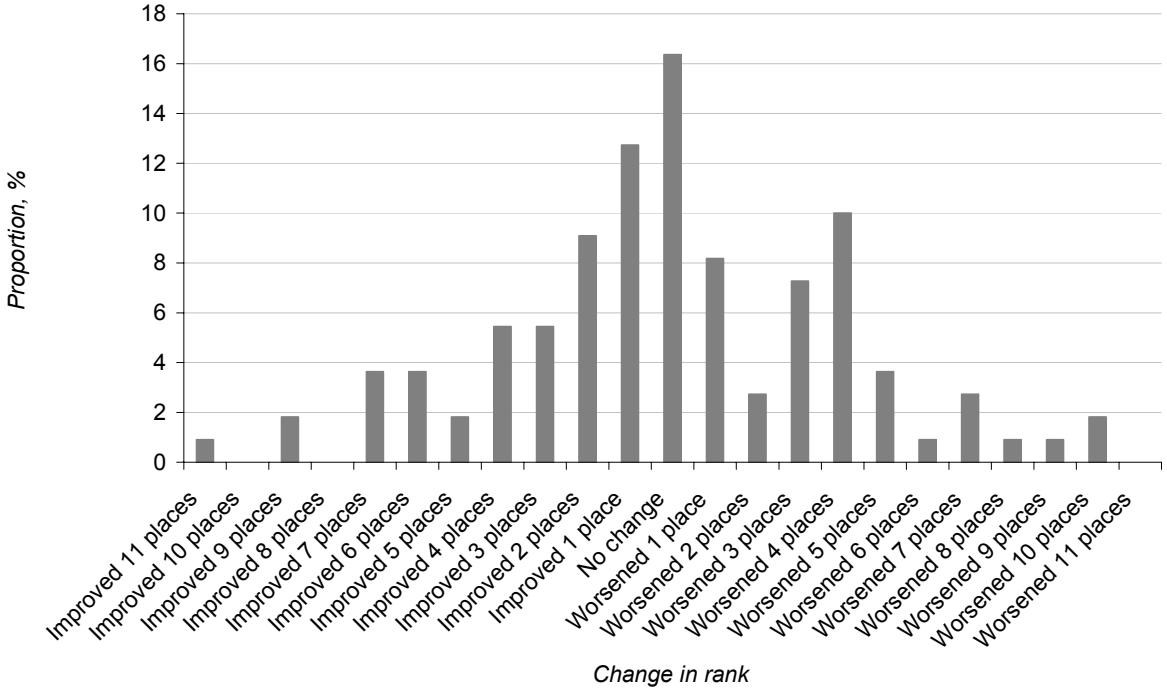
6. To interpret Table 2, consider row 1: this shows what happened, on average, to companies in band A in the base year.[3] Of these companies, 81 per cent also were in band A the following year (column A) and 19 per cent dropped to band B (column 2).[4] Row 2 in the table shows what happened, on average, to companies in band B in the base year: 19 per cent moved up to band A the following year (column 1), 69 per cent remained in band B (column 2), 10 per cent dropped to band C (column 3) and 2 per cent dropped to band D (column 4). Row 3 in the table shows what happened, on average, to companies in band C in the base year: 3 per cent moved up to band A (column 1), 48 per cent moved up to band B (column 2), 45 per cent stayed in band C (column 3) and 3 per cent fell to band D (column 4). Row 4 in the table shows what happened, on average, to companies in band D in the base year: two-thirds moved up to band C (column 3) and one-third stayed in band D (column 4). And row 5 in the table shows what happened, on average, to companies in band E in the base year: half improved to band C (column 3) and half stayed in band E (column 5).

7. We looked at the frequency and magnitude of one-year changes in the operating efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. Our results are given in Figure 1 and Table 3.

[3]Here, the base year can be 2000/01, 2001/02, 2002/03, 2003/04 and 2004/05.
[4]Here, the following year can be 2001/02, 2002/03, 2003/04, 2004/05 and 2005/06.

FIGURE 1

Frequency and magnitude of one-year changes in operating expenditure efficiency rank for 22 companies, 2000/01 to 2005/06



Source: Ofwat and CC calculations.

TABLE 3 **Frequency and magnitude of one-year changes of operating expenditure efficiency rank 2000/01 to 2005/06**

		per cent	
*Change in rank**	*Frequency†*	*Individual*	*Cumulative*
Improved 11 places	1	0.91	0.91
Improved 10 places	0	0.00	0.91
Improved 9 places	2	1.82	2.73
Improved 8 places	0	0.00	2.73
Improved 7 places	4	3.64	6.36
Improved 6 places	4	3.64	10.00
Improved 5 places	2	1.82	11.82
Improved 4 places	6	5.45	17.27
Improved 3 places	6	5.45	22.73
Improved 2 places	10	9.09	31.82
Improved 1 place	14	12.73	44.55
No change	18	16.36	60.91
Worsened 1 place	9	8.18	69.09
Worsened 2 places	3	2.73	71.82
Worsened 3 places	8	7.27	79.09
Worsened 4 places	11	10.00	89.09
Worsened 5 places	4	3.64	92.73
Worsened 6 places	1	0.91	93.64
Worsened 7 places	3	2.73	96.36
Worsened 8 places	1	0.91	97.27
Worsened 9 places	1	0.91	98.18
Worsened 10 places	2	1.82	100.00
Worsened 11 places	0	0.00	100.00

Source: Ofwat and CC calculations.

Notes:
*Difference in rank over two periods.
†Giving 110 changes of rank in total, ie for 22 companies over five changes in review period (2000/01 to 2001/02, 2001/02 to 2002/03, 2002/03 to 2003/04, 2003/04 to 2004/05 and 2004/05 to 2005/06).

8. Using the individual percentages in Table 3, we estimated the probability of moving a given number of places up the operating expenditure efficiency ranking in two years. To do this, we added together the probabilities associated with all permutations of changes in observed ranks that result in a given net improvement in places. The results of our analysis are given in Table 4.

TABLE 4 **Estimated probabilities of improvements in operating expenditure efficiency rank over two years from permutations of one-year changes**

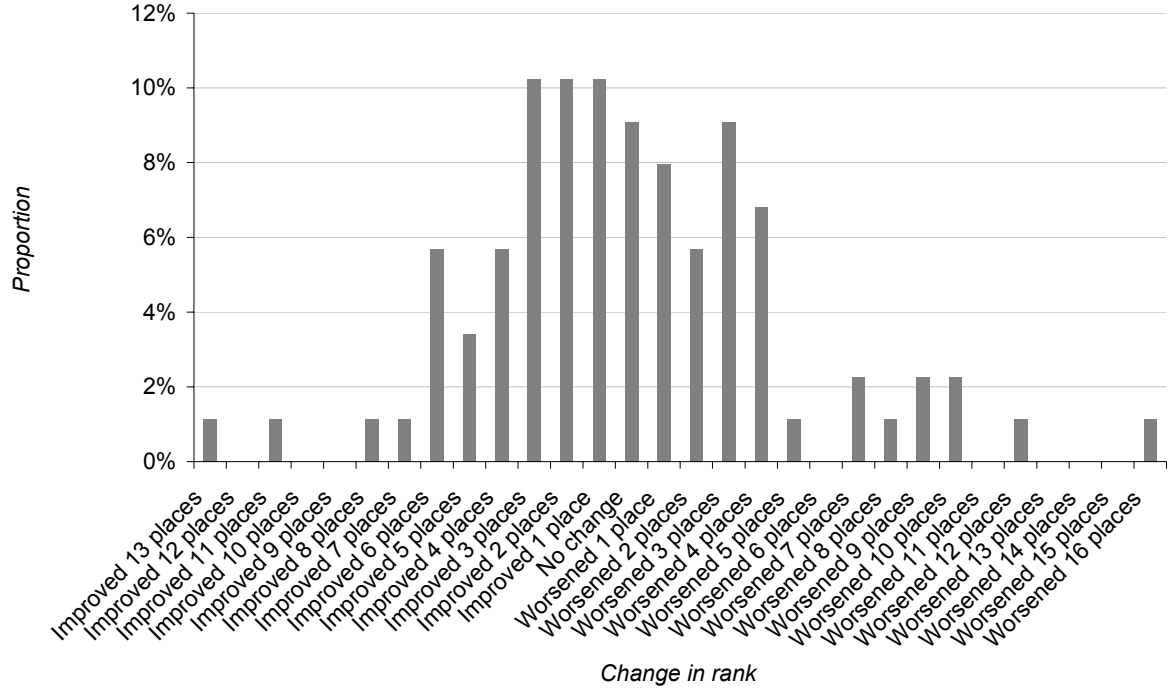
Improvement in places	*%*
21	0.0
20	0.0
19	0.0
18	0.0
17	0.1
16	0.2
15	0.2
14	0.3
13	0.6
12	0.7
11	1.2
10	1.4
9	1.9
8	2.5
7	3.5
6	4.1
5	4.1
4	5.2
3	6.4
2	7.2
1	7.5

Source: Ofwat and CC calculations.

9. We looked at the frequency and magnitude of two-year changes in the operating efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. Our results are given in Figure 2 and Table 5.

FIGURE 2

Frequency and magnitude of two-year changes in operating expenditure efficiency rank for 22 companies, 2000/01 to 2005/06



Source: Ofwat and CC calculations.

TABLE 5 **Frequency and magnitude of two-year changes of operating expenditure efficiency rank 2000/01 to 2005/06**

		per cent	
*Change in rank**	*Frequency†*	*Individual*	*Cumulative*
Improved 13 places	1	1.1	1.1
Improved 12 places	0	0.0	1.1
Improved 11 places	1	1.1	2.3
Improved 10 places	0	0.0	2.3
Improved 9 places	0	0.0	2.3
Improved 8 places	1	1.1	3.4
Improved 7 places	1	1.1	4.6
Improved 6 places	5	5.7	10.2
Improved 5 places	3	3.4	13.6
Improved 4 places	5	5.7	19.3
Improved 3 places	9	10.2	29.6
Improved 2 places	9	10.2	39.8
Improved 1 place	9	10.2	50.0
No change	8	9.1	59.1
Worsened 1 place	7	8.0	67.1
Worsened 2 places	5	5.7	72.7
Worsened 3 places	8	9.1	81.8
Worsened 4 places	6	6.8	88.6
Worsened 5 places	1	1.1	89.8
Worsened 6 places	0	0.0	89.8
Worsened 7 places	2	2.3	92.1
Worsened 8 places	1	1.1	93.2
Worsened 9 places	2	2.3	95.5
Worsened 10 places	2	2.3	97.7
Worsened 11 places	0	0.0	97.7
Worsened 12 places	1	1.1	98.9
Worsened 13 places	0	0.0	98.9
Worsened 14 places	0	0.0	98.9
Worsened 15 places	0	0.0	98.9
Worsened 16 places	1	1.1	100.0

Source: Ofwat and CC calculations.

Notes:
*Difference in rank over three periods.
†Giving 88 changes of rank in total, ie for 22 companies over four changes in review period (2000/01 to 2002/03, 2001/02 to 2003/04, 2002/03 to 2004/05 and 2003/04 to 2005/06).

10. The probabilities in Tables 4 and 5 are estimated assuming changes in rank in successive years are independent. However, Table 1 indicates that this may not be the case. We therefore looked at the changes in rank over two years of companies ranked 13 or worse (MKW's rank) in each year from 2000/01 to 2005/06. We estimated the probability of reaching the benchmark by looking at the number of instances where the two-year change was an improvement sufficient for the company to reach the benchmark.

TABLE 6 **Operating expenditure efficiency ranks and changes in rank over two years for companies ranked 13 or worse**

	Efficiency rank						*Changes in rank over 2 years of companies ranked 13 or worse*			
	2000/01	*2001/02*	*2002/03*	*2003/04*	*2004/05*	*2005/06*	*2002/03*	*2003/04*	*2004/05*	*2005/06*
Anglian	11	7	12	9	10	9				
Bournemouth & West Hampshire	14	14	8	8	6	7	8	8		
Bristol	17	20	16	20	13	17	16	20	13	17
Cambridge	10	15	6	7	4	11		7		
Dee Valley	12	16	9	10	3	6		10		
Folkestone & Dover	21	21	22	22	21	21	22	22	21	21
Mid-Kent	19	19	18	17	14	13	18	17	14	13
Northumbrian	7	5	14	13	17	12			17	12
Portsmouth	3	3	1	1	1	4				
Severn Trent	9	6	4	6	11	15				
South-East	13	12	11	15	15	14	11			14
South Staffordshire	15	13	2	2	2	5	2	2		
South-West	16	9	19	19	22	19	19		22	19
Southern	1	2	10	4	5	1				
Sutton & East Surrey	8	10	13	14	9	16			9	16
Tendring Hundred	20	18	17	11	12	8	17	11	12	
Thames	5	11	21	21	18	22			18	22
Three Valleys	18	17	15	18	16	20	15	18	16	20
United Utilities	6	8	7	12	19	10				
Welsh Water	22	22	20	16	20	18	20	16	20	18
Wessex	4	4	3	3	7	3				
Yorkshire	2	1	5	5	8	2				

Source: Ofwat and CC calculations.

11. Our results are given in Table 6 and show that of the 40 instances of changes in rank over two years of companies ranked 13 or below:

- two changes were improvements sufficient to reach the top three, so the probability is 2/40 = 5 per cent;
- two changes were improvements sufficient to reach the top five, so the probability is 5 per cent; and
- three changes were improvements sufficient to reach the top seven, so the probability is 3/40 = 7.5 per cent.

12. Table 7 summarizes the probabilities of reaching the benchmark for operating expenditure for PR09 estimated by these three methods.

TABLE 7 **Summary of estimated probabilities of reaching the benchmark for PR09 for operating expenditure**

per cent

	Permutations of 1-year changes		*Two-year changes*		*Two-year transitions*	
Improvement of at least…	*Per company*	*Total**	*Per company*	*Total**	*Per company*	*Total**
7 places in 2 years	12.5	23.4	4.6	9.0	7.5	14.4
9 places in 2 years	6.5	12.6	2.3	4.5	5.0	9.8
11 places in 2 years	3.3	6.5	2.3	4.5	5.0	9.8

Source: Ofwat and CC calculations.

*Calculated as 1 – {[1 – Pr(company 1)] x [1 – Pr(company 2)]} because probabilities for each company are not independent.

13. For PR14, we looked at the frequency and magnitude of five-year changes in the operating efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. Our results are given in Table 8. We combined these results with those in Table 5 and estimated the probability of moving a given number of places up the operating expenditure efficiency ranking in seven years. To do this, we added together the probabilities associated with all permutations of changes in observed ranks that result in a given net improvement in places.[5] The results of our analysis are given in Table 9. Table 10 summarizes the probabilities of reaching the benchmark for PR14 estimated by this method.

[5]Given the apparent lack of independence in changes in rank over successive years, we did not consider permutations of other combinations of year-on-year changes, such as 3-year plus 4-year or seven lots of 1-year.

TABLE 8 **Frequency and magnitude of five-year changes of operating expenditure efficiency rank 2000/01 to 2005/06**

		per cent	
*Change in rank**	*Frequency†*	*Individual*	*Cumulative*
Improved 12 places	1	4.6	4.6
Improved 11 places	0	0.0	4.6
Improved 10 places	1	4.6	9.1
Improved 9 places	0	0.0	9.1
Improved 8 places	0	0.0	9.1
Improved 7 places	1	4.6	13.6
Improved 6 places	2	9.1	22.7
Improved 5 places	0	0.0	22.7
Improved 4 places	1	4.6	27.3
Improved 3 places	0	0.0	27.3
Improved 2 places	1	4.6	31.8
Improved 1 place	1	4.6	36.4
No change	4	18.2	54.6
Worsened 1 place	3	13.6	68.2
Worsened 2 places	1	4.6	72.7
Worsened 3 places	1	4.6	77.3
Worsened 4 places	1	4.6	81.8
Worsened 5 places	1	4.6	86.4
Worsened 6 places	1	4.6	90.9
Worsened 7 places	0	0.0	90.9
Worsened 8 places	1	4.6	95.5
Worsened 9 places	0	0.0	95.5
Worsened 10 places	0	0.0	95.5
Worsened 11 places	0	0.0	95.5
Worsened 12 places	0	0.0	95.5
Worsened 13 places	0	0.0	95.5
Worsened 14 places	0	0.0	95.5
Worsened 15 places	0	0.0	95.5
Worsened 16 places	0	0.0	95.5
Worsened 17 places	1	4.6	100.0

Source: Ofwat and CC calculations.

*Difference in rank over five periods.
†Giving 22 changes of rank in total, ie for 22 companies over one change in review period (2000/01 to 2005/06).

TABLE 9 **Estimated probabilities of improvements in operating expenditure efficiency rank over seven years from permutations of two- and five-year changes**

Improvement in places	*%*
21	0.1
20	0.1
19	0.2
18	0.4
17	0.4
16	0.5
15	0.8
14	0.9
13	1.6
12	1.8
11	1.7
10	2.2
9	2.5
8	2.8
7	3.2
6	3.7
5	3.9
4	4.2
3	5.8
2	6.0
1	5.8

Source: Ofwat and CC calculations.

TABLE 10 **Summary of estimated probabilities of reaching the benchmark for PR14 for operating expenditure**

Improvement of at least…	*Permutations of 2- and 5-year changes*	
	Per company	*Total**
7 places in 7 years	19.0	34.4
9 places in 7 years	13.0	24.4
11 places in 7 years	8.3	16.0

Source: Ofwat and CC calculations.

*Calculated as 1 – {[1 – Pr(company 1)] x [1 – Pr(company 2)]} because probabilities for each company are not independent.

Capital maintenance expenditure

14. We looked at changes in the capital maintenance efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. We estimated transition probabilities for the changes in rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. The results of our analysis are given in Table 11.

TABLE 11 Transition probabilities (and number of transitions) for changes in capital maintenance expenditure efficiency 2000/01 to 2005/06

per cent

	Change in rank in next year		
	Rank worsens	*Rank remains the same*	*Rank improves*
Change in rank in current year			
Rank worsens	32 (18)	16 (9)	53 (30)
Rank remains the same	64 (7)	0 (0)	36 (4)
Rank improves	48 (20)	12 (5)	41 (17)

Source: Ofwat and CC calculations.

Note: Transition probabilities estimated for 10 WaSCs and 12 WoCs from 6 Ofwat annual 'Water and sewerage service unit costs and relative efficiency' reports, giving 110 transitions in total.

15. Table 11 compares three years' ranks and is interpreted as follows. Consider row 1 for capital maintenance expenditure: this shows what happened, on average, to companies that suffered a worsening in capital maintenance expenditure efficiency ranking from year 0 (the base year) to year 1 (the current year).[6] Of these companies, 32 per cent suffered a continuing worsening in rank from year 1 to year 2 (column 1), the rank of 16 per cent remained unchanged from year 1 to year 2 (column 2) and nearly 53 per cent improved their rank from year 1 to year 2 (column 3).[7]

16. Row 2 in Table 11 shows what happened, on average, to companies whose capital maintenance expenditure efficiency rank remained the same from year 0 to year 1: the rank of 64 per cent worsened in year 2 (column 1), and the rank of 36 per cent improved in year 2 (column 3).

17. Lastly, row 3 in Table 11 shows what happened, on average, to companies whose capital maintenance expenditure efficiency rank improved from year 0 to year 1: the

[6]Here, year 0 is 2000/01, 2001/02, 2002/03 and 2003/04. Year 1 is 2001/02, 2002/03, 2003/04 and 2004/05.
[7]Here, year 2 can be 2002/03, 2003/04, 2004/05 and 2005/06.

rank of 48 per cent worsened in year 2 (column 1), the rank of 12 per cent was unchanged (column 2) and the rank of 41 per cent improved again (column 3).

18. We looked at the capital maintenance efficiency band (from A to E) of 22 WoCs and WaSCs from 2002/03 to 2005/06. From this, we estimated the probability of a company moving from capital maintenance expenditure efficiency band B (where it was not likely to form the benchmark, regardless of its precise rank) to band A (where it was more likely to, again regardless of its precise rank). Our results are given in Table 12, which shows that there is a 50 per cent probability of a firm moving up from rank B to rank A.

TABLE 12 **Transition probabilities (and number of transitions) between capital maintenance expenditure efficiency bands 2002/03 to 2005/06**

per cent

	*Capital maintenance expenditure band in next year (columns)**				
*Capital maintenance expenditure band in current year (rows)**	*A*	*B*	*C*	*D*	*E*
A	79 (23)	17 (5)	4 (1)	0 (0)	0 (0)
B	50 (11)	23 (5)	18 (4)	9 (2)	0 (0)
C	23 (5)	36 (8)	23 (5)	18 (4)	0 (0)
D	20 (2)	30 (3)	30 (3)	10 (1)	10 (1)
E	0 (0)	20 (1)	40 (2)	20 (1)	20 (1)

Source: Ofwat and CC calculations.

*A is best, E is worst.
Note: Transition probabilities estimated for 10 WaSCs and 12 WoCs from 6 Ofwat annual 'Water and sewerage service unit costs and relative efficiency' reports, giving 110 transitions in total.

19. To interpret Table 12, consider row 1: this shows what happened, on average, to companies in band A in the base year.[8] Of these companies, 79 per cent also were in band A the following year (column A), 17 per cent dropped to band B (column 2), and 4 per cent dropped to band C (column 3).[9]

20. Row 2 in Table 12 shows what happened, on average, to companies in band B in the base year: 50 per cent moved up to band A the following year (column 1), 23 per cent remained in band B (column 2), 18 per cent dropped to band C (column 3) and 9 per cent dropped to band D (column 4).

21. Row 3 in Table 12 shows what happened, on average, to companies in band C in the base year: 23 per cent moved up to band A (column 1), 36 per cent moved up to band B (column 2), 23 per cent stayed in band C (column 2), and 18 per cent fell to band D (column 3).

22. Row 4 in Table 12 shows what happened, on average, to companies in band D in the base year: 20 per cent moved up to band A (column 1), 30 per cent moved up to band B and C (column 2 and 3), 10 per cent stayed in band D (column 4) and 10 per cent fell to band E (column 5).

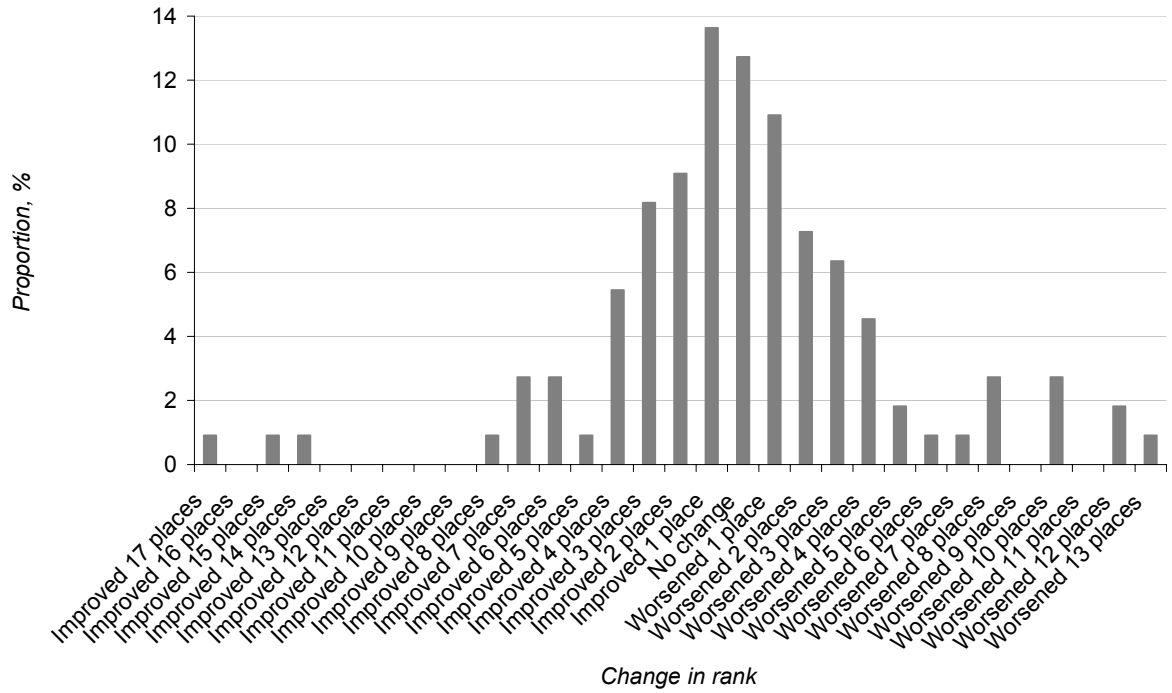
23. Lastly, row 5 in the table shows what happened, on average, to companies in band E in the base year: 20 per cent moved up to band B (column 2), 40 per cent moved up to band C (column 3), 20 per cent moved up to band D (column 4), and 20 per cent stayed in band E (column 5).

[8]Here, the base year can be 2000/01, 2001/02, 2002/03, 2003/04 and 2004/05.
[9]Here, the following year can be 2001/02, 2002/03, 2003/04, 2004/05 and 2005/06.

24. We looked at the frequency and magnitude of one-year changes in the capital maintenance efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. Our results are given in Figure 3 and Table 13.

FIGURE 3

Frequency and magnitude of one-year changes in capital maintenance expenditure efficiency rank for 22 companies, 2000/01 to 2005/06



Source: Ofwat and CC calculations.

TABLE 13 **Frequency and magnitude of one-year changes in capital maintenance expenditure efficiency rank 2000/01 to 2005/06**

		per cent	
*Change in rank**	*Frequency†*	*Individual*	*Cumulative*
Improved 17 places	1	0.91	0.91
Improved 16 places	0	0.00	0.91
Improved 15 places	1	0.91	1.82
Improved 14 places	1	0.91	2.73
Improved 13 places	0	0.00	2.73
Improved 12 places	0	0.00	2.73
Improved 11 places	0	0.00	2.73
Improved 10 places	0	0.00	2.73
Improved 9 places	0	0.00	2.73
Improved 8 places	1	0.91	3.64
Improved 7 places	3	2.73	6.36
Improved 6 places	3	2.73	9.09
Improved 5 places	1	0.91	10.00
Improved 4 places	6	5.45	15.45
Improved 3 places	9	8.18	23.64
Improved 2 places	10	9.09	32.73
Improved 1 place	15	13.64	46.36
No change	14	12.73	59.09
Worsened 1 place	12	10.91	70.00
Worsened 2 places	8	7.27	77.27
Worsened 3 places	7	6.36	83.64
Worsened 4 places	5	4.55	88.18
Worsened 5 places	2	1.82	90.00
Worsened 6 places	1	0.91	90.91
Worsened 7 places	1	0.91	91.82
Worsened 8 places	3	2.73	94.55
Worsened 9 places	0	0.00	94.55
Worsened 10 places	3	2.73	97.27
Worsened 11 places	0	0.00	97.27
Worsened 12 places	2	1.82	99.09
Worsened 13 places	1	0.91	100.00

Source: Ofwat and CC calculations.

*Difference in rank over two periods.
†Giving 110 changes of rank in total, ie for 22 companies over five changes in review period (2000/01 to 2001/02, 2001/02 to 2002/03, 2002/03 to 2003/04, 2003/04 to 2004/05 and 2004/05 to 2005/06).

25. Using the individual percentages in Table 13, we estimated the probability of moving a given number of places up the capital maintenance expenditure efficiency ranking in two years. To do this, we added together the probabilities associated with all permutations of changes in observed ranks that result in a given net improvement in places. The results of our analysis are given in Table 14.

TABLE 14 **Estimated probabilities of improvements in capital maintenance expenditure efficiency rank over two years from permutations of one-year changes**

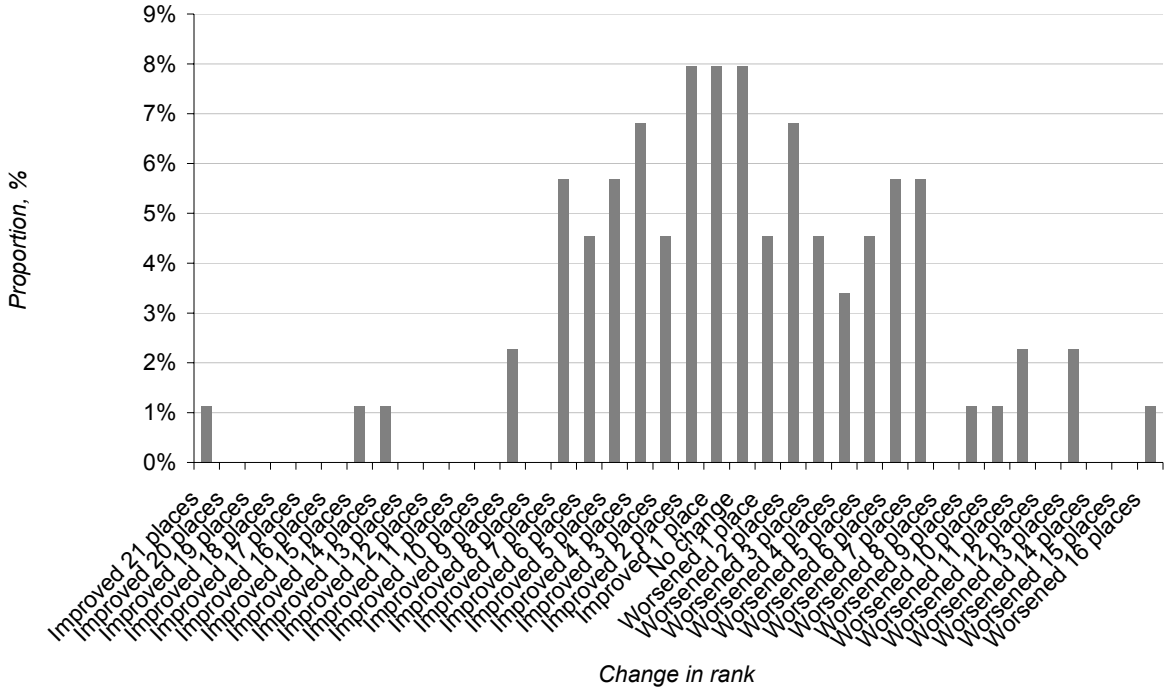
Improvement in places	*%*
21	0.2
20	0.2
19	0.3
18	0.5
17	0.5
16	0.5
15	0.7
14	0.7
13	0.6
12	0.5
11	0.7
10	1.1
9	1.4
8	2.0
7	2.8
6	3.4
5	4.4
4	5.5
3	6.5
2	7.3
1	7.6

Source: Ofwat and CC calculations.

26. We looked at the frequency and magnitude of two-year changes in the capital maintenance expenditure efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. Our results are given in Figure 4 and Table 15.

FIGURE 4

Frequency and magnitude of two-year changes in capital maintenance expenditure efficiency rank for 22 companies, 2000/01 to 2005/06



Source: Ofwat and CC calculations.

TABLE 15 **Frequency and magnitude of two-year changes of capital maintenance expenditure efficiency rank 2000/01 to 2005/06**

		per cent	
*Change in rank**	*Frequency†*	*Individual*	*Cumulative*
Improved 21 places	1	1.1	1.1
Improved 20 places	0	0.0	1.1
Improved 19 places	0	0.0	1.1
Improved 18 places	0	0.0	1.1
Improved 17 places	0	0.0	1.1
Improved 16 places	0	0.0	1.1
Improved 15 places	1	1.1	2.3
Improved 14 places	1	1.1	3.4
Improved 13 places	0	0.0	3.4
Improved 12 places	0	0.0	3.4
Improved 11 places	0	0.0	3.4
Improved 10 places	0	0.0	3.4
Improved 9 places	2	2.3	5.7
Improved 8 places	0	0.0	5.7
Improved 7 places	5	5.7	11.4
Improved 6 places	4	4.6	15.9
Improved 5 places	5	5.7	21.6
Improved 4 places	6	6.8	28.4
Improved 3 places	4	4.6	33.0
Improved 2 places	7	8.0	40.9
Improved 1 place	7	8.0	48.9
No change	7	8.0	56.8
Worsened 1 place	4	4.6	61.4
Worsened 2 places	6	6.8	68.2
Worsened 3 places	4	4.6	72.7
Worsened 4 places	3	3.4	76.1
Worsened 5 places	4	4.6	80.7
Worsened 6 places	5	5.7	86.4
Worsened 7 places	5	5.7	92.1
Worsened 8 places	0	0.0	92.1
Worsened 9 places	1	1.1	93.2
Worsened 10 places	1	1.1	94.3
Worsened 11 places	2	2.3	96.6
Worsened 12 places	0	0.0	96.6
Worsened 13 places	2	2.3	98.9
Worsened 14 places	0	0.0	98.9
Worsened 15 places	0	0.0	98.9
Worsened 16 places	1	1.1	100.0

Source: Ofwat and CC calculations.

*Difference in rank over three periods.
†Giving 88 changes of rank in total, ie for 22 companies over four changes in review period (2000/01 to 2002/03, 2001/02 to 2003/04, 2002/03 to 2004/05 and 2003/04 to 2005/06).

27. We looked at the changes in rank over two years of companies ranked 16 or worse (SEW's rank) in each year from 2000/01 to 2005/06. We estimated the probability of reaching the benchmark by looking at the number of instances where the two-year change was an improvement sufficient for the company to reach the benchmark.

TABLE 16 **Capital maintenance expenditure efficiency ranks and changes in rank over two years for companies ranked 16 or worse**

	Efficiency rank						*Changes in rank over 2 years of companies ranked 16 or worse*			
	2000/01	*2001/02*	*2002/03*	*2003/04*	*2004/05*	*2005/06*	*2002/03*	*2003/04*	*2004/05*	*2005/06*
Anglian	21	20	6	14	12	11	6	14		
Bournemouth & West Hampshire	12	15	8	10	7	9				
Bristol	8	8	21	19	14	12			14	12
Cambridge	1	1	7	17	2	3				3
Dee Valley	17	16	10	22	19	20	10	22		20
Folkestone & Dover	4	4	2	5	4	5				
Mid-Kent	19	19	22	18	21	18	22	18	21	18
Northumbrian	11	12	15	8	6	8				
Portsmouth	6	2	1	4	1	1				
Severn Trent	18	17	11	11	16	10	11	11		
South-East	3	7	5	3	11	16				
South Staffordshire	7	9	9	7	8	7				
South-West	14	13	12	9	9	13				
Southern	16	18	19	21	17	17	19	21	17	17
Sutton & East Surrey	13	10	20	20	18	15			18	15
Tendring Hundred	5	6	16	13	10	14			10	
Thames	10	11	3	2	3	2				
Three Valleys	3	3	4	6	5	4				
United Utilities	15	14	14	16	20	21				21
Welsh Water	9	5	13	12	15	19				
Wessex	20	21	17	15	22	22	17	15	22	
Yorkshire	22	22	18	1	13	6	18	1	13	

Source: Ofwat and CC calculations.

28. Our results are given in Table 16 and show that of the 28 instances of changes in rank over two years of companies ranked 16 or below:

- three were improvements sufficient to reach the top six, so the probability is 2/28 = 10.7 per cent;
- three were improvements sufficient to reach the top eight, so the probability is 10.7 per cent; and
- five were improvements sufficient to reach the top ten, so the probability is 5/28 = 17.9 per cent.

29. Table 17 summarizes the probabilities of reaching the benchmark for capital maintenance expenditure for PR09 estimated by these three methods.

TABLE 17 **Summary of estimated probabilities of reaching the benchmark for PR09 for capital maintenance expenditure**

per cent

	Permutations of 1-year changes		*Two-year changes*		*Two-year transitions*	
Improvement of at least…	*Per company*	*Total**	*Per company*	*Total**	*Per company*	*Total**
8 places in 2 years	9.8	18.6	5.7	11.1	17.9	32.6
10 places in 2 years	6.4	12.4	3.4	6.7	10.7	20.3
12 places in 2 years	4.7	9.2	3.4	6.7	10.7	20.3

Source: Ofwat and CC calculations.

*Calculated as 1 – {[1 – Pr(company 1)] x [1 – Pr(company 2)]} because probabilities for each company are not independent.

30. For PR14, we looked at the frequency and magnitude of five-year changes in the capital maintenance efficiency rank of 22 WoCs and WaSCs from 2000/01 to 2005/06. Our results are given in Table 18. We combined these results with those in Table 15 and estimated the probability of moving a given number of places up the operating expenditure efficiency ranking in seven years. To do this, we added together the probabilities associated with all permutations of changes in observed ranks that result in a given net improvement in places.[10] The results of our analysis are given in Table 19. Table 20 summarizes the probabilities of reaching the benchmark for PR14 estimated by this method.

[10]Given the apparent lack of independence in changes in rank over successive years, we did not consider permutations of other combinations of year-on-year changes, such as three-year plus four-year or seven lots of one-year.

TABLE 18 **Frequency and magnitude of five-year changes of capital maintenance expenditure efficiency rank 2000/01 to 2005/06**

		per cent	
*Change in rank**	*Frequency†*	*Individual*	*Cumulative*
Improved 16 places	1	4.6	4.6
Improved 15 places	0	0.0	4.6
Improved 14 places	0	0.0	4.6
Improved 13 places	0	0.0	4.6
Improved 12 places	0	0.0	4.6
Improved 11 places	0	0.0	4.6
Improved 10 places	1	4.6	9.1
Improved 9 places	0	0.0	9.1
Improved 8 places	2	9.1	18.2
Improved 7 places	0	0.0	18.2
Improved 6 places	0	0.0	18.2
Improved 5 places	1	4.6	22.7
Improved 4 places	0	0.0	22.7
Improved 3 places	2	9.1	31.8
Improved 2 places	0	0.0	31.8
Improved 1 place	2	9.1	40.9
No change	1	4.6	45.5
Worsened 1 place	3	13.6	59.1
Worsened 2 places	3	13.6	72.7
Worsened 3 places	1	4.6	77.3
Worsened 4 places	1	4.6	81.8
Worsened 5 places	0	0.0	81.8
Worsened 6 places	1	4.6	86.4
Worsened 7 places	0	0.0	86.4
Worsened 8 places	0	0.0	86.4
Worsened 9 places	1	4.6	90.9
Worsened 10 places	1	4.6	95.5
Worsened 11 places	0	0.0	95.5
Worsened 12 places	0	0.0	95.5
Worsened 13 places	1	4.6	100.0

Source: Ofwat and CC calculations.

*Difference in rank over five periods.
†Giving 22 changes of rank in total, ie for 22 companies over one change in review period (2000/01 to 2005/06).

TABLE 19 **Estimated probabilities of improvements in capital maintenance expenditure efficiency rank over seven years from permutations of two- and five-year changes**

Improvement in places	*%*
21	0.1
20	0.5
19	0.5
18	0.5
17	1.0
16	0.7
15	1.2
14	1.3
13	1.2
12	1.9
11	1.3
10	2.4
9	2.1
8	2.7
7	2.6
6	3.3
5	4.3
4	3.9
3	5.0
2	4.3
1	5.0

Source: Ofwat and CC calculations.

TABLE 20 **Summary of estimated probabilities of reaching the benchmark for PR14 for capital maintenance expenditure**

	Permutations of 2- and 5-year changes	
Improvement of at least…	*Per company*	*Total**
8 places in 7 years	17.4	31.8
10 places in 7 years	12.7	23.7
12 places in 7 years	8.9	17.1

Source: Ofwat and CC calculations.

*Calculated as 1 – {[1 – Pr(company 1)] x [1 – Pr(company 2)]} because probabilities for each company are not independent.