Private healthcare remittal

Assessment of the cost of capital

22 April 2016

This is one of a series of consultative working papers which have been published during the course of the investigation. This paper should be read alongside the provisional decision on remedies. The group is carrying forward its information-gathering and analysis work taking into consideration responses to the consultations on the remittal provisional findings, provisional decision on remedies and the working papers. Parties wishing to comment on this paper should send their comments to Private-Healthcare@cma.gsi.gov.uk by **Monday 9 May 2016**.

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Background

1. Appendix 6.14 to the 2014 Final Report set out our analysis of the weighted average cost of capital (WACC) for a hypothetical stand-alone private hospital operator in the UK for the period from January 2007 to June 2012. We concluded that such a firm would have a WACC of between 7.2 and 10.5%.In the 2014 Final Report, we used 10.0% as our benchmark for estimating customer detriment, which was towards the upper end of our range of estimates of the WACC.[1]

2. In our remittal provisional findings (PFs), we decided not to update our profitability analysis on the basis that there was no evidence that the profitability of HCA had declined materially since the date of the 2014 Final Report. In light of this, we also did not consider it necessary to update our WACC analysis since it covered the same period as the profitability analysis. However, as set out in our provisional decision on remedies (PDR), due to uncertainty over the size of the price difference between HCA and TLC (as measured by our insured price analysis), we have used the profitability analysis to quantify the potential benefits of a divestiture remedy. For these purposes, we considered that it was necessary to update the profitability analysis.[2]

3. We have, therefore, decided to update our WACC analysis in order to ensure that the time period is consistent with that used in our updated profitability analysis, as set out in the remittal PDR. In this working paper, we have extended the time period covered by the analysis, taking into account parties' submissions on WACC as well as evolving thinking in certain areas.

4. We invite responses on this working paper by **Monday 9 May 2016**.

Introduction

5. The approach to assessing profitability, as set out in our Guidelines,[3] is to compare the profits earned with an appropriate cost of capital. In this working paper, we set out our estimate of the nominal pre-tax WACC for a typical private hospital operator in the UK, based on data for the period January 2007 to December 2015.

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[1] 2014 Final Report, Appendix 6.14, paragraph 20.
[2] While there was no evidence to suggest that HCA's profits had declined materially since the 2014 Final Report, BUPA suggested that they may have increased. While we reasoned that any such increase would not change our conclusion that HCA had earned profits that were substantially and persistently in excess of the cost of capital, it could have had a significant impact on our assessment of the proportionality of a divestiture remedy.
[3] *Guidelines for market investigations: their role, procedures, assessment and remedies (CC3)*.

6. Our estimated range for the industry WACC for this period is 7.6 to 10.5% with a midpoint of 9.0% (see Table 1). We note that this range is similar to that set out in the 2014 Final Report.

Table 1: CMA estimate of UK private healthcare nominal pre-tax WACC

	Low	*High*
Nominal risk-free rate (%)	4.0	4.0
Equity risk premium (%)	4.0	5.5
Asset beta	0.5	0.7
Pre-tax Ke (%)	10.1	14.5
Pre-tax cost of debt (Kd) (%)	5.0	6.5
Gearing (%)	50.0	50.0
Tax rate (%)	26.0	26.0
Pre-tax WACC (%)	**7.6**	**10.5**
Mid-point estimate (%)	**9.0**	

Source: CMA analysis.

7. We consider the above range to be a reasonable estimate of the cost of capital that would have been faced by a hypothetical stand-alone UK private hospital operator.

8. For the purposes of assessing the extent to which profits may have exceeded the normal level over the period and for quantifying customer detriment we propose to use the same benchmark as we did in the 2014 Final Report, ie 10.0%.

General approach to estimating the WACC

9. There are several factors that we have taken into account in estimating an appropriate benchmark cost of capital for the various activities undertaken within the private hospital sector. These include:

   (a) how to estimate the WACC – use of the capital asset pricing model (CAPM);

   (b) which cost of capital provides an appropriate benchmark – specification of the basis of the WACC; and

   (c) over which time period should the cost of capital be measured – at the start of the relevant period, or an average for the relevant period?

Capital asset pricing model

10. The Guidelines highlight that we generally use the CAPM when considering the cost of equity since this is a widely understood technique with strong theoretical foundations.[4]

11. The CAPM relates the cost of equity $E[R_i]$ to the risk-free rate (R_{rf}), the expected return on the market portfolio (R_m), and a firm-specific measure of investors' exposure to systematic risk (beta or β) as follows:

$$E[R_i] = R_{rf} + \beta(R_m - R_{rf})$$

12. If a business were entirely funded by equity, the expected return on equity could be considered to be its 'cost of capital'. However, most firms are funded by a combination of both debt and equity, such that the appropriate cost of capital to consider is the weighted average cost of debt and equity. The WACC is given by the following expression:

$$WACC = E[R_i] \times E/(D+E) + K_d \times D/(D+E)^5$$

13. Finally, the cost of capital must take into account the effects of tax on returns to capital providers. The returns to debt holders take the form of interest payments which are usually tax-deductible. The returns to equity holders (dividends), on the other hand, are taxed. Hence, where the cost of capital is expressed 'pre-tax', the cost of equity used must reflect the fact that the actual return to shareholders will be reduced by the rate of tax. We have estimated the cost of capital on a nominal pre-tax basis:[6]

$$\text{Pre-tax WACC} = [(1/(1-t)) \times E[R_i] \times E/(D+E)] + [K_d \times D/(D+E)]$$

Specification of the basis of the WACC

14. In our analysis, we use the WACC as a benchmark for the level of 'normal' profits that a firm in the industry could expect to earn. As a result, we consider that it is appropriate to use a WACC for a typical stand-alone private hospital operator in the UK as the benchmark, rather than estimating a firm-specific cost of capital for each operator.[7] In particular, we have sought to reflect a sustainable level of gearing, cost of equity and cost of debt that a hypothetical stand-alone operator in the UK would incur when undertaking the relevant activities. Where possible, we have used UK benchmarks, although in several

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[4] *CC3*, paragraph 116.
[5] Where D is debt, E is equity and K_d is the cost of debt.
[6] This avoids the need to adjust nominal financial information to remove the effects of inflation.
[7] This approach ensures that all firms in an industry are treated equally.

cases, we have needed to make reference to international comparator firms due to a lack of comparable (listed) UK firms.

Relevant time period

15. We are analysing the profitability of HCA over the period between 2007 and 2015. When a cost of capital is set for regulatory purposes, it is generally forward-looking. In a market investigation, in contrast, we are looking backwards to understand whether the profits made by the firms have exceeded the cost of capital over the relevant period. We have not sought, therefore, to estimate the WACC at a particular point in time but rather we have considered the average cost of capital for the relevant period as a whole, taking into account the fact that various elements of the WACC estimate will have changed over the period.

CMA estimation of WACC

16. This section sets out the analysis that we have undertaken in order to estimate the components of the WACC calculation, which includes both generic and industry-specific components. The former comprise the risk-free rate (RFR), the equity risk premium (ERP) and the tax rate; the latter comprise beta, cost of debt and gearing.

17. In conducting our cost of capital analysis, we have had reference to our price determinations for Bristol Water, which was undertaken in 2009/10, and for NIE, which was undertaken in 2013, ie during the relevant period for our analysis.[8]

Risk-free rate

18. In this section, we consider the RFR relevant to calculating the cost of equity. In order to estimate the RFR applicable over the extended period. We have had reference to two sources. The first is index-linked gilt yields, which have negligible default and inflation risk. The second source is nominal gilt yields, which also have negligible default risk but which do have inflation risk (and, therefore, should contain an inflation risk premium).

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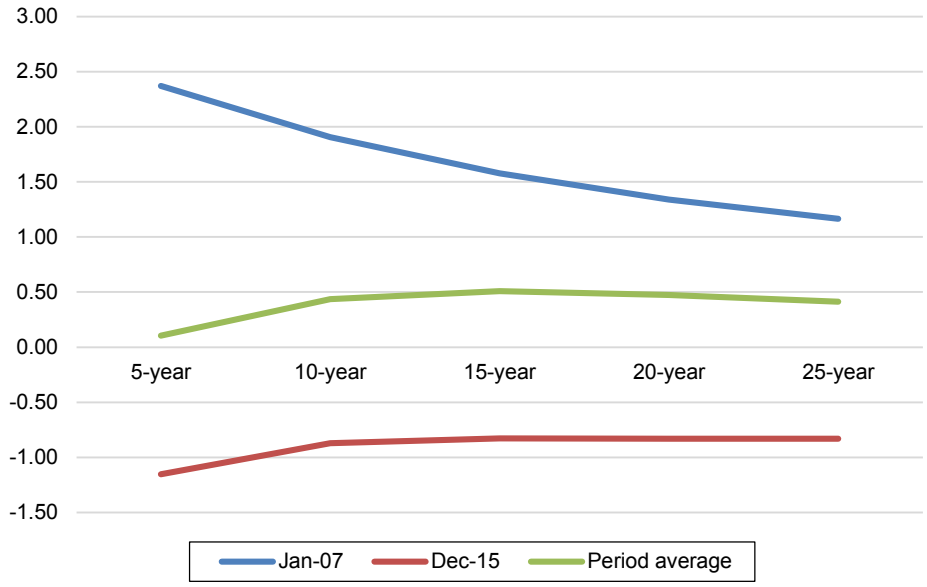
[8] Bristol Water plc: *determination on a reference under section 12(3)(a) of the Water Industry Act 1991* (August 2010). *Northern Ireland Electricity (NIE) price determination* (March 2014). We have not made reference to the 2015 Bristol Water determination, since this analysis was undertaken on a forward-looking basis at the end of the relevant period for our analysis. We considered, therefore, that it was less relevant to the cost of capital during the 2007–2015 period.

19. We consider the yields on long-maturity gilts to be most relevant to the RFR in the cost of equity since equities also have long (indefinite) maturity.[9] Figure 1 shows the index-linked yield curve at the start and end of the relevant period, as well as the nine-year average (ie covering the whole period). For maturities of 15 years and more, the yield curves are between –1.0 and 1.5% with an average of just over 0.5%. Shorter-dated yields have fallen significantly over the last nine years, while yields on longer-dated gilts have been more stable over the period.

Figure 1: Yield curves on UK index-linked gilts, January 2007 to December 2015

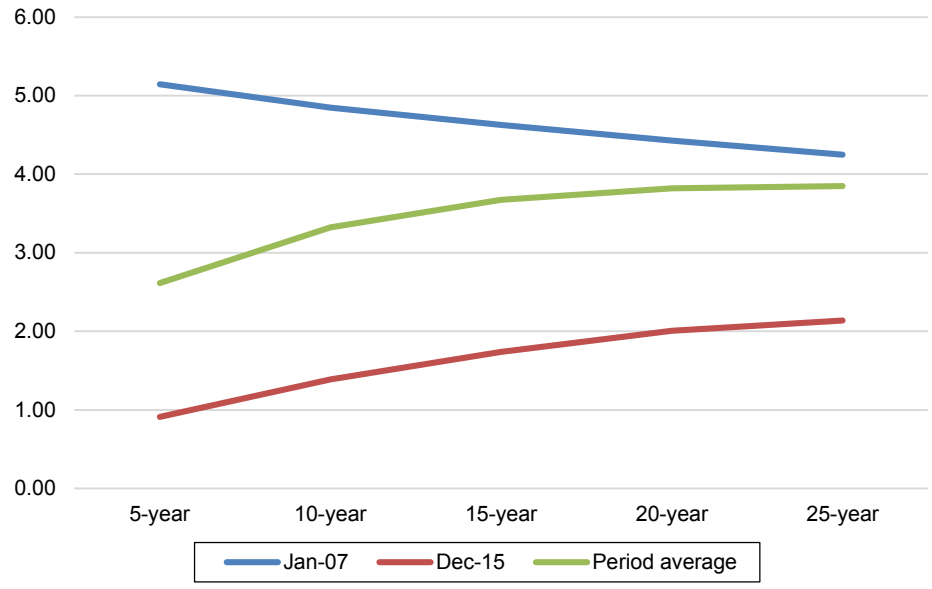


Source: Bank of England, real spot yield curve data.
Note: The three lines show yields on 31 December 2007, 31 December 2015, and the average yields covering the nine year period between January 2008 and December 2015.

20. Figure 2 shows nominal gilt yields at the start and end of the relevant period, as well as the nine-year average (ie covering the whole period). For maturities of 15 years and more, the yield curves are between 2.0 and 4.5% with an average of just under 4%. A similar pattern of declining yields on shorter maturities can be seen on these nominal gilts.

[9] In previous reports in the last ten years, we paid attention to distortions in the index-linked markets that may affect the shape of the yield curve. In Bristol Water (2010), the Competition Commission (CC) noted that shorter-dated index-linked yields were affected by action by the authorities to address the credit crunch and recession and were therefore less relevant to estimating the RFR. In inquiries prior to 2010 the CC put less weight on longer-dated maturities, noting possible distortion from pension fund asset allocation policies. As we explained in NIE, the effects of monetary policies and pension fund dynamics are increasingly well understood by the markets. Consequently we expect the market prices of index-linked gilts to incorporate effectively expectations of the effects of these factors and therefore to provide a reasonable guide to future returns.

Figure 2: Nominal yield curves on UK gilts, January 2007 to December 2015



Source: Bank of England, nominal spot yield curve data.
Note: The three lines show yields on 31 December 2007, 31 December 2015, and the average yields covering the nine year period between January 2008 and December 2015.

21. Our profitability analysis seeks to compare actual returns achieved in the private healthcare sector with the required cost of capital of investors for the relevant period. The nominal RFR that forms an element of the cost of capital is composed of the real RFR and an allowance for inflation over the period.

22. In assessing this evidence, we have had regard to the nature of the benchmark that we require, ie a reasonable, nominal return on capital over the nine-year period from January 2007 to December 2015. We observe that an investor at the start of this period would have had regard to a higher gilt yield (real or nominal) than an investor towards the end of the period, although the difference is less material when considering long-dated gilts. On this basis, we consider that a reasonable nominal RFR for the period is 4%.[10] The average yield on long-dated index-linked gilts has been approximately 0.5% over the period. However, in the NIE price determination we used a real RFR of between 1 and 1.5%, which was considerably above rates on long-duration index-linked debt, in order to allow for the possibility that rates might rise during the remainder of the price control period. In this case, we are not seeking to determine an appropriate cost of capital for a future period and therefore do not face the uncertainties associated with forecasting. We have historical information on which to base our estimates. This could provide a reason for using a lower real RFR.

[10] We note that this is consistent with the upper end of the estimates used for the nominal RFR in both the energy and the aggregates market investigations.

23. However, we have also taken into account the fact that the yields observed on index-linked gilts are likely to be affected by the imperfections associated with the retail price index (RPI) as a measure of underlying inflation. We note the historical gap between RPI and consumer price index (CPI) measures of inflation of around 0.5% between 2005 and 2013.[11] To the extent that the CPI better reflects underlying inflation, measures of the apparent riskless rate of return taken from index-linked gilt yields may be distorted as a result of that gap. This may be a factor behind negative short-term real yields. In our NIE decision, we noted that, given that the regulated asset base of the company was also indexed by the RPI, we did not need to adjust our estimate of the RFR for this effect. However, in this investigation, the financial performance of HCA is likely to have been affected by the general rate of inflation in the economy, which we consider to be most accurately measured by the CPI.

24. On this basis, we have used a real RFR of 1% in our analysis. This is consistent with taking the average index-linked gilt yield of 0.5% and adding the 0.5% estimate of the difference between RPI and CPI. This is the bottom end of the range that we used in the 2014 Final Report and reflects the persistently lower gilt yields observed in the last few years, compared with earlier in the relevant period.

Equity risk premium

25. The ERP is the additional return that investors require to compensate them for assuming the risk associated with investing in equities rather than in risk-free assets. The ERP cannot be directly observed from market data because the future yields on equities are uncertain.

26. There are two types of approach that can be used to estimate the ERP. Historical methods seek to derive the ERP from a long run of data on realised returns on equities. Forward-looking approaches seek to estimate the expected ERP based on either the reported expectations of market participants or the ERP implied in asset prices at the start of the period.

Historical approach

27. The motivation for the historical approach is that expected returns remain constant over time and hence that average realised returns reflect the expected return. Dimson, Marsh & Staunton (DMS) estimated the average ERP for a number of countries, including the UK, on the basis of equity and gilt yields over the last 115 years. These ERPs are estimated as the

[11] See *Bank of England inflation report 2014*, p34.

difference between the real return on equities and the real return on gilts over the period.[12] As DMS explained, 'To understand risk and return, we need to examine long periods of history. This is because asset returns, and especially equity returns, are extremely volatile. Even over periods as long as ten or twenty years, we can still observe "unusual" returns.' On this basis, we have used the full 115-year mean equity returns estimates in our analysis.[13]

28. During the original inquiry, HCA suggested that the arithmetic mean should be used on the basis that it provided a 'more unbiased means of estimating the average market return since it ignores estimation error and serial correlation in returns and unbiased estimators have been found to be closer to the arithmetic than the geometric mean'.[14]

29. We note that the arithmetic mean reflects the returns that an investor could expect to make in any given year, while the geometric mean reflects the compound returns that an investor would have made if they had invested over the full 115-year period covered by the Dimson et al data set. It is usual to quote figures for the average of one-year returns but investors in the equity market usually expect to invest in the market for longer than a year. As the holding period increases, the expected return declines from the arithmetic mean towards the geometric mean. Therefore, in coming to a view on the appropriate market return, we have had reference to the range of mean returns (geometric to arithmetic), ie 5.4 to 7.2%.

30. Table 2 shows the geometric and arithmetic average returns on equities, bonds and bills over the period between 1900 and 2015, together with the historical ERP implied by these returns.

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[12] The formula used to estimate the ERP is: ((1+ Equity rate of return) / (1+ Riskless return)) – 1, which is approximately equivalent to deducting the riskless returns from the returns on equities. DMS categorises 'gilts' into two groups for the purposes of its analysis: shorter-dated 'treasury bills' and longer-dated 'treasury bonds'. The former have maturities of up to ten years, while the latter have an average maturity of 20 years. The difference between 'bond' and 'bill' returns is referred to as the 'maturity premium'.

[13] *Credit Suisse Global Investment Returns Sourcebook* 2016, pp12–15 and p18. The advantage of this approach is also that the larger sample size (ie number of years), increases the accuracy of the estimates – the standard errors of the estimations are reduced, narrowing the confidence interval.

[14] See Ian Cooper (1996), 'Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting', *European Financial Management*, Vol 2, No 2.

Table 2: Real returns on UK equities and government debt, 1900 to 2015

%

	Geometric mean	*Arithmetic mean*
UK real returns		
Equities	5.4	7.2
Bonds	1.7	2.6
Bills	1.0	1.2
ERP		
Bonds	3.6	5.0
Bills	4.3	6.0

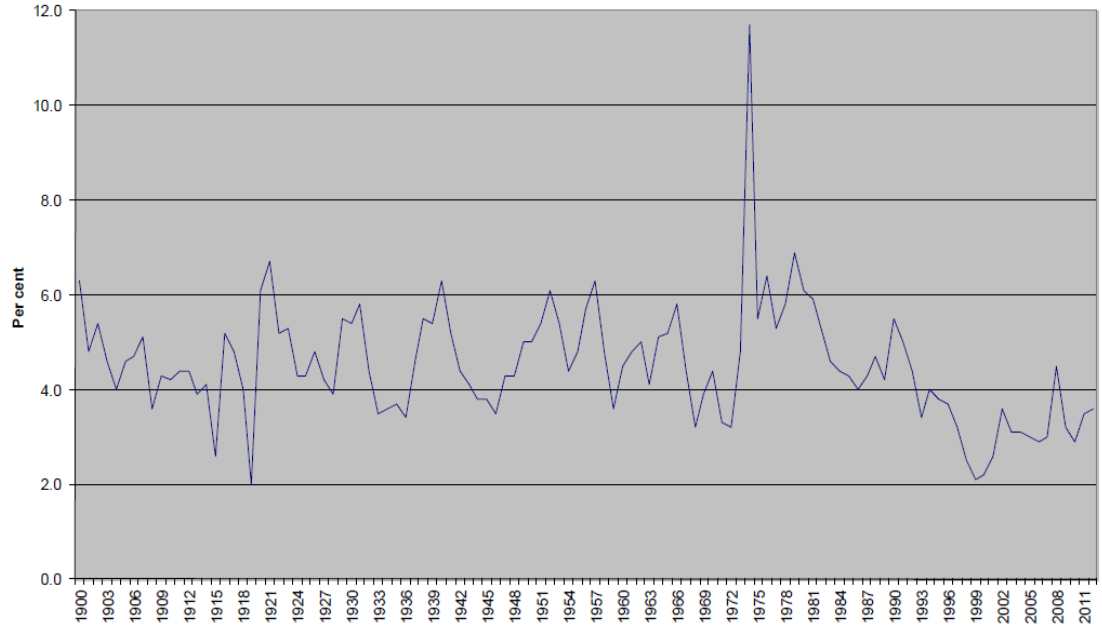
Source*:* Credit Suisse *Global Investment Returns Sourcebook*, 2016, Dimson, Marsh & Staunton.

31. An alternative approach suggested by Fama and French is to estimate the underlying return from the sum of the average dividend yield and the average rate of dividend growth.[15] Using the full run of historical data for the UK, this suggests an underlying market return of 5.5%.[16]

32. Fama and French's work on US securities provides evidence of a fall in expected returns over time, with expected returns being lower since 1950 than before. The statistical evidence for the UK is less extensive[17] but, as illustrated in Figure 3, the dividend yield as of the start of the relevant period (of about 3.5%) was below the historical average (4.5%). Unless future dividend growth is higher than in the past, this would suggest that expected returns are about 1% lower than the past average, implying a market return of about 4.5% (using Barclays data).[18]

[15] E F Fama and K R French, 'The Equity premium', *Journal of Finance*, April 2002.
[16] This result is derived from an average dividend yield of 4.5% and dividend growth of 1% a year (Barclays Equity Gilt Study data).
[17] Two papers that find evidence of a reduction in the expected market return or ERP for the UK (albeit at different times) are N Buranavityawut, M C Freeman & N Freeman, 2006, 'Has the equity premium been low for 40 years?', *North American Journal of Economics and Finance*, 17, pp191–205; and A Vivian, 'The UK equity premium, 1901–2004', *Journal of Business and Financial Accounting*, 2007. The first paper suggests that the expected equity premium may have fallen in the 1960s in the UK and other countries, while the second paper suggests that there was a permanent decline in the UK market dividend-price ratio during the early 1990s.
[18] These figures do not take into account payments to shareholders other than dividends, for example share repurchases.

Figure 3: Dividend yield for UK market (Barclays data)



Source: Barclays Equity Gilt study, 2013.

Forward-looking approaches

33. The ERP is also commonly estimated using projected dividends from analysts' forecasts (which extend out by four or five years) and a longer-term dividend growth rate. The expected return is then the discount rate at which the present value of future dividends is equal to the current market price. A limitation of this approach is that it is necessary to make an assumption about future long-term growth of dividends (which has a major effect on the calculation since dividends beyond year four or five account for a large part of present value at plausible discount rates).

34. Figure 4 shows estimates of ERP using this methodology published in an article in the *Bank of England Quarterly Bulletin*. These estimates are based on the assumption that the future long-term growth in dividends per share is equal to an estimate of the potential growth of the economy. However, the authors of the article noted that this choice of future long-term growth rate is essentially arbitrary.[19] The estimates in Figure 4 suggest that since 2007 the expected ERP has fluctuated around 5%, towards the upper end of the historical inter-quartile range of between 4.25 and 5.3%.[20] We attempted to calculate the expected market return implied by these estimates of the ERP by adding the yield on zero-coupon ten-year gilts. Calculated on this basis,

[19] M Inkinen, M Stringa and K Voutsinou (2010), 'Interpreting equity price movements since the start of the financial crisis', *Bank of England Quarterly Bulletin*, Q1.
[20] Calculated by the Bank of England based on a longer time series of data between 1998 and 2013.

since the 2008 financial crisis the market return has fluctuated around 6%. It has declined markedly following the financial market turmoil of 2009 to 5% or less. Indeed, the Bank of England's November 2013 *Financial Stability Report* notes rising equity prices, improved earnings expectations, and a fall in equity risk premia towards long-term average levels.[21]

Figure 4: Estimated ERP and approximate implied real market return

Source: Bank of England and CMA calculations.

35. We agree that it is essentially arbitrary to assume future long-run growth in dividends per share equal to potential economic growth. Indeed, we see empirical support for expecting long-run growth in dividends per share to be less than potential economic growth. The historical growth rate in real dividends for the UK from the Credit Suisse/Dimson et al data is only 0.5% and around zero using the Barclays data – this is significantly less than real UK economic growth over the same period (1900 to 2010) of 1.9%.[22] It is also the case that growth in dividends per share has been significantly less than economic growth in more recent periods. Since 1950, growth in dividends per share has been 1.1%, compared with 2.4% for GDP growth, while, since 1980, growth in dividends per share has been 1.6%, compared with 2.3% for GDP growth.[23]

36. Bearing in mind these points and also that analysts' forecasts may be subject to upward bias, we consider that the approximate 5% ERP and 5 to 5.5%

[21] *Financial Stability Report*, p8 and Chart 1.6.
[22] *Credit Suisse Global Investment Returns Sourcebook 2013*, Table 11. SH Williamson (2015), 'Annualized growth rate of various historical economic series'.
[23] A large body of literature suggests that there may be a tendency for analysts' forecasts to overreact to changes and on average to be too optimistic, eg WFM DeBondt and RH Thaler (1990) 'Do security analysts overreact?', *American Economic Review* 80, pp52–57.

market return suggested by Figure 4 are likely to be at the upper end of expected returns.

37. As set out in the 2014 Final Report, HCA argued that an appropriate range for the market return was between 5.5 and 7.25% on the basis that:

(a) the arithmetic mean is more appropriate than a geometric mean;

(b) DMS data indicates that the long-run return on the UK market has been 7.0 or 7.1% in real terms, while recent Ofgem estimates of the cost of equity for RIO, National Gas and National Grid used an estimate of 7.25%; and

(c) DMS forward-looking estimates imply an expected arithmetic average return on the market in the range of 5.5 to 6.0%.[24]

38. The interpretation of the evidence on market returns remains subject to considerable uncertainty. Historical approaches (ex post and ex ante) indicate a market return of between 4.5 and 7.2%, while forward-looking approaches indicate a market return of between 5 and 6%. In the 2013 NIE determination, we came to the view that the appropriate market return was between 5% and an upper limit of 6.5%. We explained that, in applying the CAPM, we seek to derive the expected return on the market. The 7% upper limit used in previous regulatory inquiries had been based on the approximate historical average realised return. However, we noted that past realised returns were not necessarily the same as the expected return on the market, even over long time horizons, and that attempts to estimate the historical expected ex ante return suggested that this was considerably lower than the realised return.[25] As a result, we concluded that it was appropriate to move away from this 7% upper limit based on historical ex post realised returns and place greater reliance on ex ante estimates derived from historical data that tend to support an upper limit of 6.5%. On this basis, we did not agree with HCA's argument that the 7.25% market return used by Ofgem should be used as the upper estimate. Therefore, we consider that an appropriate range of market returns is between 5 and 6.5%. Together with a real RFR of around 1%, this range implies an ERP of between 4 and 5.5%.

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[24] 2014 Final Report, Appendix 6.14, paragraph 32.

[25] In addition, we observed that historical returns necessarily incorporate, among others, revisions in expectations for future cash flows and discount rates. DMS (2007) attempted to address this issue directly by decomposing past realised returns. We shared its view that some elements of the return, in particular the historical expansion in valuation ratios, is unlikely to be repeated in the future. Finally, we noted that a forward-looking expectation of a return on the market of 7% did not appear credible to us, given economic conditions observed since the credit crunch in 2008 and lowered expectations of returns.

Tax rate

39. The corporation tax rates applicable over the period are set out in Table 3. For the purpose of estimating the WACC, we have used an average of the tax rates over the period of 26%.

Table 3: UK corporation tax rates

%

2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
30	30	28	28	28	26	24	23	21	20

Source: HMRC.

Equity beta

40. The beta of an asset measures the correlation between the volatility of the returns on the asset and the returns on the market as a whole, or the exposure of the firm to systematic or 'non-diversifiable' risk. It is in return for assuming this (market) risk that investors require an (equity risk) premium over the risk-free return.

41. The beta value of a listed firm can be directly estimated as the covariance between the stock's returns and the market's returns, divided by the variance of market returns. Within a CAPM framework, changes in gearing affect equity betas. Hence, it is necessary to adjust for gearing differences in order to make comparisons between equity betas. We do this by calculating the asset beta, ie the beta at zero gearing.

42. We have estimated a range of beta values for a stand-alone UK private healthcare operator on the basis of beta information from listed comparable companies (see Annex A). This group includes some of the parent companies of the private hospital operators active in the UK market. Table 4 provides a summary of our analysis on the beta values of comparable companies.

Table 4: Comparable companies, beta estimates

Company	*Levered betas*			*Unlevered betas*		
	Weekly	*Monthly*	*Quarterly*	*Weekly*	*Monthly*	*Quarterly*
Netcare	0.66	0.66	0.42	0.31	0.31	0.20
Ramsay	0.46	0.38	0.27	0.30	0.25	0.18
HCA	1.00	1.10	1.51	0.11	0.12	0.17
Lifepoint	0.96	1.06	0.93	0.62	0.69	0.60
Tenet	1.38	2.01	2.76	0.48	0.70	0.97
Rhoen Klinikum	0.44	0.33	0.29	0.36	0.27	0.24
Health Management Associates	0.96	1.05	0.87	0.59	0.65	0.54
Universal Health Services	0.97	1.23	1.12	0.66	0.84	0.76
Community Health Systems	1.38	1.38	1.62	0.45	0.45	0.53
Apollo Hospitals	0.44	0.29	0.46	0.38	0.25	0.40
Fortis Healthcare	0.63	0.78	0.62	0.48	0.59	0.46
Mean	**0.84**	**0.93**	**0.99**	**0.43**	**0.47**	**0.46**

Source: Bloomberg data.
Note: The beta values used were unadjusted (raw) figures calculated in local currencies for the period January 2007 to April 2016. The beta values for HCA, Life Healthcare and Fortis Healthcare were estimated for the (shorter) period from the date of their listing to April 2016. Betas have been unlevered using the statutory tax rates in each jurisdiction.

43. We observe that the frequency of measurement does not, on average, have a significant impact on the beta values, ie the weekly, monthly and quarterly estimates are similar. However, in our analysis, we have placed most weight on the monthly and quarterly beta estimates. This approach follows the research findings of Gilbert et al which show that monthly and quarterly betas are generally more reliable than those estimated on the basis of high-frequency data, ie daily or weekly betas.[26]

44. HCA put forward the view that a number of these businesses did not provide suitable beta values for comparison with a stand-alone UK private hospital operator. HCA highlighted that

> The CAPM assumes efficient markets, and perfect information for investors. This is obviously a simplification of the real world, and is only a reasonable starting point where share trading is highly liquid, and shareholders are provided with good information on which to make choices. [...]
>
> A problem arises where the observations of equity betas are distorted by low levels of trading liquidity, either for the stock in question or the exchange/index on which the stock is traded. In these circumstances, it may not be possible to obtain an accurate estimate of the beta from direct observation of the stock/index.

45. In particular, during the original inquiry, HCA argued that:

[26] T Gilbert, C Hrdlicka, J Kalodimos and S Siegal (2014) 'Daily data is bad for beta: Opacity and frequency-dependent betas', *Review of Asset Pricing Studies*.

(a) the Thai, Indian and South African stock exchanges were either thinly traded and/or had a low total market capitalisation and hence were an unreliable source of beta estimates;

(b) a number of the companies used by the CMA as comparables were thinly traded and hence an unreliable source of beta estimates; and

(c) several of the companies operated in markets with very different levels of economic development and/or healthcare systems when compared with the UK and hence could not be considered comparable businesses.[27]

46. HCA argued that the CMA should focus on US-listed comparables as the main source of beta values on the basis that 'the most highly-developed, competitive and liquid market for healthcare providers is the US market'. (See the 2014 Final Report, Appendix 6.14, paragraphs 38 to 41 for our detailed consideration of HCA's arguments. We have not received any evidence or argumentation in this area as part of the remittal that gives us reason to reconsider the conclusions we reached in the 2014 Final Report).

47. In the 2014 Final Report, we concluded that we should take into account the beta values of all the companies listed in Table 5 of Appendix 6.14 (and in Table 4 above) when coming to a view on the appropriate beta for a stand-alone private hospital operator in the UK.[28] On the basis of the updated beta estimates set out in Table 4, this would suggest an asset beta of 0.46 to 0.47, slightly lower than our previous estimates of 0.51 to 0.56, but in line with the beta estimate provided by HCA (during the original inquiry) for its parent company (HCA Inc) of 0.47. However, in the 2014 Final Report, we also took into account the beta estimates of the other private hospital operators, which ranged from 0.26 to 0.77, with an average of 0.57, as well as giving some additional weight to the beta values of the US companies which HCA had suggested we should focus on, when coming to a view on the appropriate range (of 0.5 to 0.7). Using our updated beta estimates, we note that the asset beta values of the US firms (excluding HCA) average around 0.67.[29]

48. Taking all of this evidence into account, we consider that a range of 0.5 to 0.7 is appropriate for the asset beta in our analysis. However, we note that the upper end of this range is conservative.

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[27] 2014 Final Report, Appendix 6.14, paragraphs 32–37.
[28] 2014 Final Report, Appendix 6.14, paragraph 44.
[29] We note that HCA Inc's beta value estimates are very low, which appears to be (largely) the result of its high gearing ratio (see Table 5).

Gearing

49. In order to come to a view on the appropriate level of gearing for a hypothetical stand-alone UK hospital operator, we have considered the gearing of a number of comparable companies that are listed.

50. Table 5 provides details of the levels of gearing of the listed comparable private hospital operators.

Table 5: Gearing of listed private healthcare businesses

%

	FY07	*FY08*	*FY09*	*FY10*	*FY11*	*FY12*	*FY13*	*FY14*	*FY15*	***AVG***
Netcare	70.0	78.0	69.2	59.9	62.5	103.6	38.6	35.5	36.9	**61.6**
Ramsay	33.7	50.3	44.2	33.0	25.6	43.2	45.0	44.0	63.2	**42.5**
HCA	N/A	N/A	N/A	N/A	74.3	103.5	98.4	95.0	93.1	**92.9**
Lifepoint	46.7	52.2	40.8	42.2	45.7	44.9	50.9	49.1	52.5	**47.2**
Tenet	63.4	88.7	60.4	55.4	68.6	81.0	89.9	90.7	81.8	**75.5**
Rhoen Klinikum	19.8	27.3	16.5	21.2	23.7	39.3	32.8	11.3	N/A	**24.0**
Health Management Associates	73.2	88.0	63.1	56.2	65.8	37.1	32.5	26.7	16.5	**51.0**
Universal Health Services	31.7	39.7	28.7	49.5	50.8	55.4	48.5	45.0	43.3	**43.6**
Community Health Systems	72.6	87.3	73.1	72.3	85.3	75.1	73.0	78.6	78.5	**77.3**
Apollo Hospitals	7.8	4.0	14.6	12.7	9.6	24.5	30.5	31.0	38.0	**19.2**
Fortis Healthcare	N/A	17.3	22.9	41.3	12.7	62.7	54.6	27.0	26.8	**33.2**
Mean	**46.5**	**53.3**	**43.4**	**44.4**	**47.7**	**60.9**	**54.1**	**48.5**	**53.1**	**50.2**

Source: Bloomberg data.
* N/A = not available.

51. A review of the information on comparable companies indicates that average levels of gearing are between 40 and 60% over the period. Gearing appears to be higher among firms operating in the USA and South Africa than those with activities elsewhere in the world.

52. On the basis of this information, we have used a gearing ratio of 50% in our estimate of the WACC, which is the same as the gearing assumption used in the 2014 Final Report. We note that using a slightly lower level of gearing of 40% does not have a significant impact on our cost of capital estimates.

53. In our analysis we did not allow for debt beta to be greater than zero. We noted that the Bloomberg unlevered betas (see Table 4) were based on a simple formula assuming a debt beta of zero, and for consistency we therefore assumed a debt beta of zero in our calculation of industry WACC. We note also that assuming a small positive debt beta would be unlikely to change materially the industry WACC, providing it was included both in the calculation of unlevered betas for comparator companies and in the calculation of WACC.

Cost of debt

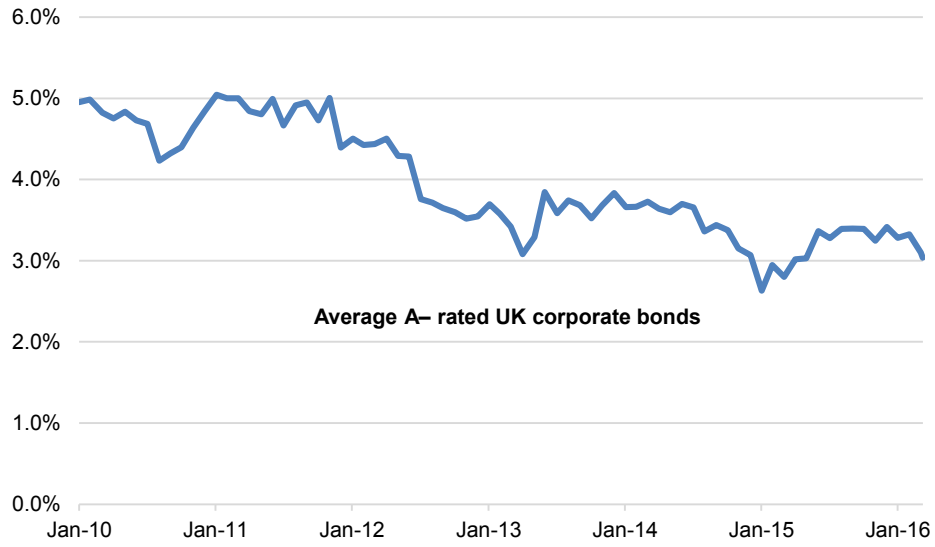
54. In the 2014 Final Report, we took into account both the effective interest rates paid by the UK-based private hospital operators, which ranged from 5 to

7.5%, and yields on UK corporate bonds, which average 6.1% over the 2007 to 2011 period (for a BBB rated bond).[30] On this basis, we concluded that a stand-alone UK private hospital operator would incur a cost of debt of between 5.5 and 7.0%, with the upper end of the range allowing for a stand-alone UK private hospital operator to have a credit rating below BBB.

55. In order to update our analysis, we have considered information on the redemption yields on corporate bonds up to the end of 2015.

56. Figure 5 shows the yield on an index of UK corporate bonds with an average rating of A– between 2010 and 2015. While yields varied from 5 to 3% over the period, with a monthly average of 3.9%, there is an overall downward trend. We note that these yields will be lower than those on BB or BBB rated bonds but that the basic trend is likely to be similar.

Figure 5: BBGID Index, UK corporate bond redemption yields, 2010 to 2015



Source: Bloomberg. The Bloomberg GBP Investment Grade Corporate Bond Index is a rules-based, market-value weighted index engineered to measure investment grade, fixed-rate securities publicly issued in the European bond market and denominated in GBP. To be included in the index a security must have a minimum par amount of £200 million. The index contains 306 different UK corporate bonds with an average rating of A–.

57. During the original inquiry, HCA suggested that a stand-alone private hospital operator in the UK would achieve a B or BB credit rating, on the basis of the credit rating of comparable US companies, and hence that – due to a lack of data relating to B and BB rated companies – an additional (0.7%) yield should be added to the cost of debt of BBB rated companies to reflect this lower creditworthiness. Table 6 sets out the (updated) credit ratings of a number of private hospital operators.

[30] 2014 Final Report, Appendix 6.14, paragraph 52.

Table 6: Credit ratings, private hospital operators

	Credit rating				
Company	*Standard & Poor's*	*Fitch Ratings*	*Moody's*	*Others**	*Credit rating agency*
Netcare	-	-	-	A/A1	
Ramsay	-	-	-	-	
HCA	-	B+	Ba2	BB–	Egan-Jones Ratings
Lifepoint Hospitals	BB–	BB	Ba2	-	
Tenet Healthcare	B	BB	Ba2	B–	Egan-Jones Ratings
Rhoen Klinikum	-	-	WR	-	
Health Management Associates	-	WD	WR	B	Egan-Jones Ratings
Universal Health Services	BB+	BBB–	Ba1	BBB+	Egan-Jones Ratings
Community Health Systems	B+	B+	WR	B	Egan-Jones Ratings
Apollo Hospitals	-	AA+	-	AA	CRISIL
Fortis Healthcare	-	-	-	A+	ICRA and CARE

Source: Bloomberg data.
* CRISIL is a subsidiary of Standard & Poor's.
Note: Ramsay did not have a formal credit rating. WR or WD = Withdrawn.

58. The information that we have collected on the credit ratings of private hospital operators in overseas markets is mixed. While the US operators tend to have a BB or lower rating, the South African and Indian groups tend to have a higher credit rating. We note that this analysis shows little change in credit ratings from our previous analysis, therefore, we have no reason to expect the cost of debt to have moved significantly, for this reason.

59. This analysis indicates that the cost of debt for a stand-alone UK private hospital operator is likely to have declined in the period from 2012 to 2015 by around 1%. Therefore, in our updated analysis, we have used a cost of debt of between 5.0 and 6.5% for the period as a whole, ie 0.5% lower than the original range. This reflects lower financing costs in recent years.

Interpretation of the cost of capital

60. Our estimate of the WACC provides a benchmark against which to assess the profitability of the industry. HCA raised issues of interpretation of the WACC during the original inquiry. In particular, HCA put forward the view that a single industry WACC would not reflect the cost of capital for its businesses due to its different mix of customers. HCA also put forward the view that the CMA should have reference to the Fama-French model when interpreting its analysis on the cost of. The Fama-French model includes both a size and a value factor in its formula for estimating the cost of equity.

61. In relation to the first of these points, in the 2014 Final Report, we concluded that the systematic risk profile, as measured by the beta value, of one private hospital operator in the UK did not differ materially from that of another private hospital operator. This did not mean that there would not be some variation in risks across local markets and customer types but that all private hospital

businesses were exposed to systematic risks to broadly the same extent.[31] In the 2014 Final Report, we noted that Fama-French models fail to describe reliably the cross-section of returns in the UK.[32] In the first instance, we noted that the private hospital operators active in the UK were not particularly 'small'. Second, it was not clear that these businesses would necessarily share any (unknown) general characteristics of small firms that would increase their cost of capital due to higher risk. In line with previous CMA decisions, therefore, we did not apply a small company premium in our estimate of the cost of capital.[33]

62. During the remittal, we have not received any evidence or argumentation from parties in relation to these issues to give us reasons to revisit the conclusions reached in the 2014 Final Report.

[31] 2014 Final Report, Appendix 6.14, paragraph 60.
[32] See Gregory, Tharyan & Christidis (2011), *Constructing and Testing Alternative versions of the Fama-French and Carhart Models in the* UK, University of Exeter, and Michou, Mouselli & Stark (2008), *On the Information Content of the Fama and French Factors in the UK*.
[33] HCA also estimated a cost of capital using the Fama-French model and US data and comparable companies. Given the sensitivity of the size and value factors to the market for which they are estimated and the use of a small set of companies in a different market, we do not consider that the estimates produced provide reliable information for our cost of capital calculation. See the Bristol Water decision.

Annex A: Beta estimates

1. The table below sets out the beta values of a number of listed private hospital operators.

Beta estimates for listed private hospital operators

	Levered betas					*Unlevered betas*		
Company	*Weekly*	*Monthly*	*Quarterly*	*Debt/equity ratio*	*Statutory tax rate (%)*	*Weekly*	*Monthly*	*Quarterly*
Netcare	0.66	0.66	0.42	1.60	26	0.31	0.31	0.20
Ramsay	0.46	0.38	0.27	0.74	30	0.30	0.25	0.18
HCA	1.00	1.10	1.51	13.01	40	0.11	0.12	0.17
Lifepoint Hospitals	0.96	1.06	0.93	0.89	40	0.62	0.69	0.60
Tenet Healthcare	1.38	2.01	2.76	3.09	40	0.48	0.70	0.97
Rhoen Klinikum	0.44	0.33	0.29	0.32	30	0.36	0.27	0.24
Health Management Associates	0.96	1.05	0.87	1.04	40	0.59	0.65	0.54
Universal Health Services	0.97	1.23	1.12	0.77	40	0.66	0.84	0.76
Community Health Systems	1.38	1.38	1.62	3.41	40	0.45	0.45	0.53
Apollo Hospitals	0.44	0.29	0.46	0.24	34	0.38	0.25	0.40
Fortis Healthcare	0.63	0.78	0.62	0.50	34	0.48	0.59	0.46

Source: Bloomberg data.