A Survey of Cost of Capital and Returns in the Commercial House Building Sector

Draft Report for Discussion

Shah Scott & Partners
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A) Introduction

Shah Scott and Partners ("SS&P", "we") has undertaken a survey of the cost of capital and the returns on capital of companies quoted on the London Stock Exchange whose main business is building houses for sale. This report sets out SS&P's preliminary findings.

The draft report is presented for discussion purposes only and is for the consideration only of the people to whom it is addressed. It contains no recommendations regarding how the addressees might use the information presented when making business or investment decisions.

The information in the report should be read only in conjunction with the detailed notes on methodology, assumptions and sources set out in the appendices and in the context of the economic conditions prevailing in the period under review.

A variety of data sources have been used in compiling this report, as listed in Appendix One. In order to calculate certain figures presented we have had to make assumptions and approximations where data is inadequate or inconsistent. We highlight where this is the case in the text or in appendix one. We have used our best efforts to apply stated methodologies to the data available to us and using the assumptions and approximations made by us, but we give no assurances as to the accuracy or completeness of such data or of the outputs from our calculations.

There are fifteen companies quoted on the London Stock Exchange engaged primarily in house building. We have surveyed twelve of these companies (the "sample companies"). For each sample company, we calculated cost of capital and return on capital for each of the financial years from 1999 to 2003. The twelve companies we studied were:

- Barratt Developments
- Bellway
- Ben Bailey
- Berkeley Group
- Countryside Properties
- Crest Nicholson
- McCarthy & Stone
- Persimmon
- Redrow
- Westbury
- Wilson Bowden
- Wimpey (George)

There was insufficient data available to analyse the remaining companies. The companies not included were:

- Bovis Group
- Fairbriar
- Country & Metropolitan

One further company referred to in the proposal was excluded because it had been taken over. This company was Swan Hill. It was taken over by Raven Mount plc, a shell company listed on the alternative investment market (AIM).

B) Cost of capital

1. Description of what cost of capital measures

The cost of capital of a company represents the return investors expect it to generate given the risks it faces in its business.

SS&P have estimated two versions of the cost of capital faced by sample companies:

a) Weighted average cost of capital ("WACC") – diversified
b) WACC - undiversified

a) WACC - diversified

WACC is a measure of the return a company must generate to satisfy the expectations of all classes of investors. It comprises the after tax cost of debt and the cost of equity, weighted by their contribution to the overall capital invested in the company.

We have derived the costs of debt and equity, and the proportions they represent in total invested capital, from publicly available information on market values. Because of the lack of availability of information on cost of debt, we have used an approximate value for the cost of debt in our calculations. We include a detailed explanation of how we arrived at this value in Appendix One.

There is an implicit assumption in the calculation of WACC that equity investors hold diversified portfolios of investments. Diversification reduces the overall risk to an investor, because it reduces the impact of risks that affect individual companies held in the portfolio on the overall returns generated by the portfolio. With sufficient diversification, only those risks that affect the returns of every company held in the portfolio have a significant impact on the returns of the portfolio. Investors therefore consider an investment held as part of a portfolio to be less risky than if held on its own, and hence demand a lower cost of capital.

b) WACC - undiversified

The equity capital invested by a housing association in a commercial activity may not form part of a significantly diversified investment portfolio. In this case, the housing association will face all the risks affecting the returns generated by the activity ("the total risk"), not just those left after diversification. We have therefore adjusted the WACC of sample companies, using established corporate finance principles, to reflect the higher risk faced by an investor who does not hold a diversified portfolio. Further details on how this adjustment has been made are in Appendix One.

2. Estimates of cost of capital

a) WACC - Diversified

The WACC - diversified of sample companies ranged from 5.8% to 12.9% over the five years under review. Generally, sample companies kept their levels of debt well below 40% of total capital (at market values). Hence, the cost of equity had the biggest influence on cost of capital.

Table one: WACC - diversified (figures in percent)

	1999	2000	2001	2002	2003
Barratt Developments	12.5	12.9	11.4	11.5	10.1
Bellway	10.8	10.6	10.1	9.1	8.6
Ben Bailey	6.1	6.2	5.8	6.0	7.4
Berkeley	10.1	10.5	9.0	9.4	8.6
Countryside Properties	9.1	8.9	8.1	7.7	7.2
Crest Nicholson	8.2	7.8	7.2	7.2	7.9
McCarthy & Stone	10.5	10.4	9.8	10.1	9.6
Persimmon	9.7	9.2	8.4	8.8	8.6
Redrow	11.3	11.2	9.0	9.4	7.7
Westbury	9.3	9.6	8.7	8.8	6.6
Wilson Bowden	10.8	10.0	9.1	8.8	9.0
Wimpey	8.8	7.8	7.5	7.2	7.2

b) Undiversified WACC

The undiversified WACC for sample companies varied from 9.2% to 21.7% over the period under review.

Table two: WACC - undiversified (figures in percent)

	1999	2000	2001	2002	2003
Barratt Developments	19.5	21.7	20.9	19.9	17.4
Bellway	17.2	17.5	16.9	15.0	13.8
Ben Bailey	10.2	9.9	10.3	13.8	13.4
Berkeley	17.4	18.2	15.9	16.0	13.8
Countryside Properties	16.6	14.9	12.5	11.2	10.8
Crest Nicholson	14.1	12.5	11.3	11.5	12.4
McCarthy & Stone	17.3	17.2	15.2	14.4	13.3
Persimmon	16.7	15.3	13.5	13.9	13.6
Redrow	18.3	18.4	14.0	14.2	12.2
Westbury	14.2	13.4	12.7	12.3	9.2
Wilson Bowden	13.9	15.3	14.3	13.3	12.9
Wimpey	15.2	13.6	13.0	12.5	12.5

3. Analysis of variations in cost of capital

a) Description of the analysis

Many factors could make one company more risky than another, and hence cause it to have a higher cost of capital. We analysed whether we could detect any relationships between the following indicators and the risk of sample companies:

- Number of units completed during year
- Growth in number of units completed during year
- Size of land bank with planning, relative to sales
- Stock of land and work in progress relative to sales
- Average selling price
- Growth in average selling price
- Use of trade credit
- Regional vs. national focus

For the purposes of this analysis, we defined risk in terms of share price volatility. Share price volatility is a key driver of the cost of capital, as can be seen in Appendices One and Two. Two factors drive share price volatility:

- The risk of the underlying business of the company that issued the share. For example, you would expect that a well established company with mature markets that delivers predictable results would have a less volatile share price than a bio technology start-up
- The level of gearing.

We adjusted WACC to remove the volatility caused by gearing. We set out in Appendix Four how we did this.

This allowed us to focus our analysis on seeking to identify if the indicators listed above contributed to share price volatility. For example, we analysed whether more geographically diversified companies had less volatile share prices – and hence could be considered less risky – than companies that focussed on a particular region.

We based our analysis on WACC-undiversified. This is because we wished to examine all the risks facing sample companies, not just those that remained after diversification.

b) Results of analysis

We were not able to establish any clear associations between share price volatility and the factors listed above.

C. Return on Invested Capital (ROIC)

1. Description of what return on capital measures

ROIC is a measure of the operating performance of companies. It removes the effect of gearing on returns and therefore allows you to compare the performance of companies that may have different proportions of debt and equity in their overall capital structure. The steps to calculating ROIC are set out in Appendix One.

2. Estimates of return on capital

Over the five years analysed, sample companies generated average returns on invested capital ranging from 11.8% to 19.9%. Sample companies' ROIC has generally been higher in more recent years than earlier in the period.

Table three: ROIC (figures in percent)

	1999	2000	2001	2002	2003	Average
Barratt Developments	15.8	17.0	18.8	19.7	21.5	18.5
Bellway	11.9	17.3	15.7	15.8	17.7	15.7
Ben Bailey	-4.9	13.8	13.5	31.0	24.4	15.5
Berkeley	11.5	11.4	10.2	11.6	14.1	11.8
Countryside Properties	12.8	15.0	12.0	12.8	12.0	12.9
Crest Nicholson	10.5	12.8	9.4	13.4	15.0	12.2
McCarthy & Stone	14.1	20.4	17.9	20.7	26.3	19.9
Persimmon	11.4	13.7	13.3	20.3	22.1	16.2
Redrow	18.5	17.3	16.5	19.9	19.8	18.4
Westbury	12.7	12.6	13.8	13.4	13.1	13.1
Wilson Bowden	14.5	15.6	15.0	17.3	17.3	15.9
Wimpey	11.0	14.5	11.3	16.9	16.5	14.0

3. Analysis of variations in ROIC

a) Description of analysis

We analysed the figures we calculated for ROIC to explain significant variations. We did this by breaking down ROIC into its constituent parts to enable us to examine how different business factors appear to have affected financial performance. Please note that our analysis has been limited by the availability of consistent data disclosed by sample companies.

ROIC can be broken down into operating margin (EBIT/sales) and asset turnover (Sales/invested capital). Appendix Three shows how you can break these components down further in order to conduct a detailed analysis.

b) Results of analysis

Companies can achieve a high ROIC either through maintaining a high operating margin, or through high asset turnover. Sample companies appear to have used both approaches, as table four illustrates.

Table four: ROIC, Margin and Capital Efficiency (figures in percent)

	ROIC (%)	EBIT/Sales (%)	Sales/invested capital
McCarthy & Stone	19	**36**	0.77
Barratt Developments	18	13	**2.03**
Redrow	18.4	18	1.43
Persimmon	16.2	16	1.34
Wilson Bowden	15.9	19	1.17
Bellway	15.7	16	1.40
Ben Bailey	15.5	11	2.00
Wimpey	14.0	11	1.67
Westbury	13.1	14	1.31
Countryside Properties	12.9	10	1.72
Crest Nicholson	12.2	12	1.46
Berkeley	11.8	18	0.93

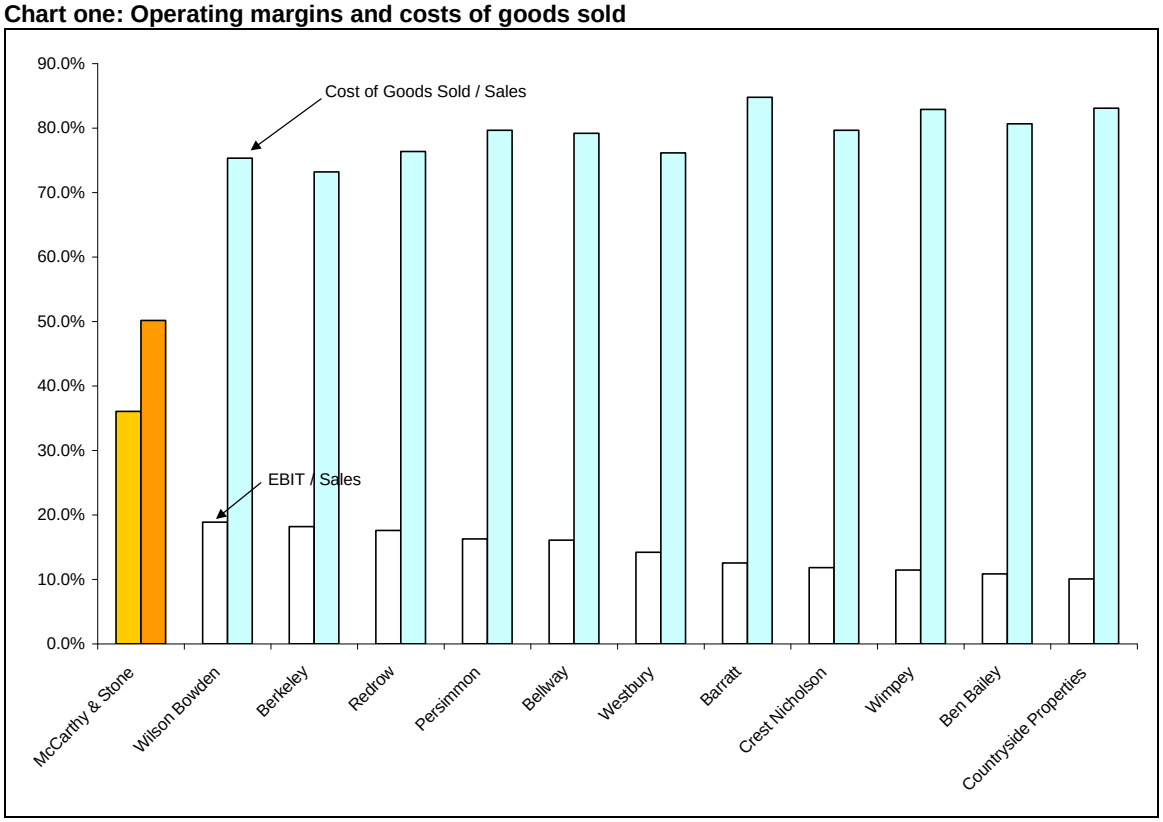
The results of the top two companies –McCarthy & Stone and Barratt - illustrate neatly the way high margins and effective management of capital appear to offer alternative routes to high returns for sample companies. We therefore use McCarthy & Stone and Barratt in parts i and ii of this section to set the context for our analysis of variations in the performance of sample companies. In addition, in part iii, we look at how more general business factors have affected ROIC.

i. What you can learn about operating margins from McCarthy & Stone

McCarthy & Stone is a specialist builder of retirement apartments. This product specialisation appears to have allowed McCarthy & Stone to achieve operating margins almost double those of the next best company in the sample.

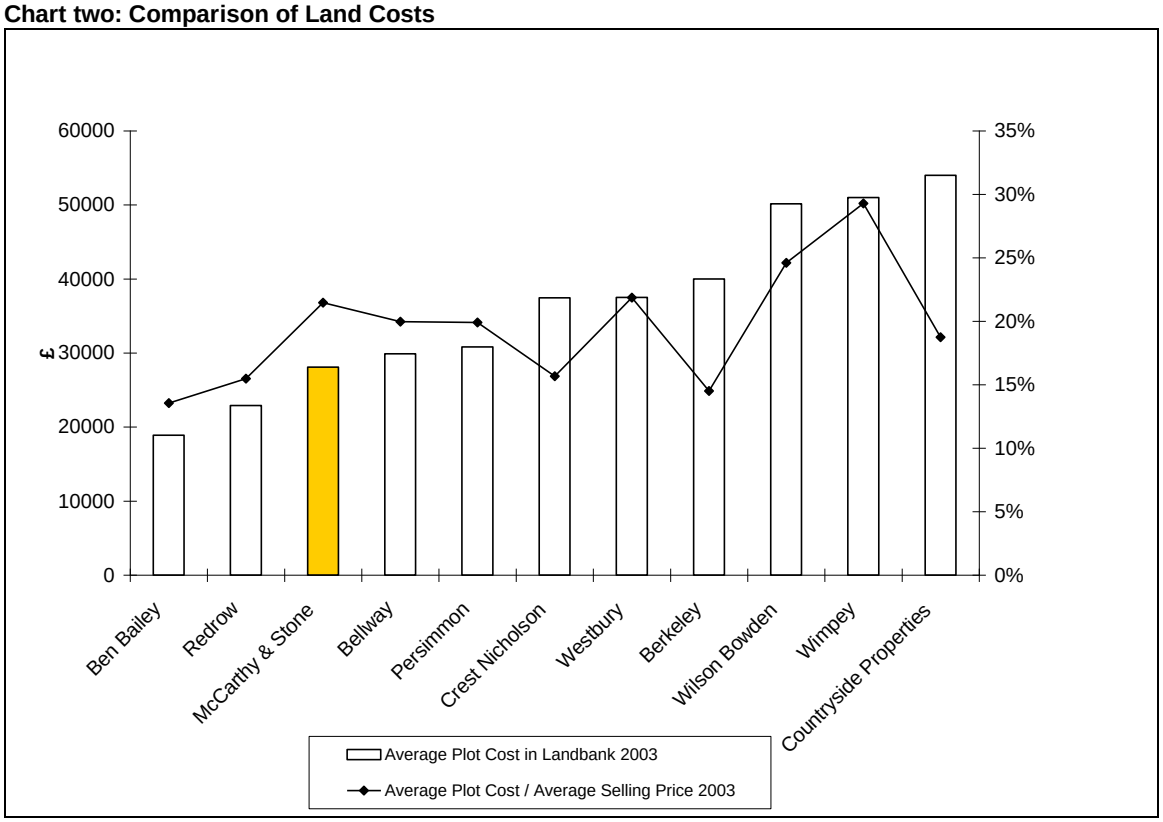
Cost of goods sold is the key driver of operating margin for sample companies. By comparison, administrative expenses are small. Chart one shows how McCarthy and Stone has achieved its high operating margins because of very low costs of goods sold.

Chart one: Operating margins and costs of goods sold



The main components of costs of goods sold are land costs and development costs. There is insufficient data to conduct detailed analysis of these underlying costs. However, we compared the average cost of a plot of land held in the land bank in 2003 to the average sales price of completed houses for the year (for companies where both these figures are disclosed. Please note that this data is compiled from various sources and should be treated as indicative only). Chart two displays the results of this comparison. While McCarthy & Stone's average plot cost is low in absolute terms, it is quite high compared to the average sale price of its properties. This suggests that it does not acquire land on particularly favourable terms compared to other companies in the sample. McCarthy & Stone's success may therefore lie in its ability to keep build costs low compared to its sale price because of its strong position in a niche market.

Chart two: Comparison of Land Costs



ii. What we can learn about capital management from Barratt

Barratt is a large, volume house builder with a national profile. In fact, over the period under review, it has overtaken Wimpey to become the largest sample company in terms of UK residential completions.

While Barratt's operating margins are unspectacular compared to other sample companies, it appears to compensate for this by efficient use of its invested capital.

Invested capital is another term for operating assets. We therefore analysed figures relating to Barratt's operating assets. From this analysis, we found that Barratt appears to be strong in four areas:

- Management of stocks
- Management of debtors
- Use of property, plant and equipment
- Use of non-interest bearing creditors

MANAGEMENT OF STOCKS

Management of stocks appears to be critical to success in this industry. The level of stocks depends on the efficiency with which the main business processes associated with house building are carried out. These include land acquisition; management of the planning process; management of construction and sales of finished properties.

For most sample companies, land and work in progress are the most significant components of stocks as is illustrated in Chart Three. Indeed, many sample companies do not distinguish between these categories of stock in their financial statements. Because of this, we have also grouped them together.

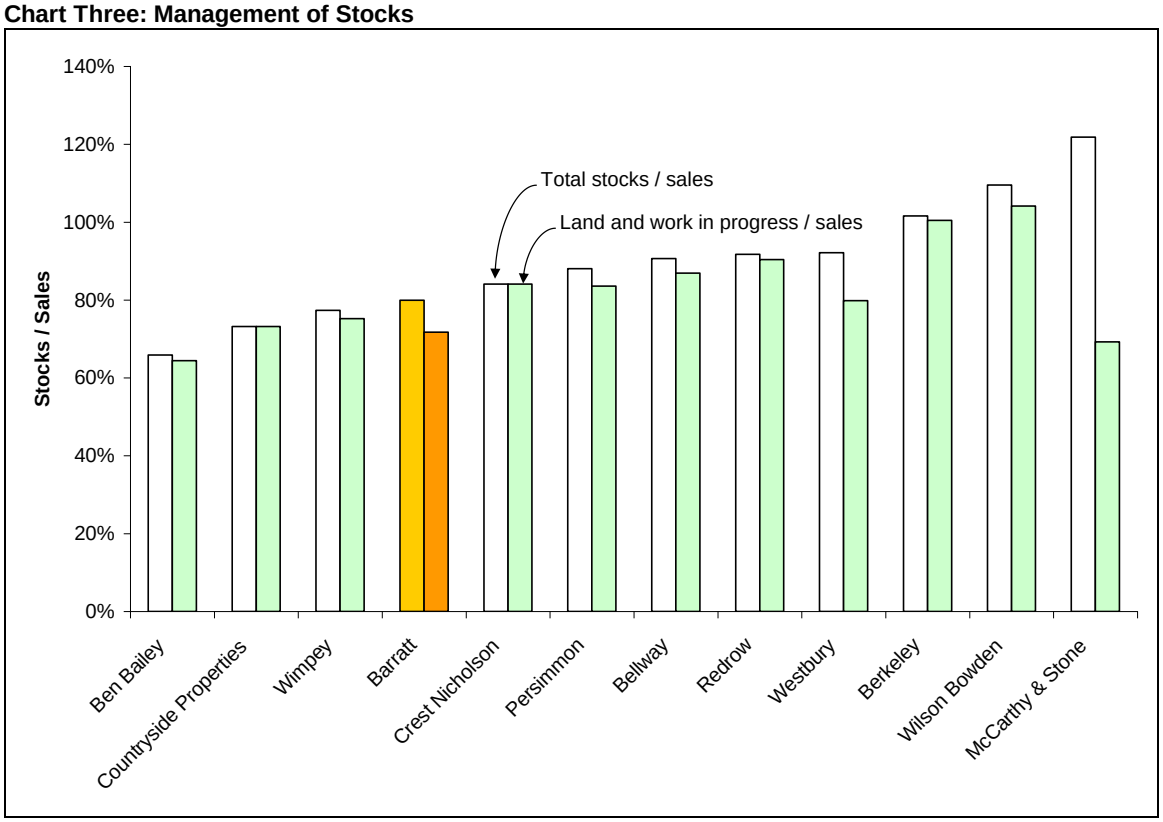
Barratt is relatively efficient in its management of its stocks. Chart Three shows that Barratt's overall efficiency appears to stem from its ability to maintain a relatively small stock of land and work in progress compared to other sample companies. One element of this appears to be Barratt's small stock of land with planning.

In general, increasing uncertainty over planning approvals has led sample companies to build up their stocks of land over the period under review. According to Wilson Bowden, it now takes 15 to18 months to acquire planning permission on a new site. Sample companies appear to be sacrificing returns now, by tying up capital, in the hope of ensuring a supply of land for the future.

While Barratt has been increasing the size of its overall land bank, at least in absolute terms, it appears to maintain a lower stock of land with planning than some other companies for which data is available. For example, in 2003 it had plots with planning representing 1.6 times 2003 sales, as part of an overall land bank representing 3.1 times sales. This compares to, say, Countryside Properties, which had a stock of plots with planning representing 5.6 times 2003 sales.

Unusually among sample companies, McCarthy & Stone has a large stock of completed properties awaiting sale. According to the annual report, there is typically a two-year sales cycle on McCarthy & Stone's properties, which appears significantly to reduce the overall efficiency of its stock management, and make McCarthy & Stone heavily dependent on its margin performance to deliver high returns.

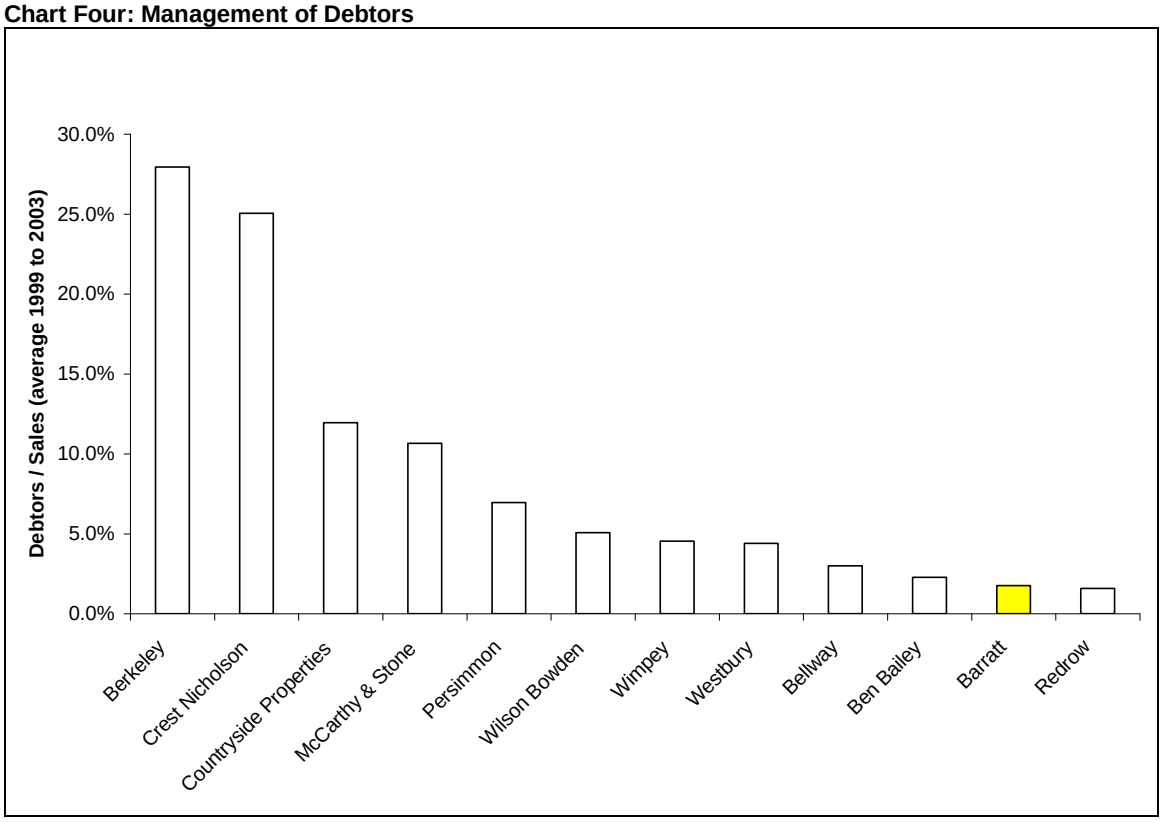
Chart Three: Management of Stocks



MANAGEMENT OF DEBTORS

As Chart Four shows, Barratt's management of debtors is second only to Redrow in the sector. Debtors are important to some sample companies because these companies book the full value of a property sale based on the customers' payment of a deposit. They then maintain a large debtor asset until the ownership of the property is transferred to the customer. Berkeley Group is one such company, as Chart Four demonstrates. The effect is to boost turnover at the expense of the company's return on capital. The fact that Barratt does not do this suggests that it may be efficient at marketing its properties and gathering the associated revenue as part of an efficient overall process for turning land into properties.

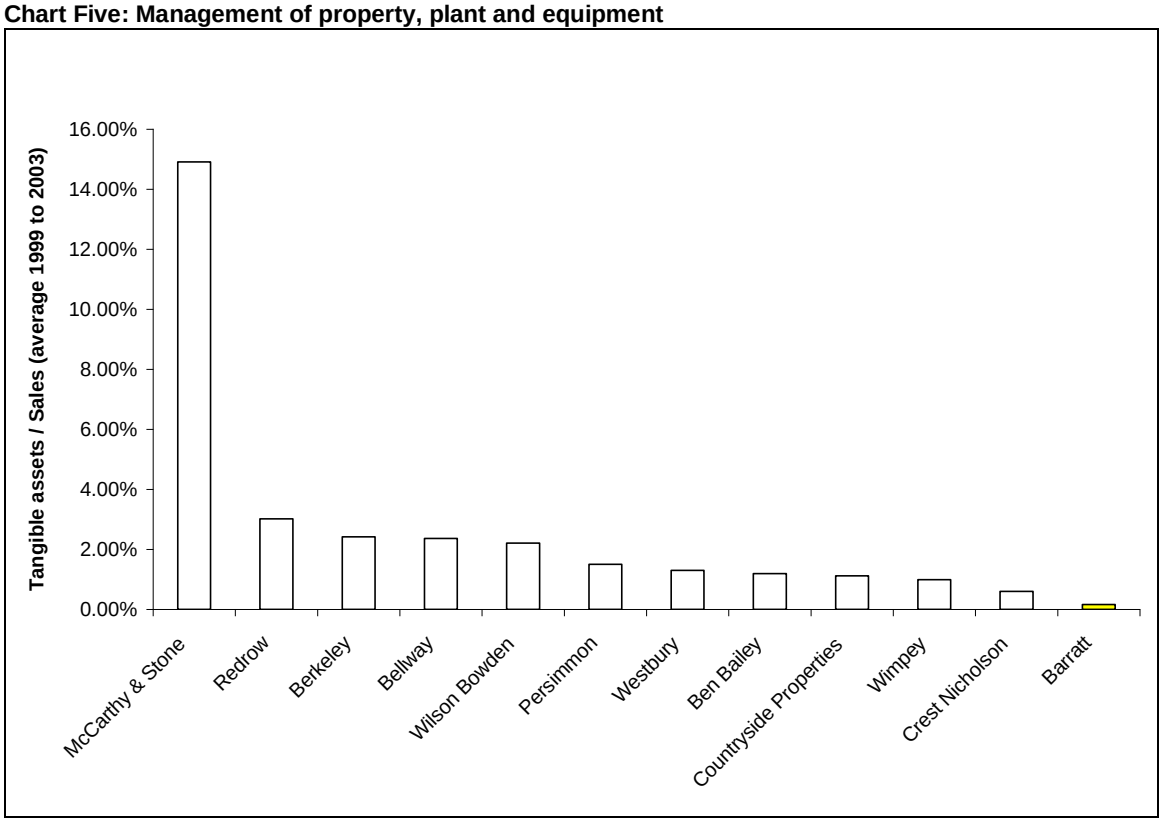
Chart Four: Management of Debtors



MANAGEMENT OF PROPERTY, PLANT AND EQUIPMENT

Investment in property, plant and equipment (or tangible assets) is not significant for most sample companies. Having said this, Barratt has operated with much lower levels of these assets relative to sales than other sample companies over the period as Chart Five shows.

Chart Five: Management of property, plant and equipment



USE OF NON-INTEREST BEARING CREDIT

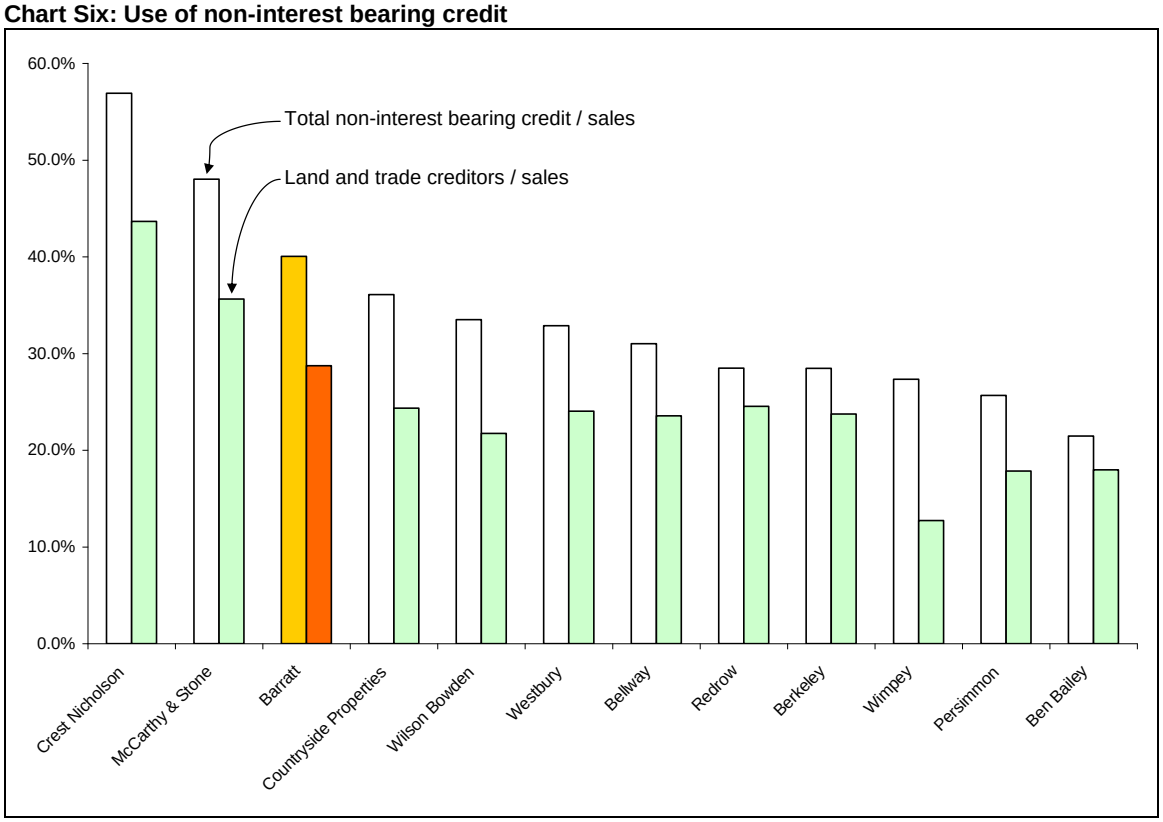
Most sample companies made significant use of non-interest bearing credit to support their businesses. On average, over the period under review, sample companies funded between 16% and 50% of the value of their stocks with such credit.

An important category of non-interest bearing credit is land credit. General trade credit was also used extensively. Between 55% and 80% of non-interest bearing creditors fell into these two categories.

Buying land and other development materials on credit obviously frees up capital and hence can affect returns.

Barratt is one of the heaviest users of non-interest bearing credit in the sector as Chart Six illustrates.

Chart Six: Use of non-interest bearing credit



iii. Analysis of business factors affecting ROIC

In addition to breaking down ROIC for individual companies, we also analysed whether we could detect any relationship between particular aspects of the business of sample companies and ROIC.

We looked at the following factors:

i) Economies of scale
ii) Average sales price
iii) Regional vs. national focus
iv) Revenue from businesses other than UK house building.

Our analysis leads us to the following conclusions:

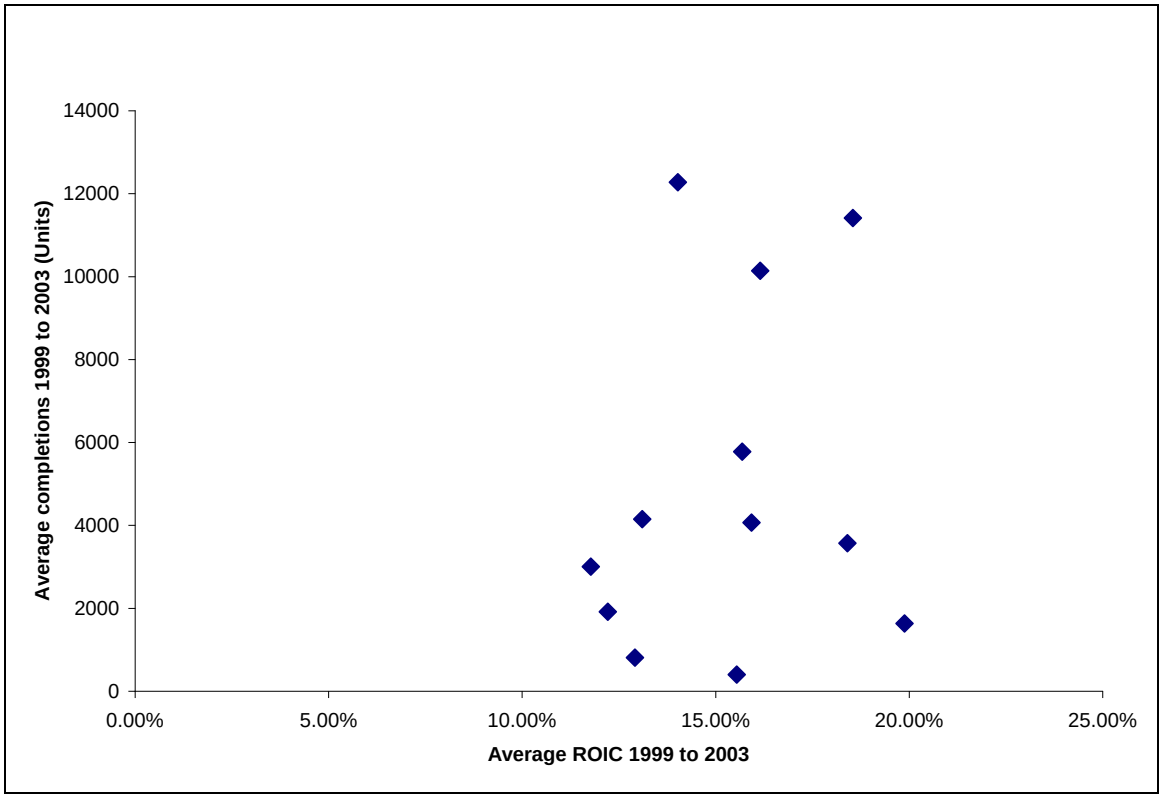
- There is no strong evidence of economies of scale among sample companies
- Sample companies specialising in properties with a lower sales price appear to make better returns than those specialising in more expensive houses
- Companies with a national profile appear to make better returns than those with a regional profile
- Participation in businesses other than UK house building appears to reduce returns.

ECONOMIES OF SCALE

We tested economies of scale by comparing ROIC of sample companies to their output, expressed in terms of number of housing units sold during the year. If economies of scale exist, we would expect that companies selling a higher number of units should deliver a higher ROIC than those selling a lower number.

As Chart Seven shows, there is no clear relationship between output and ROIC, suggesting that economies of scale are not significant in explaining performance in this industry.

Chart Seven: Economies of Scale and ROIC



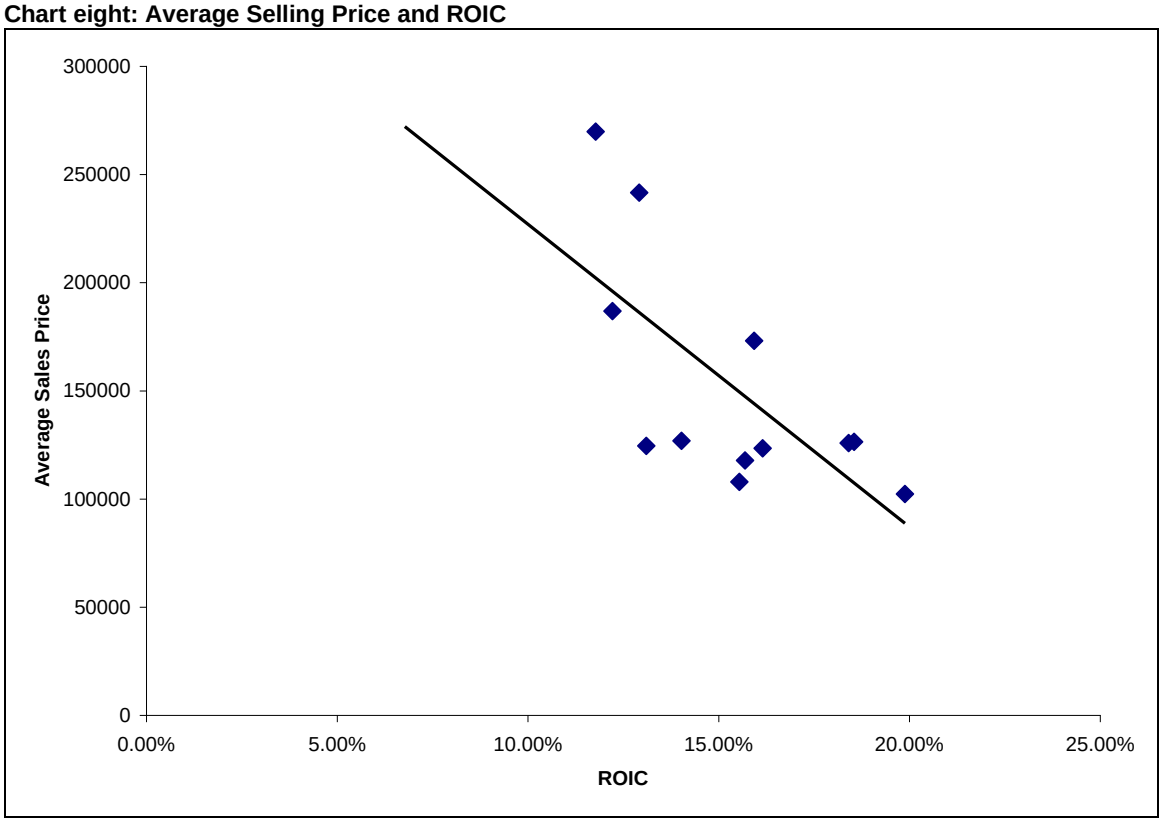
AVERAGE SELLING PRICE

Chart Eight shows an apparent relationship between ROIC and average selling price: companies that sell cheaper houses appear to be more profitable than those selling expensive houses. In particular, the three companies with the highest ROIC are among those with the lowest average selling price, while the three that sell the most expensive houses have the lowest ROIC.

There are clearly many factors that might influence average selling price, including location and product type. However, the national focus of most sample companies may mean that variances caused by location are cancelled out in the average price. It might

therefore be reasonable to use average selling price as a proxy for product type. More work is advisable to validate this assumption.

Chart eight: Average Selling Price and ROIC



iii) Regional versus National Focus

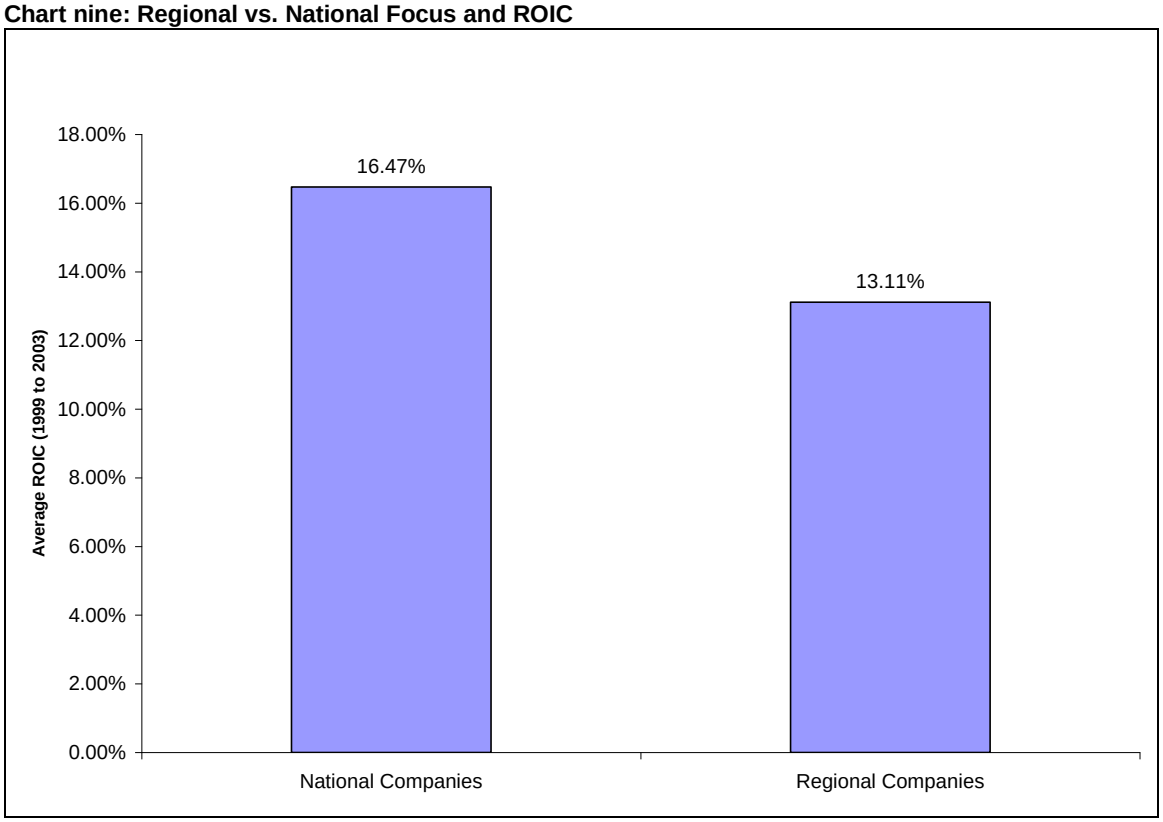
Sample companies with a national focus appear to generate higher returns, on average, than sample companies with a regional focus. As Chart Nine shows, the average return for regional companies over the period was 13.1%, compared to 16.5% for national companies.

We classified sample companies according to whether their business was concentrated in a particular region, or was evenly spread throughout the country. The companies we classified as regional were:

- Ben Bailey (Yorkshire)
- Berkeley Group (Mainly London and South)
- Countryside properties (SE and NW)
- Crest Nicholson (South)

The remaining companies operated across most of the country.

Chart nine: Regional vs. National Focus and ROIC



iv) Revenue from Businesses Other Than UK house building

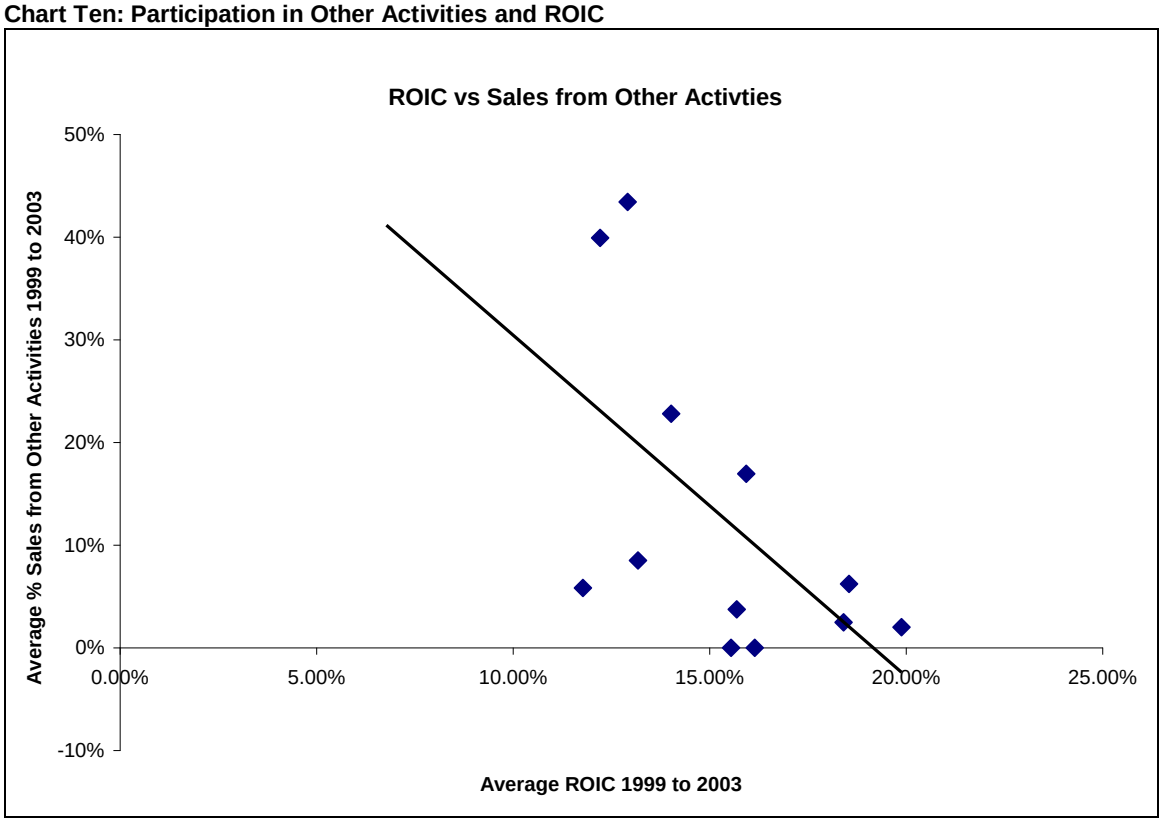
Chart Ten suggests that sample companies that specialised more in UK house building tended to deliver better returns than those that maintained interests in other activities.

Typically, other activities fall into three categories:

- House building in the United States of America
- Commercial property development in the UK
- Land sales

We have not been able to analyse whether the impact on performance caused by these activities is due to lower operating margins, or less efficient use of capital.

Chart Ten: Participation in Other Activities and ROIC



Shah Scott & Partners 11 June 2004

Appendix One: Detailed notes on methodology, assumptions and sources

This appendix sets out detailed explanations of the methodologies used to derive the figures presented in the report. It also identifies the sources of the methodologies used, the sources of data used and any assumptions and approximations made in the course of the analysis. We do not warrant that data or methodologies supplied by third parties are accurate. Where Shah Scott & Partners have made assumptions and approximations we highlight them below. Any person reading this paper needs to satisfy themselves that these assumptions are reasonable, that chosen methodologies are appropriate for the situation in which they find themselves and that such methodologies have been reasonably and consistently applied.

1. Return on Invested Capital ("ROIC").

a) Introduction

ROIC is calculated by taking the operating earnings of a company before interest, deducting tax (adjusted to remove the impact of any interest payments made), and dividing the result by the capital required to operate the business. It therefore represents the operating returns on capital, irrespective of whether the capital was obtained in the form of equity or debt. The methodology is described in more detail in part C below, along with assumptions made in calculating WACC.

$$\text{ROIC} = \frac{\text{Net Operating Profit Less Adjusted Taxes}}{\text{Operating invested capital}}$$

b) Data

We have derived ROIC using financial data available in the annual reports of sample companies.

We sourced the following financial data, derived from published annual reports, from Hemscott.net, a commercial vendor of financial data:

- Operating profit, adjusted for exceptional items
- Tax on income statement
- Fixed investments
- Cash and Securities
- Debtors
- Stocks
- Total liabilities
- Equity
- Minority interests

We have input all other data directly from annual reports.

c) Methodology and assumptions

Shah Scott & Partners followed the methodology set out in chapter 6 of "Valuation: Measuring and Managing the Value of Companies" by Tom Copeland et al (see appendix 6)

In calculating ROIC, we have excluded any income from joint ventures and unconsolidated subsidiaries.

i) Net Operating Profit Less Adjusted Taxes ("NOPLAT")

NOPLAT starts with the company's operating profit, excluding exceptional items. Added to this is any goodwill amortisation charged during the year. Also added is a notional interest component of operating lease payments. An explanation of the treatment of operating leases in this methodology is provided in part iii) below.

To get from this calculation of operating profit to NOPLAT, it is necessary to deduct adjusted taxes. Adjusted taxes are calculated as follows:

- Start with the tax charge stated on the profit and loss account.
- Add back the tax reduction caused by interest payments. This is calculated as the interest expense on the P&L multiplied by the company's corporate tax rate (which is disclosed in the notes).
- Add back the notional tax reduction associated with the interest component of operating lease payments, calculated as the notional interest charge multiplied by the corporate tax rate
- Deduct the tax payable on any exceptional items
- Convert the taxes to a cash basis by deducting any increase in deferred tax liabilities on the balance sheet.

The result is an estimate of the after tax profits the company would have made if it had had no debt.

ii) Operating Invested Capital

Operating invested capital represents the assets required by the company to run its business. It therefore excludes any assets considered non-operating in nature. Operating invested capital comprises:

- Operating working capital. This includes cash, debtors and stocks less non-operating cash and securities and non-interest bearing current liabilities. For the purposes of this analysis, Shah Scott & Partners have assumed that cash at the bank is an operating asset, whereas securities held, whether short or long term, are non-operating.
- Property, plant and equipment
- Other operating assets, net of other non-interest bearing liabilities. This category is a catch-all for any other relevant assets or liabilities. On the asset side, we have included calculations of the principal value of operating leases.

To check the accuracy of the above data, Shah Scott & Partners have converted the value calculated for operating invested capital to total assets less non-interest bearing liabilities. We have then reconciled that figure to equity and interest bearing liabilities. We have calculated total assets by adding back all excluded assets to operating working capital. These assets include securities, goodwill and fixed investments. We have checked this figure against the total of interest bearing debt (including the principal value of leases) and equity (including deferred tax liabilities and minority interests).

iii) Operating Leases

The calculations outlined above include estimates of the principal value of leases and the notional interest payments associated with them. This treatment derives from the fact that operating leases represent firm commitments for a company, and are therefore similar to debt. Shah Scott & Partners have estimated the principal value of operating leases as the net present value of:

- Payments on leases expiring in one year, plus
- Payments on leases expiring in two to five years, assumed to occur from years one to five
- Payments on leases expiring after five years, assumed to occur from years one to five and then as an annuity lasting for a further five years.

We have calculated the NPV using opportunity cost of debt as the discount rate (see part 2 below).

To estimate the interest component of operating lease payments, we multiplied the principal value of the lease, estimated as described above, by the cost of debt.

This methodology follows Copeland et al.

2. WACC - Diversified

a) Introduction

WACC - Diversified represents the after tax return a company has to make to satisfy all its investors, whether they have supplied debt or equity. It can therefore be compared to ROIC to assess whether a company has made the returns that its investors required.

WACC is estimated as the weighted average of the cost of equity, debt and preference shares (where present). It represents the opportunity cost to each class of investor of foregoing other investments of equivalent risk. This means that diversified WACC needs to be made up of the costs of capital prevailing in the capital markets on the dates for which it is being estimated. For example, if a company has issued £100m fixed rate debt on January 2 2003 that pays a coupon of 10%, but interest rates on bonds of similar credit quality and maturity have fallen to 5% on January 2 2004, the WACC calculated for January 2004 should include a cost of debt of 5% and a value of debt that is significantly higher.

b) Data

Shah Scott & Partners have derived estimates of cost of debt and cost of preference shares using information disclosed in annual reports, where available. Where a sample company has not disclosed information, we used an average cost calculated from companies that have disclosed such information.

Shah Scott & Partners have estimated the cost of equity using betas supplied by the London Business School and rates on 10-year benchmark gilts from the Debt Management Office.

c) Methodology

i) Overall calculation of diversified WACC

Diversified WACC represents the overall after tax cost of capital. Interest payments are paid before tax, whereas payments to equity holders are paid after tax. To ensure comparison of like with like, the WACC equation reduces the opportunity cost of debt by the tax rate. The equation is:

$$(Ke \times We) + (Kp \times Wp) + (Kd \times Wd \times (1-t))$$

Where
Ke = cost of equity
We = market value weight of equity, calculated by dividing the market value of equity capital by the total market value of capital (debt plus equity plus preference shares)
Kp = cost of preference shares
Wp = market value weight of preference shares, calculated by dividing the market value of preference share capital by the total market value of capital
Kd = Opportunity cost of debt
Wd = market value weight of debt, calculated by dividing the market value of debt by the total market value of capital
t = tax rate

The individual components required for the equation have been estimated as follows:

ii) Opportunity cost of debt

None of the companies in the sample had issued publicly traded bonds so there were no readily available market benchmarks for estimating costs of debt. However, some sample companies disclosed the fair values of financial liabilities if these were different to book values. Fair values were defined as the company's estimate of market value. This allowed Shah Scott & Partners to estimate an implied opportunity cost of debt for a number of sample companies in one of four ways:

- Some companies had issued fixed rate debt that had a fair value different to book value. Where these companies disclosed average maturities for their fixed rate debt, we estimated the opportunity cost of debt as that interest rate at which the present value of future coupon payments plus the present value of the principal repayment, equalled the fair value of the debt. The future coupon payments were assumed to occur annually at the end of the year, and were pro-rated for the final period if this was a fraction of a year (for example, if the maturity was 7.5 years, the final coupon

payment was 50% of a full year's payment). The principal repayment was assumed to be the book value of the debt, and occur in full at average maturity.
- Where companies disclosed book values, fair values and coupons, but not maturities, we estimated the opportunity cost of debt as the coupon multiplied by book value of debt divided by the fair value of debt. This figure is less accurate because it does not take account of debt maturity.
- Some companies had discounted their non-interest bearing liabilities by the cost of debt to give a fair value. These companies also disclosed the average maturities of these liabilities in months. For these companies we calculated the implied opportunity cost of debt as 1+((Book value/fair value) ^ (1/number of months to maturity)-1)^12-1.
- Ben Bailey disclosed the credit spread of their interest costs over base rates. We used this information to estimate Ben Bailey's floating cost of debt.

We used the first of these methods to estimate opportunity cost of debt for the following companies:

- Persimmon
- Westbury
- Wilson Bowden
- Wimpey

We used the second method to estimate opportunity cost of debt for the following companies:

- Bellway

We used the third method to estimated opportunity cost of debt for the following companies:

- Countryside Properties
- Crest Nicholson

Where none of the methods described above were applicable, we used the average cost of debt derived from sample companies where it the above methods had been used.

iii) Cost of preference shares

Shah Scott & Partners estimated the cost of capital on preference shares as:

(Coupon x book value)/fair value

iv) Cost of equity

Shah Scott & Partners have estimated the cost of equity using the capital asset pricing model. This states that the cost of equity =

Risk free rate + Beta x market risk premium.

The capital asset pricing model is a standard corporate finance model, available in many text books including Copeland et al, and Brealey and Myers.

We used the yield on a ten-year benchmark gilt as the risk free rate.

We sourced the Betas from the London Business School, which calculates them and sells them commercially.

The market risk premium is the additional return investors demand for holding equities, rather than gilts, as they are considered a more volatile investment. This is the subject of much academic research. Shah Scott & Partners have examined two sources to obtain a value for the market risk premium:

- Paul Marsh and Elroy Dimson, finance professors at the London Business School. They have published a book called "The Triumph of the Optimists", in which they analyse returns for the UK market during most of the twentieth century. They conclude that during that period, the premium has averaged 4.4% to 4.8%. However, they predict that in the future, the premium will be 3.7%.
- Tim Koller et al of McKinsey. They have produced a paper where they use a dividend discount model to estimate the returns implied in stock valuations. They have applied their model retrospectively to period going back to the 1960's. They estimate that a premium of 3.5% to 4% is appropriate for the UK market.

We have used a premium of 5%. We have used a higher rate than suggested above to build a margin of conservatism into our analysis.

v) Market Value Weights

We estimated the weights required for the WACC equation as follows:

- Debt: fair value of interest bearing debt from the annual report
- Preference shares: fair value from annual report
- Equity: number of shares in issue from annual report times share price on last day of financial year, sourced from Yahoo Finance

3. WACC undiversified

a) Introduction

The cost of equity included in the WACC estimation outlined above assumes that investors hold a diversified portfolio of equities. This means that they are mainly exposed to the risks that affect all companies in the stock market (such as economic cycles). Risks that affect individual companies are minimised. The following illustration, taken from "Analysis for Financial Management" by Robert C. Higgins shows an extreme case of diversification.

Take two simple but risky investments: purchase of an ice cream stand and an umbrella shop. There is a 40% chance it will be sunny tomorrow. If it is sunny, the ice cream stand will make a profit of £600. However, the umbrella shop will lose £300. If it rains, the umbrella stand will make £500, but the ice cream stand will lose £200. Each of these investments is risky in its own right. However, they are not so risky when combined in a portfolio, as table 5 illustrates.

Table 5: The impact of diversification

Investment	Weather	Probability	Outcome	Weighted Outcome
Ice cream stand	Sun	0.40	£600	£240
	Rain	0.60	-£200	-£120
			Expected Outcome	£120
Umbrella shop	Sun	0.40	-£300	-£120
	Rain	0.60	£500	£300
			Expected Outcome	£180
Portfolio: Ice cream stand and umbrella shop	Sun	0.40	£300 (£600-£300)	£120 (£240-£120)
	Rain	0.60	£300 (£500-£200)	£180 (£300 -£120)
			Expected Outcome	£300

In this example, the returns generated by each business are driven by completely opposite factors so that the risk is greatly reduced (i.e. the businesses are inversely correlated). In the real world, the effect is less extreme because there is usually some degree to which the returns generated by two investments held in a portfolio move in tandem. For example, nearly all companies are affected by a change in interest rates. This movement in tandem –known as correlation- means that diversification does not eliminate all risk. However, unless two investments are perfectly correlated (i.e. their returns are affected by events in exactly the same way), the risk of holding them in a portfolio is lower than the risk of holding either individually.

It follows from this that the risk associated with an investment can be broken down into two parts. The first can be removed by diversification, because the returns generated by the investments do not respond to events in exactly the same way as other investments in the portfolio. This is known as diversifiable risk. The second part can not be diversified, because risks that affect the rest of the portfolio also affect the returns generated by that investment. For example, a building company may be exposed to the risk that a major development project is delayed because of an archaeological dig. Other companies do not face this risk, and so it can be reduced by diversification. However, the company is also affected by interest rate rises, along with every other company. Its reaction to these risks is correlated with that of other companies, and so this risk is non diversifiable.

We introduce these ideas at length because they will support an understanding of how Shah Scott & Partners have adjusted diversified WACC to remove the effect of diversification.

b) Methodology

The methodology Shah Scott & Partners used to estimate WACC – undiversified derives from Chapter 12 of "Investment Valuation: Tools and Techniques to Value any Asset" by Aswath Damodaran, Professor of Finance at Stern Business School, NYU.

The adjustment to WACC focuses on the cost of equity, and in particular on the Beta.

As outlined in section 2, c) part iv) above, we used Betas sourced from the London Business School to calculate the cost of equity. These Betas –which we will call standard Betas (or $Beta_s$) -assume that investors hold diversified portfolios. To use the terminology introduced above, the standard beta measures only the non-diversifiable risk of a particular investment.

To calculate the cost of equity (and hence WACC) for an undiversified investor, SS&P have replaced these standard Betas with a Beta that measures both diversifiable and non diversifiable risk (which we will call total Betas, or $Beta_t$).

We have calculated total betas by dividing the standard deviation of the returns of each of the companies we were analyzing, by the standard deviation of the market as a whole. The standard deviation is a statistic that measures the extent to which individual monthly returns generated by a company are distributed away from the mean monthly returns of that company. The closer individual returns are to the mean, the lower the standard deviation, and the less risky the investment. See appendix two for a technical explanation of why this technique is appropriate.

We calculated standard deviations using monthly stock price data sourced from Yahoo Finance. We used the FTSE All Share index to represent the market portfolio.

We calculated monthly stock returns as:

(Closing price $month_n$/closing price $month_{n-1}$)-1,

where n = a given month, and n-1 = the preceding month.

Monthly returns on the index were estimated in the same way. In theory, monthly returns should include dividends as well as share price movements. However, it was agreed that we should exclude dividends from the calculation, as we did not have access to the total returns version of the FTA All Share Index, which includes dividends. We are not able to estimate the extent to which this exclusion has affected the results produced.

We have used 5 years worth of data to estimate standard deviations. Hence, the standard deviation of returns for a company whose financial year-end was December 1999 was based on data starting in January 1995.

Having estimated total Betas, we then estimated a revised cost of equity, using the capital asset pricing model, and applied the result to the WACC equation as outlined above.

Appendix two: A technical note on Betas

In this section, we explore betas in more detail, in order to demonstrate why the methodology used to adjust standard betas, outlined in section 3 of Appendix One above is appropriate for an undiversified investor.

1) Definition of beta.

A beta measures the risk of one investment relative to another. For example, you can calculate a beta for an investment, which we will call j, relative to the portfolio in which it is held (called m):

$Beta_j = Risk_j / Risk_m$.

Risk is usually measured in terms of the standard deviation of an investment's returns. If b signifies standard deviation then:

$Beta_j = b_j / b_m$

2) Standard betas and non-diversifiable risk

As discussed in appendix 1, standard betas assume that investors hold diversified portfolios of securities. They are therefore only concerned with that part of the risk associated with an investment that cannot be diversified away –the non-diversifiable risk.

Therefore, the standard beta of investment j ($Beta_{js}$) can be expressed:

$Beta_{js} = Non\text{-}diversifiable\ Risk_j / b_m$

The non-diversifiable risk of an investment represents a proportion of the total risk of that investment. The proportion of non-diversifiable risk depends on the extent to which the returns of the investment are correlated with the portfolio to which it is being compared (in this case the FTA All Share index). The higher the degree of correlation between an investment and the portfolio, the greater the proportion of total risk represented by non-diversifiable risk. The non-diversifiable risk of investment j can therefore be expressed as:

$Non\text{-}diversifiable\ Risk_j = a_{jm} b_j$

where b_j equals the total risk of the investment, expressed as the standard deviation of the investment's returns, and

a_{jm} represents a scale factor of between 1 and -1 that measures the degree of correlation between the returns of investment j and the returns of the overall market.

Combining this expression with the expression for the standard beta of investment j gives the following definition of a standard Beta:

$Beta_{js} = a_{jm} b_j / b_m$

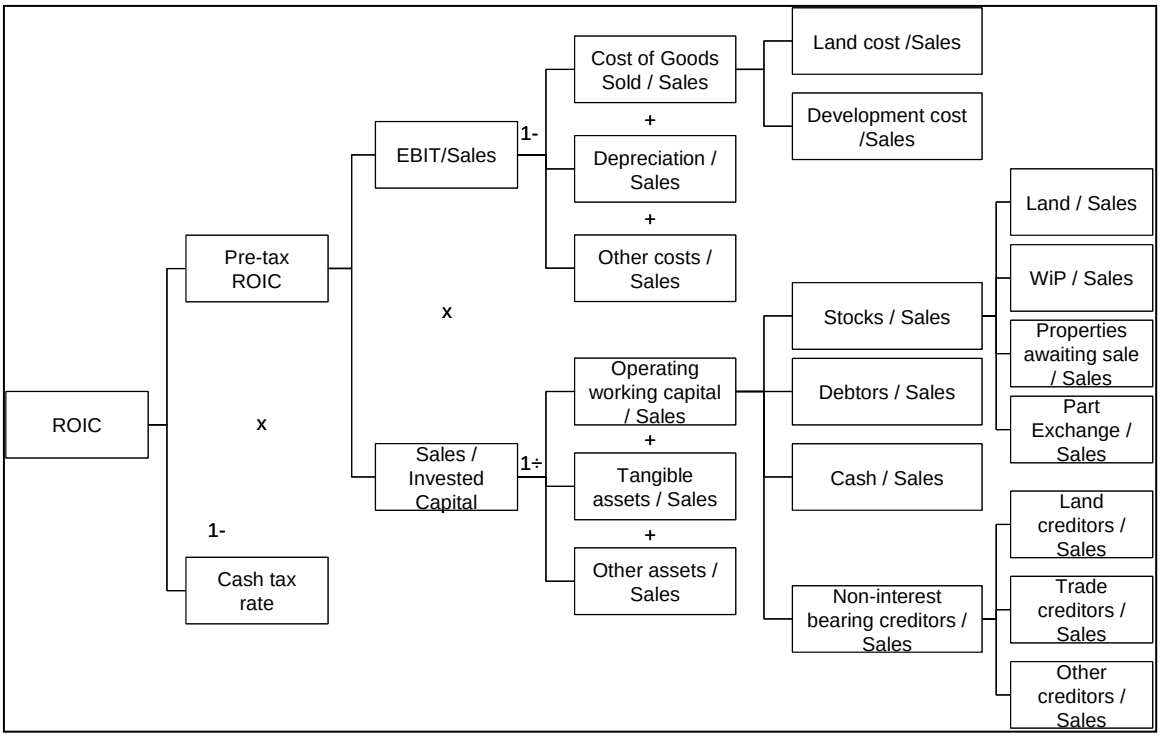
3) Adjusting the standard Beta to create a total Beta

A non-diversified investor needs a Beta that reflects the total risk of the investment: the total Beta ($Beta_{jt}$). It is relatively straightforward to estimate the total Beta by replacing the non-diversifiable risk used to calculate the standard beta, with the total risks of the investment:

$Beta_{jt} = Beta_{js}/a_{jm} = b_j/b_m$

As a reminder, b_j/b_m represents the standard deviation of the returns on investment j divided by the standard deviation of the returns on the market.

Appendix Three: Breaking Down ROIC



Source: Copeland et al. SS&P analysis.

Appendix Four: Comparing the operating risk of companies

To compare the operating risk of companies, you need to compare the total Betas, after making two adjustments:

- Remove the effect of gearing
- Remove the effect of changes to the volatility of the underlying index used to estimate the Beta.

You use total Betas because operating risks may be both diversifiable and non-diversifiable (see appendices one and two).

1. Removing the effect of gearing

A company's Beta is affected by the company's level of gearing. You can remove the effect of gearing from the Beta by assuming that the company has no debt, and is therefore less risky to equity investors. To do this, you take the actual Beta and divide by proportion of debt in the overall mix of funding (at market values) times one minus the tax rate (the after tax weight of debt.) If you used the resulting Beta to calculate a cost of capital, you would end up with the "unlevered cost of equity" –the return investors would demand if the company had no debt.

2. Removing the effect of changes to index volatility

As explained in appendix two, a Beta is a ratio of the risks of a particular investment to the risks of the stock market as a whole. Risk is usually measured in terms of the standard deviation of returns.

Betas can therefore vary both because the standard deviation of the company's returns changes – indicating that the underlying business risk is changing, and because the standard deviation of the stock market as a whole changes.

To eliminate any changes caused by changes to overall market volatility, and focus only on the operating risks of sample companies, we multiplied the unlevered total betas by the standard deviation of the index, to give an estimate of the standard deviation of the stock price of each sample company, adjusted for the effect of gearing.

Appendix 5: How this report maps to the proposal

This appendix relates this report to the proposal dated 6 May 2004

Proposal section	Description	Coverage in report
1	Explanatory Paper	Appendices one, two, three and four
2	Research to estimate cost of capital and highlight relative risk	Section B.
3	Research to estimate historic return on capital delivered by sample companies	Section C
4	Analysis of specific risk factors that may explain variations in cost of capital and returns on capital	Section B, part 3. Section C, part 3.

Appendix Six: References

In preparing this analysis, we referred to the following books and articles:

Brealey, R and Myers, S: Principals of Corporate Finance, sixth edition. McGraw Hill 2000

Copeland T, Koller, T and Murrin J: Valuation. Measuring and Managing the Value of Companies, second edition. Wiley 1996

Damodaran, A: Investment Valuation, second edition, Wiley

Goedhart, M, Koller T, Williams, Z: The real cost of equity. McKinsey on Finance 2002

Higgins, R: Analysis for Financial Management, sixth edition. McGraw Hill 2001

Marsh P and Dimson E: The Triumph of the Optimists, quoted in “What does the equity risk premium mean, and how have views on it changed recently”. Hemscott 2002.

Appendix Seven: Data tables