



Finance For Business Managers (BMMB7005)

Shaekaparvin Yusufmiya Kadri (2514895)



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Financial Analysis Report

J Sainsbury plc

Part 1: Ratio Analysis and Financial Performance Evaluation

Capital Investment Appraisal Report

Westward Plc

Part 2: Investment Options Evaluation and Financing Recommendations

Table of Contents

List of Tables	5
Executive Summary	6
1. Introduction	7
2. Company Overview	8
3. Financial Ratio Analysis	9
3.1 Profitability Ratios	9
3.2 Liquidity Ratios	10
3.3 Efficiency Ratios	11
3.4 Gearing/Solvency Ratios	12
3.5 Investor Ratios	13
4. Critical Evaluation and Discussion	14
4.1 Interrelationship of Ratios	14
4.2 Possible Reasons for Changes	14
4.3 Industry Comparison	14
5. Limitations of Ratio Analysis	17
6. Recommendations	18
7. Conclusion	20
TASK 2:	21
Executive Summary	21
1. Introduction	23
2. Net Present Value Analysis	24
2.1 Investment Options Overview	24

2.2 Tax-Adjusted Cash Flow Calculations	24
Option A: Retail Outlet Expansion (£600,000 investment)	24
Option B: Internet Sales Development (£1,000,000 investment)	25
Option C: Wooden and Roman Blinds Production (£1,600,000 investment)	25
2.3 Net Present Value Calculations at 6% Cost of Capital	26
2.4 NPV Results and Recommendation	26
3. Internal Rate of Return Analysis	28
3.1 IRR Calculation for Option B	28
3.2 IRR Interpretation	28
4. Interpretation and Theoretical Discussion	30
4.1 Theoretical Arguments for NPV as the Superior Method	30
4.2 Continued Popularity of Non-Discounting Methods	31
4.3 Other Factors to Consider Before Investment	33
5. Capital Rationing Analysis	34
5.1 Problem Specification	34
5.2 Profitability Index Calculation	34
5.3 Optimal Investment Policy	35
6. Sources of Finance and Recommendations	36
6.1 Available Financing Options	36
6.1.1 Internal Sources	36
6.1.2 Debt Finance	36
6.1.3 Equity Finance	37
6.1.4 Alternative Finance	37
6.2 Financing Recommendation	37
7. Conclusion	39
8. Bibliography	41

9. Appendices	43
Appendix A: Ratio Calculations	45
A.2 Liquidity ratios	45
A.3 Efficiency ratios	46
A.4 Gearing ratios	47
A.5 Investor ratios	47
Appendix B: Summary of Financial statement	49
Appendix C: Detailed NPV Calculations	51
Appendix D: IRR Calculations for Option B	52
Appendix E: Capital Rationing Workings	54

List of Tables

TASK1:

Table 1: Profitability Ratios Summary	9
Table 2: Liquidity Ratios Summary	10
Table 3: Efficiency Ratios Summary	11
Table 4: Gearing Ratios Summary	12
Table 5: Investor Ratios Summary	13
Table 6: Industry comparison	15
Table 7: Sensitivity Analysis for option B	15

TASK2

Table 1: Option A Tax-Adjusted Cash Flows	24
Table 2: Option B Tax-Adjusted Cash Flows	25
Table 3: Option C Tax-Adjusted Cash Flows	25
Table 4: NPV Summary for All Options	26
Table 5: NPV at Different Discount Rates	28
Table 6: Profitability Index Rankings	35
Table 7: Optimal Investment Policy Under Capital Rationing	35
Table 8: Retained Earnings Analysis	36
Table 9: Bank Loan Analysis	36
Table 10: Corporate Bonds Analysis	37
Table 11: Rights Issue Analysis	37
Table 12: Leasing Analysis	37

Executive Summary

J Sainsbury Plc's (the second largest food retailer in the U.K.) 2-year financial results have been examined using a ratio analysis methodology across five separate categories of profitability, liquidity, efficiency, gearing, and investor ratios for the period ending 31 March 2025.

There are several key observations made because of the analysis including Sainsbury's increase in profitability via an improvement in gross profit margin from 6.48% to 6.77% and return on capital employed from 5.47% to 5.52%. In addition, it was noted that Sainsbury's operates with a structural negative working capital position, common throughout the retail sector.

It was also observed that Sainsbury's has a high level of gearing due to lease liabilities arising under IFRS 16; however, this is being addressed through debt reduction initiatives.

Therefore, recommendations have been made by the author to concentrate on increasing Operational Efficiency, continuing with debt reduction strategies, and maintaining the Progressive Dividend Policy to improve Shareholder Value in a very competitive Grocery Market in the U.K.

1. Introduction

Financial analysis provides an important resource for all interested parties in evaluating the operational performance, financial position, and strategy of a company (Atrill, 2019). In order to achieve this, this report will undertake an extensive review of J Sainsbury plc's annual accounts for the years ending March 2024 and March 2025 using ratio analysis as the principal method of analysis.

Ratio analysis allows for the comparison of meaningful statistics over different time frames and comparison with the industry averages, enabling the understanding of profitability, liquidity, operational efficiency, funding requirements, and investment return (Brigham & Ehrhardt, 2020). Watson and Head (2019) have stated that ratio analysis transforms basic data from the accounting records into useful information that can be used by managers in making decisions.

This report has three objectives: firstly, to compute and present financial ratios across the five major categories; secondly, to assess each of the ratios within the context of the UK grocery retail sector and the general economic environment; and thirdly, to provide the Board of Directors with evidence-based recommendations for improving the company's financial management and its overall strategic positioning.

2. Company Overview

J Sainsbury plc is the U.K.'s second-largest supermarket with a market share, currently operating 1400 stores across the country and having 141,000 employees. J Sainsbury plc was founded in 1869. It is listed on the London Stock Exchange (as part of the FTSE 100 Index) and uses the ticker symbol SBRY.

J Sainsbury plc operates as two main groups: Retail and Financial Services. The Retail group sells food, general merchandise, and clothing via supermarkets, convenience stores, and the Internet, under the brands Sainsbury's, Argos, Habitat, and Tu. The Financial Services group operates Sainsbury's Bank and offers banking and insurance services to customers. In the 2024-25 year, the company stated that it would be strategically selling off this division.

In 2024 J Sainsbury plc launched the "Next Level Sainsbury's" strategy for the company, focusing primarily on the food retail area of the company and focusing on customer value using the Nectar loyalty program. The Nectar loyalty program has produced customer savings of over £2 billion since its launch in 2024/25.

3. Financial Ratio Analysis

Analysis of Sainsbury's financial performance is undertaken using five categories of ratios based upon data taken from Sainsbury's Annual Reports and Financial Statements for 2024 and 2025.

3.1 Profitability Ratios

Profitability ratios assess a business' ability to make a profit as a proportion of its sales, assets, and equity (Drury, 2020). Profitability ratios are key indicators of a company's overall operational success.

Profitability Ratio	2025	2024	Change
Gross Profit Margin	6.77%	6.48%	+0.29%
Operating Profit Margin	2.76%	2.31%	+0.45%
Net Profit Margin	0.74%	0.42%	+0.32%
Return on Capital Employed	5.52%	5.47%	+0.05%
Return on Equity	3.64%	1.99%	+1.65%
Return on Assets	0.98%	0.55%	+0.43%

Table 1: Profitability Ratios Summary

The gross profit margin increased from 6.48% to 6.77%. The gross profit margin increase of 29 basis points demonstrates Sainsbury's success in managing costs during an inflationary period and demonstrates improvements made in negotiating with suppliers. In the highly competitive UK grocery market, where margins are typically very narrow (Mintel, 2024), the gross profit margin has demonstrated a positive trend.

Sainsbury's operating profit margin demonstrated a significant improvement from 2.31% to 2.76%, indicating greater operational efficiency and effective cost control. Compared to Tesco Plc, who reported an operating margin of around 4.2% (Tesco Plc, 2024), Sainsbury's operating profit margin still offers considerable opportunities for improvement.

Sainsbury's Return on Equity (ROE) almost doubled from 1.99% to 3.64%. The increase was largely due to the significant rise in net profit after tax. Nevertheless, the ROE is significantly lower than the average for the retail sector of 8-10% (IBISWorld, 2024), which indicates that shareholders may benefit from better use of equity.

3.2 Liquidity Ratios

Retailers with negative working capital are able to use their operational model as an example when assessing their ability to be liquid (i.e. able to meet short term liabilities) through using liquidity ratios (Arnold, 2019).

Liquidity Ratio	2025	2024	Change
Current Ratio	0.72:1	0.66:1	+0.06
Quick Ratio (Acid Test)	0.48:1	0.49:1	-0.01
Cash Ratio	0.34:1	0.17:1	+0.17

Table 2: Liquidity Ratios Summary

Although Sainsbury's 2025 current ratio of 0.72:1 is less than the traditional 1:1, this is consistent with how major retailers operate on a negative working capital cycle (McLaney & Atrill, 2020), customers typically pay at time of purchase, and suppliers provide extended credit to enable retailers to use supplier financed funds as free interest short term borrowing.

The doubling of Sainsbury's cash ratio from 0.17:1 to 0.34:1 illustrates that there has been a significant improvement in Sainsbury's short term liquidity position. The increase in cash held by the company from £1,987m to £2,777m enables the company to have increased financial flexibility and also support the company's programme for returning capital to shareholders.

3.3 Efficiency Ratios

Efficiency ratios measure an organisation's effectiveness in employing its assets and managing its various elements of working capital (Gitman & Zutter, 2019).

Efficiency Ratio	2025	2024	Change
Asset Turnover Ratio	1.33x	1.29x	+0.04x
Inventory Turnover	15.79x	15.74x	+0.05x
Inventory Days	23.1 days	23.2 days	-0.1 days
Receivables Days	6.4 days	6.6 days	-0.2 days
Payables Days	63.0 days	61.6 days	+1.4 days
Cash Operating Cycle	-33.5 days	-31.8 days	-1.7 days

Table 3: Efficiency Ratios Summary

Sainsbury's asset turnover ratio of 1.33x represents the effective manner by which Sainsbury generates £1.33 of sales from each £1 of assets it employs. The inventory turnover of 15.79 times per year (which equates to approximately every 23 days), highlights the importance of good stock control for retailers of perishable foods.

Sainsbury's has a unique and highly beneficial competitive advantage with respect to their cash operating cycle at -33.5 days. This is indicative of the amount of time that Sainsbury's utilise supplier finance prior to paying suppliers. This element of working capital efficiency enables Sainsbury's to release significant amounts of capital in order to fund growth initiatives and return profits to shareholders.

3.4 Gearing/Solvency Ratios

The gearing ratio measures how much a company finances itself through debt as opposed to equity (Pike & Neale, 2019) - IFRS 16 will have a large impact on this ratio for retail companies with large numbers of leases.

Gearing Ratio	2025	2024	Change
Debt to Equity Ratio	99.4%	95.4%	+4.0%
Debt Ratio	26.8%	26.1%	+0.7%
Interest Cover Ratio	2.58x	2.21x	+0.37x
Equity Ratio	27.0%	27.4%	-0.4%

Table 4: Gearing Ratios Summary

Sainsbury's debt-to-equity ratio has slightly risen (from 95.4 percent to 99.4 percent), and therefore has shown a slight rise in financial leverage. It is, however, advisable to interpret with caution, as approximately £5.5 billion of the total debt is made up of lease liabilities capitalized under IFRS 16. These would not have been included on the balance sheet before the implementation of IFRS 16 (Morales-Díaz & Zamora-Ramírez, 2018).

The debt ratio of 26.8 percent shows that approximately a quarter of Sainsbury's total assets are financed through debt. Sainsbury's capital structure is therefore more conservative than many of its retail peers. This is also evidenced by Sainsbury's Investment Grade Credit Rating (BBB from both S&P and Fitch), which enables the company to obtain competitive financing rates on its debt.

The interest cover ratio rose from 2.21 times to 2.58 times; therefore, the company has an improved ability to service its debt obligations using its operating profits. Although the current interest coverage ratio is still below the Common Benchmark of 3 times (for Comfortable Debt Servicing), the trend of the ratios is improving. Sainsbury's Established Euro Medium Term Note Programme provides Flexibility for Refinancing Existing Debt at competitive rates. The Equity Ratio fell from 27.4 percent to 27.0 percent; therefore, Shareholders Funds now account for approximately 27 percent of Total Funding. Therefore, there is a suitable Buffer in case of Losses whilst continuing to benefit from the tax deductibility of Interest Payments via the use of financial leverage.

3.5 Investor Ratios

Shareholder return is measured through investor ratios, including basic measures of shareholder return, as well as the value placed on shares by investors.

Investor Ratio	2025	2024	Change
Basic Earnings Per Share	10.4p	5.9p	+76.3%
Underlying EPS	23.1p	22.1p	+4.5%
Dividend Per Share	13.6p	13.1p	+3.8%
Dividend Cover	1.70x	1.69x	+0.01x
Dividend Yield (est.)	5.15%	4.85%	+0.30%

Table 5: Investor Ratios Summary

Basic Earnings Per Share has risen dramatically to 10.4p from 5.9p (a 76.3% rise) due to enhanced operational delivery and lower levels of non-underlying costs. The Underlying Basic Earnings Per Share of 23.1p provide a better measure of Sainsbury's recurring profitability.

Sainsbury's progressive dividend policy was implemented in 2024 with total dividend payments of 13.6p for each share, resulting in a total increase of 3.8%. The approximate dividend yield of 5.15% gives Sainsbury's an attractive position compared to the FTSE 100 average of approximately 3.5% (Hargreaves Lansdown, 2024).

4. Critical Evaluation and Discussion

4.1 Interrelationship of Ratios

The financial ratios for Sainsbury's should be evaluated in a composite fashion, as they are interdependent, as noted by Penman (2019). The improved ratios for Sainsbury's profitability support the improvement in both interest coverage and dividend sustainability. The DuPont Analysis Framework shows how the 3.64% Return On Equity is derived from the net profit margin (0.74%), asset turnover (1.33x), and the degree of financial leverage (3.71x) of Sainsbury's.

4.2 Possible Reasons for Changes

There were several reasons that contributed to the movement of the observed ratio(s) from 2024 to 2025 at Sainsbury's:

- **Strategy:** The 'Next Level Sainsbury's' Strategy focused on concentrating resources on the core grocery operations and improving operational efficiency and margin performance.
- **Sale of Bank:** The strategic disposal of Financial Services created a significant change in Sainsbury's balance sheet structure and released capital.
- **Cost management:** Gross Margin was increased through improved supplier negotiations and improved operational efficiency during periods of inflationary costs.
- **Customer Offer:** The Nectar Loyalty Programme delivered customer savings of over £2 Billion and drove volume growth.

4.3 Industry Comparison

Sainsbury's has an average performance position in the UK grocery market; it performs better on nearly all metrics than the third largest grocery retailer, Morrisons, but worse than Tesco, the first-ranked grocer by sales volume and the highest by operating margin at 4.20%. The reason for this difference is primarily that Tesco is larger and has greater purchasing power (Tesco, 2024).

The two largest and most significant competitors are the German discount retailers Aldi and Lidl, which have a combined market share above 18% (Kantar, 2024). Aldi/Lidl have estimated gross margins between 15% and 18%, as they stock fewer product lines (approximately 1,800 lines) than Sainsbury's (30,000) which enables Aldi/Lidl to have greater negotiating power over suppliers (IGD, 2024).

The greatest advantage Sainsbury's possesses is that it has a negative working capital cycle (-33.5 days) which is superior to those of all other major competitors. A positive working capital cycle would mean that Sainsbury's had to pay cash earlier in the year to suppliers or customers. In effect Sainsbury's ability to collect cash from customers faster than it pays suppliers to suppliers enables Sainsbury's to have greater liquidity and partially offsets lower profit margins. For example, Morrisons high gearing (142.3%), post the 2021 acquisition by a private equity firm illustrates the risk of debt financing in the retail business.

Ratio	Sainsbury's	Tesco	Morrisons	Aldi UK (Est.)
Gross Profit Margin	6.77%	7.8%	6.2%	15-18%*
Operating Profit Margin	2.76%	4.2%	2.1%	5-6%*
Current Ratio	0.72	0.75	0.68	N/A
Asset Turnover	1.33x	1.41x	1.28x	2.5x*
Debt/Equity	99.4%	85.2%	142.3%	N/A

Table 6: Industry comparison

4.4 Sensitivity Analysis for Option B

To assess the robustness of the NPV recommendation for Option B, sensitivity analysis was conducted on key variables:

Variable	Base Case	Change	Revised NPV	% Change
Cost of Capital	6%	+2% (to 8%)	£665,420	-16.0%
Cash Flows	As projected	-10% all years	£612,991	-22.6%
Cash Flows	As projected	-20% all years	£433,754	-45.3%
Initial Investment	£1,000,000	+15%	£642,228	-18.9%
Project Duration	4 years	-1 year	£370,429	-53.2%

Table 7: Sensitivity Analysis for option B

Major Results:

1. Sensitivity of Cost of Capital: There is substantial resiliency for NPV even when the cost of capital is at 15%.
2. Sensitivity of Cash Flows – The project will still be viable with an NPV even if the cash flow is reduced to about 55% of the original cash flows.
3. Most Sensitive Variable: If the duration of the project is only three (3) years instead of seven (7), then the NPV will decrease substantially by more than 50%.

5. Limitations of Ratio Analysis

As a competitor to discounters Aldi and Lidl, Sainsbury's operates on the basis of differentiated service quality and product offerings. While ratio analysis does provide valuable insight into company performance, there are a number of significant limitations to this approach (Fridson and Alvarez, 2022):

1. **Historic Basis:** Ratio analysis is based upon historic data from a company's past financial statements and therefore cannot accurately represent the company's current position or likely future trends.
2. **Differing Accounting Policies:** Companies have different accounting policies which can create comparative difficulties when assessing their relative performance. For example, gearing ratios were impacted by the application of IFRS 16.
3. **Aesthetic Presentation of Financials:** Year-end accounts may contain representations intended to portray a positive picture of a company's position at year end.
4. **Nondisclosure of Non-financial Factors:** Ratio analysis excludes nonfinancial aspects of a company, such as its brand reputation, quality of management and commitment to sustainable practices.
5. **Applicability of Industry Benchmarks:** A common benchmark for all industries may not exist due to the unique characteristics of each industry, e.g., an industry with a large amount of negative working capital would be disadvantageous in a manufacturing context.
6. **Macroeconomic Context:** Ratio analysis must always be assessed in the light of the prevailing macro-economic environment including inflationary pressure and rising costs of living.

6. Recommendations

In accordance with prior analysis, the following recommendations shall be presented to the Board of Directors:

6.1 Increasing Profits

Continued investment into improving operational efficiency and improving the supply chain to reduce the margin between Sainsbury's and Tesco. A target of an operating margin of 3.5% within the next 3 years is set by implementing improved category management, reducing food waste and increasing the use of automation at distribution centres.

6.2 Improving Working Capital

Sainsbury's shall maintain disciplined working capital management while ensuring ethical relationships with suppliers. The increased payables period for suppliers shall be weighed against their overall financial health. Sainsbury's shall consider providing supply chain financing opportunities that would provide mutual benefits to both parties.

6.3 Managing Capital Structure

Sainsbury's shall continue to strategically de-leverage to improve its interest cover ratio to 3x. Sainsbury's shall focus on reducing its lease liability by rationally closing select stores and optimizing its property portfolio. Refinancing flexibility will continue to be provided through the established EMTN program.

6.4 Returns to Shareholders

The progressive dividend policy shall remain as a primary component of Sainsbury's investment proposition. The existing share buy back programs are designed to efficiently return surplus capital to shareholders while also providing support for the increase in earnings per share. Sainsbury's shall ensure that the dividend coverage ratio remains greater than 1.5x.

6.5 Investment in Digital Capabilities

Sainsbury's shall accelerate investments in digital capabilities to protect Sainsbury's market position from both traditional competitors and emerging online grocery platforms. Data

analytics capabilities of the Nectar Program shall be enhanced to enable personalized engagement with customers.

7. Conclusion

The financial analysis (ratio) of JS Sainsbury Plc is indicative of a company that has made successful progress in implementing its strategic transition while dealing with a difficult competitive environment & difficult economic condition.

The profitability ratios have continued to improve during 2025 compared to 2024; specifically, the gross margin, operating margin & return on equity have shown positive trends.

Although liquidity ratios are generally lower than traditional benchmarks; these values represent the type of retail business model, which benefits from negative working capital cycles. Cash and bank balances have also increased significantly, providing operational flexibility and supporting capital return commitments.

Interpretation of gearing ratios should be made cautiously because of IFRS 16 lease capitalisation. The underlying level of debt is conservative, supported by investment grade credit ratings and successful recent bond issues.

Improvement in the interest cover ratio also suggests an improved ability to meet financial obligations.

All investor related ratios confirm that management is committed to creating value for shareholders via progressive dividends, share buy backs and strategic sales of non-core assets. The dividend yield is greater than market average and therefore, Sainsbury's can be seen as an attractive income investment opportunity.

While there are areas for improvement (notably closing the gap in profitability with sector peers), the overall trend of financial data is positive. The recommendations provided represent a strategic framework to continue to enhance financial performance and shareholder returns while maintaining a suitable risk management approach.

TASK 2: Capital Investment Appraisal Report

Westward Plc

Part 2: Investment Options Evaluation and Financing Recommendations

Executive Summary

The report includes an in-depth review of Westward Plc's Capital Investment Appraisal of potential growth options. The company is looking to expand its product offerings of quality curtain manufacturing by way of one of three possible strategies: expanding its retail outlets (Option A); developing the business via Internet sales (Option B); or developing Roman/Wooden Blinds (Option C).

Using Net Present Value (NPV) Analysis at a Cost of Capital of 6% with 25% Corporation Tax and 20% Straight-Line Capital Allowances; Option B (Internet Sales Development) was identified as the best option due to it producing the highest NPV of £792,228. It was further identified that this option has a strong Internal Rate of Return (IRR) of around 32.2% which is significantly greater than the cost of capital.

When constrained by a maximum capital budget of £2,500,000 under divisible project options, the optimum investment policy would be to undertake 100% of both Options A and B and 56.25% of Option C to generate an overall NPV of £1,853,037.

The report concludes with recommendations for funding, including an evaluation of the use of equity, debt and hybrids to fund growth, and a recommendation for a blended funding strategy using retained profits and medium-term bank loans to provide a degree of operational flexibility while minimizing the Weighted Average Cost of Capital.

1. Introduction

Investment in a Capital asset is one of the biggest strategic decisions for organizations (Drury, 2020). This decision will be a big commitment of funds over a long period and therefore can affect the direction of the organization in the future and its competitive position (Drury, 2020). Westward plc must make this type of investment decision as they are considering three alternative expansions which are mutually exclusive.

This report will undertake a thorough financial analysis of all the alternative investments using Discounted Cash Flow (DCF), i.e., Net Present Value (NPV) and Internal Rate of Return (IRR) techniques. The DCF analysis will take into consideration the effect of Corporation Tax at 25%, and the capital allowance based on a 20% Straight-Line Basis (Arnold, 2019). This will ensure that the analysis reflects the true post-tax returns to shareholders (Arnold, 2019).

The Report Structure will address each part of the Investment Decision process systematically: Section 2 will provide the results of the NPV Analysis and Investment Recommendation; Section 3 will calculate the IRR for the preferred option from the NPV Analysis; Section 4 will provide the theoretical explanation and Discussion of Investment Appraisal Techniques; Section 5 will analyse capital rationing Scenarios; and Section 6 will analyse Financing Alternatives with Strategic Recommendations.

2. Net Present Value Analysis

2.1 Investment Options Overview

Westward Plc are examining three different potential investment strategies that they can employ over the course of their four-year expansion program.

- Option A - Expansion of Westward Plc's retail outlets to stock all products (initially) - Total investment £600,000
- Option B - Development of the company's Internet sales capabilities (initially) - Total investment £1,000,000
- Option C - Production of wooden blinds and Roman blinds by Westward Plc (initially) - Total investment £1,600,000

All the above investments are assumed to have a cost of capital of 6%. The corporation tax rate is also assumed to be at 25% in addition to assuming a capital allowance rate of 20% pa with a straight-line basis.

2.2 Tax-Adjusted Cash Flow Calculations

Westward Plc's projects must consider the tax implications of the cash flow. Taxable profit will be reduced through the allowance of capital allowances which provide tax relief. Annual capital allowances are determined as twenty percent of the total cost of the original investment.

Option A: Retail Outlet Expansion (£600,000 investment)

Annual Capital Allowance = £600,000 × 20% = £120,000

Year	Cash Flow £'000	Capital Allow. £'000	Taxable Profit £'000	Tax @ 25% £'000	After-Tax CF £'000
0	(600)	-	-	-	(600)
1	200	120	80	20	180
2	400	120	280	70	330
3	500	120	380	95	405
4	700	120	580	145	555

Table 1: Option A Tax-Adjusted Cash Flows

Option B: Internet Sales Development (£1,000,000 investment)

Annual Capital Allowance = £1,000,000 × 20% = £200,000

Year	Cash Flow £'000	Capital Allow. £'000	Taxable Profit £'000	Tax @ 25% £'000	After-Tax CF £'000
0	(1,000)	-	-	-	(1,000)
1	400	200	200	50	350
2	450	200	250	62.5	387.5
3	720	200	520	130	590
4	980	200	780	195	785

Table 2: Option B Tax-Adjusted Cash Flows

Option C: Wooden and Roman Blinds Production (£1,600,000 investment)

Annual Capital Allowance = £1,600,000 × 20% = £320,000

Year	Cash Flow £'000	Capital Allow. £'000	Taxable Profit £'000	Tax @ 25% £'000	After-Tax CF £'000
0	(1,600)	-	-	-	(1,600)
1	450	320	130	32.5	417.5
2	700	320	380	95	605
3	900	320	580	145	755
4	1,200	320	880	220	980

Table 3: Option C Tax-Adjusted Cash Flows

2.3 Net Present Value Calculations at 6% Cost of Capital

The NPV is calculated by discounting the after-tax cash flows using the present value factors at 6%.

Year	DF @ 6%	Option A PV £'000	Option B PV £'000	Option C PV £'000
0	1.0000	(600.00)	(1,000.00)	(1,600.00)
1	0.9434	169.81	330.19	393.87
2	0.8900	293.70	344.88	538.45
3	0.8396	340.04	495.36	633.90
4	0.7921	439.61	621.80	776.26
NPV		£643,166	£792,228	£742,476

Table 4: NPV Summary for All Options

2.4 NPV Results and Recommendation

The NPV is determined by applying the present value factor for six percent to the discounted, post-tax cash flows.

NPV Analysis shows that each of the projects has a positive NPV so each can increase shareholder wealth; however, the order of magnitude of the NPV of each project is:

- Option B (Internet Sales) - NPV = £792,228 - Highest Value
- Option C (Blinds Production) - NPV = £742,476
- Option A (Retail Expansion) - NPV = £643,166

Based on the NPV criteria, Option B - Internet Sales Development should be recommended as it provides the highest absolute return to shareholders. In addition, this option can increase shareholder wealth by £792,228 in present value terms, providing a significant strategic investment in the company's capability to trade digitally in the home furnishings sector.

This recommendation is consistent with current retail trends where the use of e-commerce is becoming a major channel for home furnishings (Mintel, 2024). Internet

sales development offers the advantage of scalability with lower marginal costs per unit sale than expanding through physical retail.

3. Internal Rate of Return Analysis

3.1 IRR Calculation for Option B

The Internal Rate of Return is the discount rate at which the NPV equals zero. For Option B, we calculate the IRR using the interpolation method, testing discount rates to identify the rate where NPV = 0.

NPV at various discount rates:

Discount Rate	NPV (£'000)	Interpretation
6%	792.23	Strongly positive
20%	280.77	Positive
30%	41.90	Marginally positive
35%	(51.99)	Negative

Table 5: NPV at Different Discount Rates

Linear Interpolation using IRR (between 30% and 35%)

IRR = Lower Rate + [(NPV of Lower Rate / (NPV of Lower Rate – NPV of Higher Rate))
x (Higher Rate - Lower Rate)]

IRR = 30% + [(41.90 / (41.90 + 51.99)) x (35% - 30%)]

IRR = 30% + [(41.90/ 93.89) x 5%]

IRR = 30% + [.446 x 5%]

IRR = 30% + 2.23% = 32.23%

3.2 IRR Interpretation

The Internal Rate of Return represents the discount rate at which the Net Present Value (NPV) equals zero. To find the IRR for Option B, we used an interpolation technique by finding the discount rate where the NPV= 0 and testing various discount rates.

Option B has an approximate IRR of 32.2%. Therefore, the IRR far exceeds the Cost of Capital of 6% by a significant margin of safety. As such, it is likely that Option B will continue to be viable even if the cost of capital is raised considerably.

An IRR of 32.2% compares favourably with common Corporate Hurdle Rates and Industry Benchmarks for Retail Sector Investments that have a typical range of between 12-18% (Pike and Neale, 2019), therefore further reinforces the viability and attractiveness of developing Internet Sales.

4. Interpretation and Theoretical Discussion

4.1 Theoretical Arguments for NPV as the Superior Method

Net Present Value is widely considered as the superior theoretical investment appraisal method for several strong reasons (Brealey et al., 2020):

i. Time Value of Money:

NPV recognises that money received today is more valuable than the same amount received in the future by discounting all future cash flows at the relevant cost of capital. Therefore, NPV accurately quantifies the increase in value created in today's terms (Brigham and Ehrhardt, 2020).

ii. Consideration of all Cash Flows:

Payback Period only evaluates initial and final cash flows and ignores all other cash flows throughout the duration of the project; whereas NPV considers every single cash flow during the duration of the project and thus assigns greater weight to later period cash flows (Drury, 2020).

iii. Direct Measure of Shareholder Wealth:

The NPV method measures the absolute increase in the wealth of shareholders resulting from the acceptance of the project. Positive NPV values directly equate to an increase in the total wealth of the firm (Arnold, 2019).

iv. Additivity Property:

The sum of the NPVs of individual projects represents the total wealth generated from a portfolio of projects and allows companies to make informed decisions about which projects to fund when there are multiple projects competing for funding (Ross et al., 2019).

v. Consistency with Shareholder Wealth Maximisation:

The NPV rule supports the primary objective of maximizing shareholder wealth and provides a clear decision-making criterion based on stakeholder interests (Watson and Head, 2019).

vi. Avoids the Multiple IRR Problem:

NPV does not suffer from the Multiple IRR problem associated with Non-Conventional Cash Flow Arrangements and provides consistent rankings when evaluating mutually exclusive projects of differing scales (Atrill, 2019).

4.2 Continued Popularity of Non-Discounting Methods

Although theoretically superior, DCF techniques have been outperformed in terms of usage by simple, non-discounted techniques like Payback Period and Accounting Rate of Return (ARR). Despite their inferior nature from a theoretical perspective, both the research of Pike (1996) and Graham & Harvey (2001) show that many companies continue to utilize these models in conjunction with Discounted Cash Flow (DCF) techniques. There are several reasons why these models are still widely used:

- **Ease of Use:**

Non-Discounting Models are easy to understand and use and do not require advanced knowledge of finance to compute. They also provide a clear way for non-finance managers to communicate with each other regarding potential investments (Drury, 2020).

- **A Measure of Liquidity/Risk:**

The Payback Period measures how long it takes for the company to recoup its investment and therefore serves as a good proxy for measuring liquidity and risk (McLaney & Atrill, 2020). The shorter the payback period, the lower the company's risk.

- **Ease of Input Data:**

Non-discounting models are easier to estimate because they require less data to determine. It is difficult to develop a discount rate using the required inputs of all projects, however, to calculate a payback period requires only projected cash flows.

- **Pressure to Achieve Short Term Results:**

If managers are rewarded based upon their ability to meet short term performance objectives, then they will tend to Favor those projects that have the quickest paybacks regardless of whether the projects produce a higher net present value (Arnold, 2019).

- **Payback as a Screening Model:**

While some organizations use payback as the first step in determining which projects to pursue, most use it as a screen and will only apply discounted cash flow analysis to those projects that make the cut.

- **Satisficing vs. Optimizing:**

According to Simon's (1957) concept of Bounded Rationality, people tend to satisfice rather than optimize when making decisions. Therefore, rather than taking the time to perform an extensive amount of financial analysis, managers will accept what appears to be a good solution and move forward.

4.3 Other Factors to Consider Before Investment

To identify which of the two online sale options is the best investment for Westward plc, it is important to consider more than just financial metrics. Atrill (2019), Pike & Neale (2019), outline several other key areas that must be taken into consideration when making an investment decision (for example, strategy, risk assessment, implementation capability etc.) are as follows:

- **Strategic Fit:**

Is this an opportunity for Westward plc to make a long-term strategic move away from their current business model. Will developing the ability to sell via the internet require significant additional resources and/or skills?

- **Market/Competitive Analysis:**

What is the likely level of future growth of the markets being considered. How strong are the competitors in these markets, and what would be the barriers to entering either one?

- **Risk Assessment:**

An objective assessment of the systematic risks associated with the project, e.g., demand, technology, regulatory, and operational risks.

- **Implementation Capability:**

The capability of Westward plc to implement both options, e.g., availability of management expertise, and technical capabilities required to deliver both options.

- **Sensitivity Analysis:**

Assessing the sensitivity of the NPV of the investment options to a range of different assumptions including those related to the volume of sales, prices charged, costs incurred, and the timing of the receipt of cash inflows.

- **Real Options:**

Assessing the strategic flexibility of the investment options, i.e., the flexibility to expand, contract or withdraw from the investments as uncertainty about them decreases over time.

- **Environmental and Social Impact:**

Assessing the sustainability implications of the investment options and assessing whether they meet the criteria set out within ESG (Environmental, Social and Governance) initiatives.

- **Stakeholder Considerations:**

Assessing the impact on employees, customers, suppliers, and local communities who will be affected by each of the investment options.

5. Capital Rationing Analysis

5.1 Problem Specification

Although there are enough funds at an initial budget level of £2,500,000, the projects can be divided up so that fractional investments can be made, which means we need to determine the best way to make use of those funds. All together, the total amount of money needed to invest in each of the three projects is £3,200,000 (£600,000 + £1,000,000 + £1,600,000). Therefore, we have a shortfall of £700,000.

5.2 Profitability Index Calculation

When there are limited funds available, and the projects can be broken down into smaller parts, then the Profitability Index (PI) will give you the correct way to rank your investments. The PI is used as a measure of how much Net Present Value (NPV) that you will receive for every dollar or pound that you put into a project (Brealey et al., 2020). Appropriate ranking criterion. PI measures the NPV generated per pound invested (Brealey et al., 2020):

Profitability Index = NPV / Initial Investment

Project	NPV (£'000)	Investment (£'000)	Profitability Index
Option A	643.17	600	1.072
Option B	792.23	1,000	0.792
Option C	742.48	1,600	0.464

Table 6: Profitability Index Rankings

Ranking by Profitability Index: Option A (1.072) > Option B (0.792) > Option C (0.464)

5.3 Optimal Investment Policy

Following the PI ranking, the optimal allocation of £2,500,000 is:

Project	Proportion	Investment (£'000)	NPV Contribution (£'000)
Option A	100%	600	643.17
Option B	100%	1,000	792.23
Option C	56.25%	900	417.64
TOTAL		2,500	£1,853,037

Table 7: Optimal Investment Policy Under Capital Rationing

To achieve the greatest total NPV (£1,853,037) when using the limited funds available (£2,500,000), we would do the following:

- Invest the full amount in Option A (£600,000) since it has the largest PI of 1.072.
- Invest the full amount in Option B (£1,000,000) since it has the next largest PI of 0.792.
- Invest 56.25% of Option C (£900,000 of £1,600,000) to utilize the remaining available funds.
- For example, if you were to take this 56.25% of Option C and compare it to a full investment (£1,600,000) in Option C, then you would generate an NPV of £742,476 x .5625 = £417,643.

6. Sources of Finance and Recommendations

6.1 Available Financing Options

Westward Plc must consider how the proposed investment programme will be financed. The principal sources of finance available to the company include:

6.1.1 Internal Sources

Retained Earnings: The most readily available source, representing profits reinvested in the business rather than distributed as dividends.

Advantages	Disadvantages
No issue costs or interest payments	Limited by current profitability
No dilution of ownership or control	Opportunity cost of forgone dividends
Flexibility in use without restrictions	May strain shareholder relations
No repayment obligations	May not be sufficient for large projects

Table 8: Retained Earnings Analysis

6.1.2 Debt Finance

Bank Loans and Term Facilities: Medium to long-term borrowing from financial institutions, typically secured against company assets.

Advantages	Disadvantages
Interest payments are tax-deductible	Increases financial risk and gearing
No dilution of ownership	Fixed repayment obligations
Lower cost than equity (typically)	Covenants may restrict operations
Structured repayment schedule	Security requirements may be needed

Table 9: Bank Loan Analysis

Corporate Bonds: Debt securities issued to investors, typically for larger financing requirements.

Advantages	Disadvantages
Access to larger capital amounts	High issuance costs (legal, rating)
Fixed interest rate provides certainty	Requires credit rating
May offer longer terms than bank loans	Less flexible than bank facilities
Interest is tax-deductible	Public disclosure requirements

Table 10: Corporate Bonds Analysis

6.1.3 Equity Finance

Rights Issue: New shares offered to existing shareholders in proportion to their holdings.

Advantages	Disadvantages
No repayment obligations	Dilutes existing shareholders' control
Strengthens balance sheet	Higher cost than debt (typically)
Maintains proportional ownership	Significant issuance costs
No interest payments required	Dividends paid from after-tax profits

Table 11: Rights Issue Analysis

6.1.4 Alternative Finance

Leasing and Hire Purchase: Asset-based financing where equipment is leased rather than purchased outright.

Advantages	Disadvantages
Preserves working capital	Higher total cost than purchase
Fixed payments aid budgeting	No ownership of asset (finance lease)
May include maintenance	Penalties for early termination
Off-balance sheet (operating leases)	Limited flexibility

Table 12: Leasing Analysis

6.2 Financing Recommendation

A balanced approach to funding Westward Plc's investment program of up to £2,500,000 is recommended as follows:

- Primary Funding - Retained Earnings (40-50%): Invest £1,000,000 to £1,250,000 in retained earnings to limit the amount of external funding and minimize the use of borrowed money; this will also help to maintain some level of financial independence.
- Secondary Funding - Medium-Term Bank Facility (40-50%): Obtain a bank term loan of £1,000,000 to £1,250,000 with competitive interest rates. This will provide tax-deductible interest, while keeping gearing levels under control.
- Funding Option - Leasing: In order to be able to adjust to future cash flow variations, consider leasing arrangements for specific equipment components used in internet sales infrastructure.

The above approach will achieve an optimal balance between low-cost debt and the financial risks associated with high gearing, while allowing for preservation of shareholder value and strategic options. Strong NPV and IRR are calculated for the proposed investment, which provides confidence that they will generate sufficient returns to cover their respective debt repayment obligations.

7. Conclusion

This extensive evaluation of three expansion options for Westward plc was performed through a detailed examination of the financial merits of each option utilizing multiple methodologies. The net present value (NPV) methodology, which accounted for corporation tax of 25% and capital allowances of 20% using the straight-line method, identified Option B (internet sales development) as the most desirable investment opportunity resulting in the highest NPV of £792,228 at a cost of capital of 6%.

The internal rate of return (IRR) methodology confirmed the attractive nature of Option B, which yielded an IRR of approximately 32.2%. This represented a substantial margin of safety over the cost of capital and provided confidence in recommending the internet sales investment.

Additionally, the theoretical discussion reinforced the position that NPV should be used to evaluate investments as it directly evaluates the increase in shareholder wealth and avoids the inherent limitations of other appraisal methods. Nevertheless, the continuing application of non-discounting appraisal methods within organizations represents legitimate concerns including the level of complexity, the ability to assess risk and the need to communicate effectively.

In a situation where the organization is constrained by a budget of £2,500,000 with divisible projects, the best investment strategy would be to maximize the overall NPV from all available funding, which totals £1,853,037. Therefore, the organization should fund all of Options A & B and 56.25% of Option C according to the profitability index rankings.

In terms of the financing of these new investments, a balance between retaining earnings and raising additional funding through medium term bank borrowing will optimize the weighted average cost of capital while providing sufficient flexibility to manage the risks associated with new investments. This strategy also provides a means to support Westward plc's growth objectives while protecting the interests of shareholders and ensuring financial stability.

Therefore, the board is recommended to pursue Option B as their initial investment opportunity; however, they should perform a thorough due diligence evaluation of

market conditions, implementation feasibility and risk exposure prior to implementing this new venture. The financial results generated through the analysis of this option provide a solid base for the strategic expansion of Westward plc into digital commerce.

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9. Appendices

Appendix A: Ratio Calculations

Profitability Ratios

A.1 Gross profit margin = gross profit / revenue * 100

$$2025 = (£2,221\text{m} / £32,812\text{m}) * 100 = 6.77\%$$

$$2024 = (£2,090\text{m} / £32,238\text{m}) * 100 = 6.48\%$$

Operating Profit Margin = operating profit / revenue * 100

$$2025 = (£904\text{m} / £32,812\text{m}) * 100 = 2.76\%$$

$$2024 = (£744\text{m} / £32,238\text{m}) * 100 = 2.31\%$$

Net Profit Margin = profit after tax / revenue * 100

$$2025 = (£242\text{m} / £32,812\text{m}) * 100 = 0.74\%$$

$$2024 = (£137\text{m} / £32,238\text{m}) * 100 = 0.42\%$$

Return on capital employed = EBIT / Capital employed * 100

[Capital employed = total assets - current liabilities]

$$2025 = (£904\text{m} / £16,367\text{m}) * 100 = 5.52\%$$

$$2024 = (£744\text{m} / £13,609\text{m}) * 100 = 5.47\%$$

Return on equity = profit after tax / total equity * 100

$$2025 = (£242\text{m} / £6,651\text{m}) * 100 = 3.64\%$$

$$2024 = (£137\text{m} / £6,868\text{m}) * 100 = 1.99\%$$

Return on assets = profit after tax / total assets * 100

$$2025 = (£242\text{m} / £24,648\text{m}) * 100 = 0.98\%$$

$$2024 = (£137\text{m} / £25,061\text{m}) * 100 = 0.55\%$$

A.2 Liquidity ratios

Liquidity ratios are designed to determine a company's ability to meet its short-term obligations and how quickly a business can convert assets into cash.

a. Current ratio - The current ratio is calculated by dividing current assets by current liabilities.

$$\text{In 2025: } £5,922 \text{ m} / £8,281 \text{ m} = 0.72: 1$$

$$\text{In 2024: } £7,571 \text{ m} / £11,452 \text{ m} = 0.66: 1$$

b. Quick ratio - The quick ratio is calculated by taking current assets, excluding inventories, and then dividing that number by current liabilities.

In 2025: $(£5,922 \text{ m} - £1,946 \text{ m}) / £8,281 \text{ m} = 0.48: 1$

In 2024: $(£7,571 \text{ m} - £1,927 \text{ m}) / £11,452 \text{ m} = 0.49: 1$

c. Cash ratio - The cash ratio is calculated by dividing total cash on hand by total current liabilities.

In 2025: $£2,777 \text{ m} / £8,281 \text{ m} = 0.34: 1$

In 2024: $£1,987 \text{ m} / £11,452 \text{ m} = 0.17: 1$

A.3 Efficiency ratios

Efficiency ratios measure the use of resources in an organization and help to identify where improvements need to be made.

d. Asset turnover - Asset turnover is calculated by taking revenue for the year divided by total assets at the end of each financial year.

In 2025: $£32,812 \text{ m} / £24,648 \text{ m} = 1.33 \text{ x}$

In 2024: $£32,238 \text{ m} / £25,061 \text{ m} = 1.29 \text{ x}$

e. Inventory turnover - Inventory turnover is calculated by taking cost of sales for the year divided by average inventory over the course of the year.

In 2025: $£30,591 \text{ m} / (£1,946 \text{ m} + £1,927 \text{ m})/2 = 15.79 \text{ x}$

In 2024: $£30,148 \text{ m} / (£1,927 \text{ m} + £1,899 \text{ m})/2 = 15.74 \text{ x}$

f. Inventory days - Inventory days are determined by taking 365 days (the number of days in a year) and dividing it by inventory turnover.

In 2025: $365 / 15.79 = 23.1 \text{ days}$

In 2024: $365 / 15.74 = 23.2 \text{ days}$

g. Receivables days - Receivables days are calculated by taking trade receivables as a percentage of annual revenue, multiplied by 365 days (the number of days in a year).

In 2025: $(£572 \text{ m} / £32,812 \text{ m}) \times 365 = 6.4 \text{ days}$

In 2024: $(£582 \text{ m} / £32,238 \text{ m}) \times 365 = 6.6 \text{ days}$

h. Payables days - Payables days are determined by taking trade payables as a percentage of cost of sales, multiplied by 365 days (the number of days in a year).

In 2025: $(£5,278 \text{ m} / £30,591 \text{ m}) \times 365 = 63.0 \text{ days}$

In 2024: $(£5,091 \text{ m} / £30,148 \text{ m}) \times 365 = 61.6 \text{ days}$

i. Cash operating cycle - The cash operating cycle is determined by adding inventory days to receivable days and subtracting payable days from the result.

In 2025: $23.1 + 6.4 - 63.0 = -33.5$ days

In 2024: $23.2 + 6.6 - 61.6 = -31.8$ days

A.4 Gearing ratios

Gearing ratios provide a measure of how much debt a business uses relative to equity and assesses the level of risk associated with a company's capital structure.

j. Debt to equity ratio - The debt-to-equity ratio is calculated by determining the ratio of total debt to total equity, expressed as a percentage.

In 2025: $(£1,114 \text{ m} + £5,494 \text{ m}) / £6,651 \text{ m} = 99.4 \%$

In 2024: $(£1,195 \text{ m} + £5,354 \text{ m}) / £6,868 \text{ m} = 95.4 \%$

k. Debt ratio - The debt ratio is calculated by determining the ratio of total debt to total assets, expressed as a percentage.

In 2025: $£6,608 \text{ m} / £24,648 \text{ m} = 26.8 \%$

In 2024: $£6,549 \text{ m} / £25,061 \text{ m} = 26.1 \%$

l. Interest cover - Interest cover is calculated by determining earnings before interest and tax (EBIT) divided by finance costs.

In 2025: $£904 \text{ m} / £350 \text{ m} = 2.58 \text{ x}$

In 2024: $£744 \text{ m} / £336 \text{ m} = 2.21 \text{ x}$

m. Equity ratio - The equity ratio is calculated by determining the ratio of total equity to total assets, expressed as a percentage.

In 2025: $£6,651 \text{ m} / £24,648 \text{ m} = 27.0 \%$

In 2024: $£6,868 \text{ m} / £25,061 \text{ m} = 27.4 \%$

A.5 Investor ratios

Investor ratios focus on how well a company has performed financially, providing investors with information about the performance of their investment.

n. Basic EPS - Basic EPS is calculated by dividing profit after tax by weighted average shares outstanding.

In 2025: $£242 \text{ m} / 2,330.6 \text{ m shares} = 10.4 \text{ p}$

In 2024: £137 m / 2,334.8 m shares = 5.9 p

o. Dividend cover - Dividend cover is calculated by dividing underlying EPS by dividend per share.

In 2025: 23.1 p / 13.6 p = 1.70 x

In 2024: 22.1 p / 13.1 p = 1.69 x

p. Dividend yield - Dividend yield is calculated by dividing dividend per share-by-share price, then multiplying by 100 to express as a percentage.

In 2025: (13.6 p / 264 p) × 100 = 5.15 %

In 2024: (13.1 p / 270 p) × 100 = 4.85 %

Appendix B: Summary of Financial statement

B.1 Consolidated Income Statement (Summary)

Item (£m)	2025	2024
Revenue	32,812	32,238
Cost of Sales	(30,591)	(30,148)
Gross Profit	2,221	2,090
Operating Profit	904	744
Finance Income	67	81
Finance Costs	(350)	(336)
Profit Before Tax	621	489
Tax Expense	(201)	(181)
Profit After Tax (Continuing)	420	308
Total Profit After Tax	242	137

Source: J Sainsbury plc Annual Reports 2024 and 2025

B.2 Consolidated Balance Sheet (Summary)

Item (£m)	2025	2024
Non-Current Assets	16,199	17,480
Current Assets	5,922	7,571
- Inventories	1,946	1,927
- Trade Receivables	572	582
- Cash	2,777	1,987
Assets Held for Sale	2,527	10
Total Assets	24,648	25,061
Current Liabilities	(8,281)	(11,452)
- Trade Payables	(5,278)	(5,091)
Non-Current Liabilities	(6,580)	(6,741)
- Borrowings	(1,042)	(1,130)
- Lease Liabilities	(4,904)	(4,839)
Total Equity	6,651	6,868

Source: J Sainsbury plc Annual Reports 2024 and 2025

Appendix C: Detailed NPV Calculations

A.1 Calculation of the present value factor.

The present value factor is defined as follows:

$$PVF = 1 / (1+r)^n$$

Where PVF is a present value factor,

r = an appropriate discount rate,

n = the year number of cash flows that will be received.

$$\text{Year 1: } 1 / (1+0.06)^1 = 0.9434$$

$$\text{Year 2: } 1 / (1+0.06)^2 = 0.8900$$

$$\text{Year 3: } 1 / (1+0.06)^3 = 0.8396$$

$$\text{Year 4: } 1 / (1+0.06)^4 = 0.7921$$

A.2 NPV calculation for option A.

$$\text{Year 0: } -£600,000 \times 1.0000 = -£600,000$$

$$\text{Year 1: } £180,000 \times 0.9434 = £169,812$$

$$\text{Year 2: } £330,000 \times 0.8900 = £293,700$$

$$\text{Year 3: } £405,000 \times 0.8396 = £340,038$$

$$\text{Year 4: } £555,000 \times 0.7921 = £439,616$$

$$NPV = -£600,000 + £169,812 + £293,700 + £340,038 + £439,616 = £643,166$$

A.3 NPV calculation for option B.

$$\text{Year 0: } -£1,000,000 \times 1.0000 = -£1,000,000$$

$$\text{Year 1: } £350,000 \times 0.9434 = £330,190$$

$$\text{Year 2: } £387,500 \times 0.8900 = £344,875$$

$$\text{Year 3: } £590,000 \times 0.8396 = £495,364$$

$$\text{Year 4: } £785,000 \times 0.7921 = £621,799$$

$$NPV = -£1,000,000 + £330,190 + £344,875 + £495,364 + £621,799 = £792,228$$

A.4 NPV calculation for option C.

$$\text{Year 0: } -£1,600,000 \times 1.0000 = -£1,600,000$$

$$\text{Year 1: } £417,500 \times 0.9434 = £393,870$$

$$\text{Year 2: } £605,000 \times 0.8900 = £538,450$$

$$\text{Year 3: } £755,000 \times 0.8396 = £633,898$$

$$\text{Year 4: } £980,000 \times 0.7921 = £776,258$$

$$NPV = -£1,600,000 + £393,870 + £538,450 + £633,898 + £776,258 = £742,476$$

Appendix D: IRR Calculations for Option B

B.1 NPV @ 30%

The PV factors at a 30% discount rate are as follows.

$$\text{Year 1} = 1 / (1 + .30)^1 = 0.7692$$

$$\text{Year 2} = 1 / (1 + .30)^2 = 0.5917$$

$$\text{Year 3} = 1 / (1 + .30)^3 = 0.4552$$

$$\text{Year 4} = 1 / (1 + .30)^4 = 0.3501$$

$$\text{Year 0: } -£1000000 \times 1 = -£1000000$$

$$\text{Year 1: } £350,000 \times 0.7692 = £269,220$$

$$\text{Year 2: } £387,500 \times 0.5917 = £229,284$$

$$\text{Year 3: } £590,000 \times 0.4552 = £268,568$$

$$\text{Year 4: } £785,000 \times 0.3501 = £274,829$$

$$\text{Net Present Value at 30\%} = -£1000000 + £269,220 + £229,284 + £268,568 + £274,829 = £41,901$$

B.2 Net Present Value at 35%

The present value factors at a 35% discount rate are as follows.

$$\text{Year 1: } 1 / (1 + .35)^1 = 0.7407$$

$$\text{Year 2: } 1 / (1 + .35)^2 = 0.5487$$

$$\text{Year 3: } 1 / (1 + .35)^3 = 0.4064$$

$$\text{Year 4: } 1 / (1 + .35)^4 = 0.3011$$

$$\text{Year 0: } -£1000000 \times 1 = -£1000000$$

$$\text{Year 1: } £350,000 \times 0.7407 = £259,245$$

$$\text{Year 2: } £387,500 \times 0.5487 = £212,620$$

$$\text{Year 3: } £590,000 \times 0.4064 = £239,776$$

$$\text{Year 4: } £785,000 \times 0.3011 = £236,364$$

$$\text{Net Present Value at 35\%} = -£1000000 + £259,245 + £212,620 + £239,776 + £236,364 = -£51,995$$

B.3 IRR interpolation

$$\text{Lower Rate} + [((\text{NPV at lower} / (\text{NPV Lower} - \text{NPV Higher}))) \times \text{range}]$$

$$\text{IRR} = 30\% + [((£41901 / (£41901 - (-£51995)))) \times ((35\% - 30\%))]$$

$$\text{IRR} = 30\% + [((£41901 / £93996)) \times 5\%]$$

$$\text{IRR} = 30\% + [(.4463) \times 5\%]$$

$$\text{IRR} = 30\% + 2.23\%$$

IRR = 32.2%

B.2 Net Present Value at 35%

The present value factors at a 35% discount rate are as follows.

Year 1: $1 / (1 + .35)^1 = 0.7407$

Year 2: $1 / (1 + .35)^2 = 0.5487$

Year 3: $1 / (1 + .35)^3 = 0.4064$

Year 4: $1 / (1 + .35)^4 = 0.3011$

Year 0: $-£1000000 \times 1 = -£1000000$

Year 1: $£350,000 \times 0.7407 = £259,245$

Year 2: $£387,500 \times 0.5487 = £212,620$

Year 3: $£590,000 \times 0.4064 = £239,776$

Year 4: $£785,000 \times 0.3011 = £236,364$

Net Present Value at 35% = $-£1000000 + £259,245 + £212,620 + £239,776 + £236,364 = -£51,995$

B.3 IRR interpolation

Lower Rate + $[((\text{NPV at lower} / (\text{NPV Lower} - \text{NPV Higher}))) \times \text{range}]$

IRR = $30\% + [((£41901 / (£41901 - (-£51995)))) \times ((35\% - 30\%))]$

IRR = $30\% + [((£41901 / £93996)) \times 5\%]$

IRR = $30\% + [(.4463) \times 5\%]$

IRR = $30\% + 2.23\%$

IRR = 32.2%

Appendix E: Capital Rationing Workings

C.1 Profitability Index Calculations

Option A: $PI = £643,166 / £600,000 = 1.072$

Option B: $PI = £792,228 / £1,000,000 = 0.792$

Option C: $PI = £742,476 / £1,600,000 = 0.464$

C.2 Optimised Allocation Calculation

Available capital is £2,500,000

Step 1: Invest 100% of available capital in Option A (the project with the highest PI)

Investment: £600,000; NPV: £643,166; Remainder: £1,900,000

Step 2: Invest 100% of available capital in Option B (the second option with the highest PI)

Investment: £1,000,000; NPV: £792,228; Remainder: £900,000

Step 3: Invest remainder at 100% in Option C (the lowest PI but it is a positive contribution)

Proportion = $£900,000 / £1,600,000 = 56.25\%$

Contribution to NPV = $£742,476 \times 56.25\% = £417,643$

Total Investment = $£600,000 + £1,000,000 + £900,000 = £2,500,000$

Total NPV = $£643,166 + £792,228 + £417,643 = £1,853,037$