Financial Engineering For Project Finance

Francis Ndupuechi MEng. (Hons.)

Submitted in accordance with the requirements for the degree of PhD.

The University of Leeds School of Civil Engineering

September 2003

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

ACKNOWLEDGEMENTS

Acknowledgement is made of Paul Cleal of PricewaterhouseCoopers, London who made my exposure to project finance in practice possible, and to Paul Newman for his unwavering support and assistance.

ABSTRACT

The provision of public services and infrastructure has evolved over the years and currently, the ever-increasing demand for public services and the greater levels of required renewal and repair of infrastructure have created unsustainable strains on limited public sector resources, leading to a resurgence of private sector involvement in such projects, to a much larger degree than ever before. The key to the success of such privately financed projects is the structure of the financing package.

This thesis traces the evolution of project financing, exploring the financial engineering of funding packages using debt and equity instruments by way of financial modelling. This research derives a generic health sector project for which a financial model is subsequently developed, based on actual project finance modelling practice and incorporating various financial instruments for funding and credit enhancement. Using this financial model, different permutations of financial structure are simulated and investigated; the use of bank loans versus fixed and index-linked bond issues, debt repayment profiles and blended equity structures, are some of the areas examined, as are gearing, credit enhancement, and the sensitivity of different financial structures to inflation.

This thesis offers insightful knowledge on the process of financial engineering for project finance, and on the various instruments and mechanisms that can be employed for project profitability and financial robustness. The development and manipulation of a detailed financial model highlight the role and importance of optimisation of the financial package during modelling and overall, afford the reader a better understanding of the dynamic that exists between the components of a project's financial structure.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

List of Abbreviations

BAFO	Best And Final Offer
BBC	British Broadcasting Corporation
BIS	Bank for International Settlement standards
BOD	Build-Operate-Deliver
BOL	Build-Operate-Lease
BOO	Build-Own-Operate
BOOST	Build-Own-Operate-Subsidise-Transfer
BOT	Build-Operate-Transfer
bp	Basis points
BRT	Build-Rent-Transfer
BTO	Build-Transfer-Operate
CA	Concession Agreement
CAPEX	Capital Expenditure
CEE	Central Eastern European
CIS	Commonwealth of Independent States
CPI	Consumer Price Index
DBFO	Design-Build-Finance-Operate
DBOM	Design-Build-Operate-Maintain
DBOT	Design-Build-Operate-Transfer
DSCR	Debt Service Cover Ratio
DSRA	Debt Service Reserve Account
EBRD	European Bank for Research and Development
ECGD	Export Credit Guarantee Department
EIB	European Investment Bank

EIF	European Investment Fund
FBOOT	Finance-Build-Own-Operate-Transfer
GDP	Gross Domestic Product
GQ	Golden Quadrilateral
IBRD	International Bank of Reconstruction and Development
IFC	International Finance Corporation
IPPR	Institute of Public Policy and Research
IRR	Internal Rate of Return
ITN	Invitation To Negotiate
ITT	Invitation To Tender
KPI	Key Performance Indicator
LIBOR	London Interbank Offered Rate
LLCR	Loan Life Cover Ratio
MoD	Ministry of Defence (UK)
MMRA	Major Maintenance Reserve Account
NAO	National Audit Office (UK)
NHAI	National Highways Authority of India
NHS	National Health Service (UK)
NPV	Net Present Value
NTBI	Non-Time Based Inputs
OECD	Organisation for Economic Co-operation and Development
OGC	Office of Government Commerce (UK)
OJEC	Official Journal of the European Community
OPEX	Operating Expenditure
PEP	Private Enterprise Partnership
PFI	Private Finance Initiative
PPP	Public-Private Partnership

PUK	Partnerships UK
PwC	PricewaterhouseCoopers
QIB	Qualified Investment Buyer
RFP	Request For Proposals
SEC	Securities and Exchange Commission
S&P	Standard and Poor's Corporation
SPV	Special Purpose Vehicle / Single Project Vehicle
TEN	Trans-European Networks
TBI	Time-Based Inputs
V&V	Verification and Validation

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

This thesis reports on research conducted over a three-year period in financial engineering for project finance. Within this account are the detailed results of an extensive literature review, an outline of the practical research conducted with details of the results, and subsequent analysis of the results of the research.

The first section of this chapter gives a brief and initial overview of the general subject area for the research. This is followed by the author's justification of the purpose of the study and the anticipated use that industry might have for the results of the study. Next, the primary aim of the research is stated and the objectives that have been set for achieving this aim are highlighted, and for balance, an examination of the limitations and scope seen to apply to this study, is made. The chapter concludes with a detailed outline of the structure of the report.

1.1 OVERVIEW

Project Finance is a term used to refer to the financing of projects by the private sector, through limited or no recourse financing. In general it is the securing of finance primarily against cash flows generated by a single facility or system (the project), with limited or no recourse to the other entities involved in its realisation. Several projects round the world have been and continue to be realised through project financing. Most of these projects have been infrastructure projects but more recently there has been a great diversification as the concept of project finance is applied to various other sectors. Where the public sector has turned to the private sector to provide infrastructure normally provided by the state, Concessions contracts are normally the means by which the private sector's involvement is implemented.

The use of private finance to provide services and facilities or assets has been around for hundreds of years. In fact, prior to the recent acceptance that provision of infrastructure was in the domain of the public sector, private finance was the only means by which infrastructure could be provided to improve transportation and communication links to generally stimulate economic growth; an early example would be the early Turnpike roads in England. Currently, the strain on the public purse has meant that such provision has in effect gone full circle; with governments increasingly looking to the private sector to finance much needed projects. Such has been the turnaround that in the early part of the last decade all major projects in the UK had to be considered for the viability of private finance. However more recently, with growing expertise and understanding of the risks in project finance, there has been the realisation that private financing is not a panacea. Hence only certain projects are now considered for procurement through the private finance market.

As with most projects, privately financed projects are inherently risky. Due to the differing nature of the contractual and financial arrangements there are risks that are particular to projects financed by the private sector. One, if not the most, fundamental aspect of privately financed projects is the financial engineering that accompanies the project proposal and it is with this aspect of project finance that this study is concerned. Financial engineering in project finance is the structuring of the finance terms of the projects in the most efficient and profitable way whilst maintaining the robustness of the venture. It addresses the source of funds, repayment and debt service structures, the payment mechanisms or the revenue stream, and of course the profitability of the project. Essentially financial engineering could make or break a project and it is on this aspect of project finance that this study focuses its attention.

1.2 PURPOSE

The purpose of this thesis is to aid the formulation of financial packages for privately financed projects, based on the merits and suitability of the financial instruments available, and independent of bias that may arise from familiarity with certain package formats or from lack of understanding and experience.

The author anticipates that the study will be most beneficial to the project companies in the private sector who have limited expertise and knowledge of the instruments involved in financial engineering, depending mostly on specialists in the field. With the growing practice and increasing complexity of partnership arrangements, the public sector could also benefit from this research, as it provides valuable information on options for structuring finance that may be far removed from the sector's usual approaches. It also provides an insight into the field of financial engineering and should hence prove to be a valuable resource to public sector officials involved in the evaluation of project finance tenders. Understanding the processes involved in the structuring of the financial packages will be relevant to countries where concessions are awarded to government owned companies. The study is also useful to the lending sector, which has a need to remain abreast of profitable alternatives in the project financing market as it reviews the practices adopted by the private sector during the preparation of bids. Such insight is particularly useful when performing due diligence on the financial aspects of the bids.

1.3 AIM AND OBJECTIVES

The aim of this research is to improve the understanding of financial instruments used in project financing, and the process of financial engineering, and to provide decision aiding notes and observations on the optimal engineering of financial structures in project finance.

This study seeks to achieve this by ultimately simulating some of the decision-making processes involved in assembling the financial structures for concession type projects. The following measurable objectives have been set as a guide to the study.

1. To review the project finance market, tracing its origins and development, and determining its current form

2. To explore the instruments used in financing projects and their development and application in today's market

3. To collect, analyse and interpret data from the project finance market, and explore permutations of financial structures, using financial tools that may be applied directly to this data.

4. To verify and validate the results and outputs of the thesis.

5. To provide discernible notes and observations on processes necessary for the formulation of an optimal financial structure for a privately financed project.

1.4 LIMITATIONS AND SCOPE

As the project finance market continues in its development there is constant generation of ever more complex and sophisticated mechanisms for mobilising private funds and maximising returns on investment. This in turn gives rise to a vast range of variables and possibilities for research considerations. As with all studies this investigation will have practical limitations; some of these are highlighted here.

There exists a great variation in the available mechanisms for the financing of projects ranging from traditional contracting where the client pays for the works done, through design and build, and on to funding of projects by the private sector. With mechanisms varying further within the private sector, and by industry (energy versus transportation or water for example), this study focuses mainly on projects financed by the private sector on a concession basis. Whilst other sectors are reviewed, simulations and analysis are conducted on a theoretical concession project in the health sector, the analysis of which contributes to the conclusions of this study.

Energy projects have carved themselves a seemingly separate sector within the project finance envelope. Due to the nature of energy development and the limited number of sponsors for energy projects, an almost natural monopoly may have developed within this area of project finance resulting in different rules being applied and different levels of risks being considered in the financial engineering of such projects. It is for this reason that the focus of this research does not rest on energy projects and where reference is made to these projects it must be borne in mind that the existence of certain financial situations may be the exception rather than the rule vis-à-vis project finance as a whole.

In the past few decades the integration of Europe has been a relentless and inevitable phenomenon and for the foreseeable future this growing union is almost inescapable. As a result there has been an incredible amount of development both in infrastructure and in other sectors. Project finance has featured in a great majority of the developments and will continue to do so and for this reason, this study retains events and practice in Europe as a main source of its information. There is however, no geographical limitation on the study focus as the developments in financial issues as addressed here are global in nature and effect, and innovations and practices elsewhere will be looked to when drawing comparisons, and when investigating recent advances and their applicability.

During simulations conducted within this study, capital allowances and taxation requirements have not been applied rigorously as these are outside the scope of this study. Conclusions drawn from the results of analysis regarding repayment of senior debt do not make the distinction between senior debt as loans or bond issues.

Within the analysis of results as performed in Chapter Ten of this thesis, some areas for possible further work is identified. These areas are not pursued in this study as they are considered outside the direct scope of this research. These areas include determination of the level of blended equity gearing at which a change in debt repayment profiles should be considered (see section 10.3), and also the impact of the cost of sponsor or third party provided subordinated debt, on the determination of optimal gearing (see section 10.4).

Due to time limitations, the use of equity bridge loans was not investigated although the financial model developed for this study included this capability.

Finally it must be noted that the pace of evolution of the project finance market has been somewhat overwhelming. As there may have been some changes between the commencement of this study and the conclusion of this thesis, efforts have been made to keep abreast of any such developments but for application of the results of this study, the changes between time of development and time of implementation must be considered.

1.5 OUTLINE

Structurally, this report is in two distinct sections. The first section comprising Chapters One to Five, addresses the first two objectives, whilst the second section consisting of Chapters Six to Ten detail the practical side of this research which serves to realise the other objectives and further develop the first two objectives. Chapter One introduces the study, describing the aims and objectives and revealing the structure of the rest of the study whilst Chapter Eleven concludes the thesis bringing together the salient points of the review of project finance and the results of the analysis conducted in the in the latter stages of this research.

Chapter Two introduces some of the mechanisms and approaches that are available for the financing of projects. Issues for consideration are highlighted and comparisons are drawn between the alternatives with the financial nature of the arrangements as the focus. This chapter serves to focus the study on the financing of projects in the private sector, defining and developing the concept of concession contracts or concession type projects. The evolution of concession projects is traced, and the key parties to the contracts are introduced and their roles defined. The latter sections of Chapter Two highlight the key features of private finance and outline some of the advantages and disadvantages of project finance to the private sector.

Chapter Three is in itself structured in two parts. The first introduces the organisations that are involved in the provision of finance for projects. These include the public sector, commercial banks, pension funds and development banks. Islamic banks are also discussed and the attributes and mechanisms that are particular to each of the introduced organisations are highlighted. These organisations form part of the key participants introduced in Chapter Two. Some of the operations and mechanisms employed by these parties in providing finance are discussed highlighting differences in operations, approach and intrinsic worth. The second part of Chapter Three focuses on the sources of finance that are available to a project promoter and examines the primary categories of funds (equity and debt) provided by the organisations previously discussed, and the roles that these categories play as components of a project's financial structure. Within this section some of the more innovative and novel sources through which funds may be raised for the finance of a project are identified and discussed.

Chapter Four addresses, in great detail, the issue of structuring available financial options for the profitable financing of a project in the private sector. The concept of financial engineering is introduced and defined as involving two processes. These processes, Credit Enhancement and the use of Financial Instruments, are fully explored in this chapter and their application examined. The various tools and mechanisms that are available and that come into play with each of the processes are defined and discussed. Under the heading of Credit Enhancement, the mechanisms of guarantees and wraps are explained and other tools that help to improve the credibility of the project identified. The use of financial instruments to engineer an appropriate finance package is then explored in depth.

The chapter is structured to include a logical and sequential examination of engineered equity and then debt as previously introduced in Chapter Three, with emphasis on opportunities for redesigning their roles and structure within the project. The variation of equity terms is discussed and mention is made of the sale and transfer of equity stakes and the difficult issues of value capture. Debt financing is explored next, examining approaches taken when considering straight bank debt, and discussing the dynamics of bonding issue as well as the pros and cons of engineering a bond element in the debt package. This section contains illustrations given by way of examples of real projects with significant bond issues. A discussion is conducted on other financial engineering tools and approaches such as the use of mezzanine finance, interest rate swaps and project leasing. Their impact on the project structure is examined as well.

Chapter Four also makes extensive use of case studies in revisiting Capital Markets, Financial Institutions and Commercial Exploitation, and the integration of these into the engineered package of finance for a project. The case studies allow an international perspective on the implementation of project finance. Finally in light of the overviews and discussions of earlier sections, an excerpt of the details for a real project is given and is critiqued in the context of financial engineering. This serves to show some of the ways in which an actual project on the ground has engineered its financial elements to improve its creditability and profitability for all concerned.

Chapter Five discusses bid development and issues and considerations of relevance when structuring a bid for a privately financed concession contract. The stages of procurement are introduced and the processes that bidders have to go through within each stage are outlined. The role and development of the financial model is also introduced. The latter sections of the chapter explore some of the strategies that may be adopted by bidders in developing their bids and outline areas that are significant to the development of the financial model such as the constraints in effect and some approaches to dealing with these.

In Chapter Six the process of data capture as adopted for this research is presented. The types of data required are first identified and then classified. The collection of the data is then discussed and some of the difficulties encountered are highlighted. The chapter goes on to outline the initial manipulation and interpretation of the data, and its use to derive a theoretical generic project, which is used for the rest of the study. Chapter Six concludes by outlining the cost and financial profiling of the generic project, and identifying some of the key performance indicators used for assessing the performance of the financial structure of the generic project.

The development of a financial model to represent the financial structure of the generic model as derived in Chapter Six is outlined in Chapter Seven. This chapter initially presents the logic and structure of this generic model and then discusses its individual components and their function. The approaches adopted in developing these elements are also outlined. Optimisation in the context of financial engineering is explored and the different elements that are involved are identified and defined. Chapter Seven concludes by outlining the method of optimising the generic model, designed integrally with the model's development.

Chapter Eight reports on the verification and validation of the financial model to establish confidence in the model's outputs. The role of verification and validation in research is initially introduced and the approach adopted to verify and validate the generic model is outlined. The chapter goes on to discuss the results of the verification and validation techniques as applied to the model. This chapter concludes with an outline of the simulations designed to facilitate exploration of various permutations of financial structure using the generic model designed in Chapter Seven and verified and validated in Chapter Eight.

The results of the simulations are presented in Chapter Nine and any arising issues during the simulation process are highlighted. The chapter is structured to list the simulation results sequentially as outlined in Chapter Eight. The results consist primarily of the measurements of the performance indicators identified in Chapter Six and other observed trends are presented as tables and charts in the chapter, and also within the Appendices of this thesis.

Chapter Ten explores the results reported in the previous chapter conducting an in-depth analysis of the recorded outcomes of the simulations. As part of the analysis further tests are performed using the model, to establish trends and to support inferences made from the initial results. The analysis is conducted and reported in the same order as the simulations. Chapter Ten concludes with a précis of the salient deductions made from the analyses within the Summary section.

This thesis is concluded in Chapter Eleven. Here the elements of the thesis resulting from realisation of the objectives set out earlier in this chapter are highlighted. A summary of the outcomes is made for each objective and the implications outlined. The chapter demonstrates how by realising the objectives, the aim of this research is achieved. Chapter Eleven concludes with details of areas identified during this research that may provide potential avenues for further research.

CHAPTER TWO

FINANCING OF PROJECTS

2.0 INTRODUCTION

This chapter introduces some of the mechanisms that are available for financing projects with an initial discussion of some of the approaches that can be adopted when financing a project. Some issues that must be considered when choosing an appropriate finance mechanism are highlighted and comparisons are drawn between the mechanisms. The main focus of the alternatives is on the financial nature of the arrangements.

Attention is then turned to the financing of projects by the private sector by way of forming Public Private Partnerships (PPP's). Initially a definition for such projects is provided in simple terms. This definition is developed and some key aspects are highlighted and discussed for a better understanding of PPP type projects. The origins of the concept are mapped on the basis of the definition, tracing its evolution and outlining its development, from very early sourcing of finance by private individuals, through to the shift of responsibility for the provision of facilities and infrastructure to the public sector, and on to the recent trends in project finance.

Within this chapter there is also an introduction to the key parties of concession projects and the roles they play. The emphasis placed here on the financial aspects of concession projects is essential in providing a base for further study in later chapters. Where possible comparisons are drawn between the alternatives. Mention is made of issues such as the lifecycle of concession projects, associated risks, and the different types of concession projects.

The latter sections of this chapter are tailored to drawing together the key features of private finance and outlining some of the advantages and disadvantages of project finance to the private sector.

2.1 ALTERNATIVE FINANCING APPROACHES

Morris (1994) reports that there has been a change in forms of financing in the last few decades; from the adoption of limited-recourse financing in the 1970's through the early 1980's where there was a shift from public to private sector financing, to the late 80's where innovations in limited recourse financing, debt, equity, swaps and barter arrangements, as well as some sophisticated co-financing arrangements using bilateral and multilateral aid, and/or exports credits caused financial engineering to become a necessary ingredient for many, if not most major projects.

Funding a project by either the private or public sector requires a financial evaluation and there are various approaches used when engineering the financing of a project, some of these are discussed below. Gerardin (1994) identifies the public sector's financial evaluation methods as being based on a cost benefit or cost effectiveness philosophy; taking externalities into account such as the wider impact of the project on the community and environment. The private sector on the other hand evaluates projects on the basis of the ability of the cash flow to cover debt service, operating costs and capital repayments, and of course the all important internal rate of return (IRR). Although the borrowing costs of government are lower than private borrowing: there could be a 20-40% difference (Muranyi 1998: 4-5), follow-up costs must be considered when deciding to make the investment. Schmidt (1986) reports that a study conducted in The Federal Republic of Germany showed that follow-up costs of public investments, such as maintenance costs, could amount to more than 30% of the investment cost every year. These are some of the issues that must be considered when the choice of finance for a project is to be made.

Various studies to date categorise different mechanisms either under public or private sector financing or even public private partnerships. The author feels that the increasing complexity of financing structures and arrangements now invented for projects causes a blurring of the boundaries between these categories. In this section no attempt is made to categorise the mechanisms. The reader may wish to refer to Nakagawa and Matsunaka (1997) who dedicate a whole Chapter to classifying funding resources. The following sections outline the alternative financing methods.

2.1.1 Traditional Financing

Although not strictly a definitive term, the term traditional is used here to define financing arrangements that involve the client/principal (public sector) paying contractors for works carried out under contract. Sinding states, "Traditionally, private sector involvement in road networks was limited to *implementation* tasks (detailed studies, civil engineering, material and equipment supply) and went through short term or medium term contracts" (Sinding 1997: 55). Road financing was entirely public, and roads were seen and managed as taxpayer supported facilities i.e. free. This method of financing projects resulted from shifting responsibility for infrastructure provision to the public sector over the years.

The funds for these projects come from the tax receipts of the government, which are then allocated in the government's budget. The government can also borrow from the private sector at rates lower than the market rates to finance projects. Although these borrowings are from the private sector they still appear on the government's balance sheets and are taken into consideration by lenders assessing a government's creditworthiness. The public sector provides facilities by awarding contracts for the various works that are involved in the realisation of a project. In the case of a project implemented with the objective of performing public services, all costs are fully paid from the public budget and raised by the public organisation at better than standard money market terms. All risks other than political risks are covered by government guarantees with the private sector's liability i.e. warranty and liquidated damages, being restricted to construction and/or operation and maintenance activities. Although the author does not necessarily agree with Muranyi, who goes as far as stating that there is actually no need for the public organisation to identify, assess and estimate the costs of each risk, as it accepts all project risks, there is an element of truth in his view that must be acknowledged (Muranyi 1998: 3). This reflects the lack of a requirement to ensure a return on all costs incurred in realising a project, and the fact that the public sector often considers the revenue generating potential of publicly funded projects as a secondary issue.

Although the share of projects financed from the public budget is decreasing, it is still one of the main sources of financing in Europe. Bousquet and Fayard (1995) identify Germany, Finland and Denmark as countries that have always financed their roadways from the state budget. However these countries have to consider other possibilities for financing due to the increasing traffic volumes and escalating construction costs, and reliance on ever decreasing budgets. In Denmark where there is no link between public road expenditure and road traffic taxes, the budget of Directorate of Roads fell from DKK3.7 billion in 1972 to DKK2.6 billion in 1995 with a overall traffic increase of 75% in the same period.

The experience of the Highways Agency in the UK with traditional financing for roads may reflect the general public sector's views of the application of traditional financing to certain projects. The previous method used by the Agency for procuring construction and maintenance of a road was to let contracts for separate tasks. For example, there would be a design agent, a contractor and a maintenance agent. Although each party may have been performing its specified task efficiently, there was insufficient incentive for the parties to collaborate to maximise overall value for money for the Agency, especially in terms of whole-life costs and quality.

The Agency would let a construction contract, which required the contractor to build to the Agency's design. (More recently however, the Agency has let Design and Build contracts that link these two functions: see section 2.1.3) Payment would be made by the Agency on the basis of measured progress in construction. Fixed rates were agreed on the basis of a detailed specification. However, the assumptions on which the contractors gave fixed rates often led to numerous claims. Once a contract was let and the contractor was on site, claims could be made against the Agency for additional costs. For example, claims would be made for unforeseen ground conditions, necessary variations to the works for carriageway and structures or measurement variations. A National Audit Office report stated that there was an average increase of 28% between tender and out-turn price, based on a sample of 42 road construction contracts each worth over £0.5 million (although a proportion of the cost increase quoted resulted from the Agency's required changes). Increase of this magnitude has a significant effect on Agency budgeting (Highways Agency 1998).

2.1.2 Road Funds

Road funds are a body of funds set aside by the government for the provision of roads and highways and may also be set up with different objectives; construction or maintenance for example. Road funds are used extensively in Europe but the sources of revenue for these funds often differ greatly. For example the Luxembourg road fund looks to the State budget for its source and the national road funds in the Netherlands are fed from two road taxes (including fuel tax) and from the economic structural fund (Bousquet and Fayard 1995: 122).

Excerpt 1. "No guidelines and accounting instructions were issued to enable effective management of the funds raised..."

Excerpt 2. "Records of quantities of fuel sold...suggest that a substantial sum of money was collected from road users but was not paid into the road fund."

Excerpt 3. "About $200,000 was used to purchase vehicles which were never delivered to the road agency."

Excerpt 4. "Funds were used to pay hotel bills, including substantial amounts billed as extraneous expenses."

Excerpt 5. "Substantial sums were spent on refurbishing offices, purchasing 1,800 yards of carpet, carrying out repairs at State House and the Parliament building, etc."

Excerpt 6. "We were unable to certify the account due to a general lack of financial information and lack of specific information on the revenue side."

Table 2.1: Excerpts from Audit Reports on selected First Generation Road Funds

Generally the funds have fuel tax receipts allocated to them and also other earmarked public revenues. The road funds have evolved over time from those termed as First Generation Road Funds to the current Second Generation Road Funds as identified by Heggie and Vickers (1998). There have been several problems with road funds and the second generation seeks to rectify these. Some of these are described by Heggie (2000a) who illustrates the extent of these problems by the excerpts in Table 2.1, which he takes from audit reports carried out on road funds set up in various countries. Heggie (2000b) describes the second generation of road funds and the requirements for their effective implementation.

2.1.3 Design and Build

In the report titled *Survey of problems before the construction industries*, Sir Harold Emmerson stated, "in no other important industry is the responsibility so far removed from the responsibility for production" (Emmerson 1962). Very gradually, the building industry has evolved and introduced the concept of Design and Build to combat some of the problems that are symptomatic of traditional financing. Although each party may have been performing its specified task efficiently, there was insufficient incentive for the parties to collaborate to maximise overall value for money for the client, especially in terms of whole-life costs and quality (Highways Agency 1998: 7).

The Design and Build concept is the procurement position that exists where one organisation is responsible to the client for both design and construction. The client requires in-house skills to prepare the requirements for the project. Turner (1990) considers the Design and Build concept to have been around for quite some time although under different names and variations, some of which are Package deals and Turnkey projects. His text may be referred to for details on these variations.

Some of the characteristics of Design and Build projects are that the client is provided with an early financial commitment and that the combined responsibility for design and construction produces economies for both the contractor and the client. The contractor is also allowed a degree of innovation that creates savings for both parties.

Walker (1989) however highlights some of the concerns of clients that may wish to utilise the Design and Build approach. Whilst assenting that the effective integration of the design and construction processes is theoretically higher with the Design and Build contract, Walker points out that the large majority of firms offering this service originated as building contractors, and many also offer competitive contracting as well as a Design and Build service.

As a result of these origins, there may be a tendency for these firms to be orientated towards construction activity. This may have detrimental consequences for the integration of the design and a subsequent effect on its quality.

Nevertheless the Design and Build approach has been used for numerous projects; by carefully structuring the bidding requirements and including stringent performance criteria some of the problems can be overcome.

2.1.4 Shadow Tolling

Shadow tolls are payments based on traffic levels that are made by a government to a contractor or operator to finance the construction, operation, or both, of a highway facility. The payments are termed "shadow" tolls because although they are directly based on traffic levels, they are not paid directly by users, and users see no tollbooths or other visible evidence of the payments. Shadow tolls are like conventional tolls, because the owner of the road collects revenue based on how many vehicles choose to travel the road. Unlike conventional tolls, however the motorists do not pay the tolls. Under a shadow toll agreement, a public entity such as a city or county forms a partnership with a construction company or consortium to build a road with privately raised capital. In North America for instance, the agreement stipulates that the public entity reimburses the private partner based on levels of traffic on the road, so that if traffic levels are below expected then the public sector would pay less for the road and the private partner would pay more. One benefit of shadow toll agreements, therefore, may be that the private partner shares in the risk associated with new road construction, whereas with conventional toll roads financed by the public sector, it is typically the public entity (and/or bondholders) that bears traffic risk, although these are not widespread in Europe. While actual experience with shadow tolls has yet to develop in the US, the report, *The Selective Use of Shadow Tolls In The United States*, explores the concept in greater detail (FCN 1998).

As mentioned earlier there are differing schools of thought on classification of resources and shadow tolls are not excepted. The Design-Build-Finance-Operate (DBFO) method of road construction has been used extensively in the UK and it would appear from the Highways Agency's approach, that shadow tolls are considered under the umbrella of private finance. Also because the payments are termed "tolls," many assume that shadow tolls are an alternative revenue source. Other sources consider it more accurate, from the perspective of a public sponsor, to consider shadow tolls as a type of payment structure where governments may use any kind of tax or fee revenue as revenue sources for the shadow toll payments.

As with conventional tolling, shadow tolls can amortize capital costs over the useful life of the investment and can create early completion and other incentives by sharing traffic and other risks with the private partners. A typical shadow toll agreement would be made between a government and a private contractor/operator for a specific construction or reconstruction project. Under a Design-Build-Finance-Operate arrangement payments to the contractor are based on traffic volume, so the contractor benefits by completing the project early, avoiding construction delays, and ensuring a long-lived road.

As highlighted by Manoj (2000), for any mechanism applicability needs to be assured before implementation. Manoj cites the case where, in its desperation to complete the construction of the much-publicised highways along the Golden Quadrilateral (GQ) by December 2003, as mandated by the Prime Minister, the National Highways Authority of India (NHAI) is opting for an annuity payment method with private sector participation on BOT (build-operate-transfer) basis.

Experts advised the NHAI, perhaps rightly, that direct tolling would not be possible on many stretches of the National Highways because of lack of viability and effective access control. As with direct tolling, the response of the investors to shadow tolling too, it is felt, will be lukewarm as the private operators opting for it will be paid a certain amount calculated on the basis of the number of vehicles actually using the highway i.e. the investors would remain exposed to traffic risk. Though the shadow tolling method removes the additional revenue collecting costs and the foreseen problems of the direct tolling method, its implementation may be slightly challenging because of the difficulty in ensuring an acceptable level of monitoring of traffic flows. The other problem with shadow tolling is that the payouts involve use of traffic flow forecasts, which are quite often unreliable, thereby impacting the effectiveness of the bidding process.

For these reasons the annuity method mentioned above was chosen with the payment of a fixed semi-annual sum by the NHAI to the project operator during the concession period to compensate for the capital cost, and operational and maintenance expenses of the project, plus a certain percentage of returns thereon. The private operator will be paid the annuity amount if operation and maintenance of the highway are as per standards specified by the NHAI in the concession document. This however, would seem slightly removed from the concept of private finance, as the risks taken on by the private sector appear limited. Manoj points to the success of the annuity approach in the Panagarah-Palsit pilot project on NH-2 in West Bengal, which, as he also notes, is in the financial bidding stage. This may be a success in terms of financial closures or attraction of private interest but there is still a long way to go before the Panagarah-Palsit project can be hailed a success for both the private and public sectors.

Perhaps the NHAI's apparent rush to sign up private developers for other projects on an annuity basis rather than using shadow tolling is understandable as the Tuni-Ankapalli section on NH-5 in Andhra Pradesh which was supposed to be a pilot for shadow tolling, made little headway. This too has been offered to prospective operators on an annuity basis.

Nevertheless it may be difficult to evaluate the effect of a shadow toll payment structure on net public sector financing costs, particularly if tax-exempt debt is available through a government agency or non-profit conduit. In general, the security of shadow toll debt is directly related to the perceived security of the underlying revenue source that a government pledges for repayment. However, contractor incentives and limits on financial risk provided by the shadow toll structure may lower the financing costs for shadow toll debt, in comparison to an issue that does not involve a shadow toll structure (Roskin et al 1998: 6). Roskin et al identifies project access to non-taxable debt and stable and creditworthy underlying repayment sources as prerequisites for the best implementation of shadow tolls.

2.1.5 Public Private Partnerships

Due to the lack of budgetary sources and substantial public sector indebtedness, governments have to decide whether to implement or postpone required public service developments. This decision must be taken with the understanding that in case of deferred implementation the public and social benefits will be deferred as long as the required project finance is not raised. In the case that the development cannot be delayed any longer public resources may have to be reallocated, or increased by raising private finance (Muranyi 1998: 1-2). The resource reallocation mentioned here includes borrowings that may be made by the public sector, as these are included in the governments' balance sheet.

Due to their inability to match the demand for public utility spending, governments are increasingly looking to the private sector to finance projects. Such ventures are termed Public Private Partnerships (PPP's). The financing of projects within the private sector is a complex task and involves established financial institutions and experts. In the U.K it has resulted in the establishment of the Private Finance Initiative (PFI) and more recently, Private Enterprise Partnerships (PEP) and Partnerships UK (PUK), all classed as Public Private Partnerships. Round the world other mechanisms have been set up to smooth, encourage and regulate private financing not just for the construction industry but in all major service and facility providing sectors (Carlile (1994: 53).

Figure 2.1 illustrates the combination of public and private sector financial involvement that can be used to finance a project. In the true sense of the term, with private financing, 100% of the funds are from the private sector. These funds are raised through equity paid by shareholders and from the loans raised by the project company. The availability of these funds depends mostly on the revenue generating potential of the project. However, as a majority of the more commercially attractive projects are completed there is now a leaning towards greater financial partnership between the private and public sector. With the public sector taking more risk than previously in concession contracts, projects that may have been deemed too risky by the private sector are able to go ahead, providing even more required infrastructure and services (Richmond-Coggan 1995: 300-302).

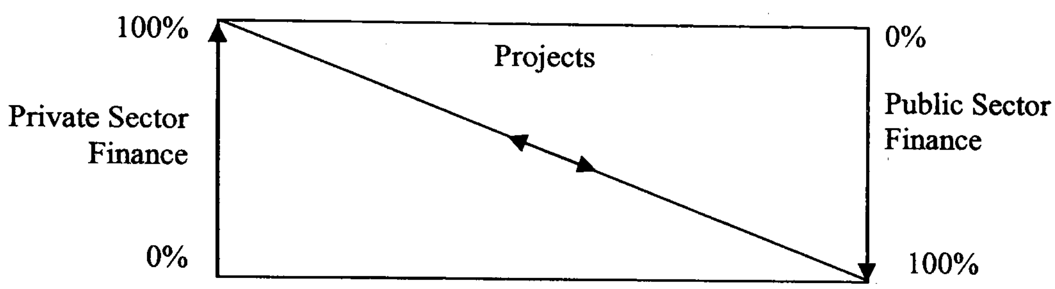


Figure 2.1: Possible percentage contributions by the public and private sectors to the finances of a project

Projects can be financed by the private sector by various methods and examples are out and out privatisation, and joint ventures between the private and public sector (PPP). One of the PPP techniques is the use of concession contracts. This involves the granting of a concession by the public sector for a private company to design, construct and operate a facility for a concession period of say 30 years. During this period the company 'owns' the revenue stream of the facility and from it any debt incurred is serviced and eventually paid off, operating costs are paid and returns are made to investors in the project, i.e. shareholders.

At present there is increasing complexity in the mechanisms that are applied to finance projects and some of these, although classed as private finance, involve the public sector to a degree. In PPP's involving concessions the public sector needless to say is at pains to limit its financial commitment to the project whilst still ensuring that it obtains value for money with regard to successful risk transfer. Throughout this study concession contracts and PPP's are considered interchangeable and as such the terms are used to that effect (Cornwell 2000). The rest of this chapter will focus on PPP's involving concessions.

2.2 DEFINITION OF CONCESSION PROJECTS

A concession contract can be defined as a project based on the granting of a concession by a principal, usually a government, to a promoter, sometimes known as the concessionaire, who is responsible for the construction, financing, operation and maintenance of a facility over the period of the concession before transferring the facility, at no cost, to the principal as a fully operational facility. During the concession period the promoter owns and operates the facility and collects revenues in order to repay the financing and investment costs, maintain and operate the facility and make a margin of profit (Merna 1994: 1).

Concession projects are also known as BOOT projects (Build, Own, Operate, Transfer) and have several documented definitions of which the above is one (Carlile 1994; Richmond-Coggan 1995). Concession or BOOT projects, in effect, allow governments, governmental agencies or regulated monopolies to obtain the provision of a service or facility to the public sector whilst incurring little or no cost. Contracts are awarded to organisations that commit to providing the service or facility in exchange for a concession to run the facility and generate revenue. For the promoters to 'own' the revenue stream or 'cash flow line' for the period of concession, they must ensure that the facility or service provided meets the required specifications and standards required by the principal.

2.3 THE EVOLUTION OF CONCESSION PROJECTS

The development of the involvement of private sector finance in providing infrastructure can be traced to Europe, during the second half of the seventeenth century, when suddenly there was a demand for mass travel and long distance commerce. The details of these developments have been well documented and reference may be made to other texts (Perkin 1971 & Williams 1883). The modern concept of concession projects is based on the turnkey contracts where the promoter is responsible for the project from conception to completion and effectively hands the "key" of a facility ready for immediate operation to the client. Usually, after handing over the facility, the turnkey contractor is on hand to ensure satisfactory training of operators so that the facility meets the required performance standards. Concession contracts are, in effect, an extension of this period such that the promoter is in control of the facility for a concession period, after which the whole facility returns to the principal. The fundamental difference between turnkey projects and concession contracts is in the finance; turnkey contractors bid for the project on a unit rate or lump sum basis and are paid accordingly whilst for the concession contract, the promoter is responsible for arranging the finance to fund the project from conception through to design, construction and operation.

Even though the concession type projects are described as an evolution of the turnkey projects, private involvement in providing public infrastructure through concession contracts can be traced back further still; to the eighteenth century. A notable example was the concession obtained by the Perrier Brothers to build an aqua-duct providing water to the city of Paris and to realise revenue by charging for the water supplied. Other examples include the Suez Canal and the Trans-Siberian Railway; both raised private finance through bond and share issues and then charged users a fee to generate revenue to cover risks, construction and operation as well as financing costs, and to provide a margin of profit (Pudney 1968).

In 1982 the volume of major construction work activity declined drastically, with international work declining by as much as two-thirds. Contractors retrenched severely letting go of huge numbers of staff, as the world economy appeared to offer no prospect of steady construction growth. Contractors, now unable to survive merely by responding to Requests For Proposals, looked inwards to their development and marketing activities. They realised that to stay involved in major projects they would have to put money and effort into initiating them. Financial engineering led by contractors hence became established in the initiation of projects (Morris 1994: 170-171)

Effectively, the construction industry had to take on the responsibility of creating a demand for it's products and also make the provision of such products possible. Governments' frequent decisions not to go ahead with projects, regardless of the demand for them, stemmed more from their entwined political and economic positions, with the impact on governments' balance sheets and their accountability to the country, crucial factors in deciding whether or not to proceed with projects (Rendbaek 1982).

Concession projects have benefits for both the industry and principals. By fronting the cost of carrying out these projects the private sector ensures that there is continued growth in the construction industry. Also, if effectively managed, the financial gains can be far greater from a concession project than from projects procured through the traditional approach. The principals are able to place major projects, mostly for infrastructure, in the private sector rather than providing these facilities themselves. By granting a concession the principal is assured the provision of a facility to meet required performance standards whilst risks associated with the project are transferred to the promoter. The tool for this risk transfer is the Concession Agreement, i.e. the contract between the principal and promoter (Scriven 1995: 98-101). The Concession Agreement is discussed in section 2.6.

As with all projects the concession contract has a beginning and an end. There are different parties and 'players' involved at different stages of the projects lifecycle from conception to completion. The promoter is able to involve these other entities from different sectors and to transfer risk to them by entering into Secondary Contracts. These contracts or agreements are tailored to suit the parts played by the parties in line with achieving the project's objectives. The roles of these sectors are expanded on later in this chapter.

The financing of concession contracts is a complex task and involves established financial institutions and experts. In the U.K it has resulted in the establishment of the Private Finance Initiative (PFI) and more recently, the Private Public Partnerships (PPP), and round the world other mechanisms have been set up to smooth, encourage and regulate private financing not just for the construction industry but in all major service and facility providing sectors (Carlile 1994: p53). In the 'true' definition of concession contracts, 100% of the funding is from the private sector, however as a majority of the more commercially attractive projects are completed there is now a leaning towards a financial partnership between the private and public sector. With the public sector taking more risk than normal in concession contracts, projects that may have been deemed too risky by the private sector are able to go ahead, providing even more required infrastructure and services (Richmond-Coggan 1995: p300).

Both sectors are aware that raising finance has its associated costs. The government has to bear the cost of revenue collection itself and government borrowing also has its charges. However, private borrowing incurs much higher costs than government borrowing and the financial plan for a project often has a greater impact on its success than the construction or design costs. Hence the use of private finance instead of public finance has to be justifiable as a more cost-effective option. The fact remains that government financed structures continue to prevail in the developed and less developed world, as well as in those markets where the project provides a service in a monopolistic environment, which for political reasons it is not felt appropriate to leave solely to the private sector (Blaiklock 1992: p212). Indeed in many Central Eastern European countries, the governments cannot avoid the commitment of sufficient public funds to the development of infrastructure even if there exist inventive combinations of tools for private financing. This is primarily due to the low demand volume, poor paying capability, low willingness to pay tolls and the resistance to privatisation of traditionally public services (Muranyi 1998: p7).

2.4 BOOT PROJECTS

Contractor-led financial engineering in the initiation of projects provided the conditions for the development of build-own-operate-transfer (BOOT) type of projects. These concepts had already been applied in various forms and early examples are given in section 2.3, but the emergence of the BOOT concept was at a time that privatisation was beginning to be looked at as a crucial policy for the improvement of infrastructure and industrial efficiency. Suddenly there was the possibility to allow contractors to build and operate roads, power stations and other forms of infrastructure at no cost to the public sector. BOT projects (build-operate-transfer) are a slight variation of the BOOT concept, the main difference being in the ownership, which does not lie with the promoter but is retained by the principal. The initiation of a BOT project in a developing nation context was in 1984 by the Turkish Prime Minister, Turgut Ozal, for the Akkuyu nuclear power project. He introduced the term BOT; a formula often referred to as the *Ozal Formula.* The Turkish Government published a list of several proposed BOT projects but progress was slow and some of the pitfalls of BOT to contractors became apparent, as by 1989 even the Akkuyu project had not yet finalised it's financing.

The engineered finance for a BOOT project is crucial to the award of a concession and its success. This is again illustrated by the Hong Kong Second Harbour Crossing contract, awarded in 1986 to a consortium led by a Japanese contractor, Kumagai Gumi, whose tender was not the best either from an engineering or cost view but won on its concession terms and financing plans (Morris 1994: p171).

In awarding BOOT contracts the use of private finance instead of public finance has to be justifiable as a more cost-effective option. Raising finance has its associated costs; the government has to bear the cost of revenue collection itself and government borrowing also has its charges. However, private borrowing incurs much higher costs than government borrowing and the financial plan for a project often has a greater impact on its success than the construction or design costs. All these factors need to be taken in consideration when deciding whether or not to fund projects partially or fully in the private sector (Smith A.J 1999: p65).

Concession contracts are described by many other acronyms, some of which include:

FBOOT	Finance-Build-Own-Operate-Transfer
BOO	Build-Own-Operate
BOL	Build-Operate-Lease

DBOM	Design-Build-Operate-Maintain
DBOT	Design-Build-Operate-Transfer
BOD	Build-Operate-Deliver
BOOST	Build-Own-Operate-Subsidise-Transfer
BRT	Build-Rent-Transfer
BTO	Build-Transfer-Operate
BOT	Build-Operate-Transfer

Many of these are alternative names for BOOT projects and are used to define projects that differ in some aspects to BOOT but have adopted the main function of the BOOT strategy. For instance, the transfer term of BOOT projects implies the transfer of the facility to the principal after a concession period; this cannot be termed as real privatisation. However in BOO projects the promoter owns the facility for as long as desired and this is more in the vein of privatisation (Smith N.J 1995: p250).

2.5 THE LIFECYCLE OF CONCESSION PROJECTS

Like all civil engineering projects, each concession project is unique, has a definable beginning and end and is undertaken to achieve certain objectives. There are different stages all through the lifecycle involving different organisations. Figure 2.2 is a schematic of the lifecycle of a typical concession project and shows the different stages of the lifecycle.

The diagram also shows the trend of cash flow as the project progresses; obviously for the project to be a financial success the cash flow line must end on the positive side. The duration of concession contracts vary depending on the nature of the project and the predicted revenue stream, and can last from 15 to 60 years. A critical factor in the success of the project is the early appointment of a project manager who must be involved with and have control of the project from conception to completion.

During the conception stage of concession projects principals determine the need for a facility or service and then ask for conceptual designs. Promoters can also come up with a conceptual idea and then try and sell it to the principal. Whether or not the acceptance of a conceptual design means that the same promoter is awarded the concession depends very much on the tendering practices and legislation of the region. Once the concession is awarded the final detailed design of the project starts in earnest. Construction can only start after a design is sanctioned. The design of different elements may be sanctioned at different times. It is during construction that most of the cost is incurred as can be seen from Figure 2.2. Careful planning and management by the promoter must permeate all levels of construction, as well as all other stages, to ensure that tight control is kept on the progress of the project. Maximum use must be made of the concession period to generate revenue and hence the payback period must be protected.

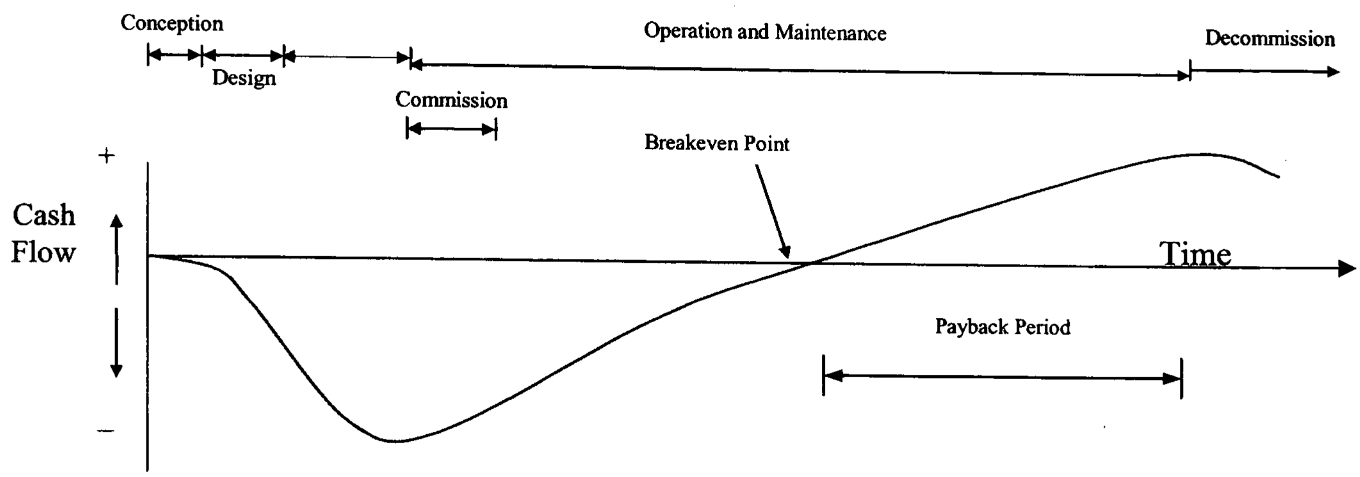


Figure 2.2: The lifecycle of a typical concession project showing cash flow

Smith identifies two phases within the lifecycle where risks associated with financing concession projects occur (Smith 1999: p148). These are:

- The pre-completion phase, i.e. relating to construction risks;
- The post-completion phase, i.e. relating to operational risks with the first few years of operation involving the greatest risk.

These phases are noted here, as a typical concession would most probably include refinancing or restructuring of the borrowing arrangements at the end of construction. This is due to the fact that the risks are greatly reduced post construction and the promoter is able to secure better financial terms against a tangible facility that is able to generate revenue. The terms may be more favourable for the promoter if a satisfactory revenue stream can be demonstrated.

2.6 THE CONCESSION AGREEMENT

The concession agreement (CA) is the contract between the principal and the promoter organisation that sets out the terms and the conditions of the concession, and is also used as the tool for transferring risk from the principal to the promoter. It also outlines any guarantees by the principal, the risks taken on by the promoter, the revenues packages, the payback mechanism, and the terms of the concession relating to the facility. The submitted bids for the project are evaluated based on the terms and conditions of the Concession Agreement. Figure 2.3 illustrates the contractual relationship between the principal and promoter.

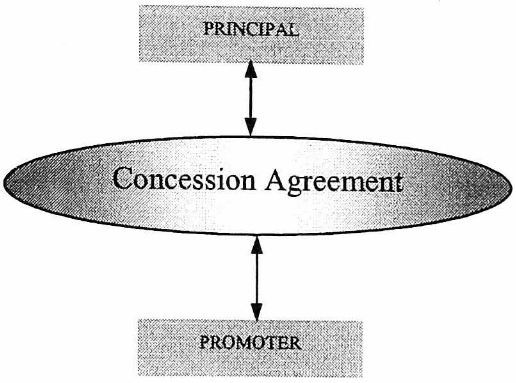


Figure 2.3: The Concession Agreement (CA)

The structuring of the contract is a key ingredient in attracting private finance; very rigid and inflexible contracts are regarded with suspicion by the private sector. For instance, a principal that reserves the right to terminate the concession at will, may frighten off promoters and may find the project impossible to finance. The roles of the principal and promoter are examined below.

2.6.1 The Principal

Normally referred to in traditional contracts as the client, the principal is the body responsible for awarding the concession for the provision of the facility and who, on expiry of the concession period, takes on full ownership of the facility. Principals are normally governments, government agencies or regulated monopolies. This is normally the extent of the involvement of the principal in the provision of the facility but sometimes the principal may offer guarantees or provide assistance in a legislative capacity. Guarantees may be in the form of guaranteed minimum demand or guaranteed supply. Occasionally principals may guarantee a percentage of the required loans.

Principals are keen to transfer all the manageable risk to the promoter organisation and their interests are normally limited to ensuring the continuous provision of a service or facility to the public. The terms and flexibility built into the concession agreement enable them to regulate the project and take necessary measures to achieve this.

2.6.2 The Promoter

In concession contracts the promoter takes on the functions normally attributed to the client in traditional contracts. Also referred to as a Single Project Vehicle or Special Purpose Vehicle (SPV), the promoter organisation is often a result of several organisations coming together and creating a single independent company for the purpose of realising a particular project. An SPV often has minimal or no asset value and often consists of construction companies or operators in a Joint Venture that incorporates constructors, contractors, operators, suppliers, vendors, bankers, business ventures, lenders and shareholders. The promoter, having no capital assets and yet bound by contract to the principal under the terms of the concession agreement, will therefore use secondary contracts to transfer the risks of the project to other parties. The promoter is responsible for attracting finance for the project and is responsible for ensuring the success of the project, and that the following objectives, typical of concession contracts, are met:

a) Minimum capital cost and minimum risk of overrun;

b) Minimum operating cost;

c) Maximum revenue stream.

Some of the main challenges faced by promoters become apparent here – there is often conflict in achieving (a) and (b) together as projects that generally require minimum initial capital expenditure (CAPEX) often need large operating expenditure (OPEX). Conversely, minimum OPEX normally implies large CAPEX. Also the user revenue might be subject to fixed caps, which dictate the maximum levels of revenue. Another question to consider is: How do you attract the vast sums of money necessary to finance a project that is being undertaken by a company with no capital assets and hence minimal value upon liquidation? This can be difficult and complex due to the risks that are inherent in construction projects. More so for international construction projects where some of these inherent risks are not obvious from the start, even to experienced contractors. Contracting on the international stage brings with it more risks and variables such as politics, different economies, market fluctuations, inflation and devaluation.

The continual change that occurs in these areas could have a significant impact on a project's outcome where the project operations are balanced between two or more countries.

2.7 SECONDARY CONTRACTS

The promoting organisation in accepting the risks transferred to it from the principal by the concession agreement is not in a position to retain much risk, as it has very little asset value; The promoter for the Dartford Crossing concession for example, had an asset value of around £100. These risks need to be transferred or allocated to other parties; parties capable and in a position to deal with the risks effectively. This allocation is done by secondary contracts that set out the risks accepted by each party and the terms and conditions of their involvement in the project. The terms of the secondary agreements must be in line with the concession agreement.

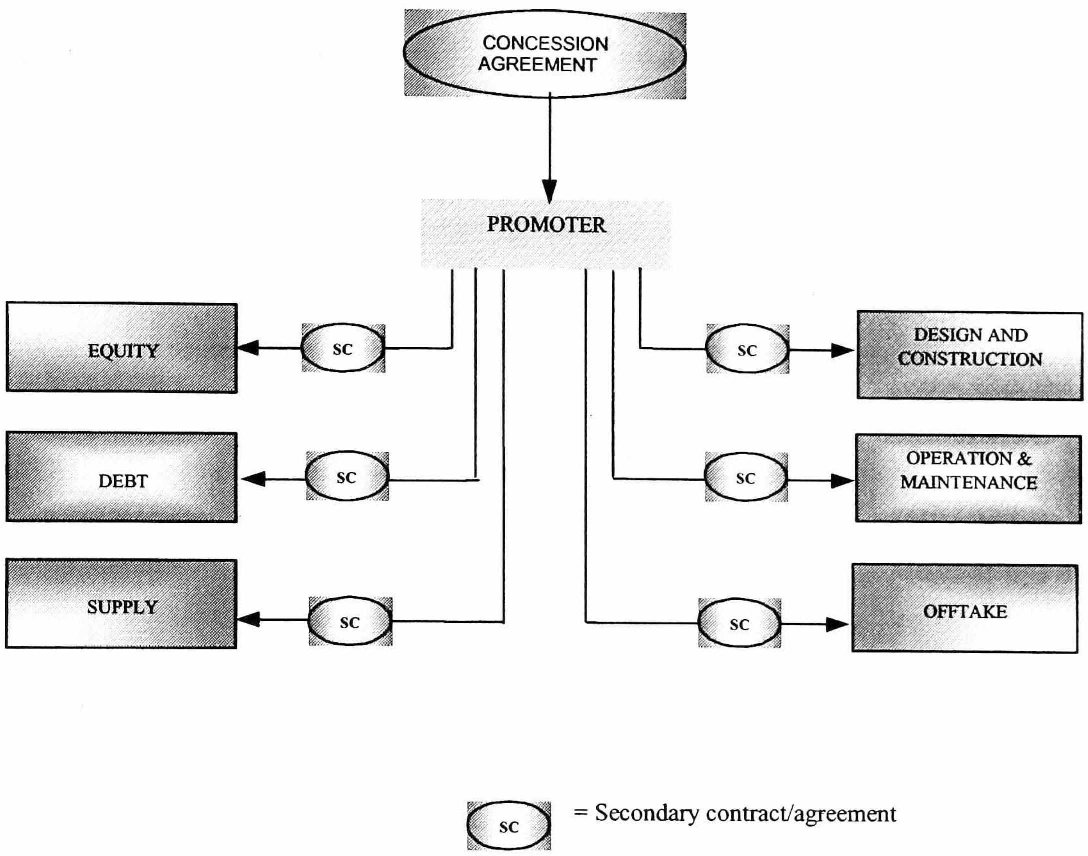
It is not uncommon for divisions of one or more members of the promoter organisation to be contracted on this basis. Although contracted on a separate basis, the presence of part of the promoter organisation, particularly in the construction phase, introduces an element of self-policing; having vested interests in the project as part of the parent promoter, the contractor is encouraged to keep costs down and discouraged from making excessive charges that might adversely influence the success of the project as a whole. The other members of the promoting organisation can always bring pressure to bear on fellow partners whose operations might be 'rocking the boat'.

It is essential that accepted and well-understood dispute resolution procedures are in place to deal with any grievances. The promoter has to co-ordinate the activities of all these third parties at the different stages of the project. The following section highlights the roles played by organisations under the various secondary contracts.

2.8 PARTIES TO SECONDARY CONTRACTS

There are several other sectors that are involved in the realisation of the project as shown in Figure 2.4. Organisations in these areas enter into a contractual relationship with the promoter and play different roles in delivering the final end product of the project. There are six main areas in which the promoter is able to transfer risk and these are illustrated in Figure 2.4. Again this risk transferral is by form of contract documents i.e. secondary contracts/agreements.

Equity: Parties wishing to invest in the project may purchase equity or provide goods in kind. Equity finance is usually an injection of risk capital into the venture and such equity/share holders may include suppliers, vendors, constructors, major financial institutions, operators and private individual shareholders. These equity providers are compensated with dividends from profits if the venture is successful, but no return should it become loss making. The amount of equity raised depends on the terms of the concession agreement or the Loan/Equity ratio required by the lender, typically 2 to 20%. The finance provided by equity is usually an indication of the promoter organisation's commitment to the project. It also forms the initial cash inflow to the project and is normally recouped last, after all debts have been serviced.



(Adapted from Merna; 1994, p2)

Figure 2.4: The secondary sectors involved in a concession project

Debt: Normally, the larger percentage of the finance for the project is obtained in the form of loans. The lenders are often a syndicate of commercial banks, niche banks and pension or export credit agencies. In most cases one lender takes the lead role for the lending consortia and enters into a loan agreement with the promoter. The lenders have no contractual ties with the actual construction. Typically the lending is in the form of "limited recourse" financing where the recourse of the banks for the repayment of the loans is limited to the project company and the assets and contracts of the particular project.

Debt and Equity are the primary categories of funds for projects and are examined in greater depth in the following chapter. The following areas are mentioned here for completeness and do not form part of this study, which takes financial arrangements as its main focus.

Supply: Suppliers are often private companies, state agencies or regulated monopolies who enter into a supply contract to supply raw materials for the duration of the operational period. This contract transfers the risk of lack of raw materials to the supplier.

Off take: An off take contract is that entered by the promoter with the users of the facility. These contracts are normally present with contract-led projects such as power generation plants when the promoter organisation secures guaranteed sales of the output of the facility. A well structured off take contract, when complemented by a supply contract, more or less assures the financial viability of the project. Contracts are less possible in market-led projects such as toll roads and estuary crossings, where the revenue is collected directly from the users.

Operation and Maintenance: The risks associated with the operation of concession contract facilities are transferred by the promoter organisation to a specialist operator company or a company drawn up particularly to run the facility. Their activities and efficiency are crucial to the success of the project as they are responsible for the payback period of the cash flow curve (see Figure 2.2). The methods employed during this period are normally geared towards maximising the opportunity for revenue collection in line with the terms and conditions set out in the concession contract. For projects where decommissioning of the facility is a requirement care must be taken to control the final declining gradient of the cash flow line.

Design and Construction: The contractors responsible for the design and construction of the facility are more often than not, members of the promoting consortia or equity providers. Hence they have vested interests in the success of the project outside the design and construction. They assume risks associated with designing and putting up the facility by entering into a contract with the promoter. Most of the project cash outflow occurs at this stage of the project and strict monitoring and management is required to ensure that the depth of the cash flow curve is not in excess of the planned expenditure. A self-policing relationship is created when the contractors are part of the promoting organisation and any deepening of the cash flow curve by exorbitant contractor charges is checked by other members of the consortia. In any case, the extension of the payback period would not be in the interests of the contractors' investments into the project.

The engineered financial plan and attributes of the project as a whole, depends on all elements of the organisational structure in Figure 2.4; each with a different perception of the risks involved.

2.9 FEATURES OF PROJECT FINANCING

This section summarises the relevant features of project finance as are related to this study and is compiled from the topics discussed earlier in this chapter.

Simply put, project financing is the raising of funds based purely on the merits of the relevant project (Macquarie 1996). Hoffman elaborates rather lengthily on this definition by stating that project financing is generally used to refer to a non-recourse or limited recourse financing structure in which debt, equity, and credit enhancement are combined for the construction and operation, or the refinancing, of a particular facility in a capital-intensive industry, in which lenders base credit appraisals on the projected revenues from the operation of the facility rather than the general assets or the credit of the sponsors of the facility, and rely on the assets of the facility, including any revenue-producing contracts and other cash flow generated by the facility, as collateral for the debt, Hoffman (1989).

There are general features that exist in project financing although there may be variations from project to project, and those highlighted below can be considered typical.

- A unit is normally set up specifically for the project and normally referred to as a special-purpose vehicle (SPV) or project company. This unit is of minimal asset value and comprises a Joint Venture that incorporates members of construction companies or operators, suppliers, vendors, bankers, business ventures, lenders and shareholders (normally all are project participants); The SPV is a single independent company for the purpose of realising a particular project.

- Bank debt is usually the primary source of funding and equity from the project company or other shareholders is always committed and sometimes subscribed prior to the provision of any debt finance. The debt and equity providers thoroughly assess the project's cash flow, projected or otherwise, subsequent to investment.

- Equity distributions are subordinated to operating costs and debt service obligations and once the project is operational, the lenders have no or very limited recourse to the credit of the project's sponsors.

- Due to the nature of project financing there is a heavy dependence on contractual commitments between the project participants. As these projects are traditionally capital intensive, the project sponsors try as much as possible to ensure that the liabilities of the projects are kept off their corporate balance sheet. By implementing non-recourse financing they are able to utilise higher leverage, minimise the gearing impact on their corporate balance sheet and are able to finance larger projects than their corporate credit standing might otherwise permit.

2.10 Advantages Of Project Finance to The Private Sector

Project financing is becoming ever more the option for major projects and particularly for infrastructure. The choice of project financing arises for many reasons; from corporations utilising project finance to assist in undertaking large debt commitments with minimum risk, to entrepreneurial developers wishing to develop several projects in different geographical areas, each independent of the financial obligations of the other projects, and with minimal equity requirements. Some of the observed and documented advantages of project financing with respect to financial management include the following:

- Non-recourse financing protects the project sponsor from any obligations in the event of failure or default. Unless otherwise agreed, recourse to the project sponsor is only to the limited extent of liability for fraudulent representations made in connection with the financing, Williston (1970). Note that a project's financing structure may be such there is recourse to the project sponsor during a limited period. For example if new technology is involved the lender may take the view that there are additional risks for which the sponsor must provide full recourse or guarantee. After the successful implementation the lender releases the sponsor from recourse liability and shifts the risk to the project assets and revenue stream (Hoffman 1998: p408).

- Off-Sheet Debt financing is an attraction of project finance from the perspective of the project sponsor. (In the U.K see Companies Act 1995, ch. 6, 258 et seq (ENG.): *Standard No. 5 Reporting the Substance of Transactions*, Accounting Standards Board's Financial Reporting Standards, April 1994). In the UK however, this advantage is diminishing in value although it is still a weighty factor in other countries. In certain countries, non-recourse financing coupled with an appropriate ownership structure can lead to the project debt commitments being kept off the balance sheets. In these cases, the equity method of accounting is used where the investment in the sponsors SPV subsidiary is shown as a one-line entry in the balance sheet. This could maintain or even improve the company's financial ratios.

- Highly leveraged debt is often available to developers to finance projects although lenders may often require a high level of equity investment. This is related primarily to the level and nature of the initial risks involved and also to the view that there is a direct relationship between the level of equity invested and the project sponsors commitment to the project; the higher the equity level, the higher the sponsors commitment (Barret, Matthew 1987).

- In the event of default or project failure lenders are more likely to participate in a work-out rather than foreclose. This is as a result of the non-recourse nature of project financing. As the assets of the project have value only together with the project contracts, and the project contracts have value only if the facility operates, the lender is probably only able to recoup losses or have its debt repaid, by the continued operation of the project, i.e. not opting to foreclose and sell the assets.

2.11 DISADVANTAGES OF PROJECT FINANCE TO THE PRIVATE SECTOR

As is to be expected there are disadvantages with project finance and some of these are mentioned here.

- Documentation associated with project finance is almost always lengthy and complex. The requirement of a project company to provide information to the lender is also significantly increased in project financing.

- The process of due diligence conducted by the lenders, legal counsel and experts results in higher transaction costs than would be from typical asset based lending. As the practical remedies that are available to the lenders are limited, there is a high level of due diligence coupled with strong, restrictive borrowing covenants.

- Due to lenders' reliance on the revenue stream for debt repayment, their supervision of the project is understandably greater than would be required for a corporate loan facility.

- As the financing is non-recourse in nature, insurance plays an important role for lenders and equity investors. To the extent that risks can be covered insurance is employed in the project finance structure. This may be very expensive in comparison to other financing structures.

- Risk allocation is often complex and this affects the speedy financial closure of projects, particularly in developing countries where credible assets or payment promises cannot always cover risks.

- Interest rates higher than would apply to direct loans made to the project sponsor may be incurred.

- As the promoter/project company has no recourse liability, it might be argued that the SPV may be more likely to aggressively accept risks, which may lead to a deviation from optimal risk transfer.

All in all, project finance provides another means for the realisation of projects; it may be an appropriate approach for certain situations and for certain governments who are unable to provide urgently required infrastructure, but project finance is not a panacea. Its implementation must be only after consideration of the long-term implications, and extensive cost/benefit analysis by both the public and private sectors. These will reflect the differing overall Time, Cost and Quality objectives of both sectors.

2.12 SUMMARY

This chapter has discussed the different approaches to financing and realising projects that may be used for major projects. These all have differing degrees of financial involvement of the public and private sectors. There has also been an introduction to approaches such as traditional financing, the use of road funds and shadow tolling.

It has also been highlighted in this chapter that although most projects are traditionally procured, the increasing inability of governments to provide sufficient projects to match the demand of infrastructure, has resulted in the evolution of mechanisms that allow more projects to be realised. The evolution of these mechanisms has also been traced in this chapter outlining that private sector finance can be used for realising public projects by the use of concession contracts as defined in this chapter. It has been mentioned though that these may place obligation on future principals. The concept of private financing has indeed been termed “the government’s credit card”; an apt phrase perhaps particularly in concessions whose terms place financial obligations on future governments and perhaps future generations.

There are different phases throughout the lifecycle of concession type projects with different parties involved at each stage, the key participants being the principal, the promoter and the lenders. The lifecycle of these projects and the participants have been introduced and discussed here.

This chapter has also outlined the features that are associated with project financing and highlighted some of the advantages and disadvantages in the utilisation of private finance that exist. The reader has been exposed to the financing approaches and the next chapter develops this further by examining in some detail, the particular financing instruments that are used within project finance.

CHAPTER THREE

FINANCE FOR PROJECTS: THE OPTIONS

3.0 INTRODUCTION

Hoffman outlines the three 'macro' varieties that project finance structures are based on as non-recourse financing; limited recourse financing; and project output interest financing (Hoffman 1998: 118-120). The first two look to the cash flows for debt repayment whilst the third is centred on the purchase of an interest in the project output. Within this chapter, there is an introduction to some of the numerous 'microstructures' or financial instruments that exist within these three varieties as are implemented in Europe and elsewhere, and also an examination of their merits. Where possible, instances of use of these instruments are used as illustrations.

The need to remain competitive often necessitates exploration of various avenues for funds to finance a project and this chapter examines some of the routes available, and the mechanisms that can be implemented when financing projects. The focus of the chapter is on the financial options available to a promoter who would typically seek out a financial consultant when dealing with these matters due to lack of knowledge. This chapter is ordered in such a manner as to afford an understanding of the components of financial structures available to a project.

Structurally, this chapter is in two parts: The first introduces the organisations that are involved in the provision of finance for projects. These include the public sector, commercial banks, pension funds and development banks. Islamic banks are also discussed and the attributes and mechanisms that are particular to each of the introduced organisations are highlighted. The second part examines the primary categories of funds, i.e. equity and debt, that these organisations provide, and the roles that these categories play as components of a project's financial structure. Within this latter segment also is an exploration of bonds and a look at the exploitation of commercial opportunities as another source of funds that project companies can access and build into the financial structure of their projects.

As mentioned earlier, there are several parties that are involved in the provision of finance for projects, some of whom have been introduced in the preceding chapter. The initial sections of this chapter further introduce these parties and discuss some of the operations and mechanisms that they employ in providing finance, highlighting differences in operations, approach and intrinsic worth.

Succeeding sections present and explore the components of financing with an initial introduction to the principles behind equity financing and the role of equity in project finance. Parties that provide equity finance are identified and the markets through which equity provision is made for projects are also mentioned with some of the issues that arise in the issuing of equity discussed.

The debt component of financing of projects is then examined providing an insight into some of the issues and approaches that a promoter must consider in attracting lenders. Some of the concerns that exist for those involved in mobilising debt are also highlighted.

This chapter introduces the concept of bond issue with particular emphasis on project finance and the merits are highlighted. The various types of bonds and their different attributes are also explored here. Creditworthiness is a very important issue especially when it comes to raising finance and the impact on finance, of bond rating, which is a measure of the creditworthiness of bonds, is examined.

The discussion in this chapter reflects the fact that traditionally, bank debt has been the most favoured and popular option for the finance of projects, and that as a result of these fore mentioned concerns, and the increasing number of projects that are being sought, there is a greater need to mobilise finance from various other sources, and to explore novel financing instruments that enable the realisation of otherwise unrealisable projects.

Some of these innovations in financing include various combinations of debt with: equity, the various types of bonds, and/or structuring financial packages that allow for exploitation of commercial opportunities that exist, or that might arise, as a result of the project's subsistence. Some of the above are explored in this chapter

The structures are influenced by the perceptions, and appetite for risk, of the investors and lenders and by the economic condition of the host country. There are situations where one source of funding may prove more beneficial than others and the decision is down to the promoter/ project company. This chapter however limits its exploration to the financial merits of the components and not to the externalities and perceptions although these are mentioned for clearer understanding.

3.1 Finance Providers

Participants in project financing are expanding their level of expertise and involvement, and with new entrants to the field, the mechanisms are getting more complex, yet more efficient. With increasing demand for more privately financed projects and the application of project financing across sectors, there is increasing specialising by providers enabling the development of more efficient tools for private finance. The following sections explore the merits and demerits of the existing providers of finance for project financing.

3.1.1 The Public Sector

The public sector's financial involvement in privately financed projects may meet with scepticism based on the view that this defeats the objective of transferring risk to the private sector. Although there may be several schools of thought on the responsibilities and roles of government vis-à-vis privately financed projects, project finance is not a static field and the public sector must be prepared to meet the challenges that may be presented by projects on a case by case basis, but within a framework and in line with long term socio-economic policies. There are situations where financial commitments on the part of the public sector may be required such as with projects with questionable commercial viability. This may be in the form of guaranteed offtake contracts, subordinated loans, equity participation, and as a last resort, direct funding. The public sector however, prefers to limit its involvement to provision of guarantees and as a regulator: basically as a facilitator.

For projects such as prisons and shadow-tolled roads the revenue stream is not generated from a third party, i.e. end users, but is still effectively paid for by the taxpayer (Heald & Geaughan 1997). This mortgage arrangement seems to be based on the presumption that it is better for governments to pay more over a longer period than less upfront; seemingly justifiable depending of course, on exactly how much more is ultimately paid. This also would seem to push risks into the distant future; a future not as distant as it may initially appear. In the UK's 'rush' to sign up private finance deals to provide infrastructure that would otherwise not be provided by public procurement, there is now a sudden realisation that the government has committed itself to annual payments of over £200 million for twenty five or so years into the 'distant future' (Mackie 2000).

With the expansion of the European union and its convergence criteria the EU has become a major fund provider for infrastructure projects within the union. The main mechanisms through which the funds are channelled into such projects are: the European Commission Budget, Structural Funds, the Cohesion Fund, the European Investment Fund and the European Investment Bank.

The Commission's budget is restricted in amount and in permitted uses; it can only be used for feasibility studies, interest rate subsidies (usually for periods of no more than five years), contribution to loan guarantee fees, and direct investment grants (which cannot exceed 10% of the total cost or the minimum amount required to launch the project).

Structural Funds have been used by the EU as the main financial instrument for reducing regional disparities since 1975. The available funds are classed into six categories for disbursement, four of which may be used for infrastructure finance:

Objective 1: for regions whose capita GDP is less than 75% of the EU average

Objective 2: for regions seriously affected by industrial decline

Objective 5b: for rural regions requiring support additional to that received through the Common Agriculture Policy

Objective 6: for sparsely populated arctic regions (under 8 persons/km^2).

Structural Funds are slightly biased towards road projects as these are easier to agree and implement and partly because the bulk of structural road funds go to countries with a poorly developed rail network, Farrell (1999).

The Cohesion Fund is restricted to transport and environmental projects in the four countries whose per capita income is less that 90% of the EU average, i.e. Spain, Portugal, Greece and Ireland, and is linked to the Maastricht convergence criteria. Eligible projects receive grants of up to 80 – 85% of costs, depending on the project's ability to be self-financing. Projects are normally co-financed with national governments but, as in the case of the Tagus Bridge in Portugal, funding can be given to private sector partners.

The European Investment Fund (EIF) was set up in 1992 and provides loan guarantees and interest rate subsidies to private investors and public-private partnerships and can take equity shares in selected projects. Unlike the Cohesion Funds and the Structural Funds, the European Investment Fund is a public private partnership and operates commercially looking to raise appropriate return for its shareholders: the European Investment Bank (EIB), the European Union represented by the European Commission, and a number of European banks and financial institutions. The EIF is the main guarantor agency for Trans-European Network (TEN) projects.

The EIB does not provide concessionary loans and its interest rates are its borrowing costs plus 0.15% to cover administrative expenses. With regional development as a primary objective, two-thirds of EIB lending goes to the less favoured regions. The loans are evenly split between public and private sector borrowers with transport, energy and telecommunications accounting for more than 30% of all lending (Farrell 1999).

3.1.2 Commercial Banks

Commercial banks to date provide the bulk of funds that are used to finance privately financed projects. The main feature of banks is that they place themselves between the lender and the borrower by obtaining funds from their investors and lending them to the borrower at higher rates of interest. This is in contrast to the capital markets (discussed in later sections), where the markets enable funds to be moved from regions of surplus, to deficit regions without the involvement of banks as intermediaries, Marsh and Wild (1988).

According to Lewis and Davis (1987) the activity of banks can be categorised into three classes, in the relation to the currency used and the location:

- Domestic Banking. This generally includes the transactions between banks based in the same country and in that country's currency. Transactions of non-residents may also be classed as domestic when the transactions are in the currency of the country of residence.

- International Banking refers to the cross currency and cross border activities of banking where deposits are taken from non residents (foreigners) or the banks lend to foreigners in the banks' domestic currency. Eurocurrency banking falls under international banking and is the borrowing or lending in currencies other than the domestic currency of the country in which the bank is located. These transactions normally involve large sums of money and the main currency involved is the US Dollar, hence the term 'Eurodollar'.

- Multinational banking involves banking transactions across a large number of countries and geographic regions (Robinson 1972).

- Commercial banks, whilst prohibited from taking equity positions, act as project finance lenders in order to acquire assets for their own portfolios. Through the use of warrants, or conversion features attached to debt, banks can sometimes obtain 'equity-like' positions, which yield higher returns than straight debt. Commercial banks may also act as intermediaries in project finance, generating fees by providing financial advisory services or underwriting debt issues.

For developing countries, commercial banks remain the largest source of private finance for infrastructure development. Data from World Bank shows that in 1995, of the $22.3 billion raised in developing countries for infrastructure financing, syndicated loans accounted for $13.5 billion, bonds for $5.3 billion, and equity for $3.5 billion, World Bank (1997).

There are limitations to project financing through commercial banks such as bank exposure limits, and the mismatch between the short-term maturities sought by banks and the longer-term loans required by infrastructure projects. The exposure limits can be overcome by syndication (see section 3.3) however this may involve cumbersome procedures. Bank financing may therefore have to form part of a mix with other long term lending or may have to be accompanied by suitable refinancing arrangements (Ahluwalia 1997: p96). Getting the mix of lending right is significant as it affects the relationship between the promoter and the creditors. This view is supported by Williamson (1984), who states "...as the exposure to risk increases... debt holders become more concerned with the details of the firms operating decisions and strategic plans. With high debt-equity ratios the creditors become more like shareholders and greater consultation between the management and its major creditors results". It is therefore essential to acknowledge that in terms of capital at risk, the lender who lends on a non-recourse or limited recourse basis is the major stakeholder in the project and may resemble controlling shareholders (Hass 1987). There is then an apparent breakdown in distinction between debt providers and equity holders. This blurring of the debt and equity is symptomatic of current financial developments, and the creation of hybrid financial instruments, which incorporate elements of both (Allen 1989).

3.1.3 Development Banks

In developing countries development needs are often unable to be met by the government budget and therefore external sources are looked to for finance. Development banks or agencies are examples of such sources and provide extensive funding for development projects. Baum and Tolbert (1985) define development projects as a discrete package of investments, policies, and institutional and other actions, designed to achieve specific objectives (or set of objectives) within a designated period.

The European Bank for Reconstruction and Development (EBRD) based in London was established in 1991 and has 60 members (58 countries, the European Community and the European Investment Bank). The EBRD operates in Central and Eastern Europe and by the end of 1999 had signed 624 projects, with a total net value of €10.8 billion, making the Bank the largest single foreign direct investor in the region, EBRD (2000). The Bank was created to support the development of market economies in the region following the widespread collapse of communist regimes.

Other examples of international development agencies are listed below in Table 3.1. These are taken from A.D.F Price's '*Financing international projects'*. (See same text or agencies' respective web pages for further information on the agencies operations).

Global
International Bank for Reconstruction and Development (IBRD), World Bank, Washington, DC
International Development Association (IDA), World Bank, Washington, DC
International Finance Corporation (IFC), World Bank, Washington, DC
Multilateral Investment Guarantee Agency (MIGA), World Bank, Washington, DC
International Fund for Agricultural Development (IFAD), Rome
Regional
Abu Dhabi Fund for Arab Economic Development (ADFAED), Abu Dhabi
African Development Bank (AfDB), Abidjan
Arab Bank for Economic and Social Development (AFESD), Kuwait
Asian Development Bank (AsDB), Manila
Caribbean Development Fund (CDB), Barbados
European Investment Bank (EIB), Luxembourg
Inter-American Development Bank (IADB), Washington, DC

Table 3.1: Development Agencies

3.1.4 Islamic Banks

Islamic banking is different from commercial banking with the operations and rules of lending very much dependent on Islamic principles, i.e. Shariah law, and primarily the prohibition of usury or interest (*Riba*). Islamic banks around the world have devised many creative financial products based on the risk and profit sharing principles of Islamic banking. For day to day banking activities, a number of financial instruments have been developed that satisfy the Islamic doctrine and provide acceptable financial returns for investors. Almost every Islamic bank has a committee of religious advisers whose opinion is sought on the acceptability of new instruments, and who have to provide a religious audit of the bank's end of year accounts. IYM (1995) identifies the basic financial techniques of Islamic banking and those applicable to the area of project financing as the following:

Musharaka: This is a partnership, normally of limited duration, formed to carry out a specific project. It is therefore similar to a western-style joint venture, and is also regarded by some as the purest form of an Islamic financial instrument, since it conforms to the underlying partnership principles of sharing in, and benefiting from, risk. Participation in a musharaka can either be in a new project, or by providing additional funds for an existing one. Profits are divided on a pre-determined basis, and any losses shared in proportion to the capital contribution.

In this case, the bank enters into a partnership with a client where both share the equity capital, and perhaps even the management, of a project or deal, and both share in the profits or losses according to their equity shareholding, IsDB (2000).

Murabaha: This is the sale of a commodity at a price that includes a stated profit known to both the vendor and the purchaser. This can be called a cost plus profit contract. The price is usually paid back by the buyer in deferred payments. Under Murabaha, the Islamic bank purchases, in its own name, goods that an importer or a buyer wants, and then sells them to him at an agreed mark-up. This technique is usually used for financing trade, but because the bank takes title to the goods, and is therefore engaged in buying and selling, its profit derives from a real service that entails a certain risk, and is thus seen as legitimate. Simply advancing the money to the client at a fixed interest rate would not be legitimate. It is important to note that only a legitimate profit in addition to the actual price is considered lawful under Islamic law. Any excessive addition on account of deferred payments will be disallowed as it would amount to a payment based on the value of money over time i.e. interest.

Mudaraba: This implies a contract between two parties whereby one party, the *rabb al-mal* (beneficial owner or the sleeping partner), entrusts money to the other party called the *mudarib* (managing trustee or the labour partner). The mudarib is to utilise it in an agreed manner and then returns to the rabb al-mal the principal and the pre-agreed share of the profit. He keeps for himself what remains of such profits. The following characteristics of mudaraba are of significance:

- The division of profits between the two parties must be on a proportional basis and cannot be a lump sum or guaranteed return.
- The investor is not liable for losses beyond the capital he has contributed.
- The mudarib does not share in the losses except for the loss of his time and efforts.

Briefly, an Islamic bank lends money to a client - to finance a factory, for example - in return for which the bank will get a specified percentage of the factory's net profits every year for a designated period. This share of the profits provides for repayment of the principal and a profit for the bank to pass on to its depositors. Should the factory lose money, the bank, its depositors and the borrower all jointly absorb the losses, thereby putting into practice the pivotal Islamic principle that the providers and users of capital should share risks and rewards.

Muqarada: This technique allows a bank to float what are effectively Islamic bonds to finance a specific project. Investors who buy muqaradah bonds take a share of the profits of the project being financed, but also share the risk of unexpectedly low profits, or even losses. They have no say in the management of the project, but act as non-voting shareholders.

Islamic banks worldwide, besides their range of equity, trade financing and lending operations, also offer a full spectrum of fee-paid retail services that do not involve interest payments. These may include consulting and advisory roles on projects as with other non-Islamic financial institutions, Monzer and Tariqullah (1989).

From the techniques described above, it may be said that Islamic financing arrangements are seemingly akin to equity (discussed later in this chapter). This comparison is drawn based on the emphasis on profit sharing in Islamic banking, which implies that the finance provided for projects is indeed risk capital. The Islamic lenders also may wish for a degree of control in the project to enable the monitoring of financial situation and to minimise their exposure to manifested risks.

It is worthy of note that there is a great debate as to whether the operations of Islamic bank lending are actually in accordance with the principles of Shariah and not just based on several contracts that effectively ensure returns on lending whilst still satisfying the requirements of Sharia in a roundabout way. The web page http://islamic-finance.net/elief.html hosts several reports on Islamic banking and some of interest on this matter are *The fallacy of the 'Islamic Bank'*, Vadillo (2000) and *Islamic banking isn't Islamic*, El Diwany (2000).

3.1.5 Pension Funds

One source of funds for privately funded projects that has a constantly growing role is the pension fund. The long-term assets of pension funds are seemingly perfectly matched for investment in infrastructure projects, which are notably long term in nature. This is largely due to the move from a 'pay-as-you-go' system where current pensions are paid from taxes to the more widely implemented accumulative system of provision where the contribution over a long period are invested and used to pay pensions of individuals.

With past and more recent reforms in Europe, the supply of capital for pension funds seems in no short supply as CEE countries and the Commonwealth of Independent States (CIS) introduce the voluntary or, in some cases, compulsory contribution of 10% of salary to private pension funds. These funds invest in government bonds and domestic equities (Clyne and Brimblecombe 1998: p54). However with government and corporate bonds having very short maturity dates in some of these countries, there is a need for the pension funds to look to longer-term investments (such as infrastructure projects) for better-suited returns. Clyne and Brimblecombe quite rightly advocate the increased involvement of pension funds in infrastructure projects. However, they call for this involvement not to be limited to fund provision but as part owners of the project (by forming part of the concession company). The author feels that although there will be benefits to be reaped from direct involvement by pension funds, externalities such as regulatory constraints on these funds, and their great risk aversion of which even the referenced text cannot belie, may call for careful consideration of the project's ownership structure and risk allocation, particularly vis-à-vis the pre-completion stage. This view is supported by Scheinkestel who accedes that until recently, capital market investors have not accepted construction or completion risk (Scheinkestel 1997: 122-123). The M2 project in Sydney for instance, required commercial banks to take on the completion risk and provide a letter of credit in favour of institutional debt investors prior to completion (Kerslake 1995).

Pension fund financing of infrastructure projects allow for efficient diversification of investments and also contribute to the growth of the local market economy especially where funds avoid international projects on account of exchange risk. Realisation that the characteristics of pension funds make them ideal for infrastructure finance prompted governments to encourage the involvement of pension funds in infrastructure development. In 1993, the US Secretary of Labour, Robert Reich issued a qualified endorsement of infrastructure investing by pension funds; Pension funds could consider such investments as long as they did not sacrifice returns or take greater risks than they normally would (Pensions and Investments 1993a). At the time, some analysts called for caution and others said, "...any attempt to mandate pension fund involvement in infrastructure repair or similar ventures, will simply mandate that capital is used less efficiently than it might otherwise be" (Pensions and Investments 1993b). Schanes reviews the comments submitted by International Foundation of Employee Benefit Plans' National Opinion Panel members, on investment in infrastructure development by pension funds. In this review it is pointed out that some notably bad results in infrastructure investments might explain the reason why pension fund investment in infrastructure is relatively recent and why there may still be reluctance on the part of some funds to invest in infrastructure projects (Schanes 1993).

Brazil can be looked to for indication of the successful involvement of pension funds in infrastructure development. Since enactment of the Brazil's 1995 Law of Public Service Concessions, pensions funds have participated directly as partners in consortia bidding in the privatisation of railroads and power companies. For instance, in 1995, the electricity distribution company of Espirito Santo State, Escelsa, which accounts for 2% of all Brazil's electricity consumption, had 50% plus one share of its stock sold for $370 million. Brazilian pension funds were key partners in the two holding companies that formed the winning consortia. Seventeen pension funds, grouped into the holding company GTD, ended up with 25% of Escelsa's shares; while the central bank employees' pension fund Centrus joined with Citibank, Nacional Energetico, and other investors to form the holding company IVEN, which now owns a 48% stake in Escelsa. In the case of Light, the electricity distributor for the City and State of Rio de Janeiro, Brazilian pension funds chose to take just 1% of the $2.23 billion controlling stake that was sold by the state government in 1996. As Part of a consortium that included Electricite de France, Houston Power and AES Corp., the profitability of their investment seems a certainty (Infrastructure Finance 1997).

3.1.6 Project Participants

Chapter Two outlines the parties that typically participate in a privately financed project. The parties to the secondary contracts (see Figure 2.4) are able to provide funds to the project by way of providing equity. In this way, suppliers, buyers and other participants can invest in the project beyond their contractual interests and this also ensures their commitment to the success of the project. These parties may subscribe to equity by way of joining the project company or as individual or institutional investors.

The organisations and parties that have been presented in the preceding sections form the source of funds that are available to a project. The funds provided could either be by way of loans, equity subscriptions, or a combination of both. These institutions are able to offer financial assistance in other ways such as by underwriting debt or providing guarantees and these are discussed in depth in later chapters. The following sections examine the nature of the investments and loans that are provided to project companies and the principles behind their employment.

3.2 EQUITY

Equity is effectively risk capital that is provided by investors who in return receive payments (dividends) in proportion to the amount of equity provided. The returns to shareholders/equity providers are made from the profits of the business venture. Dividends paid to the shareholders are subordinate to all debt and financial obligations of the project. This means that dividends are paid only after debt service and other payments are made, and in the event of loss or bankruptcy, equity is the first to be forfeit.

The providers of equity include the project sponsors, institutional lenders, insurance companies and all participants in the project. Often it is a requirement of the lenders and principals that the sponsors provide a level of equity as a measure of confidence in the project's success and to ensure that initial debt service is assured. Lenders usually require that all equity provided be utilised prior to any debt being drawn. Thus the equity holders protect the risk-averse lenders by retaining the high risks of the pre-completion stages, i.e. during construction. The project sponsors equity contribution covers, in most cases, pre-construction, or developmental cost, and is only part of the total equity although it can still run into millions of dollars. Although the risks are also higher at the pre-construction stages, the sponsors expect to reap very high returns on this portion of the investment and this is realised by the sale of part of the sponsors equity at a substantial premium to new investors, and also by charging a premium for fresh equity that is brought in by new investors post construction (Ahluwalia 1997: p95).

Equity is often raised in the stock markets and from specialised funds, and the price associated with securing equity reflects, and fluctuates with, the risks that are assumed by the investor. Equity is mainly raised through the following sources:

- Domestic capital markets and equity placements
- International equity markets

Domestic capital markets – Domestic capital markets provide access to significant funds for infrastructure projects through the issuance and sale of equity interests on the stock market, both to institutional and individual investors. Domestic investors include pension funds and other institutional investors.

According to the International Finance Corporation, about 70% of the financing for its Greenfield projects undertaken between 1966 and 1994 was derived from foreign sources. This heavy reliance on foreign funding could have drawbacks and strong effects on infrastructure investments; most projects that raise their revenue in local currency but have obligations to providers of debt and equity in foreign denominations leave themselves exposed to convertibility and exchange rate risks. This, alongside the liquidity problems that could arise due to negative exchange rate movements and assumed political incorrectness of a project being owned or financed by foreigners, call for domestic markets to be developed and utilised as an alternative or complement to other sources of financing. Indeed, certain countries have taken measures that contribute to the development of the local stock markets. In Canada for example, pension funds have a restriction on the percentage of their offshore or foreign assets, which encourages them to turn to domestic investments (Kumar et al 1997).

Although the capital markets in developing countries are only beginning to emerge, their noted growth and success to date will make them important sources of funds for projects. The importance of the domestic market is demonstrated by the situation in East Asia where the bulk of finance for private infrastructure has come from foreign sources. This is despite the fact that some of the highest savings rates have been recorded (see figure 3.1) in East Asian economies. The low domestic financing of projects stems therefore, not from a lack of domestic resources but from the relatively immature domestic markets (Kohli et al 1997: p99).

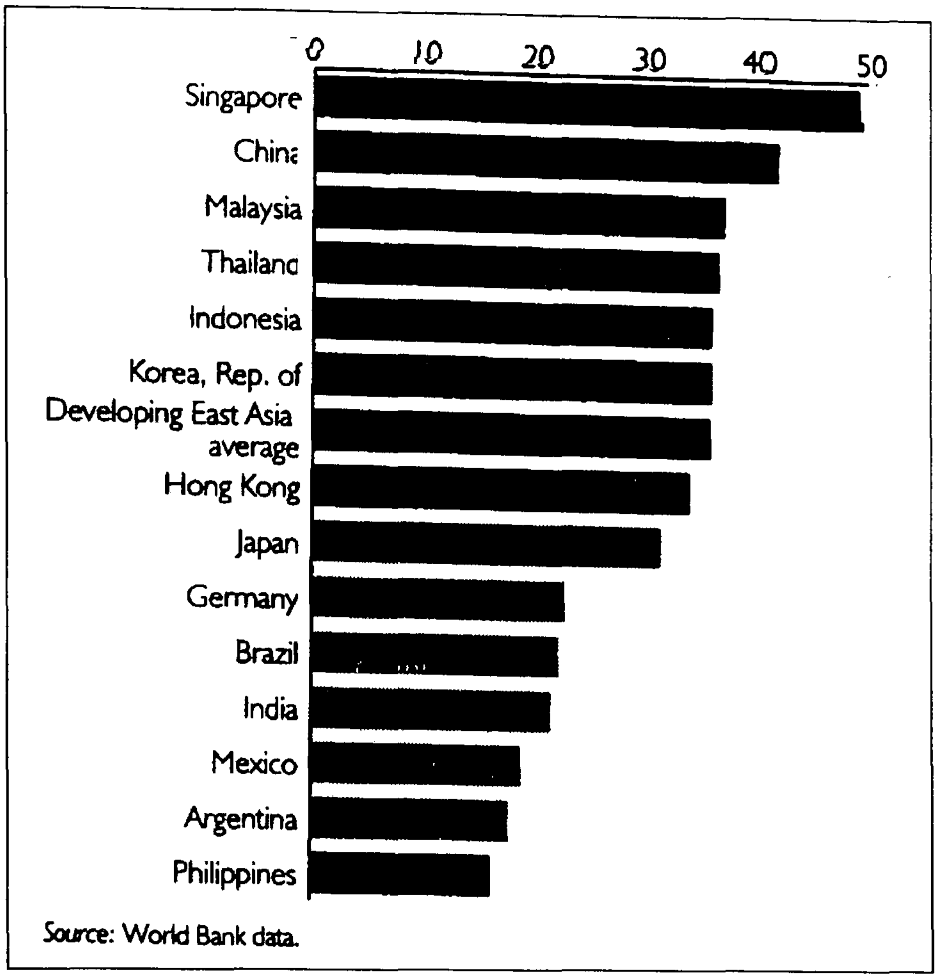


Figure 3.1: Gross Domestic savings as a percentage of GDP. 1993 – 1995 (taken from Kohli et al; 1997, p13)

International Equity Markets - Although international equity markets provide access to significant funds for infrastructure, they are mostly limited to large, multinational companies. Companies in developing countries are restricted in their access to international equity markets as a result of the legal restrictions on investment, lack of financial information and a general lack of internationally recognised credit histories. However, Rule 144A in the United States (see section 3.5.4) allows qualified institutional investors to purchase American Depository Receipts (ADR's) issued by companies in developing countries. This way these issues, although not registered with the Securities and Exchange Commission (SEC), allow equity to be raised in the U.S. markets (Ritter and Silber 1986). Through private placements in the U.S. companies in developing countries are hence able to access the international equity markets.

Banks can be equity providers although this raises several legal issues. Bank equity participation has resulted in attempts to restructure the nature of banks remuneration better to reflect the risk profile being assumed in project financings (Scheinkestel 1997). 'Equity kickers', as these equity provisions have come to be known, came into vogue in the 1980's and have taken many forms - increased margins, royalties, shared options - triggered by either surplus profits over an agreed threshold or by a commodity price relevant to the project (Weight 1992: p30). However, Vinter (1993) raises the possibility that under English tax laws, the 'equity kicker' may not be tax deductible. English legislation (Partnership Act 1890) appears also to have the effect of removing all of a lender's priority to claims in liquidation if its returns are found to vary with the borrowers profits (Scheinkestel 1997: 118-120). In the context of international banking such structures as mentioned here, that facilitate the involvement of banks at equity level may pose difficulties under the laws of the banks' home jurisdiction. It is clear then that in the event of either party seeking the involvement of the bank at an equity level, the lender and the borrower must address legal considerations primarily concerning tax deductibility and seniority of advanced capital.

Access to capital markets greatly widens the range of potential investors that a project can attract. However, as with most instruments, there are pitfalls associated with the capital markets. This is perhaps best illustrated by the Eurotunnel project where the excessive and wide distribution of shares served to diffuse power within the ranks of the equity subscribers leaving the project at the mercy of contractors. Ultimately the project overran the cost budget by more than 100%. Access to the capital markets should therefore be prudent with optimal debt-equity ratio in terms of financing costs, profitability, risk allocation and overall project robustness, as the key consideration.

3.3 DEBT

By far the most common and major source of funding for project financing is debt. There are various forms of debt available to promoters, from senior loans, subordinated loans through to bonds and soft loans. The major types of debt are discussed in this section. Traditionally debt has been considered a lower risk, lower return form of investment capital. This is because in theory, debt financing has a finite term; the principal must be repaid by the final maturity date with the providers receiving interest and principal payments prior to equity distributions (Scheinkestel 1997).

There are many debt instruments that can be applied for funding projects. Broadly speaking, debt may be divided into senior debt and subordinated debt. Senior debt is ranked first by its security over all project assets and agreements. Senior debt can take the form of either secured or unsecured loans but most borrowings from commercial lenders for project financing will be in the form of senior debt. Occasionally the term Quasi-equity is used to describe loans or advances made to a project, that are senior to equity capital but junior to senior debt and secured debt.

As implied by the term, subordinated debt can also be secured but by a lesser ranking over all assets and agreements. Subordinated debt is often more akin to equity than debt as it can rank after unsecured creditors in the event of liquidation.

Unsecured loans are available when the debt is backed by the general credit of the borrower, and is not secured by a security interest in any asset or pool of assets (Price 1995: p46). Unsecured loans are generally available to projects whose sponsors and owners have established good reputations with the financial community, and when sufficient capital or subordinated loans have been provided to meet the equity risk capital requirements of the project.

Secured debt is available to most projects where the assets securing the debt have value as collateral; such assets must be marketable and easily convertible to cash. In most of the cases of privately financed projects mentioned in this study the value of the projects' assets are not significant relative to amount of debt incurred to realise the projects.

Syndicated loans enable loans to be made for single projects whose funding requirements make them too large for single banks. Several banks pool resources and provide the loan facility with one of the banks acting as lead arranger. By spreading the risks associated with large individual projects the banks avoid overexposure and this in turn reduces the overall cost of finance. However the complexity of the arrangements could be greatly increased when several banks are involved. The commitment of syndicated loans are normally limited to six to ten years with floating interest rates based on the London Inter Bank Offered Rate (LIBOR) or the US Prime Rate however longer terms are sometimes available with fixed interest rates.

Types of syndicated bank loans (Howcroft 1985):

- *Traditional syndicated bank loans (floating rate).* These are based on variable rates but with a fixed maturity, drawn once and with repayments made to an agreed schedule. A period of grace is often included and the loan is normally negotiated and administered by a single lead bank, which will form a syndicate with other banks

- *Syndicated bank loan (fixed rate).* These are very similar to the floating rate bank loans but the interest rate remains fixed throughout the term of the loan.

- *Revolving credit.* Similar to the syndicated bank loans, these allow the borrower to draw all or part of the loan and make repayments at its discretion or to an agreed schedule throughout the term of the loan.

- *Multi-Option Facilities (MOF).* Facilities can be tailored to suit individual circumstances or borrowers' requirements. These may be a combination of the above options and may be complex and expensive to implement.

3.4 COMMERCIAL BANK LOANS

Over the last few decades, commercial banks have been amassing experience with project finance. Traditionally bank debt consists of commercial banks providing a facility to initially fund the construction of a project with the banks repaid over the operations phase of the project. This construction facility is used to meet all construction and project development costs and bank fees during the construction period. The construction facility converts into a term facility upon the completion of the construction that amortises over say, the first 15 years of operation (Macquarie 1996: p38). Although banks are in the short term, still the most popular funding source for infrastructure projects in most developed countries, there is ever growing competition from other sources. This suggests that banks may have to address their operations in the market if they are to keep a competitive edge. These other sources are also discussed in this chapter.

A commercial loan structure considers two project phases: the construction phase and the operation phase. For some projects the loan is separated into two agreements, one for each of the phases, with one institution providing the construction facility and another the loan for the operational phase. For other projects one agreement is devised but with different terms for the construction and operational phases. Occasionally the non-recourse nature of the loan is not applied throughout the project. During the construction phase the project (and the lender) is subject to greater risks. As a mitigation measure the sponsors may agree to accept all or part of the potential risks during this period, with full recourse liability reverting to the cash flows after this predetermined period (Hoffman 1998). During the construction phase, the funds for construction are made available as required under the construction agreement. This is normally predicated on the submission of appropriate requests for funds accompanied by supporting reports.

Frequently, the loan structure for a project will include a Standby Facility, which is put in place to cover the eventuality that more funds are required as a result of cash flow problems or increased costs. In effect, although the standby funds are not initially released to the project, the lenders are assuring the project company that should the need arise, the project has access to the predetermined sum of the standby facility; and for this assurance the project company incurs costs.

With most new projects revenue is not generated during the initial stages and therefore interest is rolled up into the balance outstanding; the interest payments are allowed for and included in the construction loan proceeds. However occasionally there may be a transfer of existing and operational assets to a promoter and these could generate revenue right from the onset. Lenders look upon this favourably, as initial debt service is more likely.

Typically, on the first day of commercial operation, with revenues now imminent, the amortisation of the loans can begin, with the timing and amounts dependent on the project's cash flows. The lender may also make a line of credit available which would give the project working capital during periods of low cash flow.

Debt financing provides the bulk of funds for most projects to date, and with unsecured, secured and syndicated loan facilities, debt financing can be adopted at suitable terms tailored to each individual project. The services that are available through debt financing are constantly being improved due to the growth of the project finance market, the entry of other finance providers and the development of innovative financing instruments. The fixed return nature of the banks' investment understandably makes the lenders averse to risky or novel structures and impose stipulations to protect the returns. Indeed the level of involvement of the lenders may be seen to support the saying: "Borrow £1,000 and you have a lender. Borrow £10,000,000 and you have a partner."

3.5 DIFFICULTIES IN MOBILISING COMMERCIAL BANK LOANS

Although banks are still favoured as the major source of funds their participation in providing finance for infrastructure is becoming limited. This is compounded in Central and Eastern European (CEE) countries and other developing countries as a result of many factors, some of which, in line with the findings of IFC (1996) and Macquarie (1996), are highlighted here,

- Generally lenders are cautious, as although they face the same risks as equity providers there is no upside potential. Their return is normally fixed to the interest payments on the principal. There is a great effort on the part of the lenders to reduce project risks by negotiating the conditions under which they will participate.

- Often commercial banks set limitations on their risk exposure in developing countries and are reluctant to provide long-term funds that can match the growing needs of infrastructure projects. There may exist also a high level of implementation risks, foreign exchange risks and high inflation risks.

- Foreign banks are constrained in their volume of lending by their country exposure limits, requirements imposed by their respective Central Banks and the need to adhere to Bank for International Settlement standards (BIS). [The BIS is an international organisation fostering the cooperation of central banks and international financial institutions and serves as a bank for central banks - see http://www.bis.org/about/index.htm]. After the debt crisis of the 1980's, most OECD countries (Organisation for Economic Co-operation and Development) now require commercial banks to make specific country provisions for loans to certain countries (IFC 1996).

- The existence of a large public sector external debt level compounded by under developed domestic bond markets in certain countries could also be a deterrent to lenders to participate in projects in such countries.

- The measure of a country's central bank's ability to make foreign currency available to service debt is one of the factors that determine the credit rating given to a country by credit rating agencies such as Standard and Poor (S&P) or Moody. These greatly affect the debt raising capacity of projects in these countries. Large external debt or political instability are factors that could contribute to a low sovereign state credit risk rating which makes it difficult for projects to access cross-border capital markets and international funds.

- Normally, as developing domestic markets cannot mobilise the large volumes of long-term debt required for most projects, funds are sourced from foreign lenders. This however requires a consideration of risks that are outside the domain of the private sector such as interest rate risk and availability of foreign exchange mentioned previously.

- Although there are more recent entrants to the market, globally there are less than fifty banks with a strong tradition of project financing in developing countries, and each has its exposure limits to clients, sectors, and countries (IFC 1996: p58).

- The time profile of deposits that commercial banks have does not allow them easy lending of large volumes of long-term debt. Typically international commercial bank loans are for seven to twelve years. Many infrastructure projects however require much longer term financing to enable a more robust financial project with less prohibitive debt service. Other sources of funding such as pension funds and life assurance companies are better equipped to provide the required long term financing, mostly due to their long-term depositors.

- Although pension funds and insurance companies in countries such as Central and Eastern European countries (CEE) and other developing countries are a potential source of financing for projects, their poor management and public ownership causes under performance when it comes to meeting the potential. Many countries also require these institutional sources of finance to invest mainly in government securities.

Through bank debt and equity subscriptions the necessary financing can be, and has been, raised for many projects. There are difficulties and costs associated with raising such finance. These and the need to remain competitive, drive participants in the market to seek alternative cost effective routes for financing. With the private sector's growing experience and confidence in the project financing market project companies may consider tapping into innovative provision of finance in an attempt to reduce financing costs, whilst possibly reaping returns, which may be re-injected into the project. One such approach is by the issue of bonds against the project and this is covered in depth in the following section.

3.6 BOND ISSUES

Bonds are a means of raising finance. This section initially introduces the concept of bond issue, highlighting the merits. The various types of bonds and their different attributes are also explored here. Creditworthiness is a very important issue especially when it comes to raising finance and the creditworthiness of bonds (bond rating) and the impact on financing is examined. Finally bond issuance in the context of project finance today is discussed.

Bonds are pieces of paper that state that the issuer/the borrower promises to pay whoever owns the bond, i.e. the lender/bondholder, certain interest payments at specified dates in the future. The principal/loan is also paid off at a specified date, i.e. at maturity. Normally bonds are issued with coupons attached that bondholders can clip and send in every six months or every year and for this reason bonds are often referred to as *coupon securities* (Ritter and Silber 1986: p55). Repayments may also be by way of amortisation of the bond on an agreed instalment basis.

Price (1995) classifies bonds into Domestic, International and Foreign bonds, and Eurobonds. Bonds issued by borrowers in their country of residence are domestic bonds. International bonds are issued by borrowers in countries other that of their residence and can take the form of foreign bonds or Eurobonds. Foreign Bonds are issued by non-resident borrowers, on the market of a single country and in that country's currency; Eurobonds on the other hand are sold in several countries simultaneously.

Bonds issued without coupons are referred to as *zero coupon bonds.* These are sold at a value far less than their stated face value with the difference representing the interest that will be earned by the holder over the life of the security. *Perpetual bonds* are those that are issued without a finite maturity date and promise to pay interest indefinitely without any contractual obligation to repay the principal (Moyer et al 1984).

Bonds are typically issued by governments, authorities or companies but can also be issued by SPV's. Depending on the issuing government, sovereign bonds are regarded as highly tradable and risk free as they are backed by the usually significant resources and taxing ability of the relevant government. The yield on sovereign bonds are normally the benchmark from which financial institutions determine the interest rates at which to lend funds.

Bonds differ on grounds of their taxability, call provisions and conversion features. Certain bonds issued by state governments have their interest payments exempted from taxation. This is obviously important to investors when considering investments. Some bonds are callable after a certain specified period. The issuer then has the right to pay off part or the entire principal before the maturity date. This right is only exercised when it is in the interest of the issuer as there are normally penalties applicable to the calling of bonds. For example if the interest rates fall then the issuer may re-borrow more cheaply. In this case the advantages of calling must outweigh the penalty.

Some corporate bonds (issued by companies) allow the holders to convert their bonds into company shares at a predetermined price. This convertibility often attracts lenders and allows the issuer to sell such bonds at a lower price than it would otherwise have to.

In many ways bond financing is the ideal source of finance for infrastructure. Although the costs are higher than with syndicated loans, bonds have much longer maturities (ten to thirty years with even longer maturities available to creditworthy issuers). Bond finance is one of the most rapidly developing financing instruments for infrastructure finance and in developing countries alone total flows have increased from $2.3 billion in 1993, to $45.8 billion in 1996 (World Bank 1997). However, even with Rule 144a in the Unites States (see section 3.3.4) newly established infrastructure companies might find it difficult to access the bond markets, as there is a perceived limitation to corporate bodies with relatively high credit ratings.

Merna and Owen are of the opinion that bonds provide a lower degree of flexibility relating to possible cost overruns, cost savings during the construction phase and repayment delays during the operations phase (Merna and Owen 1998: p84). Nevertheless with the development of the project finance market and growing expertise, promoters are now looking to access the bond markets directly as a means of improving project returns and/ or reducing the costs of financing. Bonds, if issued by promoters, may be best issued post construction, when risk perceptions have diminished and the project has a proven and steady revenue stream. In this way bond financing may be used to refinance shorter-term loans taken initially to finance the construction stage.

3.6.1 Municipal Bonds

Municipal bonds are those issued by public agencies that own infrastructure assets and these are commonly used in the United States of America for the finance of infrastructure projects. The total U.S. municipal bond market has expanded from $743.0 billion in 1985 to $1055.6 billion in 1990, and $1250 billion in 1993 (Eddy 1995: p101). This is representative of the need for, and the growth of infrastructure.

Federal authorities do not issue municipal bonds whilst State and Local authorities issue two types of municipal bonds:

- Revenue bonds which are backed only by the revenue stream generated by the asset against which they are issued and as such have no corporate guarantees, and
- General obligation bonds that are secured by the general tax revenues of a state or government.

Of the two, obligation revenue bonds have historically been more highly rated due to their tax-backed nature. Generally, revenue bonds are riskier as the particular project that they are tied to might falter financially. Illustrating this possibility is the example of the 1983 default of the State of Washington on $2.25 billion of Washington Public Power Supply System (WPPSS) bonds, one of the largest municipal bonds failures in U.S. history (Ritter and Silber 1986). Washington State sold these bonds to finance several nuclear power plants in the state with the payments depending on the success of those specific projects. However two of the projects were plagued by troubles for years and their financial difficulties eventually resulted in defaults and consequent losses to those who had invested in the bonds. Eddy (1995) finds that recent trends indicate that revenue bonds may be potentially more stable during economic cycles. This has been attributed to the nature of the services that these assets provide. For example, the consumption of electricity and water tends to be relatively unaffected by economic downturns whereas income and sales taxes could be adversely affected.

Despite some of the success that Eddy has reported on revenue bonds and although revenue bond financing has been utilised in countries like the U.S. and Australia to develop the investment market, Garwood (1995) reports that the UK government defines this approach as just another form of government borrowing, and as such, not appropriate to the objectives of the UK's Private Finance Initiative (PFI). At the time of writing, the UK's Treasury Taskforce on PFI (now succeeded by Partnerships UK- PUK) was unable to confirm that this was still the government's view on financing with revenue bonds, Treasury Taskforce (2001).

It is clear that the use of revenue bonds raises issues with regards to the treatment of bonds as government borrowing. The limitations that are imposed on the borrowing of governments or agencies have an impact on the success of the use of revenue bonds for project financing. This is reflected in Australia's Economic Planning Advisory Commission's (EPAC) report on private infrastructure where it is stated that if a government issued revenue bonds, it is likely that they would by included in that jurisdiction's borrowing allocation (EPAC 1995: p64). In the same report, New South Wales government in Australia noted that projects financed through revenue bonds would fail a 'commerciality' test since it would be difficult to remove the presumption that the government is accountable for the project failure even if this wasn't contractually so.

Investors in appraising a bond issue will look to ensure that the revenue produced by the asset is adequate enough to ensure a satisfactory return. The rating that revenue bonds receive are important as revenue bonds that do not receive investment grade rating (BBB and higher) are unlikely to be attractive to investors at a reasonable margin (see section 3.6.5). The ratings depend on the credit rating agency's assessment of the revenue stream with respect to the ability of the operator to change the level of toll or tariff, the security of the revenue, and whether insurers are willing to insure the revenue stream wholly or in part. A proven record of government commitment and the possibility of securing revenues with low risk, perhaps as a result of limited competition or granted exclusivity, will help to attract better credit ratings. Bond ratings are discussed in section 3.6.5.

Some of the benefits of using revenue bonds are outlined below.

- The state's credit rating is not affected subject to whether or not it affects the states borrowing allocation

- Ownership of the project remains in the public sector, avoiding philosophical objections to private ownership of facilities

- Revenue bonds can be resorted to if the private sector is unwilling to bear all the risks unless they are allowed an excessive rate of return

- Capital markets provide the funds rather than banks

- Revenue bonds represent a partnership between the public and private sector with the public sector owning the facility while the private bondholders pay for it

- There is high transparency and accountability as each project has separate bonds and the accounts are available for public scrutiny

3.6.2 Zero Coupon Bonds

These are bonds that are sold or issued at a discount to the face value and the return is reflected in this discount. The return to the bondholder is only realised at maturity where the difference between the face value of the bond that the holder receives, and the price paid for the bonds, is the return on the investment. The bondholder has no coupons to claim interest payments and hence these bonds are known as zero coupon bonds. Zero coupon bonds can also be sold in secondary markets if they exist (Ritter and Silber 1986: 55, 74-75)

Zero coupons can be used for project financing as infrastructure projects often have minimal revenue at the early years and it is therefore advantageous for such a project to have borrowings where payments are not made until later years when healthier cash flows have been generated.

Zero coupon bonds also reduce the greater risks associated with widely fluctuating interest rates. This is because they enable the investor to lock in a specific yield for a stated period of time, often as long as twenty or thirty years, regardless of what happens to market interest rates during that interval. With ordinary coupon bonds the investor may have to reinvest coupon payments in order to achieve a target yield.

The attractiveness of zero coupon bonds is dependent on whether the income they yield is taxed or not. In some countries like Australia and France, the notional interest accrued is taxable as the bondholder is deemed to have received these payments throughout the life of the bond even though no cash is actually received until maturity (Macquaire 1996: p42). Having to make tax payments without the receipt of the tax liable cash can make the use of zero coupon bonds relatively costly.

3.6.3 Index-Linked Bonds

The variation of interest rates over time is of major concern to investors and as such, fixed interest bonds are not considered an attractive investment in a high inflation environment. Index-linked bonds are structured so that interest rates or inflation risk can be effectively managed or hedged so that the investor can be offered a specified real rate of return. This means that while a fixed rate bond would have repayments that remain constant until it is paid off, the repayments for an inflation-linked bond would vary with the rate of inflation. Inflation indexed bonds provide for better cash flows in projects where the revenues are linked to a Consumer Price Index (CPI).

In the past investors invested mostly in bonds of the highest credit rating. However with protection against inflation investors are more willing to purchase bonds with maturity dates in excess of 20 years. Some of the benefits to the borrower/issuer include:

- Better margins after meeting financial obligations in the early years, which are normally difficult. This is because the coupon payments on the bonds are initially low and rise over time. Furthermore the escalation of the project revenue over time also means that a balance is struck with the cash flows throughout the project's life.

- Whereas loans have typical terms of 7 to 15 years, index linked infrastructure bonds can have tenors of up to 25 to 30 years.

- Larger sums of debt are available through bond financing as the profile for amortisation of the borrowings can be extended over much longer periods.

Category	**Bank Debt**	**Index-Linked Bonds**
Term	15-20 years	20-35 years
Margin over Commonwealth Rate	125-175bp*	175-200bp*
Risk of Revenue mismatch with Inflation rate	Mismatch	Matched
Interest Cost	11%	Floating, indexed to CPI rates

(Source: Macquarie 1996: p42)

Table 3.2: Bank debt versus index-linked bonds

*A basis point is one-hundredth of a percent. For example, a 150 basis point rise in interest rate is the same as a 1.5% rise. A 10 basis point fee is the same as a 0.1% fee.

Table 3.1 compares the generally available terms for bank debt to index-linked bonds. It clearly shows the difference in tenor and more importantly that there is room for further downward adjustment in the pricing of the bonds even after allowing for a lower starting interest rate. However the competitive advantage of index-linked bonds may only exist where the concession is for 30 years or more.

3.6.4 144A Bonds

144A Bonds are particular to the U.S. as a result of the Securities and Exchange Commission adopting the 144A Rule in 1990 (Hoffman 1998). The SEC traditional private placement allows an issuer to sell its securities to an investment banking firm and the SEC historically restricted secondary placement of private placements, such that securities placed privately could not be re-offered on the market.

With the adoption of Rule 144A, the investment banking firms are allowed to resell the securities to a Qualified Investment Buyer or QIB's as they are termed. Hoffman defines QIB's as entities that own and invest, on a discretionary basis, at least $100million in securities of unaffiliated companies, including securities issued or guaranteed by the U.S, examples of which are insurance companies and pension funds. The resale must be to QIB's only and the securities must not be of the same type as those listed or quoted on a U.S. exchange.

Pros: Although the Rule 144A market is not as large as the public debt market it is another large and liquid alternative source of funding. Debt maturity for 144A debt is longer than for the private debt market where commercial banks and some institutional investors have regulatory or internal restrictions on term of debt. Unlike most public market deals 144A deals don't require lengthy SEC registration processes.

Cons: Due to the passive nature of the investment, changes to a project are extremely difficult to negotiate. Like other bonds, in most circumstances the proceeds of the debt offering must be raised at one time. This results in interest charges being incurred as opposed to traditional loans where drawdowns are on an as-needed basis even though a commitment fee is sometimes required for undrawn funds.

3.6.5 Bond Rating

Regardless of which of the above bonds are to be issued for any transaction, the investor or buyer will obviously be interested in the creditworthiness of the issue or the project against which the issue has been made; The investor will be interested in the rating of the bond. Generally speaking, in project finance, bond rating evaluates the creditworthiness of a project company financially with respect to financial certificates issued, and it is based on a forecast of the ability of a project company to redeem (from the project cash flows) any bonds issued. Bond rating is a method for quantifying solvency risk. As such a borrower/issuer who wishes to attract a wide spectrum of investors will seek to obtain ratings for the issue. The different ratings are discussed further in the section but as a rule, the better/higher the rating, the less risky the project is deemed (with respect to rating parameters set out by the rating agencies), and hence the lower the investors' return. In other words, the riskier a bond issue is rated, i.e. the lower the rating, the higher the returns to the investors, as they assume more risk. The use of ratings creates a standardised market where investors can compare opportunities and make informed decisions depending on the level of risk they are willing to expose their investments to.

Several firms or agencies are in the business of rating bonds with the most prominent being Duff and Phelbs Credit Rating Co., Fitch Investors Service inc., Moody's Investor Service Inc., and Standard and Poor's Corporation (S&P). These agencies, for a fee, which varies with the complexity and size of the rating, evaluate bond issues and classify them into different categories of creditworthiness. The client's interests determine whether the ratings are made public or not. Table 3.3 shows the ratings used by Moody's and S&P. Issues with ratings from Aaa to Baa (Moody's) and AAA to BBB (S&P) are classed as *Investment Grade* and those from Ca to C (Moody's) and BB to C (S&P) are classed as *Speculative Grade*. S&P also have a rating of D for issues already in default.

Timeliness of debt service is an important aspect considered by the rating agencies, as the private investor has neither the willingness nor the ability to intervene in the management of a project that may have encountered difficulties. This is in contrast to lenders who are better equipped to actively participate in the management of a facility. In the context of project finance ratings, the focus is more on the timeliness of the payment than on ultimate payment after and in the event of default although there is a close link with ultimate payment (Connell 1995: p60).

The main risks in bond investments are interest rate changes on the one hand and default risk on the part of the issuer on the other. Fluctuating interest rates have different consequences on the bonds depending on whether the rates agreed are fixed or variable. Also, the magnitude of losses depends on the length of time that the capital is tied up. For instance, the losses due to interest rate change on a bond issued on a zero coupon basis will differ greatly from those issued with coupons. With coupon bonds the investor is able to reinvest his dividends at higher rates of interest whilst the zero coup bonds allow reinvestment only at maturity.

Moody's	S&P	Description
Investment Grades		
Aaa	AAA	Highest quality with least risk; strong ability to pay principal and interest
Aa	AA	High quality but with slightly less financial strength than above
A	A	Strong capacity to pay interest and principal but a bit vulnerable to changes in economic conditions
Baa	BBB	Adequate current financial strength but could be threatened by changes in the economy
Speculative Grades		
Ba	BB	Currently paying interest but with uncertain future
B	B	Little assurance that interest and principal will continue to be paid
Caa to C	CCC to C	Highly speculative bond that may be in or near default
	D	Used only by S&P for bonds in default

(Source: Ritter and Silber 1986, p57)

Table 3.3: A Guide to Bond Ratings

Default risk is the likelihood that an issuer cannot repay a bond. In the context of project financing, this means that the cash flows generated by the project are insufficient to service the debt. This revenue related risk is of course dependent on the other project risks that are inherent in the structuring of the project as a venture. For the investor the levels of these risks are reflected in the bond ratings that the investments receive.

The rating of a host country is of great influence on the overall rating of project bonds. It reflects the level of creditworthiness of the host country in respect of political and economic stability. At the time of writing, Zimbabwe is currently under international pressure due to its controversial land reforms. The reforms essentially involve the reclaim of farms owned by the Zimbabwean white population, for redistribution to the poorer black population. This has resulted in many deaths, with ensuing internal political turmoil and international condemnation. A concern being voiced by the international community and by other countries in the region in particular, is the impact on the flow of foreign investment to the country and region. The outlook might be negative, as was the case with Turkey in February 2001 when its B^{+}/B long and short-term issuer credit ratings were reduced by S&P and placed on CreditWatch with negative implications. This followed the instability of the government coalition and the heightened risks to the IMF supported economic programme after a public row between the Turkish President and the Prime Minister (Al-Yousuf 2001).

Whereas commercial lending involves the banks carrying out comprehensive risk analysis on the project details prior to agreeing financing, institutional investors with little or no expertise in project financing can only rely on bond rating as their 'risk analysis' instrument. Credit ratings are credible, independent assessments based on consistent criteria, which provide investors with some ability for screening and selecting among project lending opportunities, and also facilitate communication between project sponsors and the investors (Connell 1995). With the increasing use of bonds in the project finance market, and project companies looking to issue bonds themselves, bond rating will continue to be of great importance both to the investor as a classification tool, and to the issuer as a means of enhancing access to potential investors. However such investors must be aware that the different rating bodies place analytical emphasis on different factors, as do banks' credit assessments.

3.6.6 Bonds and Project Finance

The bond financing structure is similar to the commercial loan structure except that the lenders in this case are investors purchasing the borrowers' bonds in a private placement, or through the public debt market, with a trustee acting as the agent and representative of the bondholders.

The different features of bonds such as convertibility, principal amount, maturity date, yield to maturity (rate of return earned on a bond purchased at a given price and held until maturity) and face value, can all be varied. This leads to numerous permutations in financial structure that can be achieved with the bonds and makes them ideal for infrastructure projects. Conventional bonds have been used to finance projects but with the constant evolution of project finance market, more innovative types of bonds are being developed and used to finance projects.

As has been pointed out already, as project finance instruments develop and participants gain experience, promoters may be able to tap into the bond market directly. There may be benefits in the project company directly issuing bonds against the project cash flows. By issuing bonds at the outset of the construction the promoter is able to raise capital right at the beginning of the project. This capital even if simply deposited in an account would raise interest that could form part of the returns for the project company. Availability of this initial capital would also reduce transaction and financing costs, improve returns to the promoter group and enable greater control over the financing structure of the project as a whole.

Infrastructure bonds issued at the outset of the construction period would provide the investors with an immediate return. The interest or coupon payments can be funded by additional debt raised and earmarked for this purpose. Investors ought to be aware that although the additional debt should be adequate to pay a fixed return on the bonds during construction, there is the possibility that these funds may be required in the case of project cost overrun. However, as is the case with most of these projects, the construction risk is primarily assumed by a reputable construction contractor under a fixed-time and fixed-price contract. Therefore investors are more comfortable with the security of the return and more inclined to invest in such promoter issued bonds at the project outset without a letter of credit backing (Byers 1995). This should however be considered against Merna and Owens opinion that bonds are best issued post construction (Merna and Owen 1998: p84).

There is still a long way to go in the growth of the market worldwide in terms of access. The IFC has underwritten very few bond deals (a US$207 million revenue bond in 1992 for a Mexican Toll road that was already in operation for example) but most of the companies that it has helped to finance have tapped international bond markets. Although a few projects in developing countries have accessed international bond markets, bond financing has mostly been available only for large projects with strong sponsor and government support arrangements (often past the construction stage), in countries with an adequate sovereign rating (IFC 1996). Recent examples of UK projects that have accessed the bond market include:

- ***June 1998*** - Morgan Stanley Dean Witter launched a bond to finance construction of a UK hospital under the private finance initiative (PFI). The £136 million, 30-year deal, guaranteed by AMBAC Insurance UK, will pay for a new building for Law Hospital in

Wishaw near Glasgow. The bond, issued by SPV Summit Finance (Law) plc, with a coupon of 6.484% has scheduled amortisation beginning in September 2001, giving an average life of 20.1 years. Bond proceeds will cover most of the £146m construction cost of a new 684-bed hospital. Law Hospital NHS Trust has granted a 30.5year concession to Summit Healthcare (Law) Ltd. to design, build, finance and operate the hospital (EuroWeek 1998a: p18).

- ***August 1999*** - £137.4 million bond by Barclays Capital was launched under the UK's Private Finance Initiative (PFI). The SPV for the project is Endeavour SCH *plc*, and the bond provided the senior portion of a £165 million package to finance the redevelopment of the South Tees Acute Hospital in Middlesborough, UK (EuroWeek 1999b: p17)

- ***April 2000*** - The Highways Agency and Road Management Services Consortium - which comprises Amec Investments, Alfred McAlpine, Brown & Root and Dragados - raised £200 million for the A13 DBFO road through a bond issue in the UK (Watkins 2000: p38).

- ***May 2000*** - Greenwich NatWest launched a £65.95 million index linked securitisation to finance the construction of a new hospital in Neatly South Wales. The borrower, Baglan Moor Healthcare Ltd, has a contract from Brow Morgannwg NHS Trust to build a new 270 bed hospital, the Neath / Port Talbot Local General Hospital. Baglan Moor will then provide all non-clinical services to the hospital until the expiry of the contract in 2029 (EuroWeek 2000a: p14).

3.7 COMMERCIAL OPPORTUNITIES

In the engineering of the financial package for projects there is scope for commercial innovation to create an inflow of cash. To fully exploit the commercial opportunities that might exist, a project company must shirk from the dogma that project financing is just another source of funds for realising projects. Instead, the philosophy that project finance is a source of revenue must be adopted. A lateral approach to the project may reveal innovations that can be woven into the fabric of the concession agreement to provide different sources of revenue. These innovations may involve entering into other contracts that are seemingly extraneous to the project or concession at the time but if carefully included in the financial engineering, could go a long way to achieving and maintaining the financial robustness of the project.

The number of commercial opportunities that are able to provide initial and direct cash injection into the project seem limited but an example might be the inclusion of terms in the project contract, that allow the promoter to operate the commercial ventures within say, an airport. The promoter is able to include the design of outlets within the facility for which businesses may offer initial payments to secure.

More often than not the commercial opportunities that afford a source of funds during the course of the project stem from value added by the project's subsistence. An illustration of this would be the value added to undeveloped or slightly developed property as a result of the provision of improved access roads.

For projects with payment mechanisms that involve payments for services or facilities made available such as with shadow toll roads, there might be benefits in allowing the private sector to capture the value added to the wider community by the project, as this may help to bridge a gap between commercial and social returns. These mechanisms would also allow a more efficient allocation of costs than a simple payment out of the government's consolidated revenue.

Needless to say value capture is very difficult on the part of the promoter group and this makes for difficulties and contention in realising revenue from third parties that have benefited from the project. The Australian Private Infrastructure Task Force reports that, as value capture mechanisms are linked to usage of services, they form a second or third best approach to infrastructure financing (EPAC 1995: p65). Effective and foolproof means of capturing funds this way are yet to be devised.

It should be noted that the funds that can be obtained from commercial opportunities are seldom accessible until the post-completion stage or until the venture is effectively online. However there are several ways of exploiting commercial opportunities if innovation is applied in engineering the contract terms and the financial package. Some of these innovations are discussed in the next chapter. By viewing concession projects as the means to an end; the end being access to those commercial opportunities that the promoter would be otherwise unable to exploit, and those that arise as result of the project's existence, project financing can be incorporated as part of a long-term business strategy.

3.8 SUMMARY

This chapter has identified the providers of finance in the context of project financing as the public sector (or public sector agencies), commercial banks, development banks, Islamic banks, institutional investors and project stakeholders. Each of these potential providers has been examined and the mechanisms, such as the EC's specialised funds, the EIB and syndicated lending by the banks, that come into play in the provision of funds explored. The extent of involvement, the objectives, and the criteria varies for each of the mechanisms and are generally applied on a project-to-project basis. Islamic lending has been highlighted as being different from conventional lending. This is due to the principles of Islam, which also govern Islamic banking operations, and which forbid the receipt of interest on funds loaned. Instead there is a tendency towards lending on a fee basis and acting as partners with the project company, with a view of the project as a profit or loss (risk) sharing venture.

The second part of this chapter has outlined debt and equity as the primary categories of funds supplied by the fore-mentioned finance providers and described the roles that these categories play in project financing. Some of the issues that arise in equity subscription and the markets through which equity can be provided have been noted.

Debt financing has been explored and the effects of the non-recourse nature of project financing on the lenders' requirements have been discussed. Creditability has been identified as a concern in attracting lenders and a general definition of credit enhancement has been given. Due to the current mismatch between the relatively short-term nature of the bank loans and the long-term requirements of infrastructure projects, institutional investors such as pension funds are identified as having fund profiles that are more matched to the long-term nature of infrastructure developments.

Bond issues have also been discussed as an alternative route to financing projects. The concept of bond issue has been described in this chapter and the different types of bonds briefly explained. Section 3.5.6 discusses the application of bond financing to reduce financing costs and increase returns for a project and gives examples of such application. Again creditworthiness has been identified as important with respect to the issuing of bonds. Within this chapter bond rating is discussed as a measure of the creditworthiness of bonds and some of the parameters for rating are given. Mention is also made of the continued and growing importance of bond rating in an era of bond issuing by project companies.

Finally the chapter examined commercial opportunities that promoters may seek to explore in a bid to improve the returns on the project. This has been likened to a changed ideology from viewing project finance as a source of funds to finance projects, to viewing project financing as a means for creating sources of revenue. Mention is made of some opportunities that may exist in particular types of projects that may provide cash inflow pre- or post completion. This final section has also touched on the contentious and difficult issue of Value Capture or mechanisms of obtaining funds from third parties that benefit from the project's subsistence.

Overall, this chapter has provided a background of the components that exist in project financing structures and affords an understanding of some of the instruments involved. These have been explored as instruments that the promoter, with enough knowledge and expertise in the area, may use to maximise project returns, or at least ensure implementation of more financially efficient structures (from the promoter's viewpoint). A complete financial package for a project would include some if not all of the elements introduced in this chapter: various combinations of debt with equity, the various types of bonds, and/or structuring financial packages that allow for exploitation of commercial opportunities. The combination in which they exist in a project's structure is as a result of an engineered financial package that aims to maximise revenue. Awareness and knowledge of the mechanisms mentioned in this chapter, is fundamental to understanding the permutations that can be achieved. The 'financial engineering' of these permutations is the focus of the next chapter.

CHAPTER FOUR

FINANCIAL ENGINEERING

4.0 INTRODUCTION

The preceding chapter introduced the various sources of finance for a project under the umbrella of debt and equity, and discussed the roles of the providers of finance in the project finance market. This chapter will explore the engineering and structuring of these sources, accessed by the project company to provide the most profitable and robust financing arrangement for the project.

Beidleman et al (1991) describe financial engineering as involving the altering of the size, timing, quality and direction, or currency of cash flows to meet investors' needs. Within this chapter the processes and means of doing just that, along with the merits and demerits are examined. To achieve this engineering, novel approaches and instruments are sometimes required. Some of these innovations may include various combinations of debt with equity, various types of bonds, and/or structuring financial packages that allow for exploitation of commercial opportunities that exist, or that might arise, as a result of the project's subsistence. Most of these have been mentioned in the preceding chapter but within this chapter, these mechanisms and approaches are explored in greater depth and detail.

Initially the concept of financial engineering is introduced and the two main processes for such engineering identified. These processes (Credit Enhancement and the use of Financial Instruments) though somewhat inextricably linked in their application, are explored separately. Within the context of credit enhancement, guarantees and monoline wrapping are introduced and discussed. This section also defines other contractual variations that are used to help improve the creditability and hence the bankability of a project.

Next, the use of financial instruments in engineering the financial package for a project is examined. The categories of debt and equity previously introduced in Chapter Three are explored, and the opportunities for redesigning their structure and roles within the project structure examined. The variation of equity terms is discussed and mention is made of the sale and transfer of equity stakes and the difficult issues of value capture.

Debt financing is explored next and this is presented as affording more opportunities for innovation. This section examines approaches taken when considering straight debt, and discusses some of the dynamics of bonding issues, and the pros and cons of engineering a bond element in the debt package. Illustrations are also given by way of examples of real projects with significant bond issues.

This chapter goes on to discuss other approaches and tools for financial engineering and their impact on the project structure. These include the use of mezzanine finance and interest rate swaps. Project leasing is also introduced and the mechanics of its application to project finance explored.

The latter sections of this chapter revisit capital markets, financial institutions and commercial exploitation, and the integration of these into the engineered package of finance for a project. An overview of the use of capital markets (introduced in the preceding chapter as a means of broadening the base of investors that a promoter can source funds from) in financial engineering is given. Elements of a case study are used to highlight some of the problems that may arise if capital market use is not done prudently. The roles that financial institutions such as the World Bank and Export Credit Agencies can play are also discussed and some of the impacts that involvement of these organisations has on a project's finances are considered. The concept of using commercial exploitation to finance some, or all, of a project has already been introduced in the preceding chapter; in this chapter more examples of commercial exploitation in project finance are given. Details of these case studies help to illustrate the benefits to the parties concerned, of such exploitation and indicate some of the more innovative methods of engineering project finance.

Finally, an excerpt of the details for a real project is given and is analysed in the context of financial engineering. Though not an exhaustive illustration of the resources available, the project detailed makes use of several financial instruments and credit enhancement, and serves to show some of the ways in which an actual project on the ground has engineered its financial elements to improve its creditability and profitability for all concerned

4.1 PACKAGING THE FINANCE

Paramount to the success of a tender for a privately financed project, and indeed to the success of the project itself is the overall financial package proposed for the venture. With the constant evolution of the private finance market, it is essential that a comprehensive analysis of the financial features of the project be conducted, to ensure that the most beneficial options for financing the project are employed. This can be a complex and time consuming task due to the various requirements of such funding sources as those mentioned in the previous chapter. The project examples given in the preceding chapters and those discussed later in this chapter give an idea of the level of sophistication that is involved in arranging the finance for a project. For this reason, most Special Purpose Vehicles (SPV'S) undertaking privately financed projects employ a financial adviser, normally a merchant or investment bank, to assist them in the financial packaging of their proposal. The role of the adviser is primarily to determine the feasibility of the project under the limitations and constraints of the financial markets. The engineering of a successful financial package for the project obviously depends on in-depth knowledge on country and industrial financing conditions, and a financial adviser appointed at the early stages of project development and whose remuneration largely depends on the success of the project, would help avoid major pitfalls that might otherwise plague the project. The role of the financial adviser is covered in depth by Walker and Smith (1995). Part of the objectives of this study is to enlighten SPV's who can in turn ensure that the role of the adviser is more effective.

The financial package refers to the structure of the financial arrangements for funding a project. Inclusive in the financial package are: the ratios of debt to equity, the sums and terms any senior debt, subordinated debt and soft loans. The financial structure may also include bonds issued against the project, guarantees obtained, financial costs and repayment schedules, and any other externalities arranged to provide revenue inflow such as the commercial opportunities mentioned in the preceding chapter.

The variations that occur across financial packages are due to the engineering of the structure, hence the term financial engineering. One, if not the most, fundamental aspect of privately financed projects is the financial engineering that accompanies the proposal. Financial engineering in project finance is the structuring of the finance terms of the projects in the most efficient and profitable way whilst maintaining the robustness of the endeavour. It addresses the source of funds, repayment and debt service structures, the payment mechanisms or the revenue stream, and of course the profitability of the project. Essentially financial engineering could make or break a project.

Indeed studies today show that in the financial world, project finance is not so much the novel approach from 'traditional' or 'conventional' financing that it used to be. The current evolution in financial engineering is at such pace that already non-recourse financing is now being referred to as 'traditional' or 'conventional' project finance. Innovations and 'new breed' financing techniques now arise from the development and grafting of other sophisticated mechanisms such as mezzanine finance, interest or equity swaps and synthetic leasing, onto, or in place of, non-recourse financing (Watkins 1999). In the US particularly in the power sector, hybrid project financing combining leasing, project bonds and straight debt are becoming common.

Another aspect of project finance that could be considered under financial engineering is the packaging of several project finance deals together; This helps to pool the risk spread, enhance the credit of weaker projects and provide an investment that is sizeable enough to be of interest to large investors. Credit Suisse First Boston (CSFB) has surged ahead in this field by structuring, in 1999, a $1billion, four-year revolving facility for Calpine, a US power plant corporation, that enables it pursue its medium term strategy of building 12 to 16 power plants. CSFB has also pioneered the Collaterized Loan Obligation (CLO) market and the innovative private placement programme which provides funds of $2.7 billion part of which have already been used to finance five transactions worth a total of $1 billion, (Euromoney, 2000).

The benefits of this approach are that projects can be sponsored quicker and more efficiently than through the traditional syndicated loans route as the investors can commit and execute faster. Also the expense of seeking financing for each project individually is removed, reducing the total project costs. This aspect of project financing, although of great importance to the financial world, is outside the scope of this study and is therefore not examined in any depth here.

Due to the complexity and variety of projects now undertaken, the scope for financial engineering is very broad. There are however limitations such as the constraints on the conditions of financing that are acceptable to the lenders and investors. These constraints are often tied in with the risk profile of the project and of each participant [Risk in project finance is not the focus of this study but readers may wish to refer to such texts as Merna and Smith (1994) and Smith (1999) for coverage of the topic]. The financing structure is also dependent on the economic climate at the time. The recent Asian financial crisis and Brazil's January 1999 devaluation served to adversely affect investors' and lenders' inclinations. Such situations require the designing of innovative structures that renew interest and enable deals to be closed. The following example taken from a report by the International Finance Corporation highlights the impacts of some of these economic changes, IFC (1999).

The KMR Power Corporation (US) had planned to raise financing for its $175 million independent power project in Colombia (TermoCandelaria) through a 1998 high-yield debt issue in New York's 144A bond markets. However due to worsening of the Asia crisis in October of that year, a new solution was required. This involved re-engineering the package so that an $85 million subordinated loan was raised from an AA rated partner (Zurich

Reinsurance), and appointing Bank of America (BoA) as financial adviser who proceeded to obtain a full package of political insurance for the project. BoA also arranged the remaining $90 million in five–year senior debt, providing $40 million itself and the rest from Colombian institutions. It is obvious then that in engineering the financial package, one has to anticipate potential economic changes and build in enough flexibility to tackle any arising problems.

Essentially, financial engineering involves two processes:

- Credit Enhancement: Structuring of the various project-related agreements entered by the participants in such a way as to enhance the creditworthiness of the borrower. This credit enhancement reduces the risk to lenders and therefore lowers the cost of borrowing.
- Financial Instruments: Innovations in developing financial instruments that improve the viability of the project. This involves making optimal use of the capital markets and sources of funding as discussed in Chapter Three. Ultimately this attracts more equity investors and potential project lenders.

It is very difficult to examine the two items separately as the strength of their use lies in their co-existence in project structures. The following sections will attempt however to explore these core processes of financial engineering.

4.2 CREDIT ENHANCEMENT

Whilst project finance is typically non-recourse, realistically in the event of default, a lender may be exposed to equity risks or be unable to recover lent principal. Mere reliance on the revenue-producing project contracts to service debt may be insufficient to protect the lender. For this reason, credit support or credit enhancement from a creditworthy source may be required to reduce the risks to the lenders.

Credit enhancement may be of the form of direct guarantees by the project sponsors or the project participants, guarantees by third parties not directly participating in the project, and in some cases contingent guarantees and 'moral obligations of the project participants. Hoffman's extensive writing on project finance identifies other mechanisms for enhancing credit worthiness as including limited, indirect, implied and deficiency guarantees, comfort undertakings, insurance, letters of credit, surety obligations, liquidated damages, take-or-pay, through-put and put-or-pay contracts, indemnification obligations, and additional equity commitments (Hoffman 1998: p412). Some of these are explored in later sections.

Macquarie (1996) however advises on meticulous consideration on the usefulness of the type of enhancement used by looking at factors like the term of the device selected, its cost, the difficulty in enforcement and the time required to arrange such an enhancement. In order to be effective each type of credit enhancement is normally in the form of a separate agreement that is incorporated into the whole project's finance structure. It is necessary for this documentation to be in place before financial arrangements for the project can be closed. The credit enhancement needs to be collaterally assigned to the lender who must have the rights to enforce it; if the enhancement is removed without agreement, the project lender could consider this a loan default.

The financial community's perception of risk at any given point in time determines, to a large extent, the type of credit enhancement that is necessary to satisfy the lenders or equity investors. Guarantees against certain risks on one occasion might not be required several years later, as with processes or technology with proven reliability. Conversely a guarantee not present initially might suddenly become required, perhaps as a result of changes in political scenarios. This may be illustrated by the project to expand the capacity of an existing refinery by the National Oil Distribution Company (NODCO) in Qatar. Barclays was sole arranger and underwriter for the $850 million deal but had to rearrange the deal with sub-underwriters and co-arrangers when Russia announced a 90 day debt moratorium. The news from the Russian government effectively stopped all lending to emerging markets. By reducing the debt to $510 million and the tenor from a possible thirteen and a half years to a nine-year maximum, amongst other engineered variations, Barclays was able to renegotiate the deal with Qatar (Project Finance 1999). The Asia crisis of the 1990's and the Brazilian devaluation in 1999 also served to undermine the confidence of investors in these areas and as such slightly different financing terms than may have otherwise been agreed on had to be used to enable the financing of projects.

Some of the mechanisms mentioned here that are used to enhance the creditability of project are examined in the following sections.

4.2.1 Guarantees

Guarantees serve to shift some project risks to units that prefer little direct involvement in the operation of a project. They are mechanisms that permit entities to invest capital without becoming directly involved in the project. Project lenders may request guarantees for certain activities, such as completion of construction, in order to protect themselves from risk. A third party is able to assume these risks through a guarantee, as opposed to a loan or equity contribution, whilst avoiding financial reporting of the liability guaranteed as a direct liability, although it may be footnoted.

Essentially, project sponsors and third parties are the types of guarantors in project financing and these are discussed in the following sections. Obviously the value of a guarantee to a lender is dependent on the creditworthiness of the guarantor. There is great emphasis on the language of the guarantee as the lender may not be sure that creditworthy support is in place unless there is a waiver of defences and absolute and unconditional obligation on the guarantor (Alces 1983).

4.2.1.1 Sponsor Guarantees

The project sponsors or members of the Project Company (SPV) normally establish subsidiaries, which are awarded contracts such as the construction or operation and maintenance contracts, for the realisation of the project. As the subsidiary often lacks the capital to totally assume some of the underlying risks, the sponsor may have to offer some form of credit enhancement, often in the form of a guarantee of the obligations of the subsidiaries. For example a completion guarantee could require the sponsor to complete the construction of the project if the subsidiary is unable to do so. Once construction is complete, subject to agreed performance levels the completion guarantee terminates. In this instance it would be important that measures of completion are established beforehand in the guarantee.

Demands for guarantees in a project's structure must be done in such a manner that the 'commerciality' of the project is not inhibited. A balance must be achieved when combining enhancement mechanisms with other sponsor risks. This ensures that the project proceeds without burdening the sponsor to the point that the non-recourse nature of the project is jeopardised.

Although the sponsors are the most common guarantors in project financing, occasionally they may be unwilling, or unable, to supply sufficient guarantees in terms of credit. This may give rise to the need for credit enhancement by a third party.

4.2.1.2 Third Party Guarantees and Monoline Wraps

Most participants in a privately funded project are potential third party guarantors (see Figure 2.4). Third parties that may offer guarantees include banks, insurance companies, specialist investment companies, bilateral and multilateral agencies, input suppliers, equipment manufacturers, contractors and output purchasers. Typically, third party guarantors act as commercial guarantors for a fee and the risks that they cover range from specific commercial risks, political risks, casualty risks, and war risks to various *force majeure* risks.

Third party credit enhancement is described by Walker and Smith (1995: p77) as 'filling the empty chair' and is evident in the following example taken from the same text. Hopewell Holdings Shajiao B Power Plant in Peoples Republic of China (PRC) was the first privatised power project in Asia and had Guangdong General Power Company (GGPC) as the off-taker. However GGPC was deemed an unknown credit risk as it was an unknown entity to international bank lenders and was not licensed to deal in foreign exchange. Furthermore, its entire revenues were in Renmenbi (PRC currency), which at that time foreigners were not allowed to hold. The risk was unable to be priced or taken by the lenders or sponsors and a solution was found in inviting third party involvement. Guangzhou International Trust and Investment Company (GITIC) is a trading and investment company with holdings in Hong Kong as well as China and was recognised for international borrowing, and it guaranteed GGPC's power purchase payments removing the unknown payment risk from the lenders and sponsors.

Project companies often seek out the services of financial guaranty insurance companies such as Financial Security Assurance (FSA) who, by nature of having the highest available credit ratings from the major rating agencies, are able to guarantee the timely service of debt and principal repayment. The benefits of this include achieving the highest available credit rating for the project debt hence attracting a broader range of lenders. Specific insurers that are specialised in financial guarantees are often known as Monoline Insurers. This means that the insurer is in one insurance business only, the insurance of investment-grade debt securities, and is not exposed to risks from any other lines of business, as are property, casualty and life insurers. Moreover, every monoline bond insurer has at least one Triple-A rating from a nationally recognized rating agency, and every insured bond, in turn, receives a Triple-A rating based on the insurer's own capital and claims-paying resources. It is noteworthy that bonds that receive a Triple-A rating with the aid of a monoline are not identical to 'true' AAA rated bonds, and institutional investors buy insured bonds at a discount compared to real AAA bonds. The reason for this lies in the fact that notwithstanding a rare and irrevocable guarantee provided by an insurer, the contractual framework of the guarantee is such that there is the residual risk that payment on the part of the guarantor when called upon may be delayed or not fully paid out. Understandably the lower the creditworthiness of the bond issuer (without the monoline), the greater the probability of resorting to the guarantor and hence the greater the discount available to the investors.

The necessity of such guarantees varies depending on the capital markets that are accessed. In the United States projects that seek revenue bond financing (see section 3.6.1) are required to achieve investment grade rating from the rating agencies. This system works because the insurance premium paid by the issuer is more than offset by the reduction in the amount of interest paid to the investors as a result of the higher credit ratings achieved by using bond insurance. Jones et al (1996) report that in the US the expectation on the part of the suppliers of capital that ratings be available causes firms wishing to raise capital to acquire a rating. Jones et al are of the opinion that ratings may not play such important roles in Europe, as European investors do not generally demand this. This of course means that firms do not have to incur the costs of obtaining such ratings but for European projects that are hoping to attract extensive US capital, ratings may have to be sought. With the continued expansion of Europe's private finance market as predicted by P*f*I (2000) ratings may however become commonplace for projects wishing to finance from within Europe.

4.2.2 Other Credit Enhancement Tools

Other means of credit enhancement include Indirect Guarantees (such as Take-or-Pay Contracts and Take-and-Pay Contracts), Implied Guarantees, Put Options, Letters of Credit and Insurance.

Take-or-Pay contracts exist when the sponsor is able to secure a contractual agreement with a buyer who makes payments on certain dates in return for available deliveries of goods or services at specified prices. This can greatly enhance the financial package for the project in the eyes of lenders and investors as it provides a guaranteed revenue stream. The payment obligation of the buyer is unconditional thus even of no goods or services are delivered the payment obligation still exists. Take-and-Pay contracts are similar to the Take-or-Pay contracts except that the payment obligation is conditional on the delivery of the goods or services.

Implied guarantees are not contractual in nature and are just means of providing assurances to the lender that the guarantor will provide necessary support to the project, supposedly out of its underlying credit. Implied guarantees can be based on the size of the parent companies' equity investment or by Comfort Letters that express the parent companies' intention to continue supporting the project.

A Put Option, in the context of project finance, is an agreement between the project sponsors and specified third parties whereby the sponsors agree to purchase the third party's equity interests or debt obligations should equity returns or debt repayment obligations (or other specified contingencies) not be met.

Letters of Credit are used to protect against failure of the SPV to satisfy specific conditions by substituting the payment obligation and creditworthiness of a more solvent party (usually a bank) for the payment obligation and creditworthiness of the less solvent SPV.

Project risks not otherwise covered by other agreements can be insured at a premium to the SPV. The insurance package is of great importance to the lender and often included in the policies are requirements that the lender be made aware of any changes, or indeed cancellation, to the policy (Hoffman 1998).

There are many forms of credit enhancement and the main ones have been addressed here. The enhancement of creditability for a project is done in hand with other financial instruments and it is through these that the benefits of enhancement can be seen to manifest as the ability of these instruments to attract capital is enhanced. The instruments provide the access to the sources while the enhancement improves the quality of the access.

4.3 FINANCIAL INSTRUMENTS

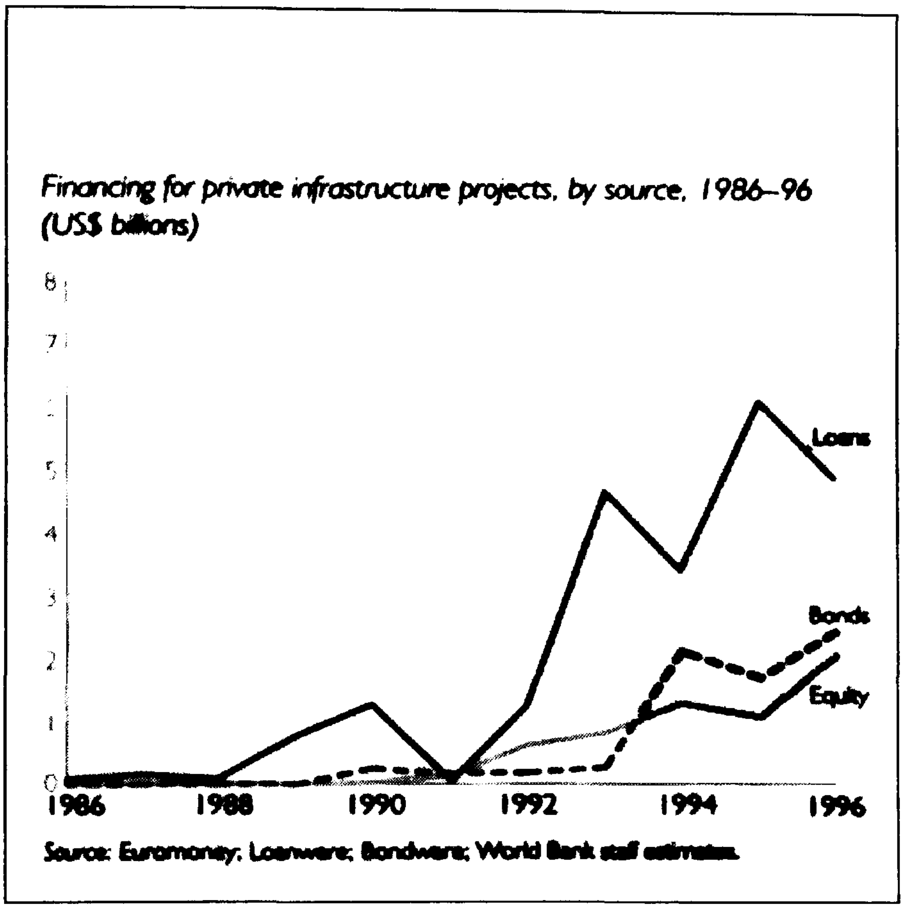
Key to the success of most, if not all privately financed projects, is the project cash flow. A typical philosophy in structuring the levels of debt and equity is to use as much debt as the project cash flow allows. This is done to realise an attractive return for the shareholders. However generally speaking, the less equity in a project, the greater the risk to the cash flow. An unstable cash flow means greater risk of non-repayment to the lenders and no dividends to the investors. It is obvious then that to maximise the return to investors whilst at the same time protecting the project cash flow requires innovative financing instruments and techniques. These instruments and techniques are frequently, if not always, applied together with credit enhancement. In determining the most appropriate instruments for each project, borrowers need to consider factors such as:

- Drawdown and repayment profiles
- Currency mix
- The level of protection required against interest rate movements
- Balance sheet structure

The mix of financing instruments differs from one region to another and this is due to the sectoral shifts in the demand for financing that exist. This can be illustrated by the differences between financing in East Asia and in Latin America. Following the privatisation of assets, Latin American infrastructure enterprises have turned to bond and equity markets for most of their international financing. In East Asia there has been a significant rise in international bond and equity finance, but syndicated loans have been the main source of finance, accounting for more than half in 1996 and an even larger share in 1995 (see Figure 4.1).

This is explained largely by private power projects, which have relied mostly on syndicated loans, with debt-to-equity ratios in the range of 75 to 25. Other sectors such as telecommunications have relied more on bond and equity issues than the power sector, but syndicated loans have also been important (Kohli et al 1997: 4-6).

These regional differences are also due to the fact that in the absence of well-developed financial markets it is difficult to utilise sophisticated capital market instruments particularly during the construction phase of the project.



(source: Euromoney; Loanware; Bondware; World Bank staff estimates)

Figure 4.1: Financing for infrastructure projects in East Asia (1986 –1996)

The level of market sophistication accessible to a project determines the financial instruments that can be used. The following sections discuss some of the instruments used to adapt and modify the more traditional forms of debt and equity into more flexible and profitable mechanisms.

4.3.1 Equity

To the promoter, equity means expensive capital. As the cost of equity is higher than debt, equity needs higher overall return (and therefore revenues) to give the same rate of return. The level of equity in a project's finance structure is influenced greatly by the debt providers' requirements and of course by whether or not high equity is specified as an important criterion in the Request For Proposals (RFP's). Generally speaking, high equity commitments are required when financing is considered to be a problem as with the case of Hopewells Guangzhou-Shenzhen-Zhuhai Superhighway in China where the equity was 30%. This was due to difficulties in raising finance during political and economic instability resulting from the June 4, 1989 massacre and uncertainty about revenues (Wu 1991). The Labuan Water Supply Project in Malaysia where the IPCO group proposed 30% equity as a result of the financial market's uncertainty, and the high level of equity that Thailand and Hong Kong generally require for BOT projects are other examples (Attajarusit 1988; Anderson 1989).

In contrast to these are the projects such as estuarial crossings, which are monopolistic in nature, and where the revenues are certain and cash flows predictable. The equity levels for such projects can be low. The most prominent use of low equity is Bank of America's strategy of 'pinpoint' equity finance and 100% debt financing for three BOT projects in UK: the Dartford Bridge, the Second Severn Crossing and the Skye Bridge (Tiong 1995: p286).

An adaptation to fixed equity involvement is the ability to sell or transfer equity stakes. This allows providers to limit their involvement to terms with the highest returns. In this way equity providers can pull out their equity stakes and invest them in other projects with higher internal rates of return (IRR). In 1996 the UK's Private Finance Panel (PFP) published a guide on the transferability of equity in which it stressed that in general there are no restrictions on the sponsor equity investment for PFI projects (PFP 1996: p6). Consequently, private sponsors have the freedom to sell and to invest parts of their equity stake in other PFI projects, and thus, there exists the possibility to adjust the project's financial structure to suit the project risk structure, for example at the end of the construction period. This transfer of equity allows sponsors to build opportunities into the financial structure for reaping higher returns on their initial equity injections as described below. Hoffman (1998: p82) however describes equity investments in infrastructure projects as more illiquid than those in projects in other industries. This is particularly true in countries with developing equity markets. Some governments impose equity sale restrictions on project sponsors particularly in the early project years to ensure sponsor support. Also when governments want ownership ultimately in local hands the sale of equity will be restricted until a sufficient local investment base develops to purchase interests in the project.

The project sponsors equity contribution covers, in most cases, pre-construction, or developmental cost, and is only part of the total equity although it can still run into millions of dollars. Although the risks are higher at the pre-construction stages, the sponsors expect to reap very high returns on this portion of the investment. This is realised by sale of part of the sponsors' equity at a substantial premium to new investors, and also by charging a premium for fresh equity that is brought in by new investors after construction (Ahluwalia 1997).

Equity terms can also be varied to suit the return requirements of providers such as contractors. For example, a contractor, who injects equity for the opportunity to obtain the construction contract for the project, could transfer or sell its equity stakes on construction completion. On completion the construction profit would have been received and at that point the IRR for the contractors investment is high as a result of those profits. Continued involvement as an equity provider would reduce the internal rate of return (IRR) for the contractor's investment as the impact of the construction profits on the IRR would diminish. Also, a high level of equity stake would undermine the effect of the construction profits and therefore it is in the contractor's interest to reduce its equity stakes in a project. A contractor's equity stake is also reflected on its balance sheets and therefore affects it's gearing. Hence equity stakes would make it more expensive for it to borrow more capital. It is worthy of note at this point to mention that increasingly, the projects coming to the markets contract the construction works on a lump sum, certain date, fixed price contract, with less requirements for equity participation on behalf of the contractor. This may be primarily due to the almost certain possibility that the contractor will look to transfer its equity stake on project completion. Walker and Smith (1995: 84-87) illustrate the dynamics of equity returns more fully.

The concept of value capture as introduced in Chapter Three is often viewed as engineered equity (Macquarie 1996: p54). Although this study often addresses elements of value capture in the context of exploitation of commercial opportunities, it is rightly mentioned here as part of the structuring of the equity element of a financing. This is because the sponsors of a project may benefit through an increase in land values by developing commercial, housing or retail estates. Key sites may have their value created or significantly enhanced by the new project. If the project company owns the site, then the entire benefit can be captured using the profit from redeveloping the property to offset some or all of the cost of the infrastructure. Macquarie identifies some of the major issues associated with engineering a value capture mechanism as:

- How the value increase should be calculated;
- The real beneficiaries of any increased value;
- How the benefits are allocated or shared among the beneficiaries;
- The boundaries of the benefits area; and
- How any value increase should be collected or realised.

Several projects have successfully captured the benefits of increased value to surrounding areas and engineered such capture into the financial package of the project. Some examples include the previously mentioned Guangzhou-Shenzen Expressway, which used the increased value to adjacent lands to cross-subsidise road construction costs, and the Hong Kong Eastern Harbour Crossing, which increased the projects IRR from 4% to 12% by obtaining the rights to develop property above the main railway station (see section 4.8).

The terms and structures of equity provision are continually being revised to suit projects within the available legal frames. However, this revision is largely influenced and dependent on the debt structure of the project and it is within the debt instruments that the most innovation seems to have occurred in the project finance market.

4.3.2 Debt

As previously mentioned, debt is still the main source for the larger portions of funding for privately financed projects. The arrangements that are implemented in the debt structure depend largely on the lenders' preferences and confidence in the project. Issues that need to be addressed would include the repayment schedule, which needs to be tailored to the cash flows of the project. Figure 4.2 illustrates the various cash flow profiles that exist across sectors and types of projects and also depicts the typical debt repayment profiles in comparison. (NB. Figure 4.2 is used for illustrative purposes and is not drawn to any scale on any axis.) It can be seen that the repayment profiles reflect the cash flow characteristics somewhat. For projects with early high cash flows the debt repayment is also high such as with oil or gas development projects. These have early high cash flows that then decline in the later stages of the project. The debt repayment payment can also be seen to reflect the cash flow. For industrial projects the debt repayment typically reflects the peaks and troughs of the cash flows. Depending on the nature of the project the interest payments may need to be capitalised (not paid straight away but added to the outstanding capital). Repayments can either be graduated to reflect a gradual change in the cash flow, structured as equal quarterly or semi-annual payments or incorporate principal repayment at maturity. The structure agreed between the lender and the project company varies depending on the sector or type of project, and on any peculiar features or arrangements that might exist. It is obvious then that any desire to alter these typical profiles would involve reconsideration of the borrowing terms or restructuring of the terms of the debt element of the financing.

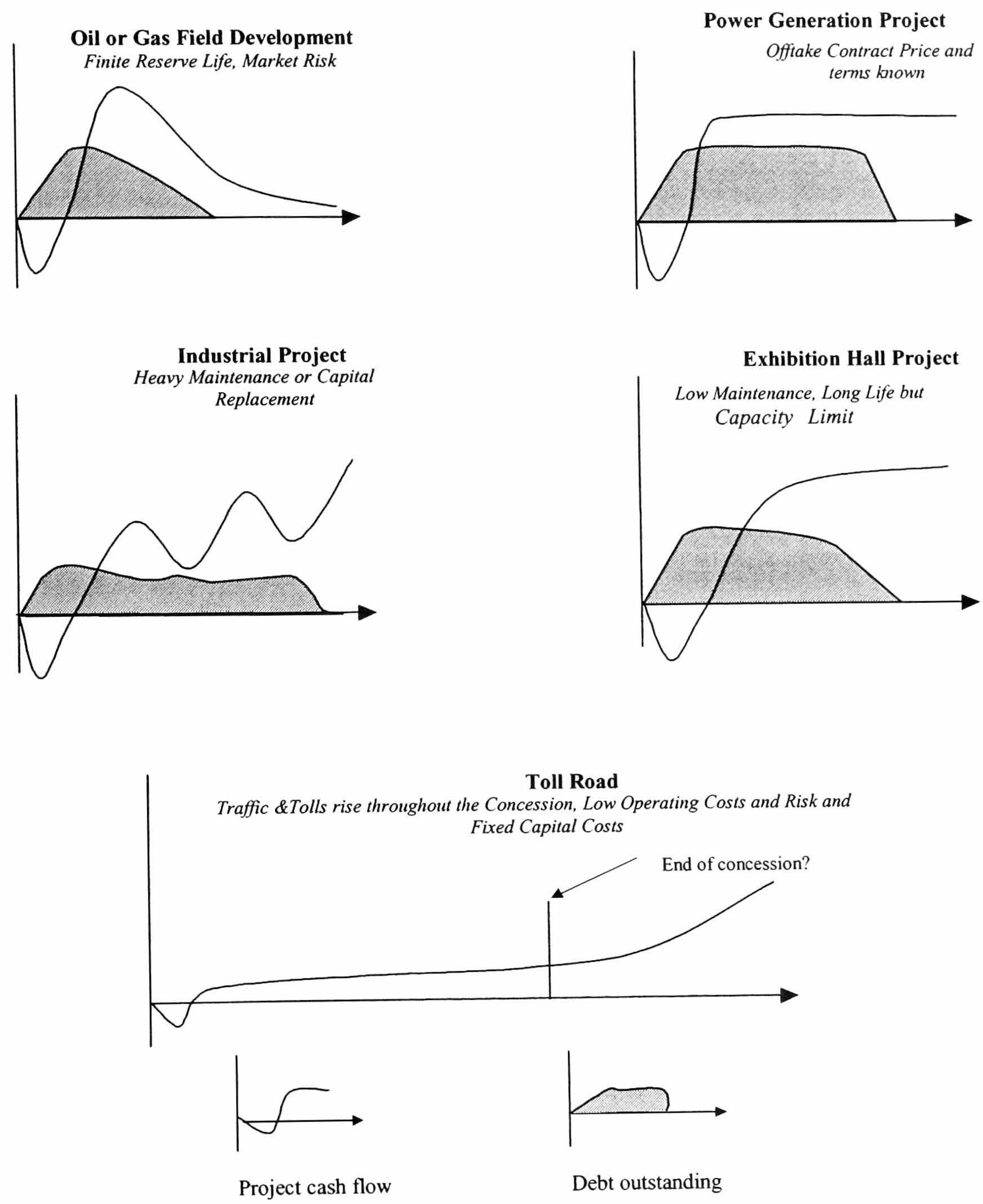


Figure is not to scale and is for illustration only.

Figure 4.2: Typical project cash flows and debt repayment profiles

Although the short-term maturities are often a mismatch with the long-term nature of the project's cash flow profile, there is still a strong market for bank debt. Many financings are taking shorter term loans, particularly during the construction period, complemented with equity provision, and the option to refinance on more favourable terms after construction when the risk profile is different. Engineering the project structure to include refinancing also gives the project company the opportunity to access the bond markets and raise finance more competitively with which to repay outstanding principal and reinvest into the venture.

In accessing the bond market, the issuer must be aware that a stable macroeconomic environment in the home country is necessary for the proper functioning of a long-term bond market. The investor is extremely concerned with inflation as this erodes the value of the investment, as well as the interest rates on the investment earnings.

An investor may, to limit exposure, limit the terms of bonds purchased to shorter maturities for example. They may also seek bonds with built in floating rates. The issuer/borrower needs to however complement such issues with derivatives such as interest rate swaps in order to offer a predictable cost profile, especially for highly leveraged infrastructure projects (Ferreira and Khatami 1996: p39). Interest rate swaps are explained in section 4.3.5.

The marriage of credit enhancement and financial instruments as discussed in previous sections that are now part and parcel of most project finance transactions becomes obvious when exploring the details of project bond issues. The samples of project details below illustrate the almost inevitable combination of these two elements of financial engineering in the project finance market.

- ***July 1998*** - The £91.2 million deal for Meridian Hospital Co plc was the first UK hospital bond to be sold without a monoline wrap, and the first to be index linked. The 30 year bond, rated BBB^{+} by Duff & Phelps, has an initial coupon of 4.1875% and re-offer spread of 160bp* over the 2016 index linked Gilt. Both interest and principal will rise in line with inflation (EuroWeek 1998a).

- ***March 1999*** - RBC DS Global Markets launched the first water utility PFI bond in the UK for a £79.3 million issue through Stirling Water Seafield Finance plc, for the Stirling Water consortium. East of Scotland Water Authority (ESWA) has awarded the 30-year Almond Valley and Seafield concession to the consortium comprising Thames Water, MJ Gleeson and Montgomery Watson Ltd. The concession involves the design, building, operation and maintenance of five wastewater treatment plants in and around Edinburgh.

The 27.5-year bonds, wrapped by MBIA Assurance SA through the MBIA-AMBAC International joint venture, are rated Aaa/AAA by Moody's and Standard & Poor's, and will contribute some 80% to the project's costs (EuroWeek 1999b).

- **September 1999** - The Bishop Auckland Hospital Project in the UK was financed with index-linked credit-enhanced bonds issued under the PFI Private Finance Initiative (PFI) projects. The use of credit enhancement opened up a greater band of investors for the project (Whitham 1999: p18).

- ***June 2000*** - Deutsche bank placed one of the largest PFI bonds so far to finance construction of a new building for the UK's main Electronic spying installation, the Government Communications Headquarters, in Cheltenham. The £406.85 million bond was issued by Integrated Accommodation Services plc (IAS), a consortium that has a contract to demolish two buildings, build a new one and service it until 2029. The consortium comprises Carillion, previously the construction wing of Tarmac, British Telecom and security company, Group 4. The group expects to finish construction by 2003. The transaction was wrapped by triple-A rated monoline insurer Financial Security Assurance UK, but is believed to be the first PFI deal to be rated single-A by Standard & Poor's before the wrap (EuroWeek 2000b: p22).

(* A *basis point is one one-hundredth of a percent. For example, a 150 basis point rise in interest rate is the same as a 1.5% rise. A 10 basis point fee is the same as a 0.1% fee.)*

The reasons for the greater suitability of bonds for privately financed projects lie in the characteristic structure of the projects: relatively large amounts of capital (typically £50million+) are required over long periods of time. For this form of investment bonds are ideal. Banks tend to be uncomfortable with such a long term loaning approach and want their money back again as soon as possible. This can have a detrimental effect on the Net Present Value of a project. Furthermore a wrapped bond will usually prove a cheaper source of finance than a bank loan. Although banks now offer lower cover ratios in order to compete with the bonds, bonds can be expected to maintain the edge and to see projects benefit from the competition generated.

P*f*I (2000) reports that the European bond markets are expanding rapidly at the moment and project developers can be confident of finding buyers for correctly priced bonds regardless of the special features, which the project company might want to include. The project company can put together any complicated structure and then take it to a bond house that will be able to find investors whose needs match up. Furthermore, as the breadth and liquidity of the European bond markets increase over the coming years, conditions will only improve. On the flip side, there is a sense in which bonds are less flexible, because it is much more difficult to renegotiate with several hundred bondholders than with one bank. However, the up front flexibility of the bond market - you can put anything you want into the offering circular - means that you can specify in advance how to deal with any event that might involve a meeting of bondholders.

As mentioned before debt normally provides the greater portion of the finance necessary to realise a project. The promoters however now often see senior bank debt as too restricting and generally as claiming part of the returns that could be absorbed into the project. For this reason other borrowing arrangements that provide more flexibility, reduce and/or complement the amount of sponsor equity required, reduce costs, or even provide a means of increased returns are being sought. Some other borrowing instruments are outlined below.

4.3.3 Mezzanine Finance

The use of mezzanine finance is one way to enhance the returns to investors and in its broadest sense can be considered to be the gap between senior debt and ordinary equity. Mezzanine finance is attractive to lenders as it provides higher yields than can normally be obtained from loans. The return to lenders for providing mezzanine finance depends heavily on the perceived risks of the project but is generally over 3% greater than would be expected on senior debt. Mezzanine arrangements closely resembling equity command higher returns on capital, usually in the range of 15-20% whilst those more similar to debt obtain lower returns.

Walker and Smith (1995) outline the following as factors that the selection of particular instruments for use in the mezzanine layer depend on:

- The project's prospective cash flow
- The cost of the instrument
- The legal and tax consequences of utilising the instrument
- The capital structure of the project company, existing and prospective
- The risk/reward perceptions of the financing institutions involved
- The size and purpose of the financing

The maturity period of mezzanine finance is normally longer than that for senior debt and this combined with the insecure nature of the finance makes it more expensive than bank debt

(Levine 1998). It is however less expensive than straight equity due to the higher returns required by the equity providers. Generally mezzanine finance improves the balance sheet by reducing the leverage. This is because banks view subordinated and unsecured debt as being similar to equity or quasi-equity: junior to the banks' capital. The greater flexibility in setting interest rates and loan terms that is associated with mezzanine finance, combined with the longer debt maturity also helps to improve the project cash flow.

There are lenders that specialise in mezzanine finance and they are able to fill in the debt-equity gap with unsecured loans from $500,000 to $20million. These loans are still junior to the capital of the secured creditors in the event of bankruptcy and as Levine explains, the lenders, in return for their increased risks, seek interest on the loan often with warrants to buy common stock. By this the mezzanine lender provides the subordinated debt but also takes a minority equity position giving the lender a stake in the upside potential in the project. The mezzanine lenders often expect stock warrants or some other mechanism (termed 'equity kicker') that requires the borrower to buy back the stock from the lenders. The payback on the loans typically starts in the fifth to sixth year, with final payment due in the eight to tenth year.

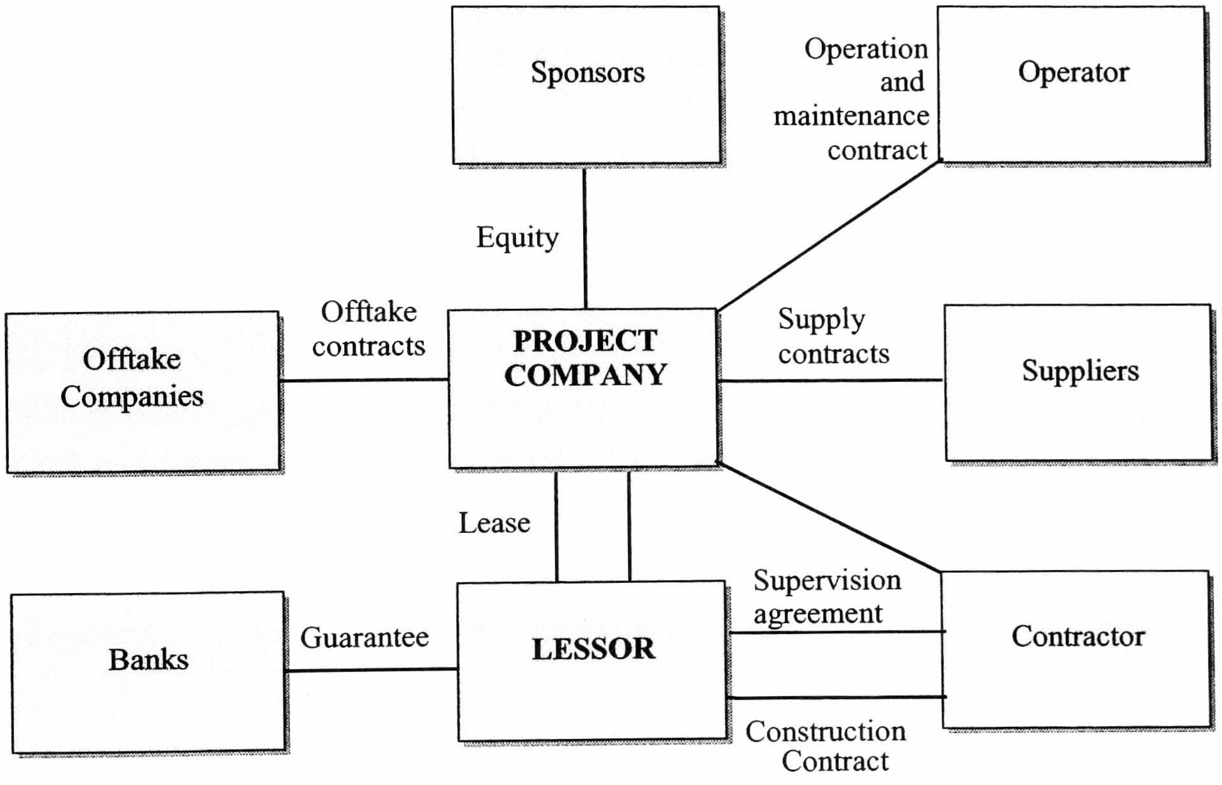
There is an acknowledgement by Jessop that there has been a move in the market for tranches of mezzanine debt to be provided in place of loan stock or equity (Jessop 1998: p13). Jessop also concurs with Levine by defining mezzanine finance as expensive debt as opposed to cheaper equity and though it is an important financial instrument for large scale, complex project deals its application in smaller deals may be limited

Mezzanine providers have similar rights to senior debt providers and will be compensated in termination events. This may prove to be little incentive to resolve issues to make the project work and result in prolific easy bailing out under such circumstances. It must be said however, that mezzanine finance improves the quality of the senior debt and hence the projects marketability, and as such appeals to investors looking for a share in the 'up side' risk of the project (Ahluwalia 1997: p100).

4.3.4 Project Leasing

A result of financial engineering that is becoming more common particularly for power projects is the use of leasing. This has developed from the corporate world of leases where essentially one party takes out a loan to acquire an asset (or construct infrastructure), and then leases the property to another party whose lease payments are often equal to the interest payment on the loan with a principal sum being made at the end of the lease. An example of this is Synthetic Leasing, an off-balance-sheet transaction in which a special-purpose entity is created to obtain a loan, which is used to buy some real estate. The real estate is then leased back to the parent company, which makes lease payments that are equal to the interest payments on the loan. At the end of the lease a balloon payment becomes due.

Project Leasing is the engineering of the legal and tax structures of the project such that tax efficiencies are gained and costs reduced. It is a combination of the concept of limited recourse financing and finance leasing (where the lessor leases the asset to a lessee. The lessor retains the legal title to the project whilst the lessee has the right to use the assets.) In a project lease an asset employed in a project is leased against the project bank's (lender's) assessment of the project cash flows. The main attraction of the inclusion of a lease is that it is tax based – that is the lessor claims tax depreciation. This provides savings over debt as to the extent that tax depreciation would not otherwise have been used.



(Source: Bull; 1995, p123)

Figure 4.3: Project Lease Structure

Referring to Figure 4.3 it can be seen that by including a lease, a second creditor (the lessor) has essentially been introduced into the structure. This can be of concern primarily to the lenders over issues of control in instances where the creditor has to enforce its security. This is normally overcome by the inclusion of an inter-creditor agreement, which sets out the order in which the two parties can realise security, and against which risk exposures (Bull 1993: p41).

Project leases can be either a Domestic Tax-based Lease or a Cross-border Lease. A domestic tax based lease will probably provide the most attractive savings as authorities often grant the most favourable tax depreciation to assets located within their own jurisdiction. However to operate a domestic tax based lease requires a well developed local leasing market with sufficient tax capacity to absorb the large value tax losses arising from major capital investment. Local leasing can also be either leveraged as in the USA and Japan, or single investor as in the UK. Through a leveraged lease the lessor obtains whole entitlement to the tax depreciation while typically funding a small percentage (normally around 20%). This will allow the rest of the asset to be financed through limited recourse financing. This ability to claim the tax benefits of the transaction while providing only a small portion of the capital required enables the lessor to lease the equipment/asset to the lessee, at a lower cost than the lessee could obtain if it sought either a direct lease or some other form of non-recourse financing Colucci 1999: p18). For a single investor lease however, the requirement is such that the lessor must completely finance the whole asset (Bull 1995).

Cross-border lease allows for the access of tax depreciation from external jurisdictions - that is, a country may allow assets abroad (in countries where domestic capacity is not available for instance), to claim tax depreciation but usually at a reduced rate from domestic assets. This is to encourage a preference for domestic leases. It may also be possible to access depreciation from two different jurisdictions although this has not been widely documented. Export credits (discussed in section 4.5.2) can also be used in a lease structure; that is financing by the lessor taking an export credit guarantee for a percentage of the assets costs. This can be used to support the credit of projects in lesser-developed countries where the projects would be otherwise 'unbankable'.

Leasing is becoming a greater part of project financing and institutions and governments are looking at ways of initiating enabling legislature for its implementation. An example is the Inter-American Development Bank's (IDB) study into a framework that will allow private investors to become involved in irrigation schemes in Brazil by way of leases (Wood 1999: 32-35). Morash reports that financial institutions, changing as a result of complex challenges posed by deregulation and industry wide changes, are constantly exploring the avenues through which the leasing option can be exploited in the context of project finance (Morash 2001).

This section's coverage of project leasing is by far not exhaustive as the market is far too vast and complex to do so. The main points on its application to project financing have, however been touched upon highlighting that its use is often in conjunction with the instruments and mechanisms discussed in previous and succeeding sections.

4.3.5 Interest Rate Swaps

One of the main concerns for a project company in obtaining senior bank loans is that of interest rate risk. Fluctuating interest rates can cause problems to projects' debt repayment profiles and place investors' returns at risk. In projects financed with bank debt the borrower is generally committed to pay a floating interest rate to the banks. In many projects however, the payment mechanism does not allow the borrower to pass on the variations in interest cost to its customer(s). A mechanism that allows a degree of protection against this is that of interest rate swaps illustrated in Figure 4.4.

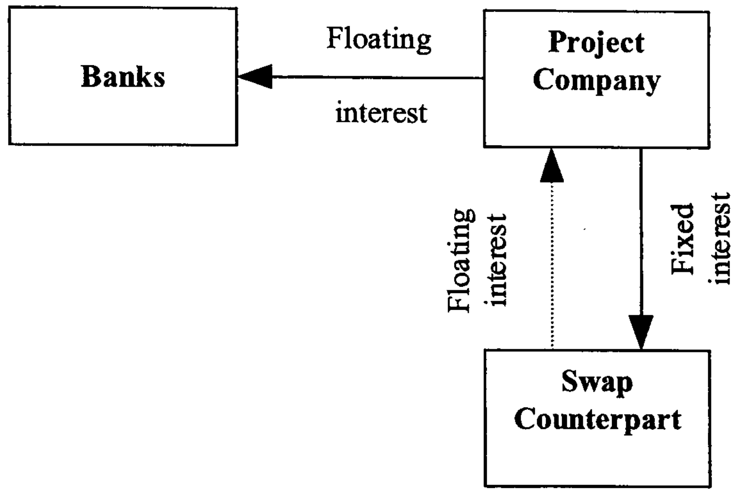


Figure 4.4: Interest Swap relationships

In a typical interest rate swap, the project company pays fixed interest rate to the swap counterpart and receives floating interest. The project company then pays floating interest to the banks and the net interest payment is therefore fixed. Similarly if the project is financed by bonds, then the project company is exposed to falls in interest rates that will leave it paying a higher rate of interest than necessary on its borrowings (bond coupons). In this case the project company can enter into an interest rate swap agreement as previously described except in this case the project company receives fixed and pays floating, thereby effectively converting its fixed income liability into a floating rate (Clarke and Lousada 1998). Often the swaps are provided by the lead arranger which allows the arrangers credit committee some control over the hedging strategy, i.e. making investments in order to reduce the risk of adverse price movements in a security, by taking an offsetting position in a related security.

Effectively one counterpart agrees to exchange a fixed interest rate on a specific notional principal in return for a floating rate of interest on the same notional principal. The arrangement also stipulates the term to maturity of the agreement. No principal is exchanged in the transaction. The interest rate on the floating leg of the swap transaction is typically reset at the beginning of each interest-payment period, and the cash interest payment is made at the end of the period. The London Interbank Offered Rate, or LIBOR (The interest rate at which banks lend to each other), is commonly used as the floating rate. Payments between counterparts are usually netted, and a single amount is settled on each payment date.

As a financial engineering tool swaps are very useful for offsetting fluctuations in interest rate changes. In their application to project finance, each swap, as is to be expected, is based around an individual project cash flow and Clarke and Lousada report that for extensive maturities around and beyond twenty years, the swap has to be built out of a large number of underlying swap transactions.

Swaps are becoming more common on the project finance market as more promoters gain knowledge and expertise in the field. One high profile project that has used swaps is the London Underground where swaps were used to convert the floating rate funding into fixed (NAO 2000).

The instruments discussed in this section have been those that are concerned with structuring of the debt portion of a project's financing. These provide ways of increasing the flexibility and efficiency of borrowing. Whilst bank debt is cheaper than equity there is a trend for promoters to move to bond issuance. Although banks are pressured to provide competitive alternatives through loan provisions they are not too hard done by some of the developments in financial instruments. By offering fee earning services that enable them to bring bond deals to the market, banks do not end up with large amounts of risk-tied capital on the their balance sheets, although they may have to provide a certain amount of short term bridging finance

The use of the financial instruments discussed in the preceding sections can give rise to numerous permutations of financial arrangements that allow for optimising of the funding structure. The sources of debt and equity also need to be considered, as the market constraints need to be examined when developing the financial package. The capacity of the debt and equity markets, their willingness to invest, their preferred risk profiles and the levels of return required are some of the issues that need to be considered when exploring the sources of finance.

1.4 Capital Markets

The previous sections have explored some of the elements in engineering equity and debt financing. Any capital sourced for a project will fall in one or both of these categories. The only possible exception would be direct government grants, which for the purposes of financial engineering is considered in this chapter under equity. Although sponsors and banks raise equity and debt respectively, capital markets can and do provide an expansive source for both equity and debt, and their role as a source for raising equity on the domestic and international stage is discussed in the previous chapter.

By accessing capital markets rather than conventional medium term financing, the promoters are able to broaden the base of investors from which they can raise funds and this is aided by the tradability of the instruments. This increased range reduces costs to the borrower due to competition and the different return expectations of the investors.

Overall, the increasing sophistication of the innovative instruments within the project finance market, some of which are discussed in this chapter, is placing pressure on banks to maintain their position as providers of the greater portion of finance for projects. They are responding by developing their ability to place and trade the new instruments. This seems to be, in the near future at least, constrained to the developed countries where the capital markets have the ability and means to engineer innovative investment and financing options as the need arises.

The story is slightly different with developing economies where the domestic markets when they exist or are effective at all, offer very limited absorbing capacity while demanding higher rates and offering shorter maturities than offshore markets. Guasch (1996: p368) reports that in the early 1990's domestic financing of infrastructure investments was infeasible in Latin America. In 1994 maturities longer than three years were almost unheard off except perhaps in Argentina, which has one of the most developed capital markets in the region.

Occasionally financial engineering may backfire as with the famous Eurotunnel. Due to the hugeness of the undertaking, the joint companies were allowed to issue shares first to private institutional investors, and then to the public even though the works hadn't begun. The massive initial public offering (IPO) helped to create such a wide distribution of shares that effectively diffused power within the equity holders, and this left the contractors with greater control over the project companies as well as the contracting consortium. The contractors were able to issue claims for variation orders with little control by the non-contracting shareholders and although the situation was eventually remedied, it was not until cost overruns exceeded 100% of the original estimated project cost.

It is then obvious that where independent investors are involved by way of the capital markets, the overall impact on the management of the project needs to be considered carefully. Also, managing the needs of these investors is markedly different to situations where the project participants provide the equity. The needs of these third party investors must be borne in mind when conducting negotiations. These considerations are of great importance especially now that initial equity holders look to transferring their equity stakes early on in the project cycle to maintain a high IRR for their investments

4.5 SPECIALISED FINANCIAL INSTITUTIONS

Several financial institutions exist which can be involved in the financing of a project in one way or another to ultimately improve the financial quality of the project. Their involvement may be by way of financial consulting and advice, or by loans and equity participation. Depending on the situation aid grants may also be made. A feature of these institutions also of great importance is the guarantee service that they offer. Guarantees have been discussed in great detail in earlier chapters and their impact on creditworthiness of a project described. The involvement of these institutions could be very significant in building or improving investor confidence in an otherwise seemingly risky project. Some of these institutions such as the World Bank and other Development agencies may have almost altruistic origins and drivers, but they are aware that private sector participation and commercialisation is crucial to realising many of their desired goals. In the context of project financing financial institutions as discussed here include special infrastructure funds such as those set up to promote private participation in infrastructure provision. Institutions such as the EIF and EIB as discussed in the previous chapter may also be included in this category.

One way of addressing the deficiencies in a country's domestic debt market is by creating specialised institutions to deal with infrastructure financing. Examples are the Pakistan Private Sector Energy Development Fund, established in 1998, which provides subordinated loans to private sector power projects, and the Jamaica Private Sector Energy Fund established in 1992 to provide long-term finance. Another example of such an institution is Partnership UK (PUK) set up in the UK to succeed the Treasury Taskforce. PUK is itself a PPP with a 49% government stake and encourages the financing of projects by providing advisory services to the private sector and also by taking equity stakes in projects.

.5.1 Options Provided By Financial Institutions

These institutions are able to provide private promoters with various options that could improve the structure of a project's finance package. Ahluwalia (1997: p101) discusses the role of such institutions; some of the options they provide are highlighted below.

- *Take-out financing.* Occasionally a project requires initial early financing in the form of short-term debt (such as credit from suppliers to finance equipment purchase), which is refinanced later by longer-term debt. A specialised financial institution may, for a commercial fee, be able to guarantee such refinancing at a predetermined financing cost. Essentially, the project is therefore assured that should the refinancing not be available on specified terms when needed, the institution will either provide the funds directly or reimburse the difference between the predetermined cost of financing and the cost at which funds can be raised.

- *Liquidity Support.* By creating a market or by providing support in the form of put options (see section 4.2.2) the institutions are able to encourage bond issuance.

- *Securitisation.* Being involved in a string of successfully operating infrastructure projects allows the specialised financial institution to pool assets and hence reduce risk by diversification.

- *Direct Financing.* Specialised financial institutions could be approached for direct financing (on a limited scale). This would give confidence to potential investors and could leverage larger flows of funds from other sources. As with mezzanine financing, subordinated loans from specialised financial institutions, for example, could improve senior debt and stimulate a larger flow of total resources at reduced costs.

Depending on the institution involved there are occasional peculiarities or conditions stipulated by the institution that may pose some problems. For instance, many Finance- Operate projects in the UK have benefited from involvement of the EIB and EIF. Some projects may find however, as with some bidders for DBFO projects, that as the EIB does not take construction phase risk, bank guarantees need to be in place to support its loan during the construction phase. In practice, the time and internal approval process required by EIB to provide funds could also mean that it may be difficult for bidders to blend EIB and commercial bank or bond funding. The difficulty involved with EIB funding has been considered in some projects to outweigh the potential cost saving (Highways Agency 1998: p19).

.5.2 Export Credit Agencies

:xport Credit agencies play an increasingly important role in the project finance market and are mportant in the securing finance for projects as their involvement provides extra confidence for enders lending against project cash flows. These agencies effectively offer coverage in the orm of providing creditworthiness to investments. This way, companies can use export credit ıgencies in their country to improve the creditability of their investments abroad.

'he ECGD, (Export Credit Guarantee Department) is the UK's official export credit agency and s a governmental agency of the Department of Trade and Industry that offers guarantees for nvestment by UK's companies in other countries, particularly developing countries. Examples ›f guarantees that are offered (a maximum of £100 million of loan principal or equity plus etained earnings, maximum term of 15 years) include those against currency transfer risks, :xpropriation and war, revolution and civil disobedience (ECGD 2001).

)ther examples of organisations that provide Export Credit facilities include:

- United States Export-Import Bank ("USExim"): generally for creditworthy U.S exporters, U.S. financial institutions, creditworthy foreign importers to the U.S, and foreign financial institutions. Coverage in form of direct export loans or guarantees.

- The Export-Import Insurance division of Japan's Ministry of International Trade and Industry (MITI). A governmental agency providing coverage mainly for Japanese companies and non-Japanese companies registered in Japan.

- Export Import Bank of Japan. ('Jexim'). Provides limited political risk coverage limited to loans from financial institutions (and branches) in Japan for the funding of recently privatised business and related industries in developing countries. Unusually, here the coverage is not limited to Japanese export financing.

- Export Development Corporation of Canada (EDC)

- OECD member countries (Organisation for Economic Co-operation and Development) have also each established export credit agencies that are similar to the ones above. See www.oecd.org for the current list of members and further details (OECD 2001).

4.6 MULTILATERAL AND BILATERAL INSTITUTIONS

Multilateral Institutions, or agencies, function between and across several borders. This is different to bilateral agencies which are agencies established in the parent countries that promote economic development activities between the parent country and others. It could be said that multilateral agencies do not have a parent country but are owned by all the member countries. Examples of multilateral institutions include the Inter-American Development Bank (IDB) and the World Bank (see Table 3.1 in preceding chapter for other examples).

The IDB is an international financial institution created in 1959 to help accelerate the economic and social development of Latin America and the Caribbean. The IDB Group also includes the Inter-American Investment Corporation and the Multilateral Investment Fund, which promote private sector development in the region. The IDB is owned by its 46 member countries: 26 borrowing countries in Latin America and the Caribbean and 20 non-borrowing countries (16 European Countries, U.S.A, Japan, Canada and Israel). The non-borrowing countries use the IDB as a tool for strengthening economic relations with more countries in the Latin American and Caribbean region than would be possible with just bilateral institutions (IDB 2000).

Another major multilateral institution is of course the World Bank (officially known as the International Bank for Reconstruction and Development - IBRD). The bank is part of the World Bank Group, which also consists of the International Development Agency (IDA), the International Finance Corporation (IFC), the Multilateral Investment Guarantees Agency (MIGA), and the International Centre for the Settlement of Investment Disputes (ICSID). About 50% of the shares in the World Bank are owned by developing nations whilst the largest industrial countries, known as the Group of Seven or G-7 (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) have about 45 percent with the United States having the largest shareholding of about 17% (IBRD 2001).

The World Bank is very much pro-private finance but primarily in the developing world. There are two types of World Bank lending. The first type is for developing countries that are able to pay near-market interest rates. The money for these loans comes from investors around the world when these investors buy bonds issued by the World Bank. The second type of loan goes to the poorest countries, which are usually not creditworthy in the international financial markets and are unable to pay near-market interest rates on the money they borrow. The World Bank cannot issue bonds to raise money that would finance lending to these countries. Lending to the poorest countries is done by the World Bank affiliate, the International Development Association (IDA). IDA lends an average of about $6 billion a year to the world's poorest countries and its credits are free of interest, carry a low 0.75 percent annual administrative charge, and are very long term-35 or 40 years including 10 years grace (IDA 2001).

Projects in developing countries approach multilateral agencies as their involvement improves the creditability of the project and as such can attract more private investors. By engineering such enhancements as MIGA guarantees, a project company can protect itself and the project from default risks by the sovereign state. However the involvement of these multilateral institutions may raise issues of control and interference as they may demand levels of involvement and stricter satisfaction of criteria such as environmental considerations.

Bilateral institutions/agencies are very similar to multilateral agencies except, as mentioned earlier that bilateral agencies attempt to develop and improve economic relations between one parent country (where the agency is established) and other countries. Bilateral agencies are set up by governments (mostly developed countries) to develop economic ties with other countries to offer financial support for development and in so doing benefit from supply and procurement opportunities. These agencies work closely with bilateral agencies in other countries and with the World Bank (DFID 2001).

Examples of bilateral agencies include the UK's Department for International Development (DFID - formerly known as Overseas Development Administration), the United States Agency for International Development (USAID), Australian Agency for International Development (AusAid), and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. Other examples are listed in Table 4.1.

A project company may again approach its country's bilateral agency to participate financially in a project abroad, particularly if the project structure can be engineered such as to allow for participation of the country's private sector firms in the project.

The involvement of a bilateral or multilateral organisation in a project may improve the creditability of the project and hence potentially lower the financing costs. The contacts and relationship that exist between these agencies and sovereign states across the world may also help to expedite the implementation of a project.

Austrian Development Co-operation
Canadian International Development Agency (CIDA)
Danish Development Agency (DANIDA)
Department for International Development Co-operation (Finland)
Agence française de dévelopement (AfD)
Irish Aid
Japan Bank for International Co-operation (JBIC)
Japan International Co-operation Agency (JICA)
Kreditanstalt für Wiederaufbau (KFW)
Netherlands Development Co-operation
New Zealand Official Development Assistance (NZODA)
Norwegian Agency for Development Co-operation
Swedish International Development Co-operation Agency (SIDA)
Swiss Agency for Development and Co-operation (SDC)

(Source: World Bank http://www.worldbank.org/html/extdr/institutions/bilaterals.htm)

Table 4.1: Bilateral Agencies

4.7 ALLOCATION OF RISK

There is scope for financial engineering by manipulating the risk allocation. Emerson (1983) notes that this requires the identification of two broad categories of risk: the lenders' risk and investors' risks. It is the author's view that perhaps a third category should be included, that of the public sector's risks. Though this may seem to depart from the dogma that private financing is all about transferring risk to the private sector, it is suggested in view of the increasing partnering that is occurring between the public and private sector manifested in the new wave of PPP's. This is also in line with a recent report by the UK's Institute of Public Policy and Research (IPPR) which advocates further evaluation of the partnering mechanisms vis-à-vis risk transfer and allocation, IPPR (2001). Generally lenders are usually prepared to only accept post completion risks, expecting that the promoters and investors take on all the pre-completion risks. The engineering of the finance of projects by risk allocation is however outside the scope of this study and will not be considered here. Nevitt P.K (1983) and Emerson (1983) are examples of texts that cover this area in more depth.

4.8 EXPLOITATION OF COMMERCIAL OPPORTUNITIES

As already mentioned in the preceding chapter there is occasionally scope in privately financed projects for commercial innovation to create an inflow of cash. These innovations can be woven into the fabric of the concession agreement to provide different sources of revenue. Although funds that can be obtained from commercial opportunities are seldom accessible until the post-completion stage, or until the venture is effectively online, there are ways of exploiting commercial opportunities earlier if innovation is applied in engineering the contract terms and the financial package.

A good example is the BOT concession of the Eastern Harbour Crossing in Hong Kong awarded to a consortium led by Japanese contractor Kumagai Gumi. The crossing was to comprise of road and rail tunnels, which would be tolled. The concession also provided for the construction of the new Lam Tin Station at the crossing. In Hong Kong, dwellings near Mass Transit Railway (MTR) stations are highly desirable for obvious reasons, and no doubt with this in mind, the consortium managed to secure, under a separate agreement, property development rights above the station.

From Figure 4.5 it can be seen what use these rights were put to. Eight large 33-storey apartment blocks were constructed by a joint venture between the consortium and a local contractor set up for that purpose. Smith reports that most of these were pre-sold ahead of their construction (Smith 1999: p115). By including this seemingly separate apartment block project, the consortium succeeded in strengthening its financial position in relation to the concession and in creating a source of revenue that was not directly related to the revenue stream anticipated from the traffic though the tunnels. Overall the IRR was increased from 4% to 12%.

Another example is the previously mentioned Guangzhou-Shenzen Expressway which used the increased value to adjacent lands to cross-subsidise road construction costs.

Opportunities for commercial innovation may prove to be rare however possible areas include tapping into the commercial aspects of airport retail in airport projects and the development of land corridors adjacent to road projects and improving the cash flow with revenue from the subsequent development of commercial properties on the corridor.

(Source: Smith, A.J. 1999: p114)

Figure 4.5: Property development above Lam Tin Station, Eastern Harbour Crossing, Hong Kong

Obviously the opportunities for such commercialisation may be few and far between but such innovations should always be looked for, as the favourable impact that they may have on the project revenue could be considerable.

4.9 FINANCIAL ENGINEERING EXAMPLE

The following details of a project finance deal are highlighted here in box 4.1 as illustration of some of the instruments and mechanisms that can be engineered into the financial package of a project. In March of 2000 Citibank led a $730 million loan and synthetic lease to finance Pacific Gas and Electrical (PG&E) National Energy Group's 1,048 MW La Paloma gas fired power generating plant. The details of La Paloma below are excerpts from Project Finance (2000: p19).

This particular project financing has been chosen for illustrative purposes as it makes use of a variety of instruments. From the excerpt it can be seen that the financial engineering for this project has accessed the debt markets, using both a straight bank loan and a bond issue. The package is structured so that the commercial paper has not exceeded 50% of the financing. This was in accordance with views that bonds should not be issued for more than 50% of the debt required or the project may become unacceptably vulnerable to some of the bond risks discussed in the preceding chapter, (Smith 2001).

BOX 4.1 La Paloma Project Details

...La Paloma's $730 million financing includes a $25 million debt service reserve facility, $15 million working capital, $374 million of commercial paper backed by the parent PG&E Corp., rated A/A3 and issued through a Citibank managed conduit, $295 million term loan B tranche, and $21 million in certificates. Sponsors also have a 55% equity stake.

The loan is priced as follows: 137bp for the construction phase, 150bp for the end of the construction through year five, 225bp for years six through ten, 237.5bp for years 11 through maturity.

"...the large commercial paper funding,..... is appealing to sponsors who like the low cost and security of payments. In addition, the commercial paper acts like a bridge loan during the construction period, except that commercial paper market funding costs maybe lower."

"The commercial paper is funded in the market and the cost of it is backstopped by the banks. So in the event that the conduit falls through, the banks are on the hook, so the company always has certainty of funding."

A 100% cash sweep option loan after year seven of the loan's tenor is another feature of the financing PG&E National Energy Group selected so they would have an opportunity to refinance. ...

"The deal is door to door 18-years for the non-recourse loan and B-notes and the cash sweep is something that occurs beginning in the 17th year and we see it as a way for banks to recognise that we have a very strong incentive to refinance before the seventh year."

There is also an element of credit enhancement as a rating has been sought for the bonds. The debt is structured to have a working capital with a reserve facility and a second tranche (B) has also been included. A large sponsor equity stake has also been built in. The bonding facility is described as a cheaper option to a bridging loan for the construction period. The list of instruments and mechanisms used in this example is by no means exhaustive. It does however serve to show that the engineering of a project's financing is done bearing long-term intentions in mind such as that to refinance, and implementing structures that improve the flexibility, viability and returns of the project.

4.10 SUMMARY

This chapter has been structured to explore the engineering and structuring of financial sources in ways that provide the most profitable and robust financing arrangement for a privately financed project. The instruments and novel approaches that may be used in project financing as introduced in earlier chapters, and the permutations that may be arranged and the benefits of such arrangements, are discussed in great detail in this chapter.

By discussing credit enhancement and the use of financial instruments as its main components, this chapter has introduced the concept of financial engineering. Credit enhancement has been explored with an introduction to guarantees and monoline wrapping of securities and the use of financial instruments was explained with debt and equity as the main categories under which the finance sources fall.

This chapter has investigated the means of engineering the equity component of the project's financing such as through the varying of equity terms and inclusion of value capture elements. There has also been an investigation into the innovative means through which the debt component, whether as bank loans, bonds or other forms of debt, can be structured in the package for improved profitability and success.

Other approaches and tools for financial engineering, such as project leasing, mezzanine financing and interest rate swaps have also been addressed within this chapter. Capital markets, the involvement of financial institutions and the exploitation of commercial opportunities to improve the robustness of a project have been delved into within the structure of this chapter, as has the integration of these into a project's financing by financial engineering.

Throughout, case studies have been used as illustrations and this chapter concludes by outlining details of a real project that incorporates several elements of financial engineering as a demonstration of its applicability.

CHAPTER FIVE

BID DEVELOPMENT

5.0 INTRODUCTION

An appreciation of the processes involved in the engineering of project financial structures is required, in order that the contexts in which the approaches and methods employed in the following chapters exist are fully understood. For this reason this chapter is structured to afford an insight, first into the progression of funding structure development, and then into the financial model; a tool created during such development and fundamental to the selection of an appropriate funding structure. The viewpoint of a bidder's financial adviser has been assumed.

5.1 THE PROCUREMENT PROCESS

Requests by the government for expressions of interest in any PFI projects are published in the Official Journal of the European Community (OJEC) (MoD 2003a). Private sector sponsors interested in participating in a project are subject to the procurement procedures put in place by the public sector. In the case of the UK these procedures are influenced by government policy and by requirements to conform to European procurement guidelines (HM Treasury 2002). The UK's Office of Government Commerce (OGC) has produced a detailed step-by-step guide to the procurement process available on its website (OGC 1999). These procedures may differ cosmetically, i.e. naming conventions, from project to project and sector to sector but the overall approach is similar; with the procurer or public sector controlling the formats of the procedures involved. The broad categories below summarise the procurement stages. The financing strategy for the project will develop as further negotiations are entered into throughout the categories identified below and is manifested in the development of a financial model. As acknowledged in the report by SMi Group (SMi 2002), the provision of a financial model has become a key element of the project development process. The study conducted by Tiong (1995b) on the importance of a strong and viable financial package to the awarding of the contract also concludes that the inclusion of a sound financial package is key in the award of most privately financed contracts.

As such, much of this study is concerned with the development and manipulation of a financial model. However at this stage it is necessary to enlarge on some of the considerations and processes that come into play during the procurement stages in relation to the financial strategy.

- **Pre-Qualification:** Guidance from the OGC requires that interested parties responding to the OJEC Notice mentioned above should be evaluated against the minimum standards set for technical capacity, financial and economic standing and ability (where procurement is for services but not works) (OGC 1999). The purpose of the pre-qualification process is to assess the competence of the interested parties and is not intended to deal with proposals for the particular project. The outcome of the pre-qualification stage is a list of bidders suitable for consideration in the next stage of procurement, i.e. the invitation to tender

- **Invitation To Tender (ITT):** Here preliminary information on the project is given to the list of successfully pre-qualified bidders. On the basis of this information the bidders are required to submit an Outline Proposal for the project (MoD 2003a). Although the development of the project financing strategy commences as soon as a client expresses an interest in a project, the financial aspects with which this study is concerned are not really initiated until the ITT stage. The submitted proposal will include elements of the financing strategy to be adopted (PwC 2002). The procurer evaluates the submitted proposals and a limited number of bidders are short listed for further negotiations.

- **Invitation To Negotiate (ITN):** The short listed bidders are invited to submit a more detailed tender on which negotiations are based. More detailed financial details are required at this stage and features of the financial model are often specified in detail as part of the tender. Generally the model needs to show how the initial assumptions at ITT translate into cash flow and profits over the life of the project (SMi 2002). Some negotiations are conducted on the bids submitted by the short-listed bidders. NAO (2000; p4) illustrates how the development of the public sector comparator, against which tenders are evaluated, accompanies the ITN stage. For further information on the public sector comparator see the Treasury Task Force publication *How to Construct a Public Sector Comparator* (Treasury Taskforce Policy Statement No. 5) and *Public Sector Comparators and Value for Money* (Treasury Taskforce Technical Note No. 2). After the negotiations the client may seek a best and final offer (BAFO) on the basis of the clarified bids.

- **Best and Final Offer:** The BAFO stage may or may not be included in the procurement process and its inclusion should normally be stated in the ITN documentation (OGC 1999). The MoD states in its guidelines that most MoD PFI projects have not required BAFO's but proceed to contract award based on the previous negotiations and the resulting bid ranking (MoD 2003a). The BAFO will include detailed information on the technical and financial aspects of the bid. The financial model is key at this stage and a Preferred Bidder is selected for the project based on the submitted BAFO's. The Office of Government Commerce recommends that in order to ensure value for money the Preferred Bidder should be required to run funding competitions, as lenders are more likely to offer more competitive terms to a Preferred Bidder (PFU 2002). This may be strengthened by the fact that by the BAFO stage the lenders should have carried out further due diligence on the project and its participants.

- **Contract Award and Financial Close:** The end result of a successful BAFO submission is a contract binding the parties involved under the terms of the financial model and the terms and conditions of the concession contract. The project is said to have reached the Financial Close stage and this process of closing the deal is often lengthy and plagued with difficult negotiations. One of the final tasks before financial close is reached is that of establishing the Hedging Strategy. The strategy adopted at financial close will depend on the type of financing used. Usually but not always, 100% of the debt will be hedged with an interest rate swap (see section 4.3.5). This effectively means that the SPV will pay a constant fixed rate on its debt obligations over the life of the swap. For instance money initially raised by way of a bond is held in a bond deposit account until required and it is usual for the interest rate on the bond deposit account to be hedged by means of derivative contracts such as Forward Rate Agreements- where rates to apply over a period are agreed in advance, or an Amortising Swap where the notional principal of the swap amortises or reduces over time. This helps to ascertain the potential returns by way of interest earned on the deposit account in the event of fluctuating interest rates. At financial close the inputs into the model will be finalised and will form a binding contract. With fluctuating rates of interest and hedging pricing this can be tricky and it is usual to identify sections of the model that will require updating just before financial close so that the finalising of the model can be done quickly and easily. These will normally be limited to reference interest rates. The contract is only awarded by successfully reaching financial close and the concession is normally considered to commence the moment the contracts are signed.

5.2 CONSIDERATIONS DURING PROCUREMENT

The ITT documents as issued by the public sector will include the Draft Concession Contract as the principal draft contract. This contract must be reviewed to assess its impact on the funding; this will primarily involve highlighting issues that may be of concern to the lenders, and the impact on the bankability of the project. Examination of the contract terms in reference to responsibility for planning, payment mechanisms, termination provisions, compensation on termination, change and variation mechanisms and *force majeure*, are important as these areas have a direct impact on the funding of the project and as such need to be carefully evaluated to ensure that a robust funding structure is designed.

Furthermore, to ensure an informed strategy is adopted it is often, if not always necessary, to conduct a review and analysis of the market sector. Such analysis may include gathering information on other similar projects; researching and reviewing existing funding structures and funding providers; establishing a preliminary view on risk allocation; undertaking an analysis of strengths, weaknesses, opportunities and threats (SWOT analysis) on the competing bidders; and reviewing current public sector guidance on funding (Whittal 2002). The market sector analysis increases the chances of tender success and would enhance the financing strategy adopted.

The financial model is key to the financing of the project. It is a complex tool and is used in choosing an optimal project funding structure for the project by way of analyses showing the key financial outputs of different financial structures. The outputs of the model provide important information to the project stakeholders. For the procurer (public sector) the model needs to demonstrate project viability and value for money. For the lenders a robust financing structure that assures repayment needs to be displayed, and for the shareholders the projected returns need to be commensurate with the capital at risk (SMi 2002). The model is almost always spreadsheet based (although database programmes can be used) and outlines the financial strategy from project start to finish. It is normally structured on a semi annual basis (semi annual periods) and illustrates the financial robustness of the structure; a key factor in convincing lenders to fund the project. Typical outputs would include the Net Present Value (NPV) of the project, the gearing, and the projected cover ratios. The model also indicates the returns to the sponsors (MoD 2003b).

The initial building of the financial model involves incorporating sponsor constraints on the project and model. Some of these may arise as a result of the sponsors' internal accounting practices or shareholders requirements. For instance shareholders may demand a specified minimum return from the project. Other restrictions may include limits on the amount and number of periods of losses and the amount of pure equity that the sponsor may inject into the project. Obviously excessive constraints will undoubtedly result in a sub-optimal funding structure.

At the earlier stages of the model development uncertainties abound: uncertainties such as those regarding the costing of the project activities and the terms and rates at which the project will be financed. The options of financing considered for the project have been discussed in earlier chapters and will include senior debt funding, i.e. bank loans, bond issues, leasing or combinations of these; equity financing, i.e. subordinated debt, mezzanine funding, pure equity, or combinations of these; and combinations of senior debt and equity financing. Note here that subordinated debt is highlighted under equity. This is because an assumption is made that, as in many cases, the subordinated debt for the project is provided by the project shareholders. In the case of subordinated debt being provided by third parties it would be classed as a loan; junior to the senior debt (MoD 2003b).

During the earlier preparatory stages of the model, indicative financing terms such as margins on loans and financing fees are obtained from potential lenders and these are used within the initial model. For this reason it is normal for a few assumptions to be made at this stage although these need to be documented in detail.

In practice the costings of the project i.e. the cost breakdown of the construction and operation and maintenance schedules, is unlikely to have been finalised by the sponsors. Estimates are therefore required for use in the model. Indeed the finalised figures are often not received until hours before the final bid is to be submitted. This obviously limits the amount of time that can be dedicated by the financial adviser/ modeller to optimisation of the model.

All projects need appropriate risk allocation and the manner and extent to which the public sector wishes to transfer risk to the private sector needs to be determined from the concession contract. The structure of the model, which will reflect the lenders view on the risk allocation, will also be impacted by the payment mechanism and any likely deductions associated with the mechanism. For this reason an extensive review of the risk allocation implicit in the concession contract and subsequently implemented through the secondary contracts needs to be conducted and considered whilst developing the model.

Any innovative funding structures conceived need to be taken into account early on to ensure that the model is designed to cope with any peculiarities that may arise as a result. In establishing potential sources of funding for the project the lending institutions' experience of project finance must be considered, as must their relationships with the sponsors. More importantly, consideration should be given to their arranging and underwriting capacity, the maximum debt tenor offered and their inclinations vis-à-vis the market rates for spreads and margins. The perceived complexity and reliability of the funding process must also be weighed up. Privately financed projects are normally heavily dependent on debt as this often forms the majority of the financial package, and as such potential future lender difficulties need to be avoided as these could be fatal for the project. At the same time savings that could be made by comparing lending rates could be substantial and need to be sought. It is usual that lenders identified in this manner are contacted shortly afterwards and Confidentiality and Exclusivity Agreements signed with them to secure their possible services in the face of competition (PwC 2002).

Essentially a competition is held among the potential finance providers for the best financing terms. This may be done at the ITT stage to improve the initial bid and/or at BAFO stage as mentioned earlier at the request of the client (PFU 2002). It is important to keep the competitive tension as the financing costs are a major proportion of the project costs and as such the more favourable the terms the lower the NPV of the project will be. The potential lenders will base their submitted indicative rates based on preliminary information passed on by the consortium outlining the total funding requirement, the type of finance, i.e. bank and or/bond, subordinated debt and/or pure equity, and total contributions required from the various debt and equity funding sources. Lenders will also require an outline of the sources and uses of funds during the construction stage, i.e. the highest risk stage.

The potential lenders supply their rates and terms by way of a Term Sheet outlining the terms and conditions, fees, margins, constraints and the lenders' security over the project. A sample term sheet is given in Appendix A. Evaluation of the terms sheets in order to select the lending institutions to include in the bid in response to the ITT will include consideration of the following factors: total number of lenders to be selected; which terms produce the cheapest NPV; the deliverability of the financing terms and level of approval given by the lenders credit committee (lenders internal committee that approves lending transactions). It is also important to consider whether any banks have proposed equity participation as this reduces the total funding requirement from the sponsors. Equity participation by banks however is normally adopted at the expense of sponsor control over the project and may also increase the complexity of documentation and, as mentioned in section 3.2, may involve further legal complications.

During the evaluation of PFI tenders the NPV of each bid submitted will be an important evaluation criteria. From the procurers point of view the NPV of the income stream is one, if not the, key evaluation criteria. Of the funding structures modelled by a bidder, the structure with the lowest NPV will be arrived at by optimisation of the model. Financial modellers agree that the three variables that dictate the optimal structure are cover ratio limits, equity return and gearing, (Douglas 2000; Woodings 2002). In practice the lenders' term sheets will specify the minimum cover ratios they are willing to permit (see Appendix A), and as already mentioned, the sponsors will have indicated their minimum return requirements (SMi 2002; NHS 2001) Theoretically then, the option available to the financial modeller is the choice of gearing at which the model is optimal. This however is still not strictly true, as the term sheets will also have specified a gearing limitation. It can therefore be seen that the 'optimal' nature of an optimal model is rather subjective. Senior financial analysts agree that the lenders are often overcautious in their term sheets (Porter 2002). In practice it is occasionally possible for modellers to renegotiate the gearing with the lenders without increasing the financing costs although changes are never too different from the lenders original figures. This is only normally done if the benefits are demonstrable and as long as the lenders risk exposure is unaffected or perhaps even reduced. The optimisation process of financial modelling is further discussed in Chapter Seven.

Adherence to accounting standards is important in financial modelling if the model is to withstand audit. Although Taxation and Capital Allowances are not addressed in this study to any great degree they are complex areas subject to Inland Revenue rules and guidance. MoD (2003b) defines capital allowances as allowances that a company can offset against profits chargeable to corporation tax if it is investing in capital equipment. Capital allowances effectively allow a reduction in the value of the project assets as in depreciation and this is implemented in project finance for tax efficiency. There are strict tax rules governing capital allowance that prevent initial excessive write off as in depreciation. With capital allowance you reduce the profits that are subject to tax by reducing the value of the assets on the sheets. At the ITT stage an estimate as to the capital allowance will normally be sufficient in the determination of the funding structures however it is essential that at later stages, an expert opinion be sought regarding the correct rates for the calculation of the allowance as application of incorrect rates may lead to a material misstatement of the tax computation in the model. Many bidders use the capital allowances aggressively to improve the competitiveness of the bid, however the implementation must be prudent enough to withstand audit.

The inputs and assumptions give rise to the Base Case Model and sensitivities are conducted to ensure that the model is sufficiently robust to withstand reasonable downside sensitivities. These analyses provide the sponsors with an indication of the sensitivity of the project to various factors including changes in CAPEX, OPEX and sponsor required returns. They also provide the lenders with comfort that in a reasonable downside scenario, they will still be repaid in full. The lenders will use the results to ensure that the cover ratios achieved are satisfactory. It is important that sufficient documentation of sensitivities must be kept such that each scenario used in the sensitivity analysis can be recreated at any time in the future. One way of doing this is by using data or sensitivity tables where all the variables of the analysis are listed and from which the model will draw its inputs.

The client will require that the financial model is submitted accompanied by Support Letters from the lenders verifying the contents of the Term Sheets (also included with the bid) and confirming their willingness to finance the project (PFU 2002). Where there is a group of lenders for the project a common Term Sheet is agreed upon and submitted with the Support Letter. Occasionally bidders may decide to propose more than one funding solution for the project. In these cases Support Letters and Term Sheets should be submitted for each financing solution (PwC 2002)

5.3 SUMMARY

This chapter has given a brief outline of the relevant stages involved when entering into a contract for a privately financed project. The context of funding structure development has also been explained.

The development of the financial model has been identified as becoming significant at the Invitation To Tender stage. At this stage the financial structure is designed around the specifications provide by the draft concession contract. The structure is also limited by the indicative terms and constraints provided by the lenders and shareholders.

Short-listed bidders from the ITT stage are invited for further negotiations in the ITN stage. Best and Final Offers may be required of the bidders based on the renegotiated terms. A high level of technical and financial detail is essential at BAFO stage and greater commitment is required from the potential lenders to the project. Financial close is achieved after successful negotiations and the project commences as soon as the concession contract is signed.

The details explained in this chapter offer an important background to the development of the model and the simulations run as part of this study. For this study the development of a financial model is achieved as would be for the stages described in this chapter. The processes, data and information required for this development are outlined in the following chapter and the structure and realisation of the model is detailed in Chapter Seven.

CHAPTER SIX

DATA CAPTURE

6.0 INTRODUCTION

This Chapter outlines how data collection and interpretation is achieved. The selection of the data sample is explored and the criteria applied highlighted. The processes for data extraction from the sample are then discussed alongside the explanation of data interpretation and collation.

The data extracted here is used to derive a generic project. This generic project is a theoretical project, details of which are developed from extensive review of several actual projects within the health sector. This review of projects is used to identify parameters that can be assumed to be typical to projects in the sector. A generic project is then structured around these parameters. The cost and financial profiling of this so developed project is explored in this chapter and this forms the basis of the financial model developed in Chapter Seven.

6.1 DATA CLASSIFICATION

The data required to develop the generic project is qualitative and quantitative in nature. The qualitative data encompasses the methods, models and processes of structuring finance whilst the quantitative data consists of the financial details of project funding structures. With a view to meaningful analysis the qualitative and quantitative data is further classified into the following:

- The processes initiated during project finance structuring;
- The financial tools used in this structuring;
- Constraints and issues affecting structuring;
- Financial terms and details of funding structures of existing projects.

The first two classes fall under the qualitative umbrella whilst the last clearly involves quantitative data. The third, constraints and issues affecting structuring, could be either qualitative or quantitative as the constraints are often in the form of limitations in the financial terms, but could also be due to external issues such as the economic outlook, policy or corporate strategy. These external issues are beyond the scope of this research but some of the impacts of these on the structuring are addressed.

6.2 DATA COLLECTION AND INTERPRETATION

The project finance market is highly commercially sensitive with most projects shrouded in corporate and government secrecy. As a result there is very little project specific information and even less project specific data in the public domain. Aside from the commercial concerns of cautious sponsors there is also political concern as the provision of public infrastructure and/or services by the private sector is often dogged by controversy. Indeed in some instances such as the London Underground project in the U.K., the procurement of the projects may be legally challenged (BBC 2002). For these reasons it has been extremely difficult to obtain meaningful data to support this study.

Of the classes of data identified as necessary for this study, financial data is the least readily available information and almost all the firms and agencies contacted during the course of this research declined to release any such data for analysis or referral, citing commercial sensitivity and competitive pressures as reasons for refusal. This was not altogether unexpected as this issue was foreseen in the initial research proposal in the authors Transfer Report. The following sections describe the data selected for this study and the processes involved in the data capture and interpretation.

6.2.1 Data Sample

The hard data required consists of explicit financial details from a sample of several projects. The sample is a pool of Health Projects in the UK mostly procured under the Private Finance Initiative. Using projects from within the same sector enables the assumption to be made that the project conditions and required standard of the facility and/or service are common to these projects or at least very similar. On examination of the sample projects, trends and typical ranges of the relevant values were identified. From these trends and ranges, characteristic details for the financial structure of a project were then generated. The supposition was that from the sample pool of health projects, a 'typical' project with a financial structure in line with the trends displayed by the sample would be arrived at which could, for the purposes of this study, be considered to be generic to the health sector. The details of this generic project could then be used for further analysis. This procedure ensures that the data used for further analysis is representative of actual project financial structures in the market within this sector, whilst the confidentiality of the project details within the sample remains protected.

Whilst definitions and criteria (such as project size, financial mechanisms employed and date of financial close) for selecting the projects to include in the sample were initially drawn up, the level of data actually accessible made adherence to most of these impossible. Due to limitations on the amount of data available the criteria eventually used in the selection procedure was primarily that the sample was to consist of projects procured by means of concession contracts and all within the same sector. In particular health sector projects were selected, as it was considered that elements of the asset and service provision involved are perhaps more similar between projects than may be the case in other sectors. Other criteria applied included that the projects be of very similar concession lengths and, as the data would have to be extracted largely from the projects' financial models, that the model layouts facilitate such extraction.

The time scale of this thesis (three years) and the amount of work involved in the processes outlined below dictate that a restriction be placed on the size of the sample to retain feasibility of the study. However, too small a sample may not provide enough or convincing data, whilst too large a sample could become cumbersome. For this reason eight health projects were considered for the sample with five deemed suitable for inclusion under the criteria above.

6.2.2 Data Collection, Measurement and Interpretation

Figure 6.1 outlines the stages involved in the processes of data collection, measurement and interpretation. In an effort to source data for this research several parties were contacted. These included project companies (SPV's), members of project consortia (sponsors), financial advisers and banks, almost all of who were unwilling to make any data available for this research. The author however, was able to secure a stay of ten weeks in a shadowing capacity with the Project Finance and Privatisations Group (now Infrastructure and Government Utilities) of PricewaterhouseCoopers (PwC), determined as the market leader for project finance by Project Finance International in its project finance league tables of January 2002. Much of the initial quantitative and qualitative data was collected during this period from a number of project finance deals. By sourcing the data from project details available to, and structured not just by PwC, but also by various other parties, the potential for bias within the project structures was eliminated.

The data required for the study was extracted from the collated sample by detailed manual examination of the projects' financial models, all of which are structurally different. The list of data required was driven by the required inputs for the generic project's financial model (see Chapter Seven) and as such the schedules of data extracted were designed to match that of the model.

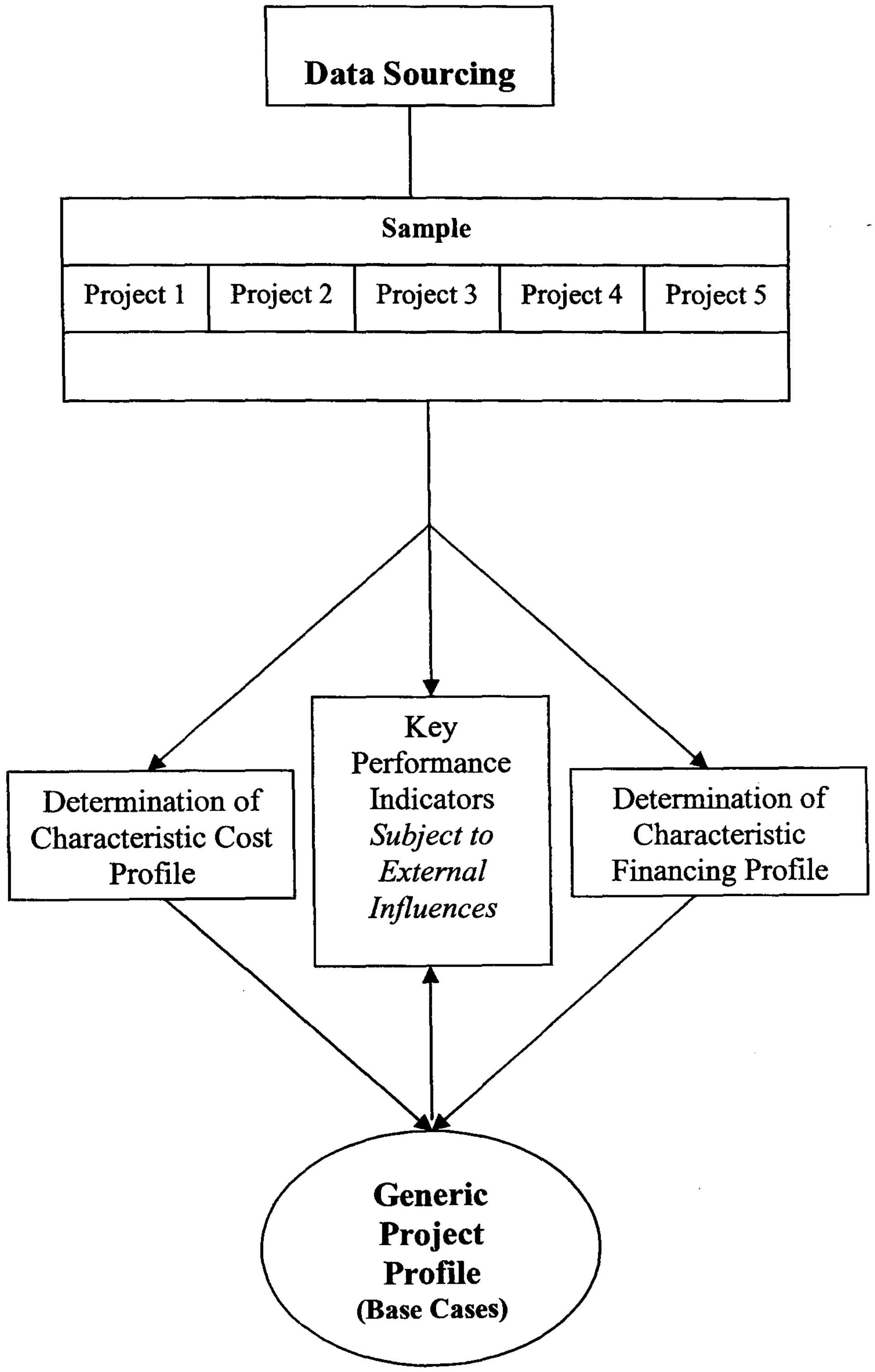


Figure 6.1: The data collection, measurement and interpretation processes.

The extracted data is grouped into two:

- **Cost and Revenue Data**. This consists of the development costs up till contract award, construction and operational costs, and information on the revenue stream of the project. The data on construction costs is scheduled on a monthly basis. This is to ensure that the cost trend over the construction period is sufficiently reflected. Development costs refer to the project related costs that are incurred by the sponsors or the project company itself prior to financial close, i.e. up contract award, (Yescombe 2002). For modelling purposes these costs are scheduled for repayment in the first period of construction and as such the development cost data here was collected alongside the construction costs data. Operational costs are those incurred after the facility is online and in operation. These include the day-to-day running costs as well as the major maintenance costs. There are various forms the revenue stream for a project may take including user pays (tolls), shadow tolls and government service payments. The revenue stream for the generic project was determined to be of the form of a fixed annual service payment to the SPV. The operational cost and revenue stream data are extracted together as these are scheduled semi annually over the project's life.

- **Financial Data**. This is data relevant to the financing aspects of the projects in the sample, i.e. the financial instruments used and information on the projects' financial structure. Much of this information is also present on a project's Term Sheet (see section 5.2)

Outlines of the data sheets populated with the data extracted are located in Appendix B and can be referred to for a list of data items required.

6.2.3 Cost Profiling the Generic Project

To obtain a construction cost profile for the generic project the average construction expenditure within the sample over the construction phase was calculated from the cost data gathered. This expenditure was processed further to determine average unit construction expenditure. As the sample is comprised of health sector projects the Hospital Bed was assumed and applied as the Unit, computing the average construction cost per unit (or bed) over the construction period. These costs were then adjusted for the differing construction phase lengths across the sample.

Figure 6.2 graphs the average construction cost per unit (i.e. per bed) calculated based on all the projects in the sample. The imposed trend line on the graph shows that the unit construction cost can be considered to rise gradually during the initial construction months, peaking almost halfway through construction before decreasing gradually till the end of construction.

The actual average unit construction cost profile plotted in Figure 6.2 has been selected as the construction profile for the generic project. Figure 6.3 illustrates that this average expenditure is very similar to the average unit cost profiles exhibited by projects 1,2,3 and 4 and can be said to be representative of 80% of the sample projects. Project 5 exhibits much higher costs over a much shorter construction phase. The use of the average cost profile as opposed to the trend line ensures that the often 'peaky' nature of construction expenditure that occurs in projects, the sample projects being no exception, is accounted for.

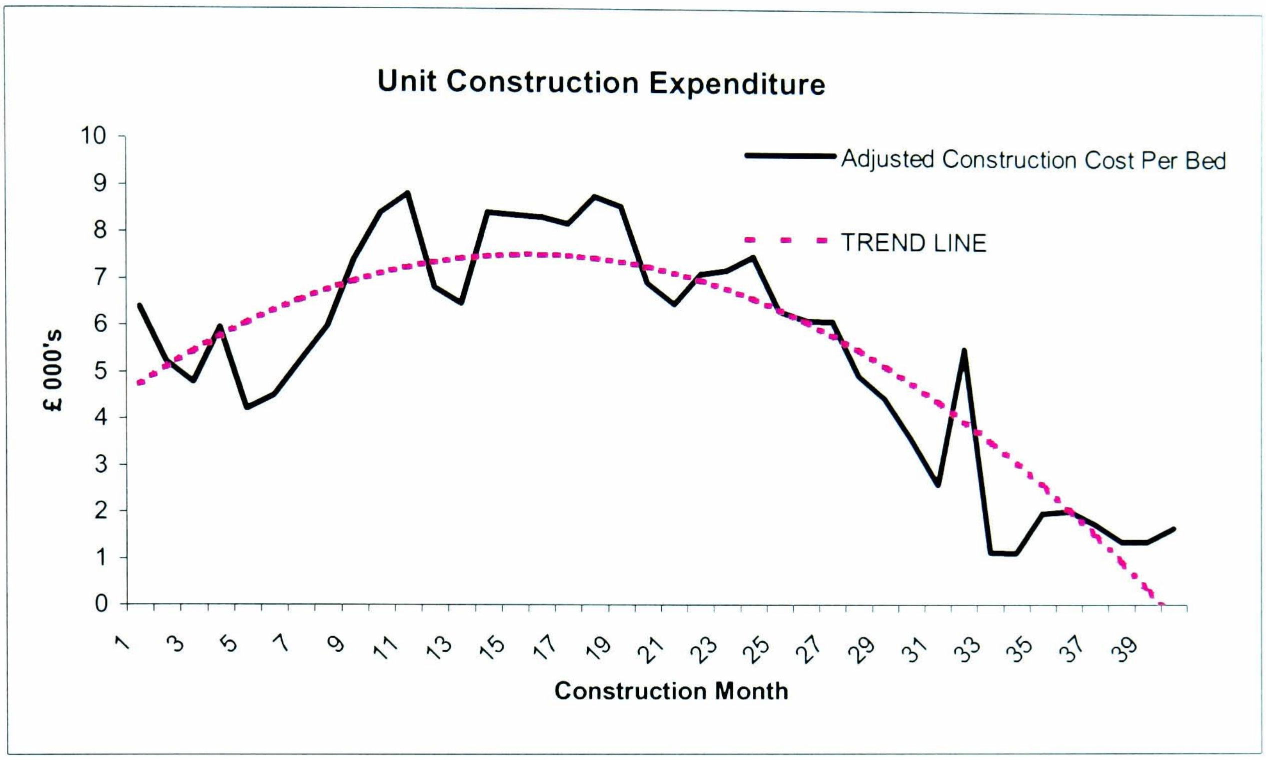


Figure 6.2: Average construction cost per bed for data sample

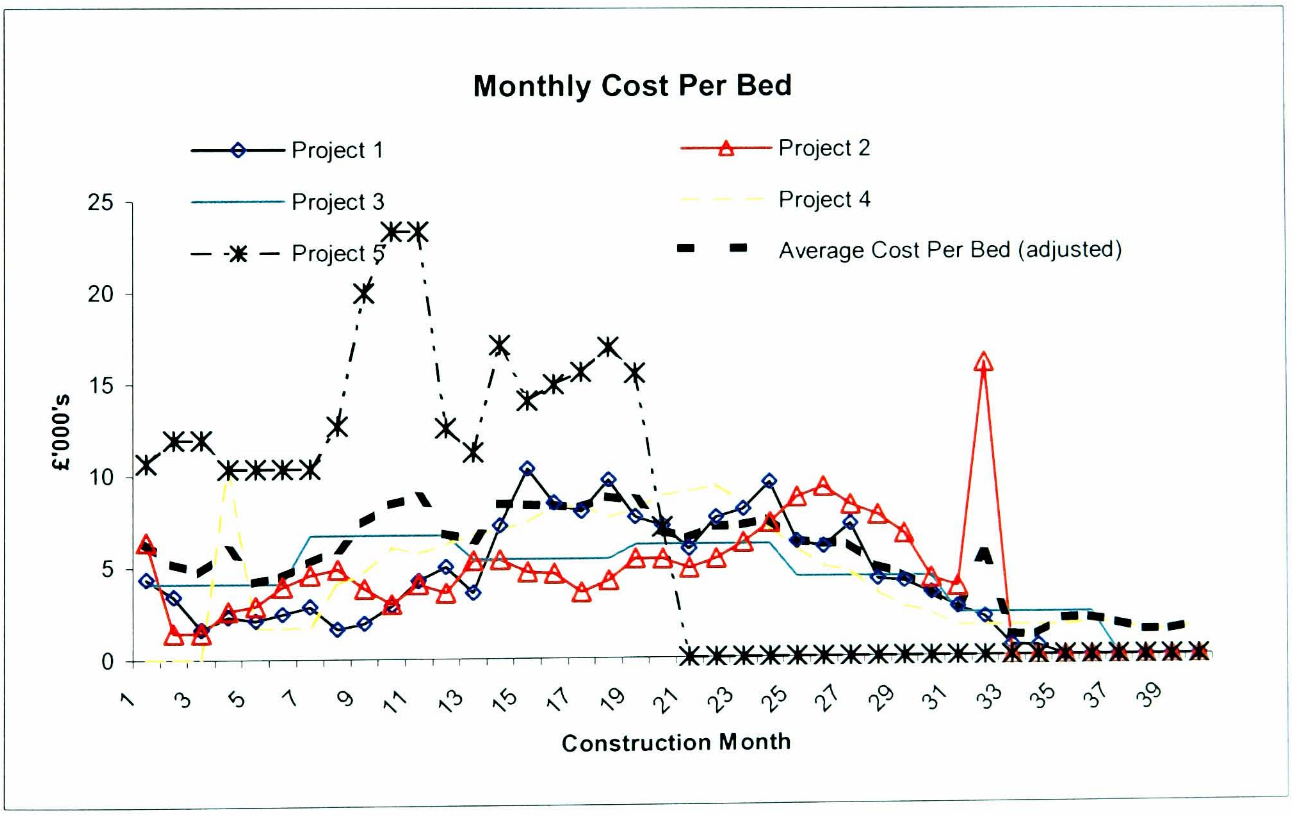


Figure 6.3: Individual sample projects' monthly construction cost profile and the average monthly construction cost profile

Review of the development cost data available indicates that the development costs within the sample are consistently applied as comprising costs incurred up to the award of the contract. For the purposes of cost scheduling within the sample these are assumed to occur in the first period of construction. As development costs are project specific an approach has been adopted for determining the development costs for the generic project which involves viewing the sample development costs as a percentage of the total financing amount for each sample project. Table 6.1 lists the proportions as determined from the sample projects.

Sample Project	**Development Costs as a Proportion of Total Financing**
Project 1	2.38%
Project 2	*Unknown*
Project 3	7.17%
Project 4	4.57%
Project 5	4.44%
Average	**4.64%**

Table 6.1: Development costs of sample as a proportion of total project financing.

As Table 6.1 indicates the development cost profile for the sample can be said to average 4.64% of total financing. This average has been applied so that the development cost of the generic project is fixed at 4.64% of the total financing figure and it is assumed that, as exhibited by the sample, this is representative of the project finance market.

Profiling of the generic project's operational costs was achieved much the same way as the construction costs. Figure 6.4 charts the operational costs per bed for each project in the sample and also plots the average operational unit cost. The operational unit costs are scheduled on a semi annual basis, as the operational phase of the projects are scheduled semi annually. As can be seen from Figure 6.4 the projects have different operational phase lengths. For this reason the profiles are charted from the first operational period. The average operational unit cost in any one period is based on figures derived only from projects that are still operational in that period. As with the construction costs, this average unit cost profile has also been selected as the operational unit cost to be applied to the generic project.

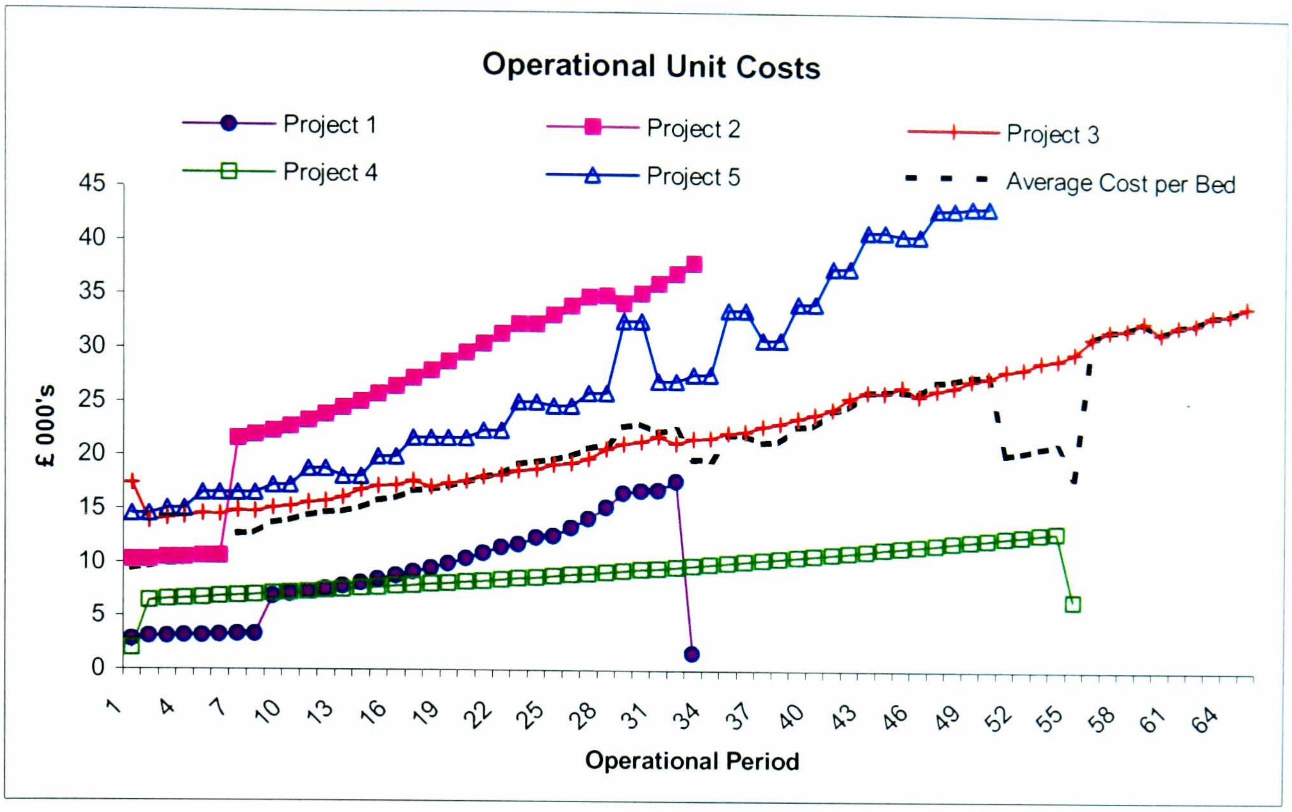


Figure 6.4: Semi-annual operational unit cost profile of sample.

6.2.4 Financial Profiling of the Generic Project

The financial profiling of the generic project was achieved by an extensive review of the sample projects. The financial models were explored and details relating to the financial structure extracted. The extraction was done in tandem with the initial stages of the generic model design (see Chapter Seven); the inputs required for the generic model again dictating the list of data extracted from the sample. The financial data items extracted from the sample are listed in the financial details data sheets in Appendix B, and include vital items such as gearing, facility amounts, key financial terms and rates, margins and fees, and key dates to determine lengths of construction and operational phases. From the data extracted a typical financing structure and typical terms were determined for a project in the health sector.

The cost and financial profiling carried out result in an initial project structure and set financial terms. As mentioned above these have been applied to the generic project thus creating an initial base case for the generic project; one against which structures resulting from changes to the terms or financing structure are later compared. Appendix C is a record of all initial input values used to derive this initial base case model.

The qualitative data collected comprises processes involved in modelling financial structures, the different mechanisms available for financing, and suitable measures for use as Key Performance Indicators (KPI's). The qualitative data was gathered from discussions with financial consultants and modellers during the shadowing period at PwC, from material reviewed during earlier stages of this research, and from examination and scrutiny of possible outputs of the financial modelling process.

Most of the qualitative data is difficult to record formally but is revealed in this study through the design and structuring of a financial model (see Chapter Seven), the discussions accompanying the development of the model, the process of simulating different financing structures with the model, and the analysis of the outputs from such simulations as in Chapter Eight.

Key Performance Indicators	**Performance Element**
Gearing	Exposure
Equity Return	Profitability
Cover Ratios	Robustness
NPV of the Revenue Stream	Profitability

Table 6.2: The key performance indicators.

The performance indicators were identified as the outputs of the financial model that are best suited to reflecting the impact of change in financial structure. By design these indicators are determined in the Outputs section of financial models (see Chapter Seven). Key Performance Indicators were derived by initially identifying which of the indicators would help quantify the fore mentioned impact and then considering those of greatest concern to the main parties involved in the project, i.e. the sponsors, the lenders and the client or public sector. This was done by review of the information required of the financial models by the client, as indicated in the ITN and requests for BAFOs; the financial details considered by the lenders during the due diligence procedure; and the shareholders requirements of the developed financial model (Douglas 2000; NHS 2001; OGC 1999; PwC 2002). Considering stakeholders' concerns in the event of an altered financial structure helped to identify these aspects as profitability, exposure to risk and robustness. Table 6.2 lists these performance indicators and specifies the area of project performance reflected by each. This is consistent with the material reviewed in earlier chapters and with the measures used within the project finance market for project evaluation.

6.3 SUMMARY

Due to the commercial sensitivity that exists in this field project data is very difficult to come by and financial information on projects is kept very closely guarded. This chapter has outlined the process undertaken to collect, interpret, and manipulate data for this thesis. The data sample consisted of projects realised by project financing methods, procured by means of concession contracts and all within the same sector. In particular health sector projects were selected, as it was considered that elements of the asset and service provision involved are perhaps more similar between projects than may be the case in other sectors. The sample was then used as the source for direct data extraction. The data collected thus was used to determine typical characteristics that might be considered as generic to projects in the health sector. These features were then used as parameters around which a generic project to suit the health sector was developed. Some of the characteristics derived in this manner include the cost and financial profiles for the generic project. By creating a theoretical project in this manner the confidentiality of the data sources is maintained, without jeopardising validity of the study. The following chapter details the development of a financial model for the generic project arrived at in this chapter.

CHAPTER SEVEN

DEVELOPMENT OF THE GENERIC MODEL

7.0 INTRODUCTION

A significant part of this study involves the design and development of a financial model as a tool for realising the research objectives. This section outlines the model structure so designed and describes relationships between the different components. Any assumptions that were made in the development are highlighted and the reasons behind them summarised. The data used to design and populate the model was collected as detailed in the previous chapter.

The model was built after extensive review of several professionally developed models for various privately financed projects, run by various consortia. The structure and contents of a professional financial modelling training course as provided to PricewaterhouseCoopers for it's financial modellers was also studied, and contributed to the initial development stages. Throughout the development of the model dialogue was maintained with several financial modellers around the country and advise sought where and when necessary.

The latter sections of this chapter introduce the optimisation process as carried out during financial modelling. This process attempts to manipulate the model parameters and to strike a balance between minimising financial cost and maximising profitability subject to the lenders' and shareholders' constraints.

7.1 MODEL STRUCTURE

The overall structure and logic of the model is illustrated in Figure 7.1. The model developed can be very broadly classified into Inputs, Calculations and Processing, and Outputs. For the modelling process the project life, which can run to several decades, is divided into semi annual periods. This is reflected in the schedules for the inputs, the processing of the data and the outputs of the model. The following sections elaborate on the structure of the model as created in Microsoft's Excel Spreadsheets package under the categories identified above. Different sections of the model are contained and manipulated on separate worksheets within the same Excel workbook and these are identified in the text.

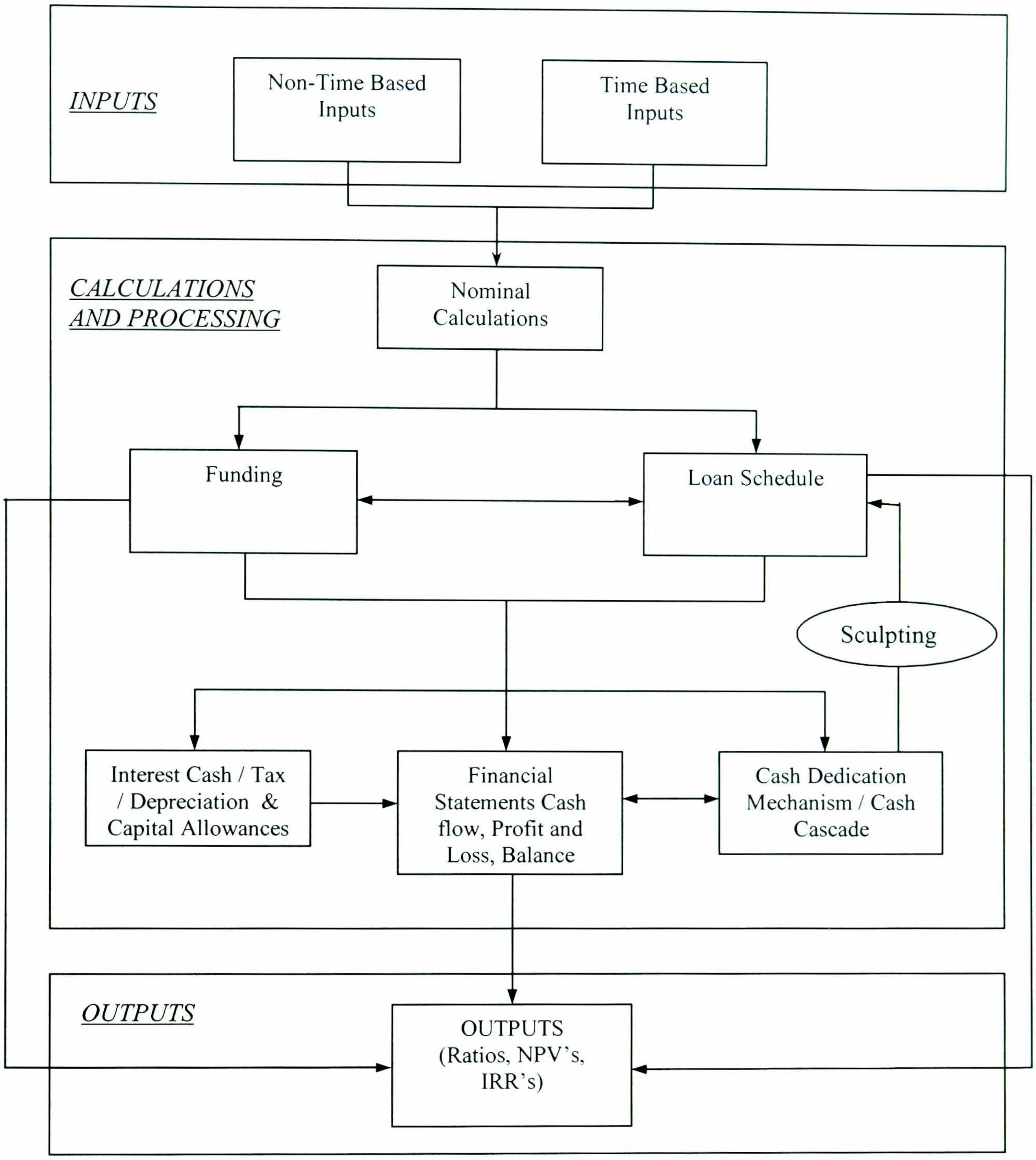


Figure 7.1: The structure and logic of the financial model.

7.2 INPUTS

The Inputs section is the primary section of the model and its contents form the basis for the development of processes for the other sections. All inputs to the model are made into this section and are classified into Non-Time Based Inputs (NTBI) and Time Based Inputs (TBI).

Non-Time Based Inputs refer to the input data, information or assumptions that do not change with time i.e. from period to period. Examples would be the margin on a loan or the start and stop dates for construction and operational phases. Reference by other model sections to data items in this section is absolute, for example the input value for the margin on the loan would be referred to and applied unchanged throughout the project regardless of the project period. Time Based Inputs are those input data and assumptions that are expected to change from period to period. For instance the indices applied to reflect inflation would need to change every period. The project expenditure is also expected to differ from period to period. Reference by the model to the data in this section can be said to be relative, as reference to the TBI is only made to input data in corresponding project periods.

Due to the period specific nature of the TBI, for each data item calculations are required to determine the appropriate figures for each period of the project. In the case of the inflation example mentioned above, a fixed input value for inflation would require the calculation of the applicable indices for each project period to represent such inflation. The NTBI however contains no calculations.

7.2.1 Non-Time Based Inputs

These are inputs and assumptions that do not change in time i.e. for the duration of the project. The Non-Time Based Inputs (NTBI) set the boundaries of the project. As mentioned previously there are no calculations here and reference to these is made and applied as they are input; unchanged throughout the model. Inputs into the NTBI section will fall under some of the following areas:

Key Dates: These are the important dates that define the project and include dates such as start and completion dates for the construction phase, and the operation and maintenance phase of the project. Other key dates include commencement of drawdowns on the debt, repayment of debt, and initiation of financing mechanisms or processes such as the indexation of revenues (to match inflation) or capitalisation of interest.

Accounting Assumptions: Inputs and assumptions relating to the taxation treatment of the project, depreciation and capital allowances, and the financial statements are recorded in this section. This area of project financing is complex and some expertise is required to ensure that the appropriate taxation treatment is applied.

Dividends: Any constraints placed on dividend payments are listed here. In project financing the dividend payments are restricted by retained profit or loss as stated in the profit and loss accounts with dividend payments not usually made until later stages of the project. This is because the huge cumulative accounting losses made during the early stages of the project need to be diminished by profits once operations become profitable. Dividends are usually only paid out when the cumulative losses are reduced to zero and an overall cumulative profit is recorded.

Reserve Accounts: These accounts are for accumulation of funds to offset expenditure or cash outflow at a later date. Two such accounts are used in this study: the Debt Service Reserve Account (DSRA), which funds the debt service payments, and the Major Maintenance Reserve Account (MMRA), which funds the major maintenance expenses. For this study a strategy commonly adopted by financial modellers to finance these accounts is used. In each period, 50% of the debt service due in the following period is deposited in the DSRA; for the MMRA the following percentages of future expenditures are deposited: 100% of the next period's major maintenance expenditure, 66% of the period after that (next period + 1), and 33% of the period after that (next period + 2). As of the start of the first operational period the reserve accounts would not have accumulated funds and for this reason it is assumed that the accounts are pre-funded in the period before operations to ensure that the required balance of the reserve accounts is met. The calculations for the reserve accounts are done through the Cash Dedication Mechanism or Cash Cascade Sheet.

Financing: The financing options and the terms of such options are listed in this section. The options included in the model for this study are Senior Bank Loans, Bonds, Subordinated Loans, Equity Bridge Loans, and Pure Equity participation. The terms for the financing options as input into the NTBI sheet are mostly taken from the facility Term Sheets as introduced in Chapter Five and include the maximum facility amount, margins/spread, fees, term of the facility and date for drawdowns, repayment and interest capitalisation. The reference rates for the facilities are also specified (LIBOR for senior and subordinated loan; Gilts for Bonds), as are the interest rates applicable on any cash deposits. Monoline wrapping has been built into the model as an option for credit enhancement and the terms for this option are input here with the financing terms. The gearing or debt/equity ratio of the funding structure also forms an input in this section and the percentage composition of the total funding structure from all the options is highlighted. The model has been designed to include switches allowing selection and deselecting of the different financing options. The switches here permit the selection of monoline wrapping, indexation of the bonds, use of an equity bridge loan and the selection of a debt repayment option (annuity or sculpted). The repayment options and the equity bridge loan are discussed in later sections.

7.2.2 Time-Based Inputs

As already mentioned the Time-Based Inputs are those that change over time i.e. that vary from period to period. Calculations are used to manipulate the inputs so that the appropriate figures are used for each period through the model. The TBI Sheet uses the key dates from the NTBI to set out the dates for the semi annual schedule used throughout the financial model. The construction phase of the project is also scheduled into monthly periods within the TBI Sheet for a clearer breakdown of initial costs. The following are sections under which Time Based Inputs are made on to the worksheet.

Macroeconomic Assumptions: The inflation rate assumed for the duration of the project is used to calculate the appropriate index to apply to construction, operating and development costs; and to revenues and index-linked bonds. These indices are calculated for and applied to semi annual calculations in the model as required. It has been assumed that under the tendering process for project finance, inflation risk is borne by the procurer up until financial close, and as such the procurer is often the source of the assumed inflation rate for financial modelling. This assumption is made as the bidders have no control over inflation and stipulating an assumed inflation rate allows easier bid evaluation and comparison. At financial close the inflation assumptions are updated to reflect current trends.

Revenues: This project has been assumed to be a Health PFI Project and the revenue input is assumed to be an annual figure payable by the procurer (public sector). In practice the calculation of this annual figure will be subject to the terms and conditions of the payment mechanism in place. The TBI Sheet schedules the revenue by halving the annual input into a semi annual revenue stream, which is then applied throughout the model. The revenue input is a 'real' value, i.e. does not take any account of inflation. Application of the inflation indices to the real values in later calculations results in 'nominal' revenue values.

Operating and Major Maintenance Costs: The operational and major maintenances cost are also recorded as real costs per annum, which are then split into semi annual values. Major maintenance schedules for long-term infrastructure projects are often of a 'peaky' profile as major maintenance is carried out at intervals. For this study it is assumed that the major maintenance profile is similar to that illustrated in Figure 7.2 and the major maintenance cost schedule assumed effects such a profile. The figure shows that there is no major maintenance expenditure until around the 6th year of the project. The figure also exhibits the peaky profile associated with major maintenance costs as mentioned earlier with relatively low initial expenditure rising, and sustained for longer periods, further into the project's lifecycle. Major maintenance costs are highest and most sustained in the latter years of the project although there is reduced expenditure just before cessation of the major maintenance cycle. This profile reflects and is typical of the lifecycle costs of health projects where the regular maintenance and renewal of equipment is involved. During financial modelling the operating and maintenance cost figures are supplied by the consortium and are directly input as scheduled by the consortium, i.e. hard coded into the model and the modeller has no control over the schedule.

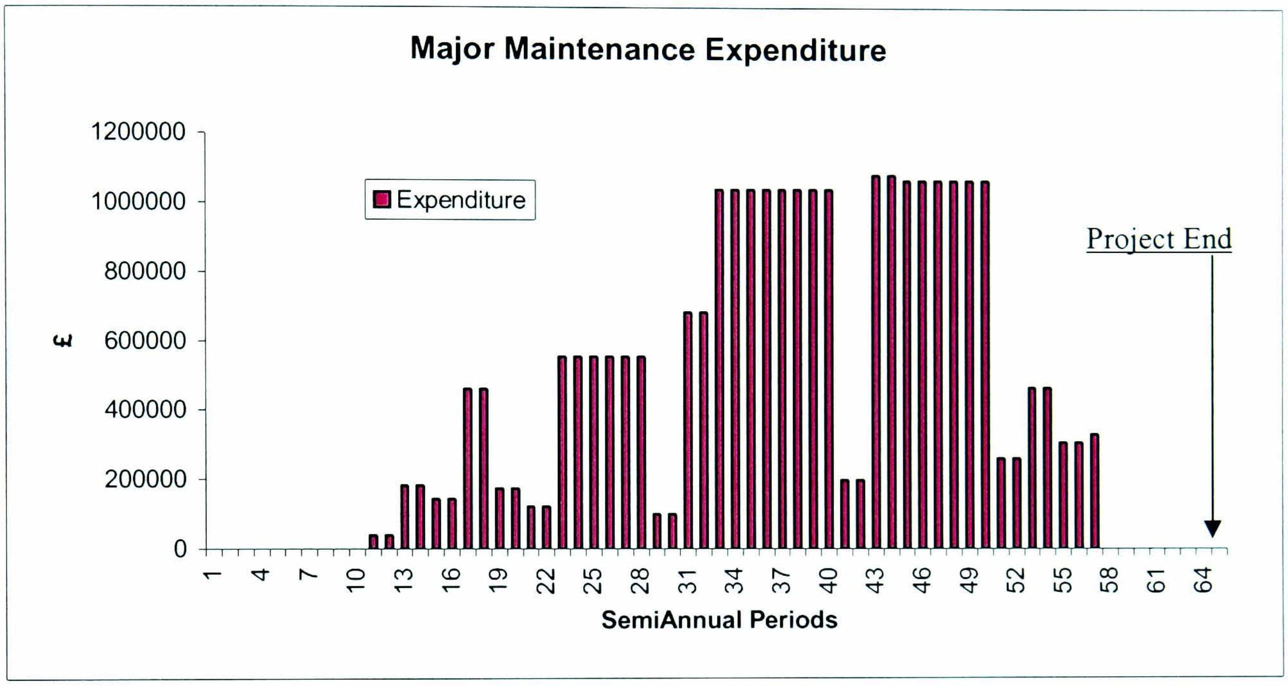


Figure 7.2: Major maintenance cost profile for the Generic Project.

Construction and Development Costs: The construction and development costs are also real values and are supplied by the consortium; the modeller has no control over the schedule. Development costs refer to costs incurred by the consortium in developing the proposal and bid. The development costs are normally scheduled to occur in the first period of the project as they are occurred in the run up to start of construction. The TBI Sheet breaks down these costs into a monthly schedule of outgoings throughout the construction phase. These costs are subject to inflation when processed further by the model.

Pre-funding Costs: As mentioned earlier the pre-funding of the reserve accounts is assumed to occur in the last period of construction (period before the start of operations) and as such is considered a cost during the construction phase. The pre-funding amount is input in the Non-Time Based Inputs and then scheduled with the TBI monthly cost schedule.

The source and rationale behind the actual input data used in this model is discussed in Chapter Six. It is from these inputs that the model sources its data for processing. The data entered into

Paginated blank pages are scanned as found in original thesis

No information is missing

7.3.3 Interest on Cash

The Interest on Cash Sheet in the model calculates the interest due on any cash deposits. The proceeds from any bond issue are held in the Bond Proceeds Holding account and any interest due on this account is also calculated here. Any interest earned is fed back as income into the cash flow of the project.

7.3.4 Accounting and Statements

The Taxation Sheet applies the appropriate corporation tax to the model, ensuring that all qualifying deductions are made from the taxable profits and applying any capital allowances and depreciation from the Semi Annual Depreciation and Capital Allowances Sheet. This section also includes the compilation of the financial statements within the Statements Sheet of the model. Here the Cash flow Account, Profit and Loss Account, and the Balance Sheet are developed. As has been stressed in earlier sections it is the cash flow of a project that is crucial to its success. This however does not refer to the cash flow statement here, which is just produced as an accounting requirement. The actual flow of cash in the project is recorded under the Cash Dedication Mechanism; also known as the Cash Cascade.

7.3.5 Cash Dedication Mechanism

The Cash Dedication Mechanism or Cash Cascade traces the actual flow of cash through the project. It is so called because it is structured in order of dedication of cash. The flow or cascade of cash is arranged in order of priority; in other words there is a strict pecking order when it comes to access to the cash flow. The access to cash available (after all project specific costs are expended) is prioritised in the following order: senior debt service; debt service reserve account; subordinated debt service; and finally shareholders returns (dividends). The required transfers to the reserve accounts are also calculated on the Cash Dedication Mechanism Sheet.

A sculpting mechanism has been developed on the Cash Dedication Mechanism Sheet as a method for moulding the debt service payments to the cash available. This is discussed in further detail as part of the optimisation process in section 7.5.

7.4 OUTPUTS

The Output section of the model houses the products of the modelling and optimisation process. At any one time, the displayed outputs are only valid for the current input values. Hence for analytical purposes the outputs are collated and recorded for comparison after each run of inputs. The Outputs section primarily consists of measurements of the key indicators identified in section 6.2.4 as well as other relevant features used in later analysis. The outputs from the model are presented under the following categories.

7.4.1 Ratios

Ratios are an integral part of project finance and are key indicators of project performance. The precise definitions of ratios are very important as minor differences can lead to a substantial difference in project economics. Throughout the research analysis conducted here, consistency in calculating and defining the variables and indicators ensures that meaningful comparisons can be made during analysis. Most of the ratios are calculated based on the cash flows from the financial statements and the appropriate cash flows necessary for each ratio calculation is outlined within the Ratios Sheet. The following subsections discuss the ratios of relevance to this study.

Debt Equity Ratio (Gearing): This is a measure of the proportion of debt and equity financing the project, i.e. the gearing. For the purposes of this study, subordinated debt is assumed to be provided by the shareholders and the combination of the pure equity and subordinated debt is termed blended equity. The gearing ratio is calculated as follows:

$$\text{Gearing} = \frac{\text{Blended Equity (i.e. Equity + Subordinated Debt)}}{\text{Equity + Subordinated Debt + Senior Debt}}$$

Cover Ratios: There are two types of cover ratios, Historic Cover Ratios and Forward Looking Cover Ratios. Historic Cover Ratios will, at the time of calculation, be calculated on known figures, i.e. they always look backwards. Historic Cover Ratios include Debt Service Cover Ratios and Interest Cover Ratios. Forward Looking (or NPV) Cover Ratios always look forward and therefore will always be calculated on the basis of projected data. NPV Cover Ratios include Loan Life Cover Ratios and Project Life Cover Ratios. There are several ways of calculating these ratios but for consistency, and also in an effort to remain contiguous to professional practice, the ratios calculated for this study are the Debt Service Ratio (DSCR) and the Loan Life Cover Ratio (LLCR). The DSCR's compare how the cash flows in each period compare to the debt service that must be made in that period whilst the LLCR's compare how project future cash flows are expected to cover loans outstanding. Both cover ratios are calculated from when the debt is fully drawn, i.e. from when debt service commences. The formulae used for the cover ratios determined for the analysis are:

$$\text{DSCR} = \frac{\text{Cash flow Available for Debt Service} + \text{Debt Reserve}}{\text{Debt Service}}$$

$$\text{LLCR} = \frac{\text{NPV of future Cash flow Available}}{\text{Debt Balance}}$$

Internal Rates of Return: The Internal Rate of Return (IRR) for a stream of cash flows is the discount rate at which the Net Present Value of that stream of cash flows would equal zero (Levy & Sarnat 1994). The IRR figures give a measure of the profitability of the project and are calculated in real and nominal terms, and for pre- and post- tax cash flows. The nominal rate of return is calculated on the basis of nominal pre-finance cash flows (pre- and post- tax), i.e. the cash flows, as they appear in the cash flow statement. The real rate of return is calculated on the basis of deflated pre-finance cash flows (pre-and post- tax) by adjusting the nominal cash flow values by a suitable deflator factor (calculated in the TBI Sheet). The primary IRR used for analysis in this study is the Shareholder IRR (return on blended equity) although the model also computes other IRR's such as those for the separate components of blended equity.

7.4.2 Summary Sheet

The Summary Sheet has been included in the financial model as an outline of the key features of the project and the funding structure that may be of interest to a viewer, prior to in-depth examination of the model is conducted. It is meant to serve as a 'at a glance' sheet for the model.

7.4.3 Results

The Results Sheet has been created to collate the different values and results considered relevant to the analysis. The Results Sheet contains an outline of the current funding structure, the corresponding returns (IRR's), and the key cover ratios. This sheet serves as an exporting template as the information contained is copied and recorded elsewhere after each successful simulation of the modelling and optimisation process. These recorded simulation outputs form the results of this study, the analysis of which is discussed in Chapter Eight.

7.5 OPTIMISATION

The term optimisation is subjective but is defined here in reference to financial modelling, as the manipulation of a base case model to lower the cost of financing whilst maintaining profitability and robustness. Financial engineering refers to the selection of instruments and mechanisms to finance a project and modelling is the development of the financial model. Optimisation can be considered the final stage of financial engineering where elements of the financial model are adjusted to reduce cost, increase commercial/cash flow efficiency, and profitability, as far as the financial package selected will allow, and within the constraints dictated by the financial engineering. The expression optimisation is somewhat misleading, as there is no one 'correct' final structure for the financial model. The structure decided upon will depend on the requirements of the investors and as in practice optimisation is carried out largely within hours of financial close; it is often the case that there may be room for further improvements to the final model.

An element of the financial structuring that has been already mentioned is the bundling of subordinated debt and pure equity together as Blended Equity. This as already stated is due to the assumption that the shareholders provide both, and that the subordinated debt repayments as well as being junior to the main facility, are so flexible as to be treated as Equity. The returns to shareholders are assessed based on the funds provided, i.e. the blended equity. It is also common for the blended equity to be provided by means of an equity bridge loan as long as the project economics permit this. The equity bridge loan is a loan made by the lenders to the project company to cover the blended equity during the construction stages and is retired as soon as construction is completed, with a bullet payment, which includes the interest and margin accrued on the loan. The reason for the use of the bridge loan is that debt is cheaper than shareholder funds and therefore an equity bridge loan may reduce the costs of financing although the provision of this is dependant on the lenders securing a guarantee for the bridge loan repayment.

This study has determined three main aspects of the financial model that are key to the optimisation process. These are Cover Ratios, Shareholder Returns and Gearing.

- **Cover Ratios:** The level of debt that can be raised for a project is based primarily on its ability to pay interest and repay loan instalments as they fall due, with a comfortable margin of safety. To assess this margin of safety lenders calculate cover ratios (Yescombe 2000). These ratios measure the level of cash available relative to the payments due and are subject to minimum levels stipulated by the lenders. The ratios most commonly used are the Debt Service Cover Ratio (DSCR) and the Loan Life Cover Ratio (LLCR). The DSCR measures the ability of the project to service the debt from the annual cash flow whilst the LLCR considers the same but taken over the life of the loan. The DSCR gives a more immediate overview of the cash flow as it helps to indicate whether the next debt service payment can be made. The LLCR can be considered to be more refined and accounts for performance over the longer term (Newman 2003). Typical minimum ratios required by lenders are 1.15 for the DSCR and 1.2 for the LLCR. Arguably optimisation would involve ensuring that the cover ratios are maintained at the minimum requirements throughout the project. However the model will need to demonstrate that this will be sustainable in downside scenarios such as in the event of increased inflation or maintenance costs.

- **Shareholder Returns:** The minimum return on equity is set by the shareholder and is subject to market trends. This can also be referred to as the cost of equity. With the project finance market being as politically charged as it is in the UK there is disinclination to demand excessive returns. For the projects reviewed for this study the current minimum required return on blended equity is in the region of 13%. There is a degree of flexibility in setting the required return depending on the individual project specifics but these are usually subject to the minimum demanded by the shareholders. One of the options during optimisation is to lower the actual return on the model to the target of 13% thereby lowering financing costs.

- **Gearing:** This is the ratio of debt to blended equity. Obviously as debt is the cheapest form of finance it is sensible that projects should seek as high a gearing as possible, i.e. maximise debt to reduce costs. However for a project, there is usually a maximum gearing beyond which prospective lenders are unwilling to lend, requiring that the rest be provided by shareholders. This is a constraint to which financial modellers must work. It must be noted that this may be inherently sub optimal as it may be demonstrable from the financial model that a higher level of gearing can be supported by the project. The limitations set by the lenders are influenced by the economics of the model of course, but also by the risk perceptions of the lenders, market conditions and by availability of previous experience in the technology involved. For instance even as this research is carried out there are preliminary developments in possible new energy projects in the UK such as Wind Farms and Tidal Power Projects as a result of the expected decline in world oil reserves. Financial consultants are aware that these would be considered as relatively new technology by lenders and hence subject to higher level of risk. Indeed whilst current privately financed projects have typical debt levels of 85% to 95%, such new projects may have to be financed at levels as low as 65% to 75%, due to lenders uncertainties about the unproven markets, (Newman 2000).

7.6 THE OPTIMISATION PROCESS

The optimisation process described here is a combination of the observed approach adopted by financial modellers and that developed to suit this study. The revenue stream of the model adopted for the generic project is structured as a fixed annual service payment by the government linked to inflation. The primary driver during the optimisation process is, more often than not, the reduction of revenue required and therefore, the bid price. Beyond construction, the bulk of the costs of a project are related to the debt and equity service. For most projects interest rates are generally fixed by hedging (interest rate swaps) and also do not change with inflation, hence there is little need to index the bulk of the revenue to inflation. Costs such as operating costs and maintenance costs do rise with inflation however and for this reason 40% of the revenue stream for this research's base case model is indexed to inflation. In cases where the debt service is linked to inflation such as with index-linked bonds, the bulk of the revenue stream needs to be indexed and for this research, 100% of the revenue is linked to inflation for structures with index-linked bonds.

The starting point for the optimisation process is the input of a large initial annual service payment that satisfies requirements, i.e. lenders' and investors' criteria, and modelling checks. This is then gradually reduced until either the cover ratio requirements and/or the required returns are no longer met. There are also other checks performed to ensure that the model structure is still sound such as checks that there is sufficient cash to repay the debt and that the Balance Sheet balances. Once the revenue has been reduced to a level at which the requirements are not satisfied, changes are then made to other elements in an attempt to restore the satisfactory status of the model. Alteration of the debt repayment profile is one of the ways this can be achieved.

For an annuity based debt repayment profile, the debt service amounts (principal + interest) in each period are always equal but the proportion of principal repaid increases gradually whilst the interest paid decreases. For a sculpted profile the repayment amount in each period is dependant on the amount of cash flow available as determined by the cash dedication mechanism. This sculpting to match the cash flow is normally achieved by calculating the amount of debt service that must be made in each period to leave enough free cash to satisfy the lender's stipulated minimum DSCR in each period.

There is also the possibility of manual sculpting where the debt repayment profile is altered to suit the cash flow profile. Here the amount of principal repaid in individual periods is changed depending on the amount of cash that is available for debt service and also to reflect the level of post debt service cash that is desired in any period. Within the generic model developed this is achieved by altering the cover ratios i.e. changing the minimum cover ratios required in individual periods. By increasing the cover ratio in a period, less senior debt is repaid in that period and more cash is made available for subordinated debt, and then equity service as a result of the cash cascade structure. The debt service resulting from sculpted repayments is therefore often irregular. Sculpting is also frequently used to ensure that the cash flow remains positive in each period of the project.

Revenue sculpting is a different approach to that described above. Here the revenue stream is not a fixed amount but is profiled essentially by working backwards, determining the amount of revenue required in each period to achieve a fixed annual DSCR. There are also means of optimising the model for tax efficiency to ensure that any tax benefits are exploited. This requires expert knowledge and is not addressed by this study.

In brief, assuming the shareholder returns indicated in the model are at the minimum level required; an increase in the gearing (should there be flexibility) would decrease the amount of equity. All things being equal this decrease of equity would result in an increase to the returns as there is less equity making the same earnings. There would therefore be room to reduce the revenue (and hence bid price), reducing the amount of free cash distributable to shareholders, thereby diminishing the returns (obviously only as far as the minimum required level). This is however subject to the cover ratios and debt service requirements being met. Optimisation of models is an iterative process requiring a strong understanding of the dynamics of the model. This is often further complicated by peculiarities that may be inherent in models authored by other modellers.

7.7 SUMMARY

The financial model developed for the generic project was devised after the extensive review of several professionally developed models for various privately financed projects. This chapter has outlined the different parts to the model and explained the function of each.

The model is logically structured to accept time based and non- time based inputs through the main user interface. Calculations based on these inputs can then be performed, processed and manipulated by the model. The outputs of such processing will form results for the simulations conducted for this study; these are presented in Chapter Nine and discussed in Chapter Ten.

The model has been designed to include switch mechanisms that allow the selection of different financing options that enable various financial packages to be simulated. Part of the simulation process involves optimisation of the model. This is the manipulation of the parameters of each financial package to maximise profitability whilst minimising financial costs. The process for optimising the models generated by the simulations for this study has been discussed in this chapter and has been highlighted as subject to the constraints on the financial structure demanded by the lenders, shareholders and procurer.

CHAPTER EIGHT

VERIFICATION AND VALIDATION FOR SIMULATIONS

8.0 INTRODUCTION

This chapter introduces the process of verification and validation (V&V) highlighting its desirability and outlining accepted methods for ensuring a sufficient level of confidence. The process of V&V as applied to this thesis is discussed following its application from the derivation of the generic project, through to the design and development of the financial model for the project. The methods adopted are integrated with the development of the model ensuring that V&V is continuous from conception to completion. The conceptual model is verified and validated, as is the data used for this thesis. The V&V of the generic financial model is then examined at the micro and macro level, i.e. V&V of components and V&V of the model as a whole. The various stages involved in the creation of the generic project, and the design and development of the financial model, are also independently verified and validated by experts and project finance professionals. The latter sections of this chapter outline the simulations conducted on the verified and validated model.

8.1 WHAT IS VERIFICATION AND VALIDATION?

Verification is defined by Davis (1992) as the process of ensuring that the conceptual model design has been transformed into a computer model with sufficient accuracy. Carson (1986) defines validation as the process of ensuring that the model is sufficiently accurate for the purpose at hand. There are various other definitions such as Shi (2002) who quotes Zeigler (1984) as stating that verification is a process to assure the simulation model is properly realised, whilst validation is a process to assess the degree to which the simulation model's input-output relations map onto those of the system. In simple terms verification is checking that the model performs as intended, whilst validation ensures that the model built is an accurate representation of the system under study.

Shi (2002) notes that the complexity involved with modelling and in experimenting with the model greatly increases the chances of getting invalid results that do not typify the system being modelled. Pidd (1998) characterises one of these errors as a type zero error where the modeller asks the wrong questions so that the model does the totally wrong thing or the model does not operate in the manner in which it is intended. In order to minimise this V&V must be implemented to ensure, as much as is possible, that the simulation model is free of such errors and does actually characterise the real system being simulated.

Robinson (1997) concludes that whilst V&V should be rigorously applied to models it is not possible for the process to arrive at absolute validity. Indeed Robinson asserts that V&V cannot prove that a model is correct since this is not possible. Resinovie et al (1997) concur with this: the process cannot be assumed to result in the perfect model, as the perfect model would be the real system itself. V&V therefore sets out to prove that a model is in fact incorrect but by showing that the model is not incorrect under different circumstances, there is increased confidence in the model and its results. The more the V&V tests are unable to show that the model 'fails' or is incorrect, then the greater the extent to which confidence can be attached to the model.

The processes for V&V are often classified as either a white-box or black-box process (Pidd 1998). The white-box processes refer to those that involve a look at the inner workings and dynamics of the model, verifying or validating internal components. Black-box processes are the opposite, 'blacking out' the internal components, and verifying and validating the model as a whole. Black-box validation is the only process that requires a completed model.

Sargent (1996) summarises the entire V&V process as a step-by-step procedure that deals with conceptual model validity, verification, operational validity, and data validity; this summary corresponds with the classifications identified by Pidd above. Conceptual model validation involves checking that any assumptions made at the conceptual stage of model development are correct and are relevant to the study. Validation of the model at conceptual level, i.e. before being transformed or developed into a computer model can also be classified under the white-box processes. Verification establishes that the components of, and the model as a whole, function as is intended and sufficiently represent real world elements. Operational validity is a black-box process at macro level, determining that the model represents the simulated system. As implied, data validation assesses that the accuracy of the data collected for model development, validation and simulation is sufficient.

Sargent's summary indicates that the V&V procedure is tied with the development of the model, and Nayani and Mollaghesemi (1998) concede that integration of verification and validation with the model development is crucial. The approach adopted for verification and validation within this thesis as discussed below is in line with the summary and procedures above.

8.2 VERIFICATION AND VALIDATION OF THE MODEL

The true conceptual model was based on a generic project for which a project finance structure would be designed. A generic financial model for the generic project would then be developed which would simulate this project finance structure. The model was required to allow further simulations to be run which would provide an insight into the trends and properties of the different elements of the project finance structure. The development of the generic project is described in Chapter Six, and the financial model, which allows the simulation of the financial aspects of this project's life over the entire concession, was subsequently developed as described in Chapter Seven. The simulations run on this financial model are outlined in the latter sections of this chapter.

Kleijnen (1995) and Balci (1994) write extensively on current V&V techniques and how they are applied to simulation models. The techniques used for the V&V process for this thesis are derived from a combination of commonly applied approaches as advocated by the text reviewed, techniques advised by experts, and other methods tailored to suit any peculiarities of the processes involved in this thesis. Verification of the model can only be achieved beyond the conceptual stage when the components developed can be tested. The same can be said for the data, as its verification cannot be achieved without use of the model. For this reason the V&V approach adopted was split into two stages as described in the following sections. First the validity of the conceptual model and the data was established, and then actual development of the model was embarked on. As advocated by Sargent (1992) and Nayani and Mollaghasemi (1998) the V&V process was integrated with the development of the financial model and this is reflected in the second stage of the validation and verification as is discussed further below. Mention of the real world/system during the V&V process is in reference to standard or normal project finance market practice and values as observed from other projects.

8.2.1 Conceptual Model Validity

In developing a conceptual model Robinson (1997) espouses that the modeller or designer needs to acquire an in-depth understanding of the real world system to be tackled, and to have a great deal of interaction with those who have knowledge of the system. Prior to developing the model the author spent three months immersed with project finance experts in the field achieving such acquisition of understanding and obtaining different perceptions of actual practice. Checkland (1981) also highlights this as necessary for overcoming the problem of deciding which interpretation of reality is relevant to the problem being tackled.

The information and skills gathered whilst working with these experts were put to use in developing modelling objectives and a conceptual model. Validation of the conceptual model was achieved by consultation with the experts. Table 8.1 highlights some of the outcomes of this V&V process. A list of experts consulted is included in Appendix D of this thesis.

Sensitivity Tests	**Pre- V&V Conceptual Model**	**Post-V&V Conceptual Model**
Construction Cost	Yes	No
Interest Rate	Yes	No
Inflation	Yes	Yes

Table 8.1a: Changes to sensitivity test during V&V of conceptual model

	Pre- V&V Conceptual Model	**Post-V&V Conceptual Model**
Bond Amortisation Schedule	10:20:30:40 over last 4 years	Manually sculpted over last ten years

Table 8.1b: Changes to bond amortisation profile during V&V of conceptual model

Table 8.1a illustrates an outcome of the conceptual model validation: a reduction on the number variables that were chosen for sensitivity tests. Initially the conceptual model was outlined to include tests on the model's sensitivity to construction costs, interest rates and inflation. Through the validation process with the experts it became obvious that identification of sensitivity to construction costs would not offer any information on the financial structure of the project under test, and would most likely simply indicate variation in the total amount of funding required. Likewise, as it had been assumed that most, if not all projects, employ an interest rate swap at financial close, a test on sensitivity to interest rates would be inconsistent with the assumptions and structure of the model. For this reason the sensitivity tests were limited to variable inflation. Table 8.1b also shows another example of the results of consultation with experts. The amortisation schedule for bond structures was initially outlined to repay the bond over the last 4 years in a 10:20:30:40 split. This was changed during the V&V process to amortisation over the last ten years as this was felt to offer more flexibility during optimisation of the model as repayments could be sculpted over the longer period, allowing a more gradual back-ended profile to be developed.

The V&V of the model with experts ensured that the components of the conceptual model were representative of actual project finance practice, and relevant to the objectives set out for the model, i.e. exploration the project finance structure, the various components of the financial package and the impact of certain conditions on the structure. This validation approach is supported by Robinson (1994) who notes that whilst there are no formal methods for validating a conceptual model, by using outlines of the objectives of the project and the modelling approach, feedback can be sought from appropriately qualified individuals such as those with detailed knowledge of the system, which in this case refers to experts in the financial modelling domain. The above approach adopted for conceptual model validation was therefore deemed appropriate and was revisited with any conceptual variations resulting from changes adopted downstream in the model development phase.

8.2.2 Data Validation

The development of the spreadsheet model commenced after conceptual validity had been addressed. Inaccuracies in the data required for development and population of a model are potentially a source of error in the model and effort must be made to ensure that this is minimised.

Procedures were put into place to limit the possibility of inaccuracies arising from the data used in the generic model. Most of these are as were implemented and discussed in Chapter Six during data capture. The raw data used for the development of the generic project was sourced from the financial models of real projects, which were developed by experts. These models in the data sample had been subjected to scrutiny at various levels by expert model developers, by lenders during due diligence, and by the public sector during evaluation of bid submissions. This gives a great deal of confidence in the data collected as it had previously undergone a very high level of testing and audit by relevantly qualified authorities.

By minimising the processing of this data before its direct use, its validity is maintained: in deriving the generic model the raw data was simply reviewed to identify ranges for each of the data items mentioned in Chapter Six. During the cost and financial profiling, average figures per unit were achieved by adopting the hospital bed as a unit. Although this may have introduced an element of error, the resulting figures for costs, required financing and revenues when applied to the 500-bed generic project, were very similar for similar sized projects in the sample. These figures were also checked against other real projects independent of the data sample. The values for the generic project were confirmed to be in line with all comparisons.

The input data required for the initial base case model was also checked against other projects independent of the data sample. All the initial time-based and non-time based inputs for the base case were presented to expert project financiers who confirmed that the values were in line with market values and therefore representative of the real system. For the simulations outlined in the latter sections of this chapter the varied inputs are gearing, percentage composition of blended equity, and inflation. These are effectively forms of sensitivity tests; the range used for the gearing reflects the highly geared nature of all project finance structures whilst the ranges for blended equity composition and inflation have been chosen to reflect extreme conditions. Experts have confirmed these ranges as realistic and as accurately reflecting real conditions and practice. Changes are also made to the financial structure during simulations and use made of different financial instruments. These have been checked with experts and against other models independent of the data sample, and this has shown that the variation of instruments and structure are applied in a manner also consistent with market practice.

8.2.3 Verification: White-Box Method

According to Kleijnen (1995), when embarking on the V&V of the actual model it is necessary to carry out the verification before validation. This is in agreement with the simple definitions given in the section 8.1 that indicate that the model's components, and the model as a whole would have to be shown to be functioning correctly before the model could be tested to show that it addressed the purpose for which it was created. Other studies reviewed for this thesis have also adopted this approach to V&V (Nayani and Mollaghasemi 1998, Ng and Smith 1998, Resinovie et al 1997).

The white-box method of verification tests the components of the model to ascertain whether or not they perform as intended. For this purpose the broad classification used in Chapter Seven was adopted verifying the model's components for Inputs, Calculations and Processing, and Outputs as discussed below.

Inputs: The inputs component of the model is primarily intended to provide an interface for the input of data and assumptions and to keep these separate from the workings of the model. The inputs section also generates a monthly and semi annual schedule used throughout the model. The cost and financial profiling developed as detailed in Chapter Six are also applied to the generic project here.

A visual check of the NTBI and TBI Sheets of the model established that these serve as an interface for data input. Displaying the formula contents of the spreadsheet cells also indicated that the NTBI has no calculations whilst the TBI sheet has simple calculations relating only to the derivation of the monthly and semi annual schedule for the model, and for applying the cost profiling developed from the data sample.

The TBI sheet schedules each project year into semi annual periods of June to November, and December to May, with the first period of the project starting in June 2000 and the last ending in November of 2032. This is consistent with the assumption that the 2-year construction phase starts in June 2000, followed by 30 years of operations. The construction schedule is monthly, starting in June 2000 and ending in November 2002. The construction cost schedule applied to the model involved scaling up an assumed unit cost with the hospital bed as the unit, in order to reflect the characteristic costs identified in Chapter Six.

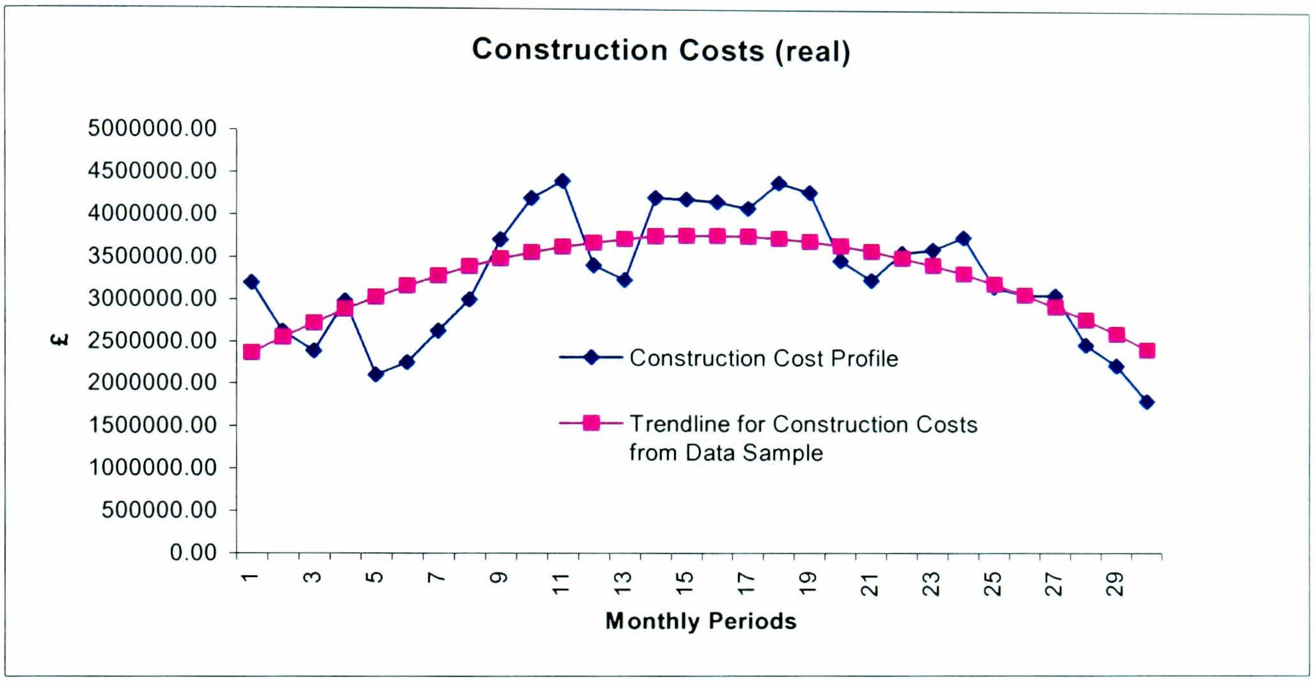


Figure 8.1: Verification of construction costs

Figure 8.1 verifies that the profile applied suitably reflects the cost profiles exhibited by the data sample, as both are very similar.

Review of the TBI also showed that when a revenue value of £18 million was input, this was applied through the schedule as revenue of £9 million per semi annual period. Likewise the constant annual value (real) assumed for operating costs was split and scheduled with half incurred in each semi annual period of each year. This confirms correct scheduling of revenue and cost data.

Calculations and Processing: This section contains various sheets performing various functions. The Nominal Sheet converts the real cost figures into nominal by applying the appropriate inflationary indices. Figure 8.2 shows the real and inflated nominal values as calculated on the Nominal Calculations Sheet when arbitrary inputs were made. The figure shows that this component of the model effectively reflects the impact of inflation on the costs and revenue. The construction cost is shown as nominal figures hard coded from the profiling.

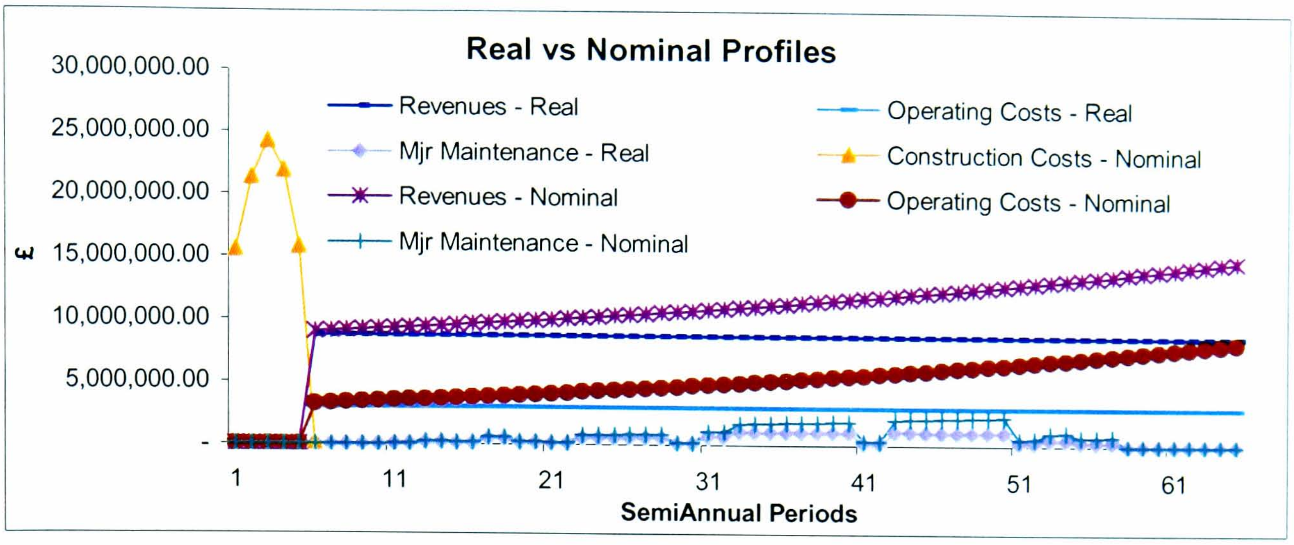


Figure 8.2: verification of the nominal calculations.

The model is designed to calculate the funding requirement and to match the sources of funding to this requirement. Table 8.2 lists the funding provided in each period when the project was geared at 94% with 5.85% of subordinated debt and 0.15% equity, and Figure 8.3 displays the level of funding required in each period of the construction phase. Table 8.2 illustrates that the proportion of funding provided by each source is in line with the gearing required for the project and verifies that the funding provided matches the totals required in each period as illustrated in Figure 8.3.

	Period 1	**Period 2**	**Period 3**	**Period 4**	**Period 5**
Construction Cost	15.53	21.34	24.26	21.87	15.78
Development Cost	6.19	-	-	-	-
Loan Fees	4.76	2.48	1.74	0.97	0.32
Prefund DSRA	-	-	-	-	1.37
Prefund MMRA	-	-	-	-	0.09
Total Funding Required	**26.48**	**23.82**	**26.00**	**22.84**	**17.56**
Funding Provided	**26.48**	**23.82**	**26.00**	**22.84**	**17.56**
Equity %	0.15	0.15	0.15	0.15	0.15
Subordinated Debt %	5.85	5.85	5.85	5.85	5.85
Senior Debt %	94	94	94	94	94

Table 8.2: Verification - funding provided for 94% gearing.

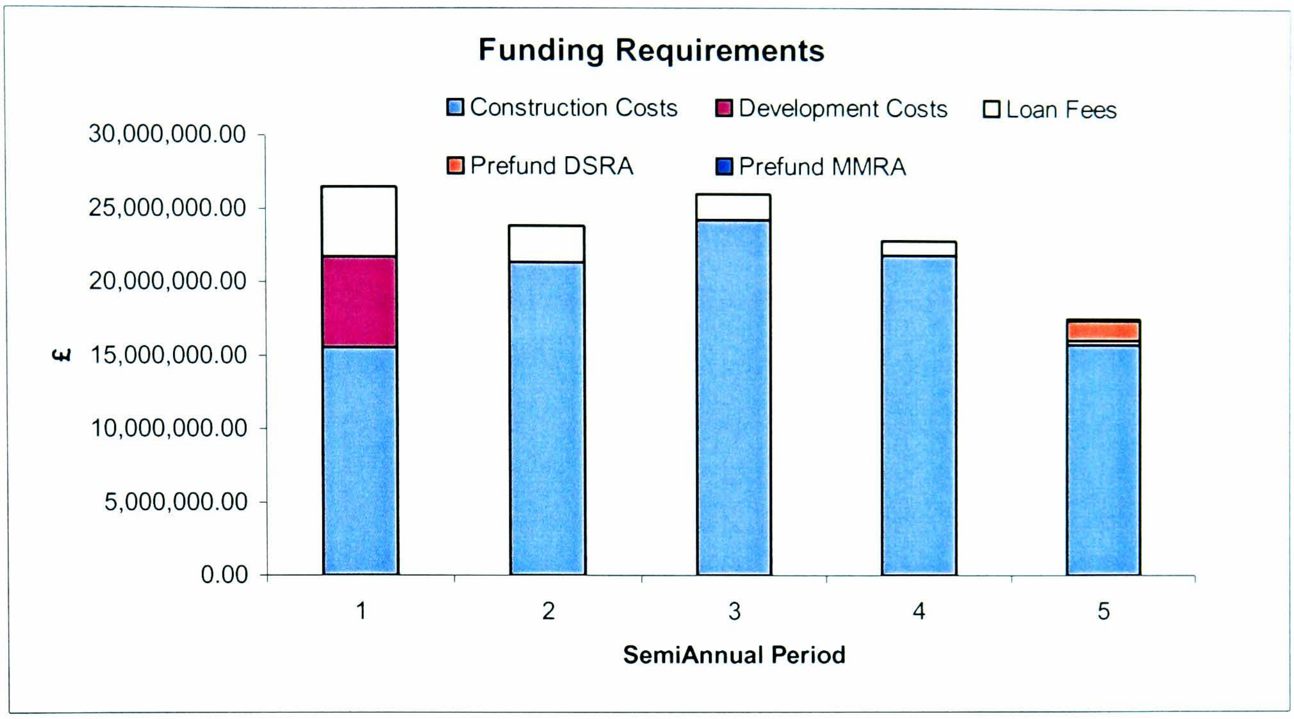


Figure 8.3: Verification -funding requirements at 94% gearing.

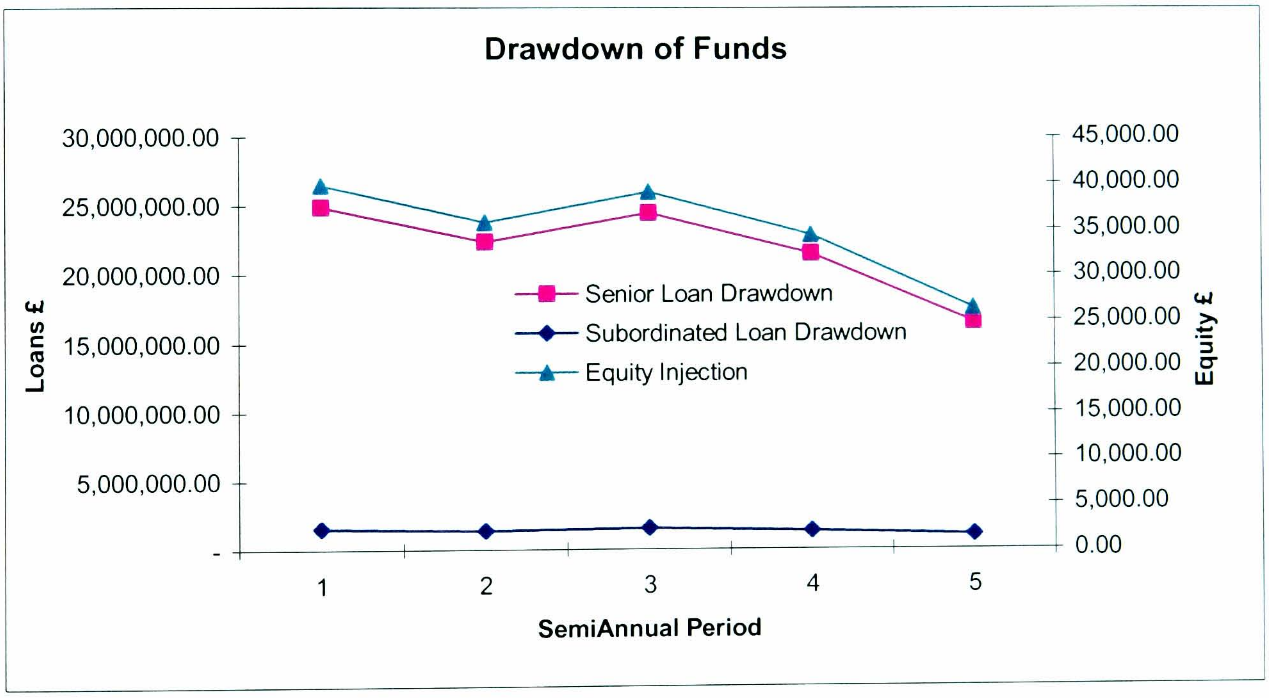


Figure 8.4: Drawdown on Funds.

Figure 8.4 displays the drawdown profile for the project and the figure verifies that the Loan Schedule correctly sets out the drawdown in each period to match the funds required as indicated in Figure 8.3. Review of the Loan Schedule also correctly showed interest accrued declining with decreasing outstanding loans.

The depreciation calculations and capital allowance schedule showed that these elements were applied appropriately: the asset value was depreciated by £2.97 million, over 50 periods or 25 years, consistent with the inputs. The capital allowances also exhibited a profile in line with the reducing balance profile assumed. The capital allowances curve, illustrated in Figure 8.5, shows the rapid initial decrease in asset value implied by the reducing balance, levelling out in later periods.

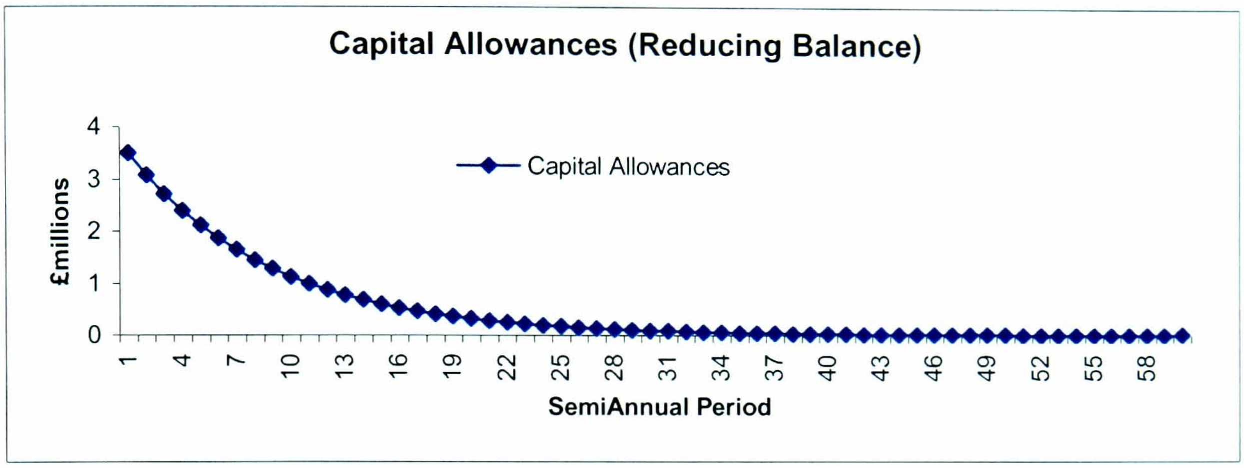


Figure 8.5: Verification - capital allowances.

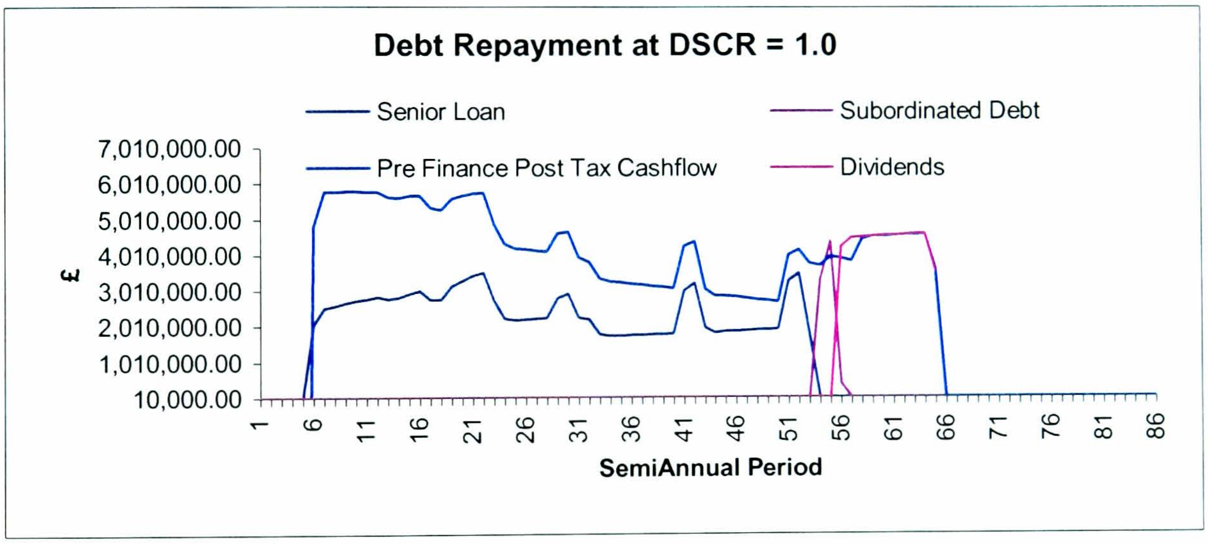


Figure 8.6: Verification – cash cascade.

The cash cascade was also verified by changing the debt service cover ratio requirement to 1.0 under a sculpted debt repayment profile. A 1.0 DSCR has the effect of allowing 100% of cash available after costs and expenses to be used towards senior debt service. The resulting repayment profile is shown in Figure 8.6. The figure shows no subordinated repayments were made until the senior debt was paid off as a result of the cascade of cash. In the same manner the shareholders, having the most junior claim to the cash flow, did not receive any cash distributions until the subordinated debt was paid off. The above procedure also serves to verify the sculpting mechanism: Figure 8.6 shows that the sculpting mechanism served to achieve a repayment profile for the debt in line with the cash flow.

Paginated blank pages are scanned as found in original thesis

No information is missing

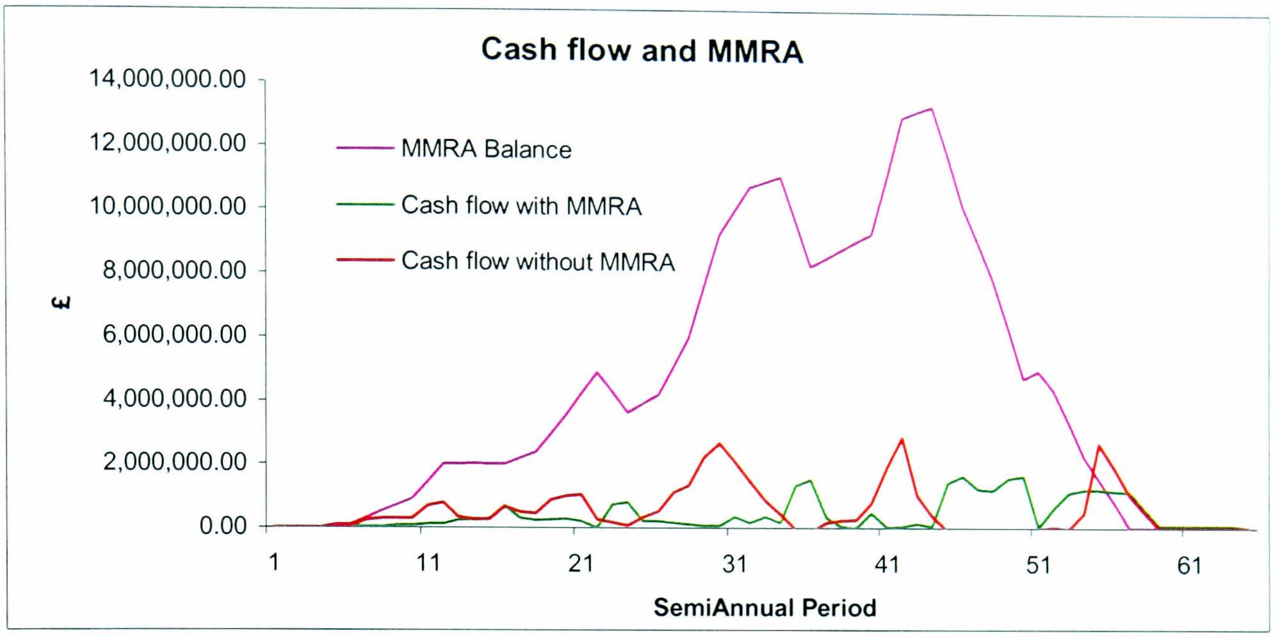


Figure 8.7: Verification – MMRA.

Gearing %	Senior Debt £m	Blended Equity (Subordinated Debt & Equity) £m	Financing Fees £m
90	112.19	13.87	10.63
92	114.51	11.07	10.45
94	116.82	8.28	10.27
96	119.13	5.50	10.01
98	121.45	2.73	9.91

Table 8.3: Verification – gearing impact.

The response of the model to inflation is recorded in Table 8.4. Different levels of inflation were simulated for different financial structures and the resulting impact on revenue, operating costs, and debt repayments was observed. All inputs except for inflation were kept constant for the three different financing options simulated, i.e. bank loan, fixed bond and indexed bond.

Table 8.3 shows that the revenue stream and operating costs rose with inflation irrespective of the senior debt option. The different rates of increase for the revenue and OPEX correctly reflected the indexation assumed; 40% of the revenue and 100% of OPEX was indexed. In all cases the debt repayments did not change with inflation for the senior loan and the fixed bond options, however as expected the indexed linked bond option showed a rise in nominal bond repayments when the assumed inflation was increased. The results in Table 8.4 further verify the model and the way the structure reflects inflation.

Inflation %	Revenue NPV £m	Total Operating Cost £m	Total Debt Repayment £m
Senior Loan Package			
0.0	104.89	206.80	116.82
3.0	120.34	356.52	116.82
5.0	135.12	524.18	116.82
Fixed Bond Package			
0.0	104.89	206.80	122.56
3.0	120.34	356.52	122.56
5.0	135.12	524.18	122.56
Index Linked Bond Package			
0.0	104.89	206.80	122.56
3.0	120.34	356.52	236.08
5.0	135.12	524.18	371.41

Table 8.4: Verification – response to inflation.

The effect of the revenue stream was also tested: the value for revenue input was increased and decreased alternately. An increase in the cash within the model should result in earlier repayment of debt when sculpted and/or an increase in returns to the shareholders. The results of the test exhibited just that: doubling the revenue stream from £17m to £34m and sculpting the debt repayments resulted in a decrease in average life of the senior debt from 14 years to 4 years. At the same time the shareholders IRR showed an increase from 15% to 48%. This confirms the model's capability to sculpt repayments to available cash resulting in earlier repayments. This also shows that the model outputs in terms of returns correctly reflect the cash state of the model: an increase in revenue leading to earlier and higher distributions. Conversely a decrease in revenue from £17.5m to £15m extended the average life of the loan to beyond 33 years leaving the debt unpaid. The model outputs also displayed a drop in shareholder returns from 15% to 14% again demonstrating correct structuring of the model.

Finally the model was tested to ensure that the inbuilt error trapping system was functional. This involved deliberate input of incorrect or inconsistent data thereby forcing errors in the model. When the revenue was decreased as above, the outputs displayed 'Error' signs highlighting that the debt remained unpaid and that the cash flow was not positive throughout the model. Other tests were also run to ensure that the Error signs for non-repayment of subordinated debt, insufficient reserve account pre-funding, and the non-balancing of the financial statements were triggered when these errors were forced on the model. The tests proved that the model was able to trap errors and flag inconsistencies when they occurred.

All the tests carried out above on the model have verified that the components of the model function as intended and that the model as a whole processes responds to the various inputs in the right manner.

8.2.5 Validation: White-Box Method

The validation involved adopting best practice methods in structuring the model to minimise sources of error. Validation was also achieved by having the model reviewed and evaluated by project finance professionals, a V&V approach supported by Lynch (1996) and Culley (2002). During the white-box validation the components of the model were checked against other valid models. The approach adopted in structuring the model and its logic was borne out as valid from the comparisons, which confirmed that good modelling practice, as adopted in the real system was being implemented here. Some of the considerations during the white-box validation conducted on the model include the following.

- **Inputs:** The inputs of the model were kept on separate worksheets. To minimise sources of error all inputs were hard coded, i.e. input manually, and no calculations were allowed on the Non-Time Based Inputs sheet. Some calculations were applied to the inputs on the Time Based Inputs sheet however these were limited to simple calculations such as applying the average unit cost profiles to the generic model and the computation of indices to effect the impact of inflation. The layout of the input sheets also allows easy visual checking that the data is accurately input. Examples of the input sheet layouts can be seen in Appendix C.

- **Calculations and Processing:** For the components that are effectively the machinery of the model all worksheets are scheduled such that the date/semi-annual period heading for each column on each sheet matched the date/semi annual heading of the same column on the Time-Based Inputs sheet. This introduced consistency and made visual checking of the model easier. During development formulae were entered only into the first column of the schedule; this was then copied across the sheet so that all cells in a row had the same formula. Checking of the formulae on each sheet then involved working down each cell of the first column of the schedules. Other columns were checked visually and random checks were performed on the formulae across the schedules to limit the potential for propagated errors. A system of structuring the sheets was adopted whereby each row would refer only to rows above it on the sheet where possible. This made it easier to follow the flow of logic on each sheet.

Part of the V&V involved the inclusion of checks built into the model to alert the modeller to discrepancies or errors. Visible checks were put in place on each sheet at key stages of the logic to return an "ERROR" value if, at run or design time, calculations did not perform as intended or inconsistencies developed between related values. These were checked against other models and with professionals for relevance, and for confirmation that the errors trapped were significant to the meaningful engineering of the finance.

The audit toolbar provided with the Excel software, which can be used to trace and follow the logic of the spreadsheet calculations, was used in establishing that the relationships between the elements of the model accurately represented those in practice or in the real system.

The white-box validation established the following amongst others:

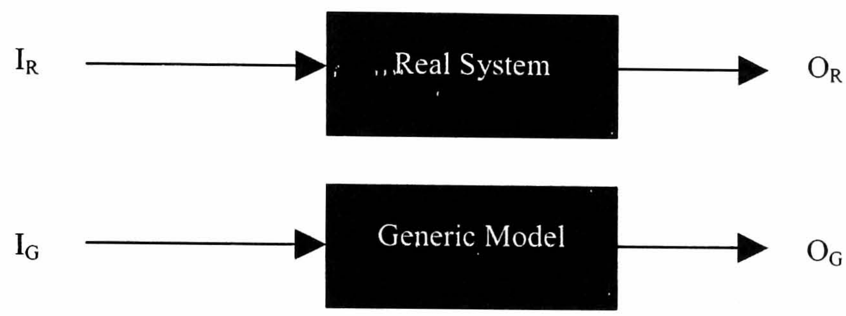
- The model does not allow repayment of loan principal during construction;
- The interest accrued on the loan is rolled up until repayments commence after construction;
- The Taxation Sheet does not charge tax on the cash flow until a profit is made;
- Distributions are not made to the shareholders until all losses have been diminished by periodic profits;
- Bond coupons are made over the construction period

The experts approached confirm, as does reference to other valid models in existence, that these are all representative of actual practice in the project finance field thereby validating the engine of the model.

Outputs: Alongside the processes and methods implemented as described above, financial modelling experts conducted white-box validation on the components of the model repeating some of the process above amongst others. The outputs of this model also match those required by the lenders for evaluating models during their due diligence process (Douglas 2000, Newman 2003, SMi 2003); by the client or public body for evaluating the bids; and also by the sponsors for ensuring profitability. During the testing, review of the results showed that movement in the KPI's identified in Chapter Six served to underline the relevance of the indicators.

8.2.6 Black-Box Validation for Operational Validity

The Black-box validation reviews the overall functionality of the model. Balci (1994), Sargent (1996) and Banks et al (1988) advocate comparison to other valid models as a method for black-box validation. Figure 8.8 adopted from Robinson (1997) illustrates this approach and the reasoned relationship that if $I_R = I_G$ then the O_R, or the impact to O_R, should be equal to O_G or very similar to the impact on O_G.



I_R = inputs to real system
O_R = outputs from real system
I_G = inputs to generic model
O_G = outputs from generic model

Figure 8.8: Black-box validation

This approach for validation was attempted on the model, however the level of complexity involved with financial models made this very difficult. As each project is unique so are the financing terms. Peculiarities with each model made it unreasonable to assume parity between other models in the system and the generic model, and attempts to match the numerous variables and terms made the exercise cumbersome and error prone. Instead, for the black-box validation a simple approach was adopted which assessed the model's behaviour under extreme situations. These extreme condition tests (Law and Kelton 1991; Banks et al 1996; Sargent, 1996; Balci 1994) verify that the model performs as would be expected in the real system. Reference to graphical presentations in the model such as the graphs for cash flow, debt outstanding, cover ratios amongst others greatly aided the validation process.

The effect of zero inflation on the model outputs was assessed and as expected, showed a great increase in the cash flow. This reflects the fact that although 40% of the revenue stream is indexed to inflation, 100% of costs are subject to any escalation. Therefore at zero inflation the impact on reduced costs is greater than on the revenue, leading to a net increase in cash flow. This was also correctly reflected by an increase in blended equity returns as a result of increased cash available for distributions to shareholders. Projects in the real system would be expected to behave in the same manner, as inflation would be expected to have an escalating impact on project costs.

Should the operator of a project introduce efficiencies that ultimately lead to a reduction in operational costs, these savings would revert to the operator or shareholders. The model was also shown as valid in this respect as when operating costs were reduced the model displayed an increase in shareholder IRR.

In the real system, depending on economic conditions, project sponsors are able to negotiate with bank loan lenders to some degree with regards to sculpted repayments. When there is an increase in cash flow, the sponsors may wish to repay debt earlier, or conversely when unexpected expenditures arise, repayments may be put off for longer. Again the model allows for this as it offers a sculpting mechanism that matches the debt repayments to the cash flow. The model allows repayments to be stopped in individual periods that may be identified as critical. It also allows the sculpting of repayments for repayment as early as possible. This mechanism is also used for ensuring that the minimum cover ratios stipulated by the lenders are implicit in the repayment schedule. All these are tools and methods that have been identified as used in practice today in models reviewed during compilation of this thesis.

As with the white-box validation, the model was made available to professionals experienced in model evaluation that reviewed the model and ran tests not too dissimilar to those mentioned above. The outputs of the model when fed certain inputs under known conditions as above, and the feedback provided by the experts, serve to validate the model as a sufficiently accurate representation of the tools and processes involved in developing financial packages for privately financed projects.

The sections above have detailed the V&V of the generic model from the validation of the conceptual model and the data selected for this thesis, through to the V&V of the components of the model, and the fully functioning model as a whole, using different white-box and black-box methods. Whilst it is not possible to prove that a model is absolutely correct (Robinson 1997) the verification and validation carried out here has increased confidence in the derived generic project and the financial model developed to reflect its financial structure. The V&V processes carried out above have demonstrated that the generic model developed is sufficiently accurate and is suited to the purpose for which it was designed, i.e. that of simulating financial packages with various instruments and under different financing terms and conditions. To achieve this the author has, using the verified and validated generic model, simulated different financial structures and scenarios to test the performance and behaviour of the generic model. The section below outlines the different simulations run, the results of which are reported in Chapter Nine and analysed in Chapter Ten.

8.3 SIMULATIONS

The data, model components and the model as a whole have been verified and validated as described in the preceding sections, allowing confidence to be placed in the soundness of the simulations outlined below and the resulting outputs. Data described in earlier chapters form the parameters for the initial base case for the model and the inputs required for this model are the characteristic cost and financing profiles, the derivations of which are described in sections 6.2.3 and 6.2.4.

A series of simulations were run comparing different project financing structures implemented to fund the generic project. These different financial packages were achieved by altering the financial package within the generic model; thus generating several financial packages. Figure 8.9 illustrates the initial financial package of the generic project as profiled from the collected data.

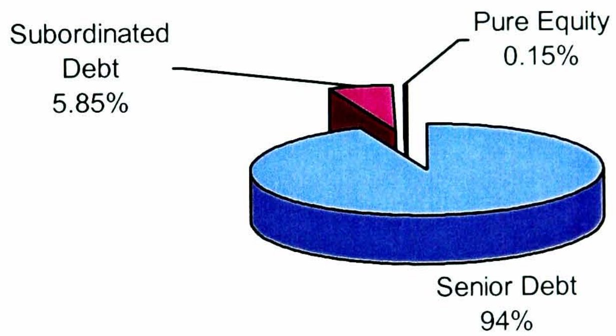


Figure 8.9: Financial composition of generic project.

The figure indicates that the generic project is highly geared with a debt equity ratio of 94:6. The 6% blended equity comprises 5.85% subordinated loan and 0.15% pure equity. The blended equity is so called because it is assumed that the shareholders of the project company provide both the pure equity and the subordinated loan.

The simulations for this research were conducted in 6 stages (A-F) based on the area of financing being investigated. The simulations were controlled by the use of a worksheet in the model on which the different combinations of input data required for each simulation are outlined. As each simulation case was selected on the worksheet, the combined data for that simulation fed into the appropriate sections of the model as the current inputs. The different inputs for the simulated models are summarised in Appendix E and the stages are outlined below:

- **Stage A:** Four simulations (Base Case 1 - 4) were run to compare different combinations of debt repayment profiles. An annuity profile and a sculpted profile have been assumed as the available options for senior and subordinated loan repayment. The following repayment profile combinations were simulated for senior and subordinated debt respectively: Sculpted and Annuity; Sculpted and Sculpted; Annuity and Sculpted; Annuity and Annuity. From analysis of the model outputs, the most competitive repayment profile from this simulation in terms of meeting lenders' requirements, as well as providing the most competitive annual service payment and shareholder returns, was adopted as the senior/subordinated debt repayment profile combination for all subsequent simulations. It has been assumed that the outcome of Stage A simulations is valid for senior bank loan and bond issue structures.

- **Stage B:** Base Cases 5 and 6 model the replacement of the senior loan with a bond issue. Two simulations were considered: a fixed rate bond (Base Case 5) and an index-linked bond (Base Case 6). The repayment profiles for the senior debt and subordinated debt reflected the results of Stage A and the simulations were structured to reflect the impact of using fixed and index-linked bonds.

- **Stage C**: This stage was structured to examine the effect of adjusting different components of the blended equity, i.e. the subordinated debt and the pure equity components. The impact of a high proportion of subordinated debt relative to pure equity and vice versa was considered using Base Cases 7 and 8, which simulated a subordinated debt/ pure equity split of 5.85%: 0.15% and 0.15%: 5.85% respectively.

- **Stage D:** Here four models (Models D1 to D4) simulated different gearings for the financial package. Different gearings between 90% (Model D1) and 98% (Model D4) were simulated. Corresponding changes were made to the blended equity to reflect the results from Stage C. Table 8.5 lists the gearings that the models were structured to simulate and shows that the simulation for 94% gearing will be sourced directly from Stage A simulations.

Case	Senior Debt	Subordinated Debt	Pure Equity
Model D1	90%	*Stage C result*	*Stage C result*
Model D2	92%	*Stage C result*	*Stage C result*
Stage A Base Case	94%	5.85%	0.15%
Model D3	96%	*Stage C result*	*Stage C result*
Model D4	98%	*Stage C result*	*Stage C result*

Table 8.5: Gearing simulations for Stage D

- **Stage E:** Here the generic model's sensitivity to inflation was tested. A sensitivity analysis is a modelling technique used to compare the effect of changes in independent variables on the overall project. These changes are applied to the variables individually whist keeping all other variables constant. In this case the changing variable was inflation whilst all others were kept constant. This stage was divided into three sections with three simulations run in each section. Section E1 tested the sensitivity of the bank loan base case whilst section E2 modelled the impact to a fixed bond package, and section E3 that to an indexed bond. The inflation values tested for each section were 0.0%, 3.2% (default) and 7.5%. These are assumed to represent the best, current and worst case inflation scenarios (respectively) for the generic project.

- **Stage F:** This was carried out to examine the effect of monoline wrapping. This was done through the simulation of fixed (Model F1) and index-linked bond issues (Model F2). As all other bond issue models were simulated as unwrapped bonds, Models F1 and F2 simulated wrapped fixed and indexed bond finance.

As mentioned earlier the inputs for all simulations were controlled from a worksheet containing predetermined data. The simulations were carried out such that for each simulation the appropriate case was selected on the Simulations worksheet and when the model was then run, all inputs were sourced from those predetermined for the selected case. For each simulation the model optimisation process discussed in Chapter Seven was followed prior to analysis. Each simulation was run as a separate model so that reference could be made to each individual scenario. Use was not made of Excel's Scenario function as this is not compatible with the automatic sculpting mechanism built into the model. It was also considered that the number of variables involved would make this cumbersome.

8.4 SUMMARY

The role and importance of verification and validation in research has been explained in this chapter. The process of V&V as applied in this thesis has also been discussed as occurring in two stages: conceptual model and data validation, and verification and validation of the model developed.

Experts validated the conceptual model developed in the early stages and this ensured that the components of the conceptual model were representative of actual project finance practice, and relevant to the objectives set out for the model. Procedures were also put in place to limit the possibility of inaccuracies arising from the data used in the model. The data was sourced from expertly scrutinised and validated models, allowing a high level of confidence to be placed in the data collected.

By describing the verification and validation techniques applied to the components of the model and to the model as a whole, this chapter demonstrates that the model performs as is intended. It also shows that the model represents actual practice in the project finance market with sufficient accuracy, and is a valid tool for the exploration of financial structures, mechanisms, and instruments for privately financed projects. The latter sections of this chapter outline the simulations that were carried out using the verified and validated model during such exploration.

CHAPTER NINE

PRESENTATION OF RESULTS

9.0 INTRODUCTION

The results of the simulations are presented in this chapter. Here the outcomes are noted and values for the performance indicators are reported as recorded. This results chapter does not contain any discussion or analysis of the results; this is conducted in the next chapter. Consistency was maintained during simulations by ensuring that where required models retained the same gearing, and that any required increments in gearing within a stage were relatively constant. This approach ensures that any comparative analysis later applied to the results is justifiable.

9.1 STAGE A – REPAYMENT PROFILES: BANK LOAN PACKAGES

As outlined in Chapter Eight Stage A simulations explore the repayment of debt when the generic project is financed by a senior bank loan and a subordinated loan. This exploration is expected to indicate which profiles, if any, are better suited for the project's debt repayment.

Table 9.1 outlines the simulations carried out to explore loan repayment profiles. Each simulated package had a gearing of 93.38% (blended equity: 6.48%subordinated debt; 0.14% pure equity), the senior debt comprising a senior bank loan. Due to the structure and dynamics of the developed model, it was difficult to attain the exact gearings desired for each simulation. An effort however was made to achieve as close a match as possible hence the reported fractional gearings.

Case	Senior Debt	Subordinated Debt
Base Case 1	Annuity	Annuity
Base Case 2	Annuity	Sculpted
Base Case 3	Sculpted	Annuity
Base Case 4	Sculpted	Sculpted

Table 9.1: Stage A – Simulated repayment profiles

Table 9.1 shows that repayment of the senior loan was simulated, first as an annuity and then on a sculpted basis, and for each of these repayment of the subordinated was also considered as an annuity and sculpted.

Table 9.2, which outlines some outputs of the simulations, shows that all base cases are able to achieve the target minimum DSCR. The minimum LLCR's are somewhat similar but with Base Cases 3 and 4 being closer to the required minimum. The average values for the LLCR are almost identical for all cases however there is a marked difference in the average DSCR values. Base Cases 3 and 4 have much lower average DSCR values of around 1.2 whilst for Base Cases 1 and 2 the average DSCR is in excess of 3.6.

	Base Case 1	**Base Case 2**	**Base Case 3**	**Base Case 4**
Target Min DSCR	*1.15*	*1.1.5*	*1.15*	*1.15*
Min DSCR	1.15	1.15	1.15	1.15
Average DSCR	3.75	3.65	1.25	1.21
Target Min LLCR	*1.18*	*1.18*	*1.18*	*1.18*
Min LLCR	1.24	1.23	1.18	1.18
Average LLCR	1.33	1.32	1.31	1.31
Funding Required	£125.1M	£125.1M	£125.1M	£125.1M
Revenue NPV	£122.9M	£122.2M	£121.6M	£121.9M
Project IRR	7.59%	7.53%	7.34%	7.35%
Shareholder IRR	15.09%	14.73%	15.06%	15.28%
Average Life of Senior Debt	16yrs	16yrs	14yrs	14yrs

Table 9.2: Stage A – Outputs.

The project returns and shareholder returns are somewhat similar across all four models. Base Cases 1 and 2 both have a project IRR of around 7.5% (Post Tax; Nominal) whilst Base Cases 3 and 4 both have a lower project IRR of around 7.35%. The trend is rather less obvious for the shareholders IRR with values between 14.7% and 15.3%. The blended equity IRR (Post Tax; Nominal) for Base Case 2 (14.73%) is closest to the minimum requirement of 13% whilst that for Base Case 4 is furthest out. Base Cases 1 and 3 exhibit similar blended equity IRR (15.09% and 15.06% respectively). The average life for the senior debt is 16 years for Base Cases 1 and 2 and 14 years for Base Cases 3 and 4.

Table 9.2 also shows that the funding requirement calculated for all four cases is circa £125 million. The revenue required for each base case does vary however. Base Case 1 requires the highest revenue at almost £123 million (NPV). Base Case 2 is over £720,000 cheaper at £122.2 million. Base Case 4 requires a revenue stream with an NPV of just under £122 million. The revenue stream for Base Case 3 (£121.63 million) is almost £300,000 less than that for Base Case 4 and has the lowest revenue demand of all four models.

The slightly varied outputs above are mostly as expected and as would be associated with very similar financial packages. Surprising though are the cover ratio figures, which are markedly different. Base Cases 1 and 2 exhibit average DSCR figures are similar but much higher than those for Base Cases 3 and 4. Base Case 3 and 4 also attain the target minimum LLCR whilst the figures for Base Case 1 and 2 are higher. These differences are not consistent with the differences already indicated for the revenue values and will be one of the focuses of the discussion and analysis in Chapter Ten.

9.2 STAGE B – REPLACEMENT OF LOAN WITH BOND ISSUE

This stage involved the simulation of two models, each financed by a bond issue: a fixed rate bond for Base Case 5, and an index-linked bond for Base Case 6. The simulations were expected to highlight the performance of the financial model, and the impact on financial outputs, when the senior debt for the project was realised by way of a bond issue. The simulation of both a fixed bond and an indexed bond model was also expected to reveal any differences in the financial profile of the project due to these two different types of bond.

The gearing achieved for both was again 93.38% (blended equity: subordinated debt 6.48%; pure equity 0.14%). As a result of Stage A analysis (see Chapter Ten) the senior debt repayment is sculpted and the subordinated debt is repaid as an annuity. The bond repayment has however been sculpted for repayment over the last ten years, and manual sculpting has been applied to achieve the back-ended profile desirable for bond repayment, i.e. starting with smaller initial repayments which gradually increase throughout the repayment period. The cover ratios over the repayment period have been structured to gradually decline from 10.0 to 0.0 over the ten-year period as part of the manual sculpting. This assumed amortisation profile is applied to both Base Case 5 and 6. The outputs obtained from the simulations are summarised in Table 9.3.

Base Cases 5 and 6 are both able to sculpt to the minimum DSCR and have high average DSCR values of above 11. The LLCR values also satisfy the target minimum although Base Case 6 exhibits a much larger margin in the LLCR than Base Case 5. This trend is also reflected in the average LLCR figures. Base Case 6 shows a much higher project IRR than Base case 5 and also slightly higher shareholder returns. Both cases have an average life of around 28 years.

Immediately obvious is the much higher values for average DSCR recorded for the bond cases than was evident for the bank loan structures in Stage A. The much longer average life for senior debt recorded in this stage, relative to those of Stage A are consistent with the long-term nature of bond instruments. Also apparent is the difference between revenue levels required for the fixed rate structure and for the index linked bond structure. These form part of the issues for analysis and discussion in the following chapter.

	Base Case 5 (Fixed Bond)	**Base Case 6 (Indexed Bond)**
Target Min DSCR	*1.15*	*1.15*
Min DSCR	1.15	1.15
Average DSCR	11.93	11.38
Target Min LLCR	*1.18*	*1.18*
Min LLCR	1.20	2.19
Average LLCR	1.39	2.93
Revenue NPV	£120.7M	£150.8M
Project IRR	7.67%	12.83%
Shareholder IRR	13.54%	14.93%
Average Life of Senior Debt	28.19yrs	28.21yrs

Table 9.3: Stage B Outputs

9.3 STAGE C – BLENDED EQUITY COMPOSITION

This stage assesses the impact of changing the blended equity composition of the financial package. This involved testing high/low and low/high ratios for the subordinated debt/pure equity combination of the blended equity. The blended equity split for subordinated debt/pure equity was 80/20 for Base Case 7, and 20/80 for Base Case 8. Base Case 7 and Base Case 8 were structured to have a gearing of 94%, however due to modelling dynamics as discussed earlier, the actual gearings achieved were 93.38% and 94.32% respectively. This slight difference in gearing is considered to have minimal impact on the results relative to the change in blended equity composition and therefore acceptable.

Table 9.4 outlines some of the outputs for Base Cases 7 and 8. The package for Base Case 7 has already been discussed as part of Stage A simulations, as the package structure is the same as that for Base Case 3. Reference to Table 9.4 shows that Base Case 8 outputs vary significantly from those for Base Case 7: the revenue required is £53 million greater, the IRR's are almost double and the average life of the senior debt is less than half that for Base Case 7. The results therefore initially indicate that the structure with a higher proportion of pure equity within in the blended equity requires far greater revenue to sustain the financing package, and also displays higher LLCR's than that with greater proportions of subordinated debt. These packages also exhibit higher IRR figures.

	Base Case 7	**Base Case 8**
Target Min DSCR	*1.15*	*1.15*
Min DSCR	1.15	1.15
Average DSCR	1.25	1.21
Target Min LLCR	*1.18*	*1.18*
Min LLCR	1.18	1.20
Average LLCR	1.31	1.66
Revenue NPV	£121.6M	£174.8M
Project IRR	7.34%	13.11%
Shareholder IRR	15.06%	28%
Average Life of Senior Debt	13.96yrs	6.5yrs

Table 9.4: Stage C outputs.

Changed polarity in the blended equity composition was further investigated by carrying out three further simulations based on Base Case 8: Base Cases 8a, 8b and 8c. Table 9.5 outlines the results of these simulations alongside those of Base Case 7 taken from Table 9.4.

Base Case 8a, which has a higher level of equity than subordinated debt, is modelled and optimised disregarding the minimum shareholder IRR restriction of 13%. Base Case 8b essentially further optimises Base Case 8a to include shareholder IRR criteria. Base Case 8c repeats the modelling process but explores different debt repayment profiles and their impact on the outputs. Table 9.5 indicates that the blended equity for Base Case 7 has a high proportion of subordinated debt whilst that for Base Case 8 and its variations, has higher levels of pure equity.

Table 9.5 also shows that Base Case 8a is able to achieve a financial model close to that of Base Case 7 and with a similar revenue demand. The results however show key differences in the DSCR and IRR indicators: average DSCR is much higher for Base Case 8a (4.96) than Base

Case 7 (1.25) and the shareholder IRR for Base Case 8a is 9% whilst that for Base Case 7 is 15.06%.

	Sub. Debt driven	Pure Equity driven		
	Base Case 7	**Base Case 8a**	**Base Case 8b**	**Base Case 8c** (Annuity x Annuity)
Target Min DSCR	*1.15*	*1.15*	*1.15*	*1.15*
Min DSCR	1.15	1.16	1.15	1.48
Average DSCR	1.25	4.96	1.20	11.12
Target Min LLCR	*1.18*	*1.18*	*1.18*	*1.18*
Min LLCR	1.18	1.18	1.19	1.52
Average LLCR	1.31	1.95	1.62	2.38
Revenue NPV	£121.6M	£121.9M	£174.8M	£139.3M
Project IRR	7.34%	7.09%	13.04%	9.41%
Shareholder IRR	15.06%	9%	28%	13%
Average Life of Senior Debt	13.96yrs	14yrs	6.5yrs	16yrs

Table 9.5: Further Stage C simulations.

The analysis of these results conducted in the following chapter will discuss the apparent inconsistency where the package with an equity driven blended equity component requires much higher levels of revenue to meet costs and modelling criteria and yet has enough cash flow to make far larger returns to shareholders.

9.4 STAGE D – GEARING

Simulations here consider different gearings for the generic model. Four versions of the model with actual gearings of 89%, 91.19%, 95.59% and 97.8% were simulated. As mentioned earlier the fractional gearings are due to the dynamics of the model and difficulty in achieving specific gearings. The changes in gearing were accompanied by corresponding changes in subordinated debt i.e. 10.86%, 8.67% and 4.27% respectively; the pure equity contribution was constant at 0.14% for all simulations. The results of Base Case 3 of Stage A at 93.38% gearing are also considered here. Table 9.6 outlines some of the outputs extracted from the result for the gearings simulated, and shows that the minimum DSCR of 1.15 is attainable at all five gearings. Minimum LLCR values are also attained except at 95.59% and above. The model was unable to be optimised fully at 95.59% and above, as the loan life cover ratio requirement (minimum LLCR = 1.18) could not be met. The defaulting cover ratios are indicated in bold type in Table

9.6. Increasing the revenue only served to increase the shareholder return figures whilst the minimum LLCR remained breached. Lowering of revenues whilst restricting shareholder returns also did not overcome the LLCR breach. This behaviour was even more pronounced at higher levels of gearing.

Initial observations indicate then that the level of gearing does make a difference to the profitability and viability of the financial structure. It is also evident that at certain levels of gearing the model cannot be brought to satisfy all stakeholders' criteria; primarily that of the lender's stipulated minimum cover ratios. In this case these criteria could not be satisfied at 95.59% and above. Discussion of these issues is raised in the following chapter.

	Model D1	**Model D2**	**Base Case 3**	**Model D3**	**Model D4**
Gearing	89.00%	91.19%	93.38%	95.59%	97.80%
Target Min DSCR	*1.1.5*	*1.1.5*	*1.1.5*	*1.1.5*	*1.1.5*
Min DSCR	1.15	1.15	1.15	1.15	*1.15*
Average DSCR	1.34	1.29	1.25	1.19	1.21
Target Min LLCR	*1.18*	*1.18*	*1.18*	*1.18*	*1.18*
Min LLCR	1.28	1.22	1.18	**1.12**	**1.09**
Average LLCR	1.46	1.37	1.31	1.41	1.48
Revenue NPV	£123.8M	£122.6M	£121.6M	£137.1M	£137.1M
Project IRR	7. 75%	7.54%	7.34%	9.15%	10.94%
Shareholder IRR	14.65%	14.80%	15.06%%	19.62%	22.22%
Average Life of Senior Debt	13.88yrs	13.94yrs	13.96yrs	9.45yrs	9.40yrs

Table 9.6: Stage D outputs.

9.5 Stage E – Inflation Sensitivity

Stage E simulates changing inflation conditions on the generic model. Stage E is split into three sub-stages, E1, E2 and E3. Stage E1 simulates bank loan financing whilst E2 and E3 simulate fixed and indexed bond financing respectively. Gearing for all stages was maintained at around 93% (E1: 93.38%. E2 & E3: 92.99%) and the same levels of inflation was tested on each financing structure to enable comparative analysis.

Earlier simulations have assumed an inflation rate of 3.2% based on current rates at the time of this study and this is repeated here. This stage also considered two further rates: 0.0% and 7.5%. These rates are assumed to represent the extremes of possible upside and downside inflation scenarios in a relatively stable economy such as the UK's; higher rates may be expected in more volatile economies. It should be noted here that the structure of the model is such that inflation is constant throughout the project, i.e. 7.5% inflation input implies that inflation is at 7.5% in every year of the project. As mentioned in Chapter Seven a proportion of the revenue input into the model is indexed to inflation (40% for bank loan and fixed bond structures; 100% for indexed link bond structures. The following sections present the outcome of assuming the above inflation rates.

9.5.1 Stage E1 – Bank Loan Packages

Figure 9.1 charts the outputs of the model at the default inflation rate of 3.2%. The model has been optimised to satisfy modelling requirements and stakeholder criteria, and the figure has an inset outlining some of the key measured indicators. The figure shows that the revenue stream, 40% of which is indexed to inflation, rises fairly in line with the total operational cost profile (operating costs + major maintenance + interest costs). The cash available for senior debt service (interest and repayment of principal) is also indicated on the chart and this is shown to primarily decline throughout much of the project before rising slightly at the end of the project.

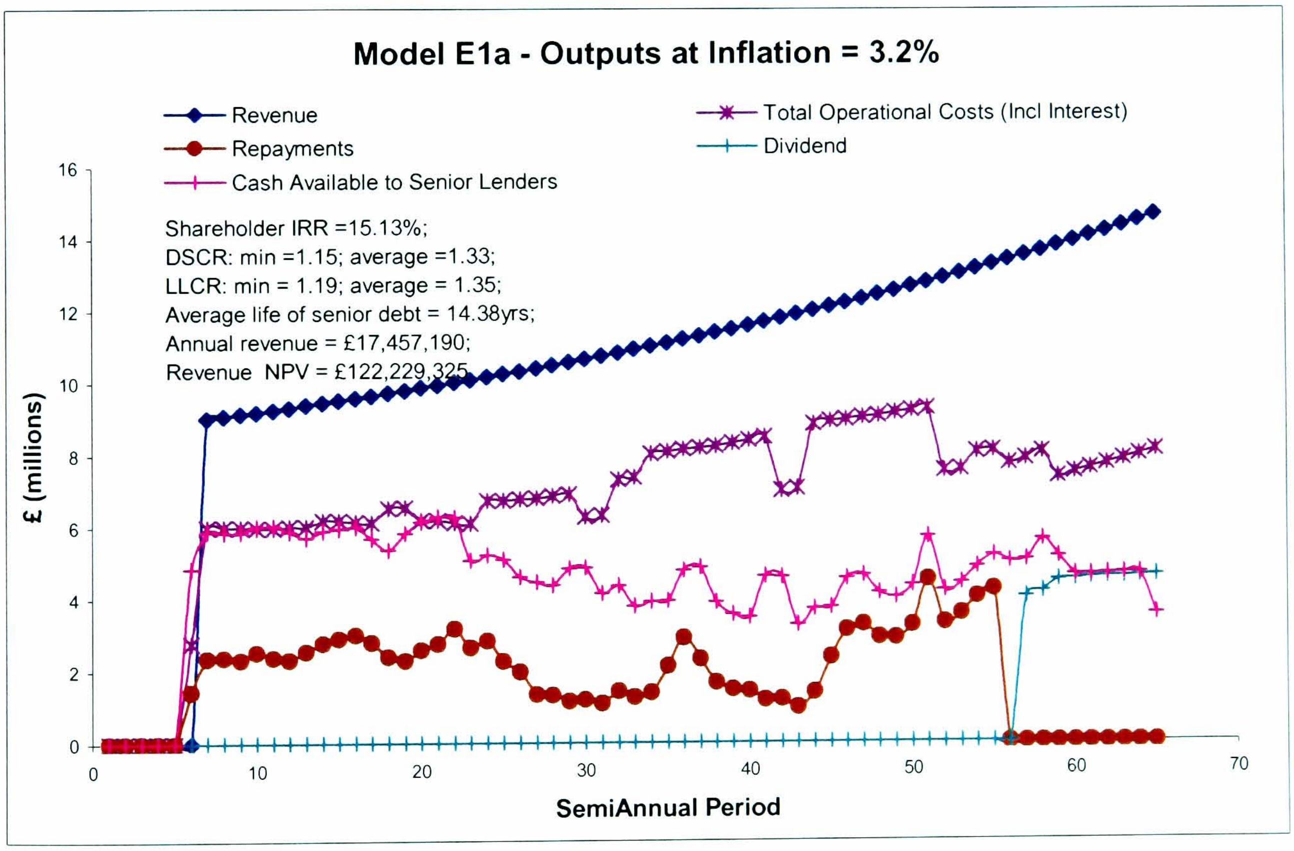


Figure 9.1: Bank loan structure at 3.2% inflation.

The repayment of principal exhibits a fluctuating profile with similar trends to the cash available. A line showing the dividend distribution to shareholders is also drawn on the graph and this indicates that no dividend payments are made until after period 56 which is also after the last principal repayment is made. The inset shows that minimum cover ratio requirements are met and that the DSCR and LLCR both display averages of 1.3. The annual revenue derived for this scenario is just under £17.5 million (£122.2 million NPV). Shareholder returns are 15%.

Figure 9.2 represents the impact of the reduction of inflation to zero inflation. No other alterations were made to the model; the debt repayment was left unchanged. The figure shows a flat revenue profile and decreasing total operational costs. The cash available for debt service can be seen to change significantly from the previous profile from period 22, increasing rapidly and peaking in period 51 at over £15 million. Dividends are paid out a few periods earlier bit still towards the end of the project from period 54. At zero inflation the revenue stream is shown to have an NPV of £105 million but the minimum DSCR of 1.15 is breached although the LLCR minimum of 1.18 is satisfied.

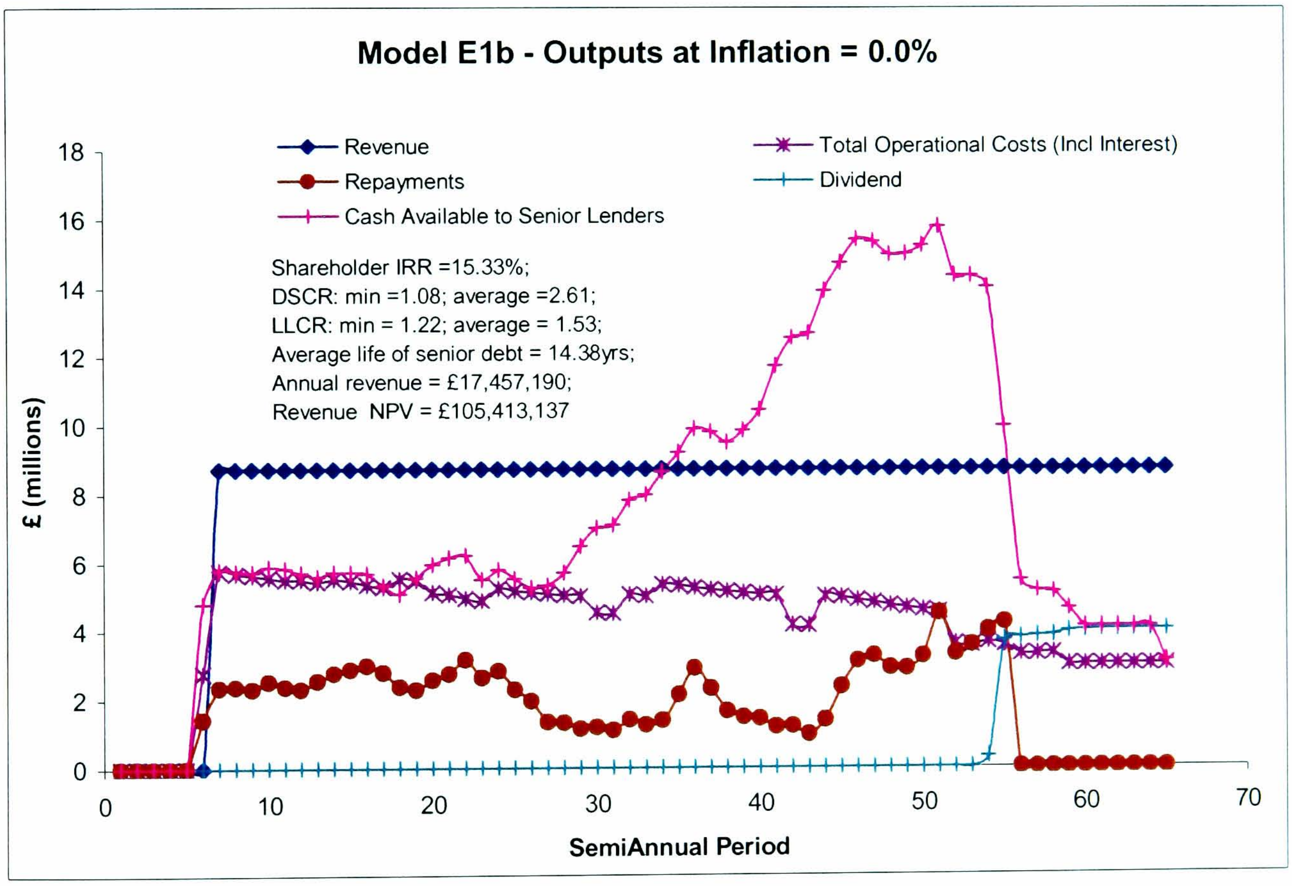


Figure 9.2: Bank Loan Structure at 0.0% inflation.

Figure 9.3 charts the impact of an increase of inflation to 7.5%. It shows that the total operational costs escalate faster than the revenue stream with the costs almost equalling the revenue in some periods. The profiles for cash available for debt service and dividend distribution are also affected; the cash available is greatly reduced, falling below zero between periods 36 and 60 and there are no distributions to shareholders until period 60 of the project.

The inset shows that the net present value of the revenue stream is over £162 million and that at this repayment profile the cover ratio requirements are not met.

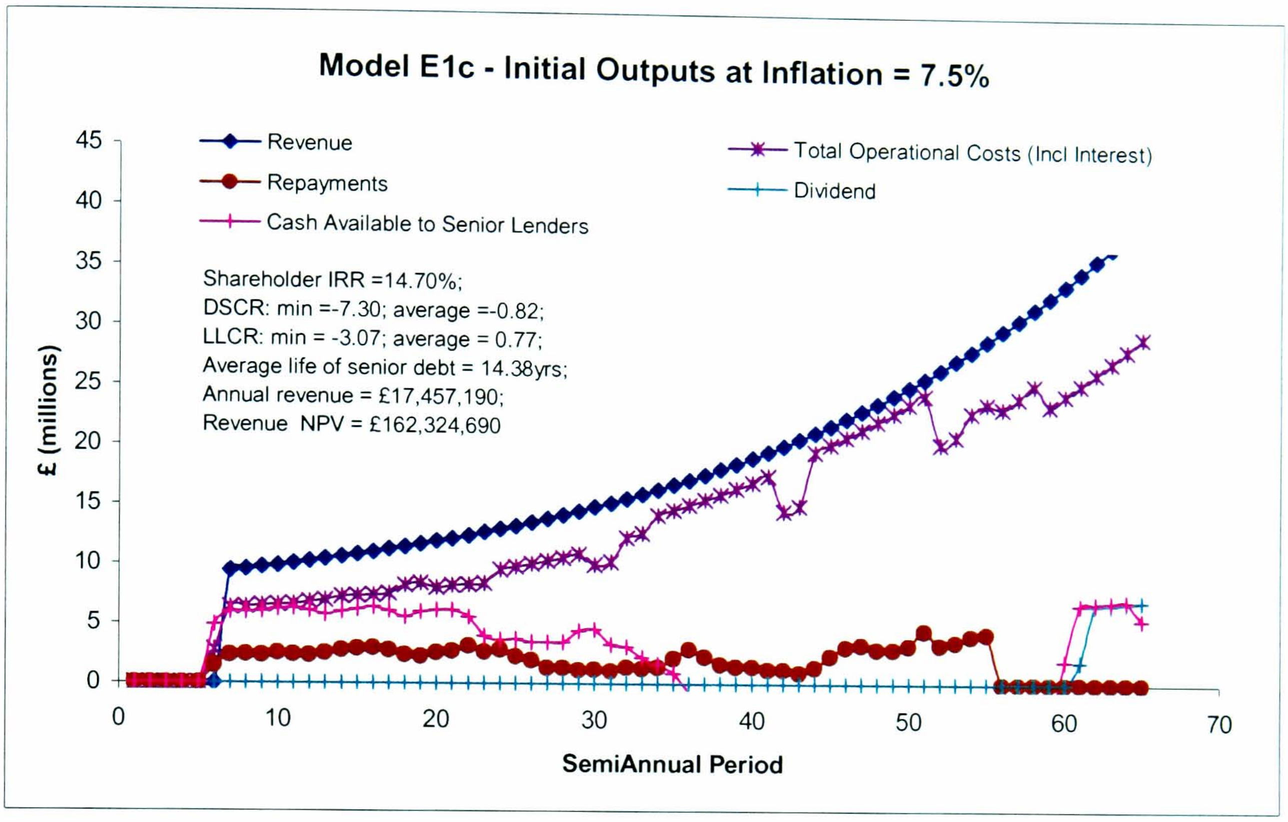


Figure 9.3: Bank loan structure at 7.5% inflation.

9.5.2 Stage E2 – Fixed Bond Packages

The simulations conducted in this stage replaced the senor bank loan with a fixed bond issue. In this section of the results charts representing the bond packages have all data plotted off the primary axis (left hand vertical axis) except for the cash available, which is plotted off the secondary vertical axis (right hand vertical axis).

Figure 9.4 highlights the outputs of the project when funded by the fixed bond structure at the default inflation rate of 3.2%. The figure shows the debt amortised over the latter end of the project (assumed to be paid off over the last ten years of project). The revenue profile is the same as that for the bank loan package, increasing gradually throughout the operational phase. The total operational costs, which include the interest costs on the borrowings, rise quickly and almost equal the revenue between period 40 and 50 before tailing off towards the end of the project. The cash available increases throughout much of the project; it averages around £8 million during the construction phase, rises steeply during the earlier periods of operations before increasing to a lesser extent after period 20 and finally declining after period 56.

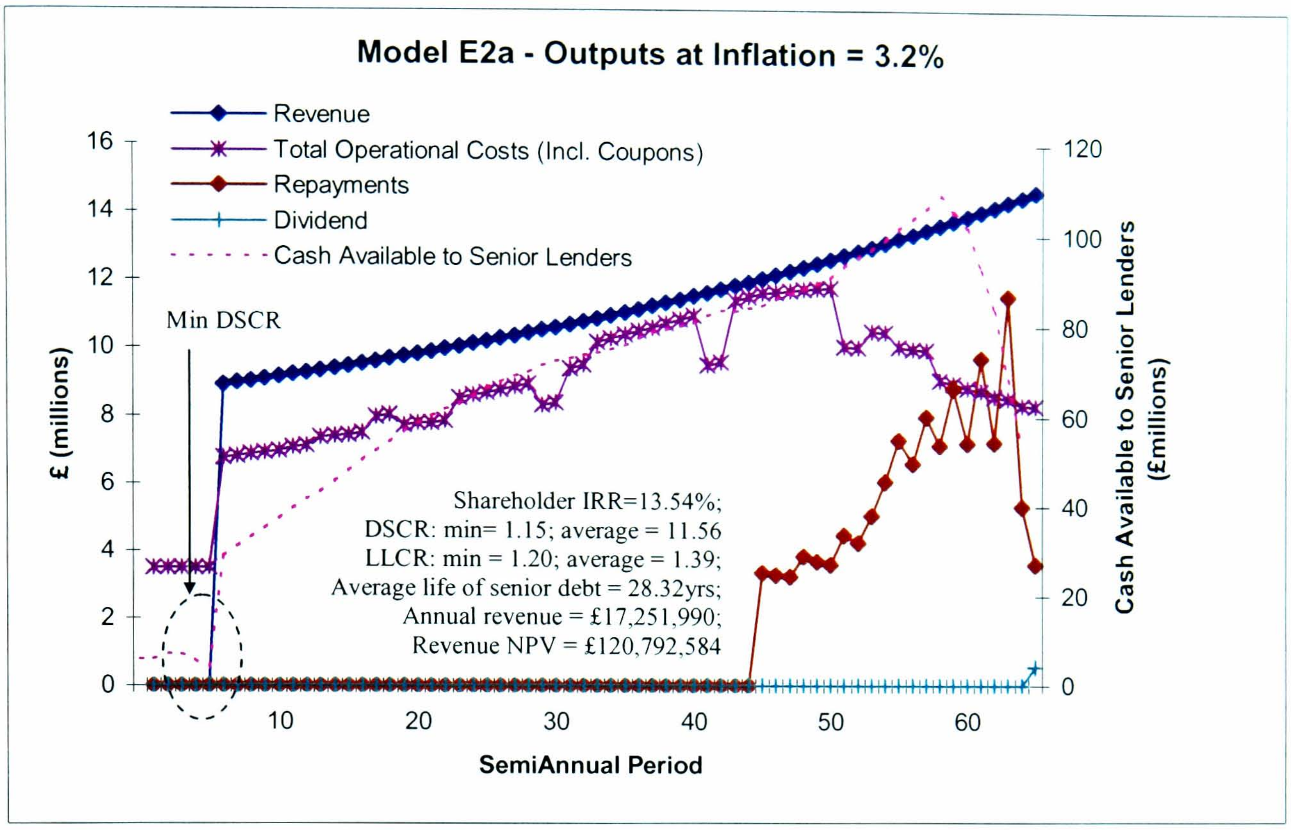


Figure 9.4: Fixed bond structure at 3.2% inflation

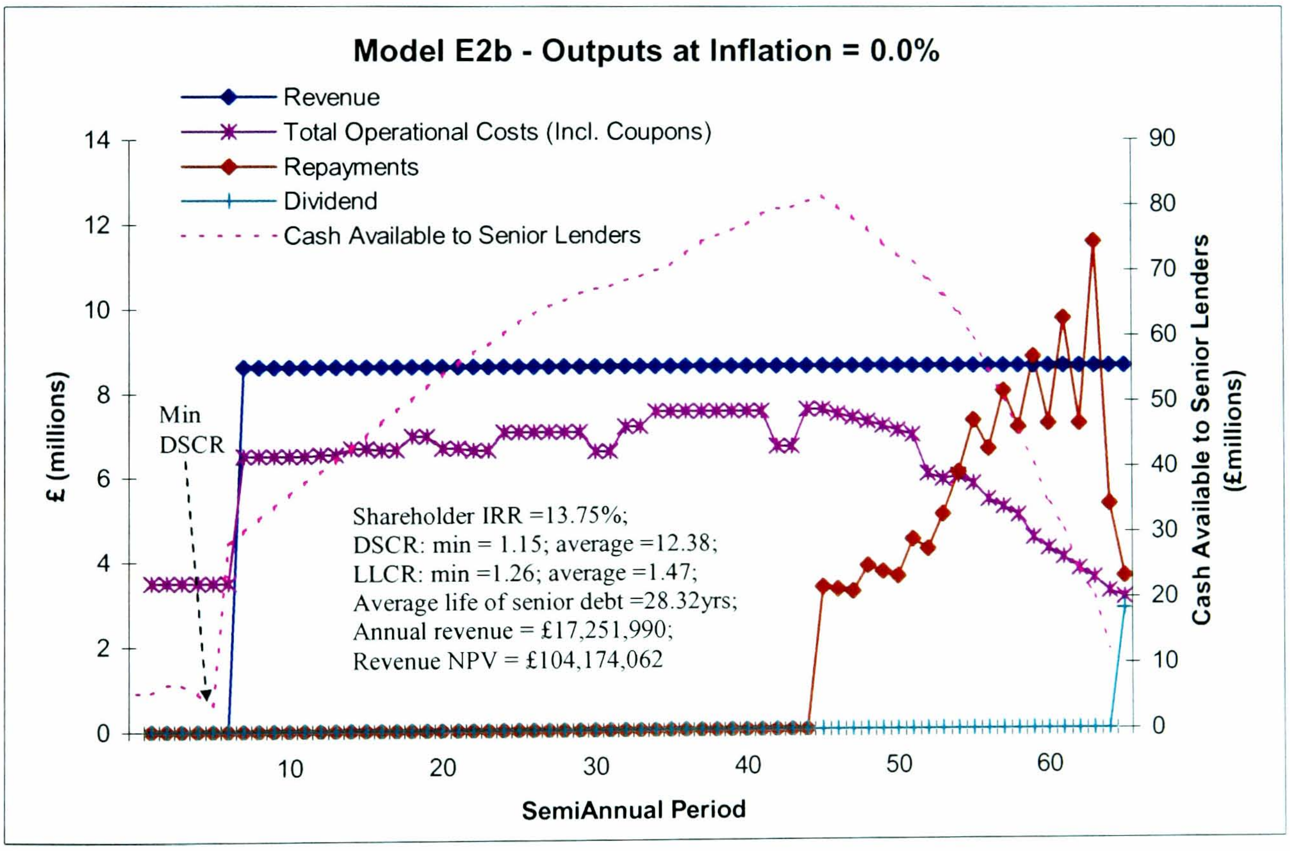


Figure 9.5: Fixed bond structure at 0.0% inflation

The DSCR remains high throughout the project except in the periods before operations where the minimum DSCR value is recorded. The chart also shows that no dividend payments are made except in the very last period. The annual revenue stream required for this scenario is £17.3 million (£121 million NPV) and the average life of the senior debt is around 28 years.

Simulation of zero inflation resulted in the profiles displayed in Figure 9.5. The figure shows the expected flat profile of the revenue stream and the relatively flat operational cost profile, which declines after the start of amortisation. Up until the start of amortisation of the debt the cash available displays a similar trend to that when inflation is at 3.2%, peaking at around £80 million before declining for the rest of the project.

The debt is fully repaid and the inset shows that the cover ratio requirements are met and with a high average DSCR. The net present value for the revenue is £104 million. The slight increase in IRR reflects the increased distributions to shareholders although this still only occurs in the last period of the project.

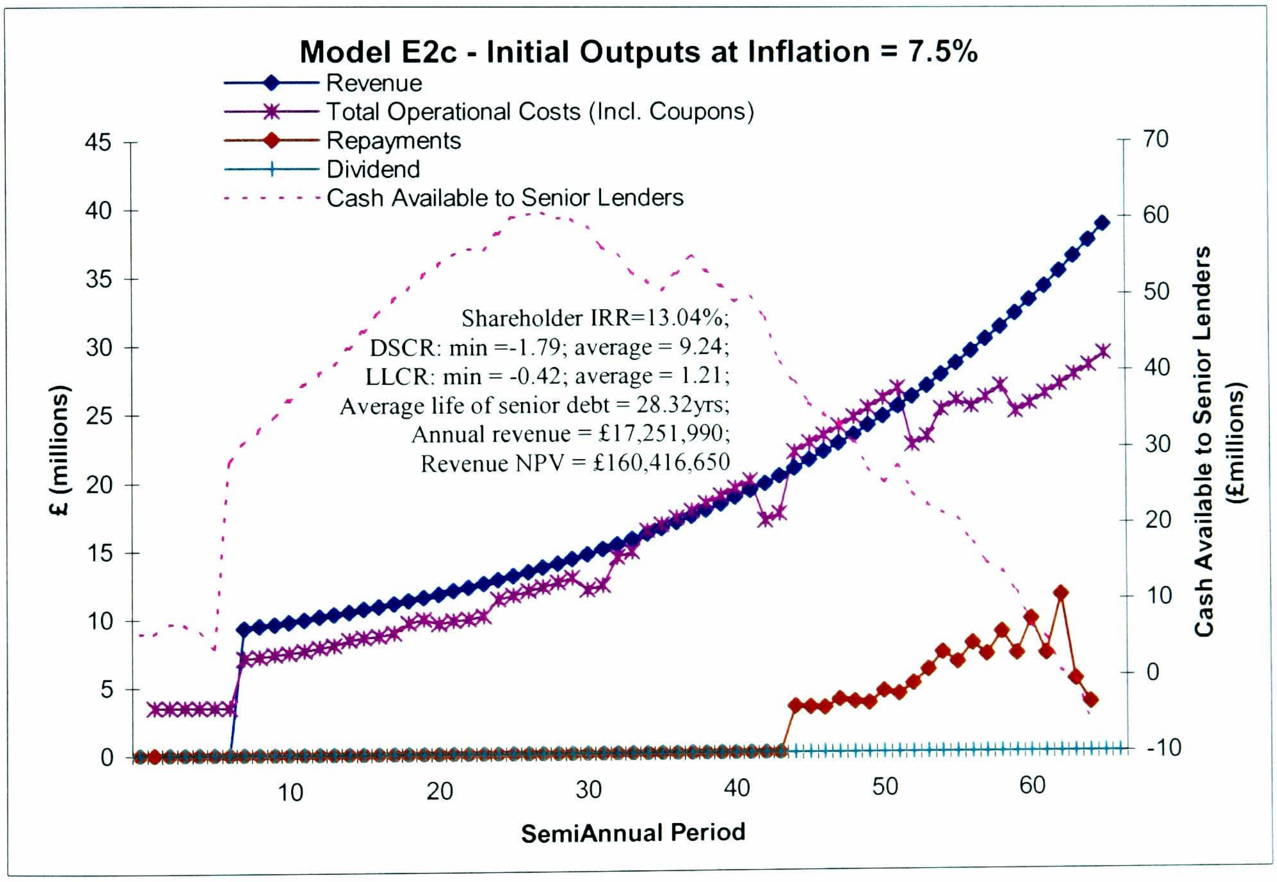


Figure 9.6: Fixed bond structure at 7.5% inflation.

The high inflation scenario of 7.5% was also simulated and the model's performance is illustrated in Figure 9.6. The revenue stream is shown to increase much more steeply. The cash available also increases much more rapidly in the earlier years of operations but peaks at less than £70 million before period 30, before declining steadily until the end of the project. The figure also shows that the total operational cost profile is steeper than that for the revenue but in this case the costs rapidly escalate above the revenue stream between periods 34 and 40 and even more so between periods 44 and 51.

The figure shows that even though the shareholder IRR satisfies the minimum requirement of 13%, dividend distribution is minimal or zero. The inset reveals that the increase of inflation to 7.5% inflation results in cash flows at which the cover ratio requirements are not met and that the NPV of the revenue also increases to £160 million.

9.5.3 Stage E3 – Indexed Bond Packages

The performance of the generic project financed with an index-linked bond issue at the default inflation rate of 3.2% is charted in Figure 9.7. The figure shows the total operational costs rising as with the base case of the fixed bond, seemingly in line with the revenue stream, but declining after the start of amortisation. The revenue stream however can be seem to much steeper as a result of 100% indexation of the revenue: £12 million at the start of operations and £29 million at the end of the project. The cash availability line indicates that, as with the fixed bond, there is a build up of cash right from the early stages of the project. The cash available peaks however at £160 million before period 30 and then declines gradually till the end of the project.

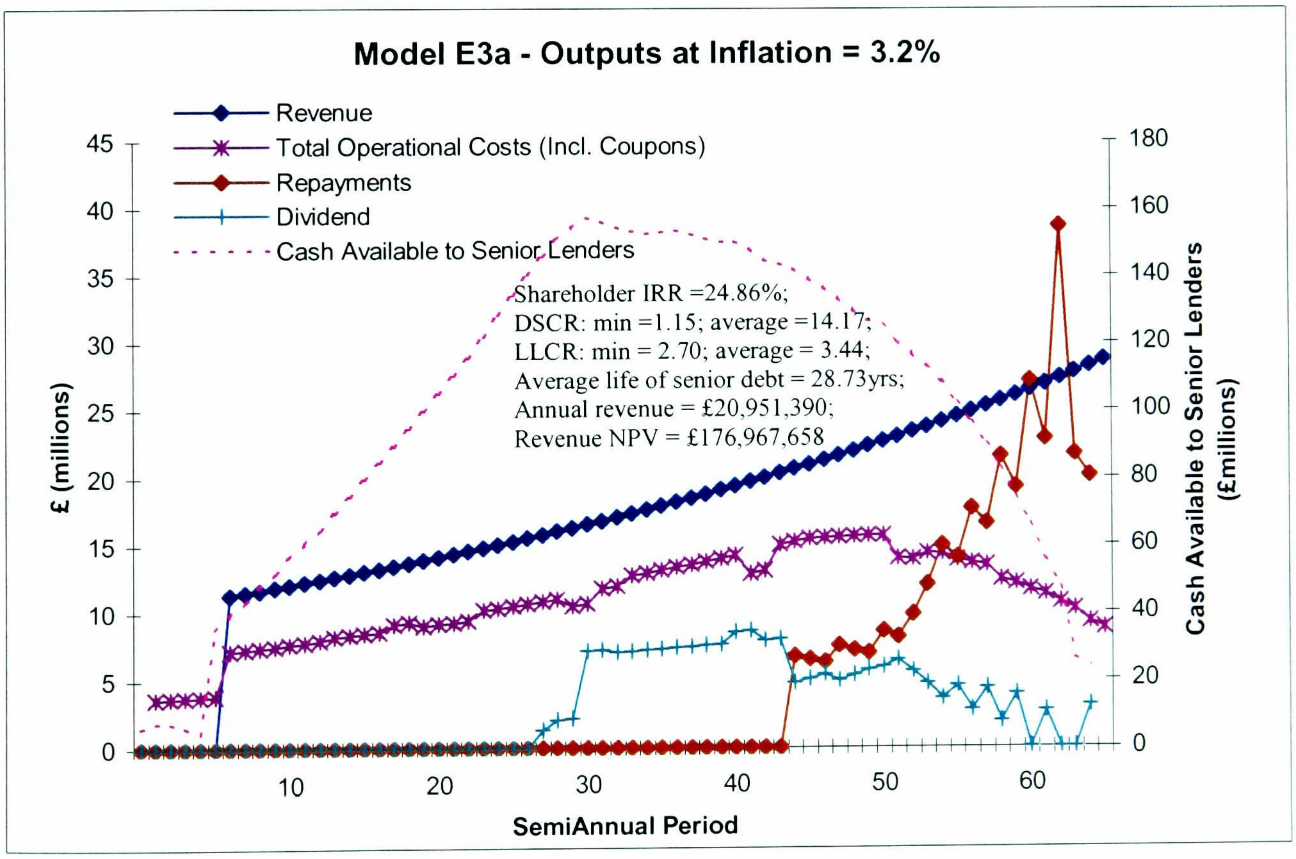


Figure 9.7: Index bond structure at 3.2% inflation.

Figure 9.7 indicates that dividend payments are made from period 26 onwards and a return to shareholders of almost 25% is achieved. The cover ratio requirements are also met and the average life of the senior debt is almost 29 years. The annual revenue required to sustain the financial package is £21 million (NPV = £177 million).

Figure 9.8 represents the effect of zero inflation on the model. Again the revenue stream profile is flat and the total operational costs are relatively flat during the project, declining after period 40 or the start of amortisation of the debt. The cash available increases for much of the project declining only from period 40 onwards.

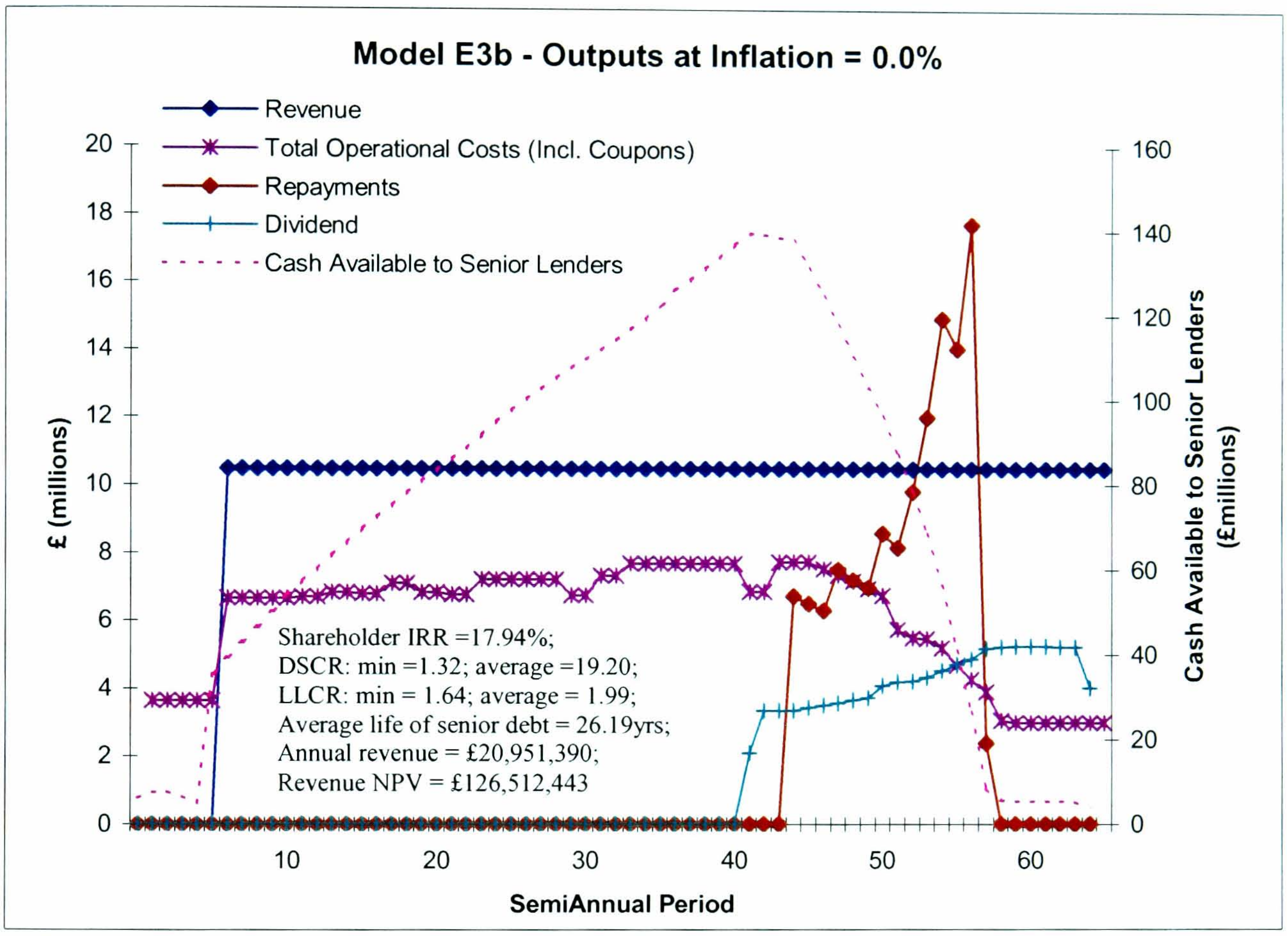


Figure 9.8: Indexed bond structure at 0.0% inflation

The cover ratios still satisfy the minimum requirements but the shareholder IRR is reduced. This is reflected by the dividend payment profile, which starts off much later in the project (from period 40 onwards). The net present value of the revenue payments is £127 million. Significantly, the model shows a change in the average life of the senior debt indicating that there is higher level of cash available for the senior lenders, which has been put towards retiring the debt earlier.

Simulation of high inflation is presented in Figure 9.9, which indicates the initial performance of the indexed bond package at 7.5% inflation before the repayments are sculpted to the cash flows. Revenue and total operational costs are shown to rise dramatically. The cash available profile is skewed to the left at 7.5% inflation as the indexed bond structure exhibits a rapid cash build-up in the years preceding repayment. Again, as with Figure 9.7, the cash available peaks around period 30 but the levels of cash are much greater; in excess of £180 million (as opposed to £160 million).

The revenue and total operational cost profiles also remain divergent with the revenue stream always higher than costs in this case. The cost line does not exhibit a significant decline during amortisation as observed with other simulations. Although the shareholder returns are indicated as being above 20%, with a large dividend payout at the end of the project, the cover ratio requirements are not satisfied.

The revenue was increased in an attempt to fully repay the bond, however at these higher levels of revenue the model indicates rising cash flow but the minimum DSCR remains breached. The profiles resulting from this adjustment are illustrated in Figure 9.10.

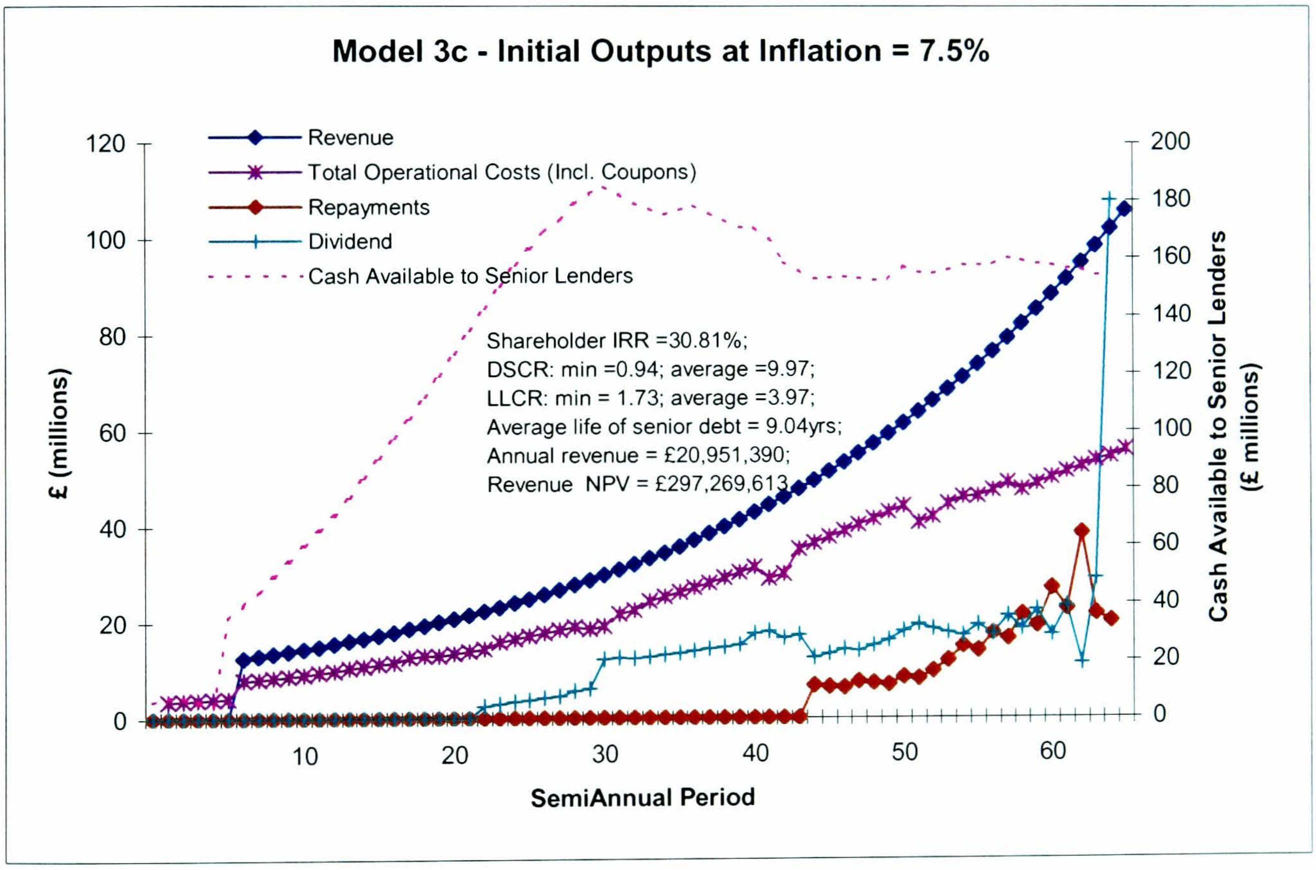


Figure 9.9: Indexed bond structure at 7.5% inflation

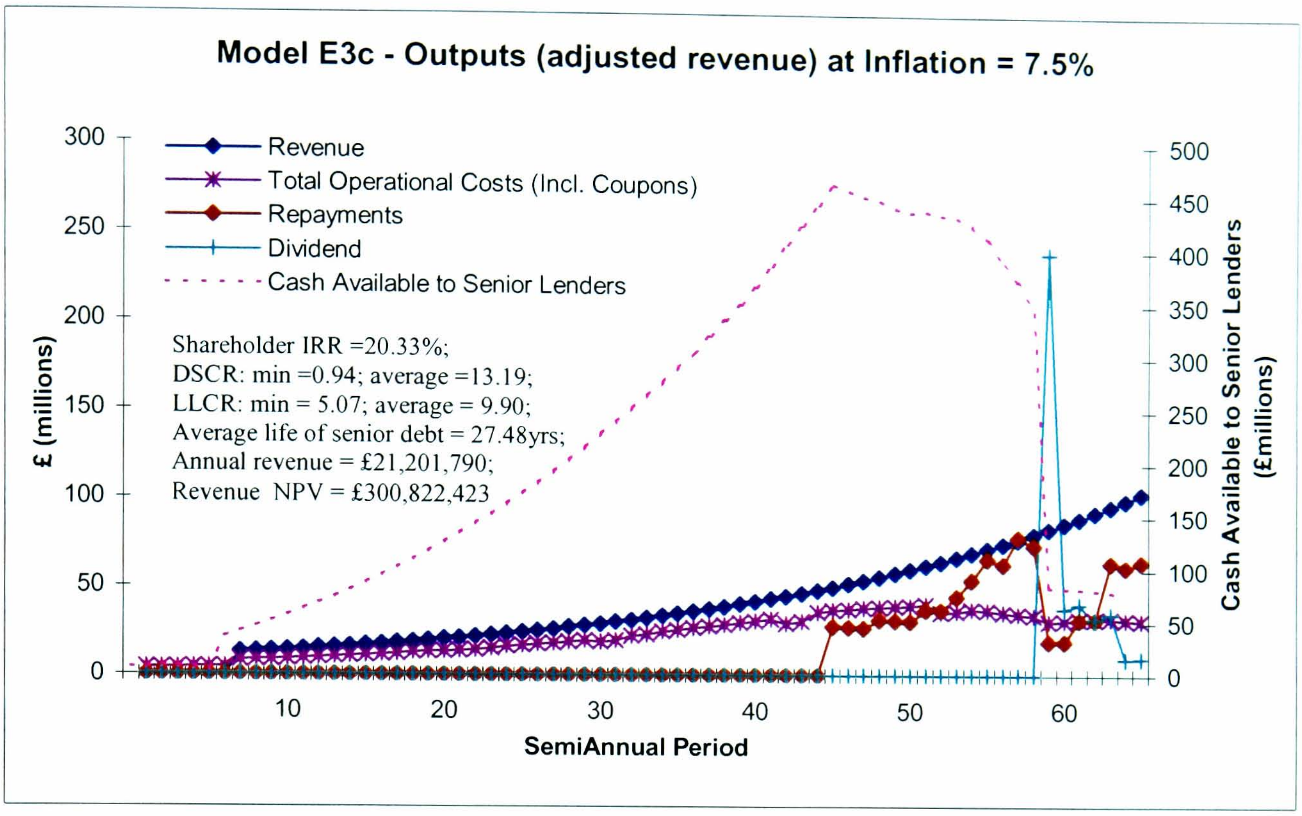


Figure 9.10: Indexed bond structure at 7.5% inflation – revenue adjusted.

9.6 Stage F – Monoline Wrapping

Here the fixed bond and indexed bond cases were simulated to include monoline insurance/wrapping. Table 9.9 lists some extracted outputs from the simulations and compares these with those extracted from models funded with unwrapped bonds.

With reference to Table 9.9 the indicators that show significant change are those linked to the financing costs. The table shows that bond wrapping significantly increases the financing costs; wrapping the indexed bond appears to be more expensive. The table also shows that the monoline fees paid upfront, i.e. 33% of the NPV of the fee, is £2.9 million for the fixed bond and £4.6 million for the indexed bond. Over the life of the project further payments are made to the monoline insurer up to an NPV of £6.0 million for the fixed bond and £9.4 million for the indexed bond.

The results indicate that there are no other significant changes to the model outputs except for an increase in the annual revenue requirements for the financial packages. In the cases simulated above, re-optimising the wrapped fixed bond structure resulted in a £3.8 million increase in revenue NPV, and an increase of £5.3 million in the case of the indexed structure. The reasons for this and considerations that arise as a result are discussed in the following chapter.

	Fixed Bond		Index-Linked Bond	
Monoline:	Unwrapped	Wrapped	Unwrapped	Wrapped
	Model E2a	**Model F1**	**Model E3a**	**Model F2**
Gearing	93%	93%	93%	93%
Financing Fees	£0.9M	£4.6M	£0.9M	£7.3M
Upfront Monoline Fee (33% of fee NPV)	-	£2.9M	-	£4.6M
Monoline Fee over Project Life (67% of fee NPV)	-	£6.0M	-	£9.4M
Min DSCR	1.15	1.15	1.15	1.15
Average DSCR	11.56	11.62	14.17	13.77
Min LLCR	1.20	1.20	2.70	2.65
Average LLCR	1.39	1.39	3.44	3.40
Annual Revenue	£17.3M	£17.8M	£20.9M	£21.6M
Revenue NPV	£120.8M	£124.6M	£176.9M	£182.2M
Shareholder IRR	13.54%	13.54%	24.86%	23.82%
Average Life of Senior Debt	28.32yrs	28.31yrs	28.73yrs	28.73yrs

Table 9.7: Bond finance structures with and without monoline wrapping.

CHAPTER TEN

DISCUSSION AND ANALYSIS

10.0 INTRODUCTION

This chapter discusses the results and conducts analysis on the observations made in Chapter Nine. As part of the analysis further review of the model has been conducted where necessary, and more detailed or specific information extracted from the various models where required. Reference is also made to the results in the previous chapter, and to items in the Appendices. The concept of optimal gearing is one of the issues that arise as a result of the examination of the results and this is also discussed in depth within this chapter. This chapter concludes with a summary of the salient issues arising from the analysis in the following sections.

10.1 STAGE A – REPAYMENT PROFILES: BANK LOAN PACKAGES

Stage A simulations focused on the repayment profile of a bank loan funding package. Table 10.1 lists the cases and repayment profiles that were simulated and the results are presented in section 9.1.

Case	Senior Debt	Subordinated Debt
Base Case 1	Annuity	Annuity
Base Case 2	Annuity	Sculpted
Base Case 3	Sculpted	Annuity
Base Case 4	Sculpted	Sculpted

Table 10.1: Stage A - Simulated repayment profiles.

Figure 10.1 charts the DSCR's taken from the models for the cases above and shows that Base Cases 3 and 4 have more desirable cover ratio profiles. The lower values of Base Cases 3 & 4 are consistently closer to the minimum DSCR value of 1.15, indicating that the cash flow is more efficient; all available cash either being used towards costs and debt service or being distributed to shareholders as excess cash. This is also clearly reflected in the average DSCR figures reported in the results; the higher average DSCR figures for Base Cases 1 and 2 are an indication of greater levels of cash available after meeting costs and debt service, which however do not seem to increase the shareholders returns much beyond those for Base Cases 3 and 4.

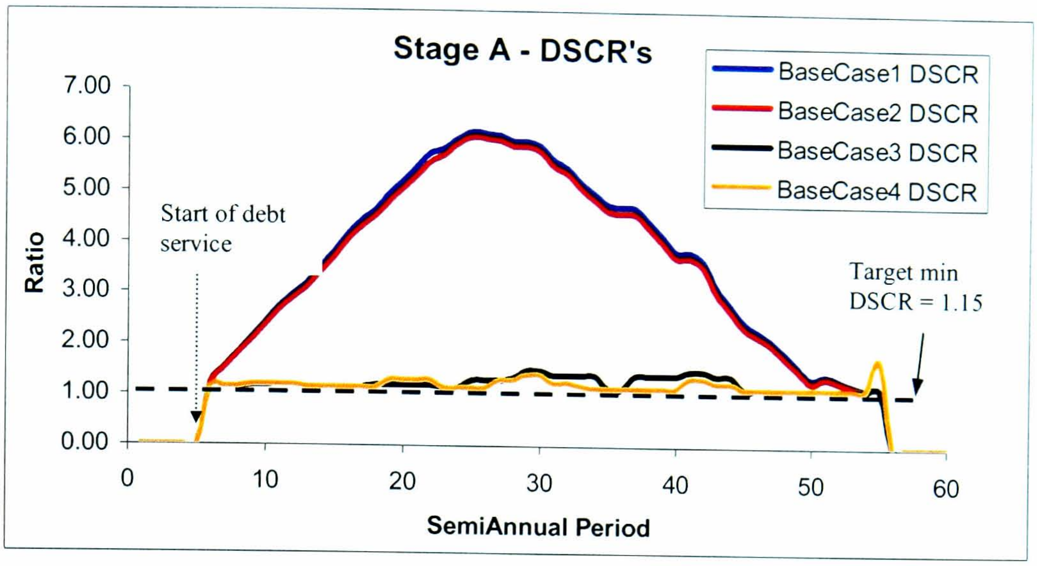


Figure 10.1: Stage A - Debt service cover ratios.

This indication is confirmed by Figure 10.2, which charts the cash flow for the projects and displays very similar profiles to those of Figure 10.1. The figure affirms that there is much higher cash build up throughout the project in Base Cases 1 & 2 relative to Base Cases 3 and 4.

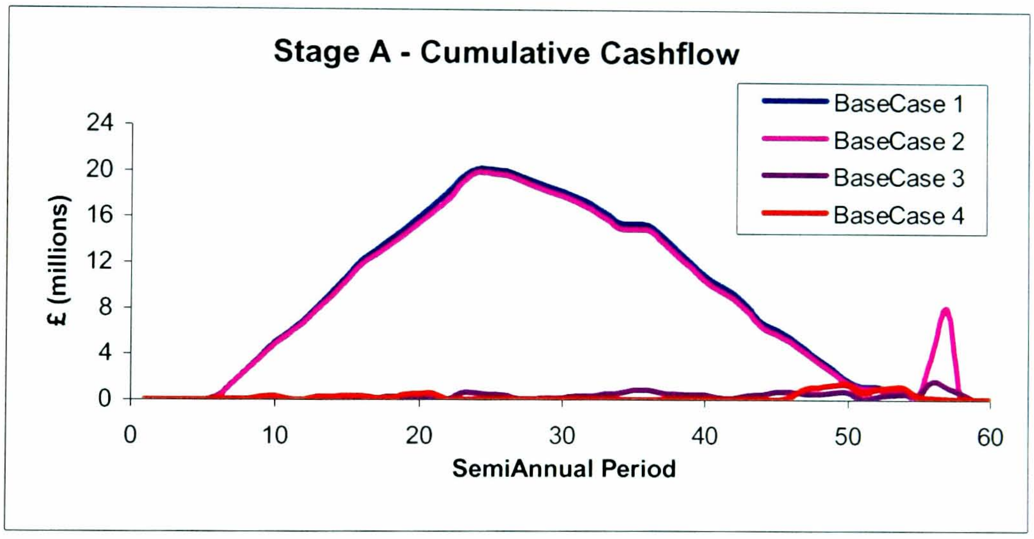


Figure 10.2: Stage A - Cumulative cash flow.

Inspection of the cash dedication mechanism and the financial statements for the models makes it apparent that this early cash build up is due to the annuity profile of the senior debt repayment and the accounting restrictions on dividend payouts: dividends cannot be paid until the losses carried forward (retained losses) are diminished. Profits earned are used to reduce the losses carried forward and once the retained losses are diminished to zero, any profit over and above this is distributed to shareholders. For this reason dividend payments normally occur several years after the project is operational. For Base Case 1 the senior and subordinated debt repayments are fixed to the annuity amounts and as the retained losses are not diminished until period 56, any cash over and above this debt service is locked in the model and cannot be taken out as early dividend payments. For Base Case 2 the senior debt repayment is also on an annuity basis and even though the subordinated debt repayment is sculpted, the cover ratio restrictions, the modelled requirement that the cash flow remain positive, and the need for cash available for funding the reserve accounts, result in the subordinated debt repayment occurring towards the very end of the project. This again effects cash build up during the early years of the project as the available cash is not used to retire the subordinated debt and cannot be extracted as dividend payments due to accounting restrictions. From this analysis it is obvious that Base Case 3 and 4 have more desirable DSCR and cash flow profiles suggesting that the generic project would be better served by the repayment profiles adopted in these cases.

The project and shareholder IRR's are less indicative and with a range of 0.6% between models no clear trend can be determined from the results in Table 9.2.

Lenders and investors are inclined to structure loans for average lives of 15-20 years and consultation with project financiers confirms that the average life of senior debt of 14 to 16 years achieved for the above Base Cases as acceptable if somewhat front-ended, (Newman 2003).

As the CAPEX is expected to be the same for the models any differences in the funding requirements would have to stem from financing costs. The financing fees for the four models are similar indicating that the difference in costs is due to the debt service costs for the different repayment profiles with interest due on loans outstanding varying with repayment schedule. This difference in financing costs gives rise to different revenue demands. Base Case 3 and 4 have the lowest demand for revenue, and as this is key to the clients evaluation of a bid, would be considered the lowest bids.

From the analysis above it would appear that the debt repayment profiles for Base Cases 3 and 4 are more desirable for this project; i.e. sculpted senior debt repayment with the subordinated debt repayment either sculpted or repaid as an annuity. The significant inference can be made from this affirmation that senior debt is better repaid on a sculpted basis than as an annuity regardless of the subordinated debt repayment profile. As the NPV of the revenue stream for Base Case 3 is almost £300,000 lower than that for Base Case 4, the repayment profile combination for Base Case 3 is selected as most favourable for this PFI model i.e. senior debt repayment sculpted and the subordinated debt repaid as an annuity. This combination of repayment profiles is applied to all the packages simulated in succeeding simulations (Stages B - F).

10.2 STAGE B – REPLACEMENT OF LOAN WITH BOND ISSUES

Here funding of the project with a senior debt component that consisted of a bond issue was explored. Fixed and indexed linked bonds were simulated and the outcomes of the simulations are outlined in section 9.2. The nature of the bond market is such that bondholders do not normally wish for irregular repayment schedules preferring instead a bullet retirement at the end of the project or a smooth back-ended amortisation profile. As already mentioned in the previous chapter the profile adopted for the bond models is a back-ended sculpt.

In the case of the fixed bond package (Base Case 5) the revenue stream has a net present value of £120.7 million, which is less than those for the bank loan financed models of Stage A, which are around £121 million (See Table 9.2). The same cannot be said of the indexed bond (Base Case 6) as the revenue stream has an NPV of £150.8 million. From the modelling process the constraints on the bond models were identified as the minimum DSCR and the amortisation profile: the models cannot be further optimised without breaching the 1.15 minimum DSCR figure, and any further decrease of the revenue stream to the indexed bond structure renders the model incapable of repaying the senior debt fully before the end of the project.

Paul Newman of PricewaterhouseCoopers concurs that the average life of 28 years for both cases is both normal and desirable for a bond-financed project, as bondholders prefer debt with long average lives ranging from 25 to 28 years (Newman 2003).

The results for Stage B show that although the project IRR differs for both cases, the shareholder returns differ slightly with the indexed bond providing greater returns. An analysis of the model indicates that this is due to the dividend payments mentioned earlier; the indexed bond package allows more and earlier dividend payments. The cash flows charted in Figure 10.3 also suggest that this may be related to the fact that Base Case 6, i.e. the indexed bond model, has a much higher build up of cash; almost double that for Base Case 5 (fixed bond) after period 25.

The DSCR can be considered to be much more critical for a bond issue than for a bank loan structure. This is because bondholders are particularly averse to default on the interest payments and as such a poor DSCR profile would not be attractive to lenders. The high average debt service cover ratios exhibited by the models imply a build of cash in the model, as illustrated by Figure 10.3 a & b. Accounting restrictions on dividend payouts also aggravates this lock up of cash, as the retained losses are not diminished until the latter stages of the project. Indeed for Base Case 5 only one dividend payment is made. This is in the form of a 'Cash Sweep', distributing available cash to shareholders at the very end of the project. Base Case 6 does allow for a few dividend payments although these too are towards the end of the project (starting four years before the end of the project). Figure 10.3 also shows that the indexed bond structure (Base Case 6) has a much higher cash build-up particularly after period 25.

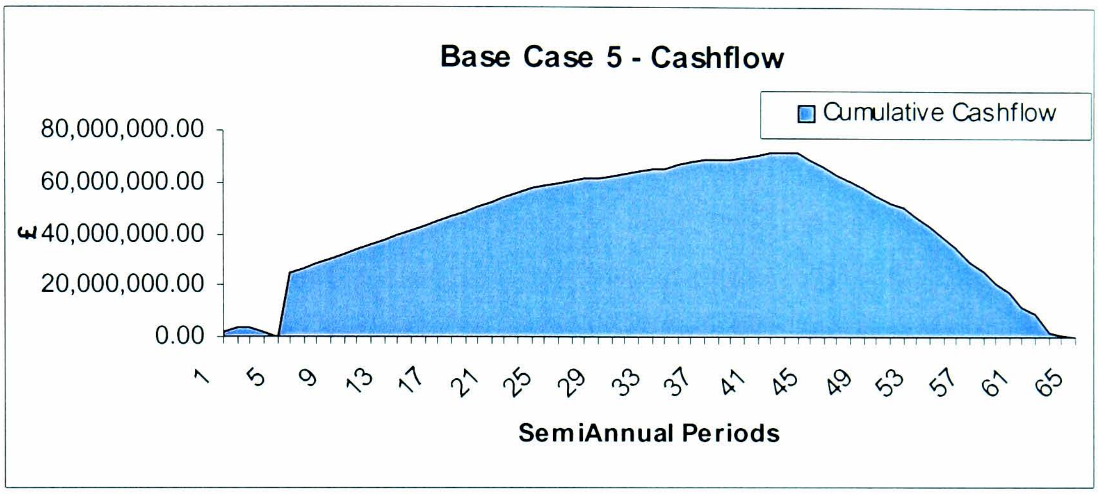


Figure 10.3a: Base Case 5 cash flow

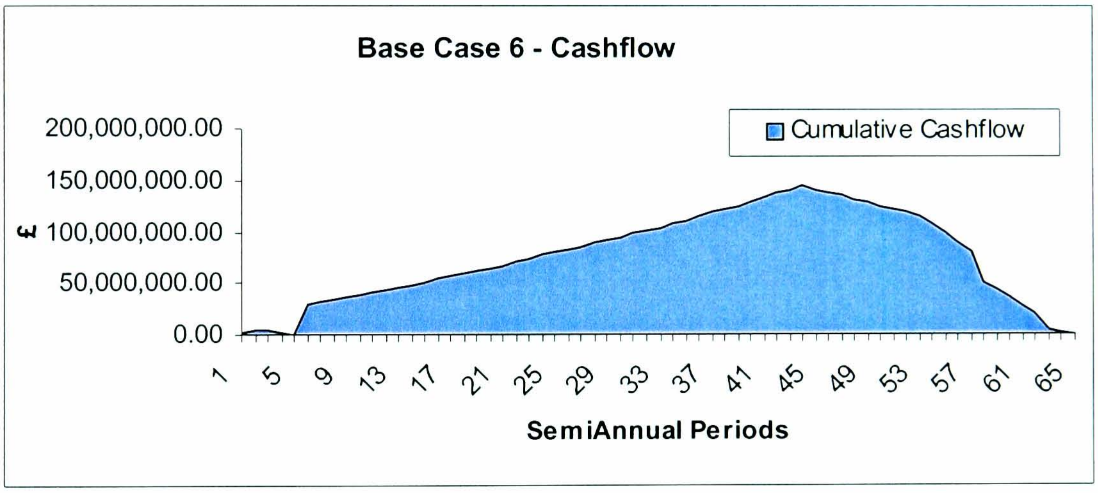


Figure 10.3b: Base Case 6 cash flow

The high DSCR values are partly due to the entire senior debt being raised at the start of the project with the bond issue with the post construction balance of the bond proceeds holding account transferred to the cash flow once the project is operational. For bond-financed projects the actual bond issue also has to be in excess of the CAPEX as the coupons on the bond (interest payments) are payable throughout the construction periods and these are drawn down from the bond proceeds. High average DSCR can also be attributed to the fact that the bonds are not retired until the end of the project.

DSCR values are calculated over the debt service period; in the case of a bond issue this starts as soon as the bond is issued (pre-construction) whilst for a bank case the DSCR would be calculated starting from start of operations. Closer inspection of the bond models' DSCR profiles in Figure 10.4 reveals that the restriction on the ratio for both cases occurs in the period before start of operations. Beyond this point the DSCR is well over the minimum. It can also be seen that the cover ratios start declining from the start of repayments as a result of the back-ended sculpt. As was mentioned earlier DSCR values are far more critical with bond finance than with bank loan finance and a failure to meet the obligations would most likely be treated as a default on the borrowings. In contrast, for bank loan structures such a breach of the minimum DSCR in one period may be overlooked based on the strong cover ratio profile over the rest of the project.

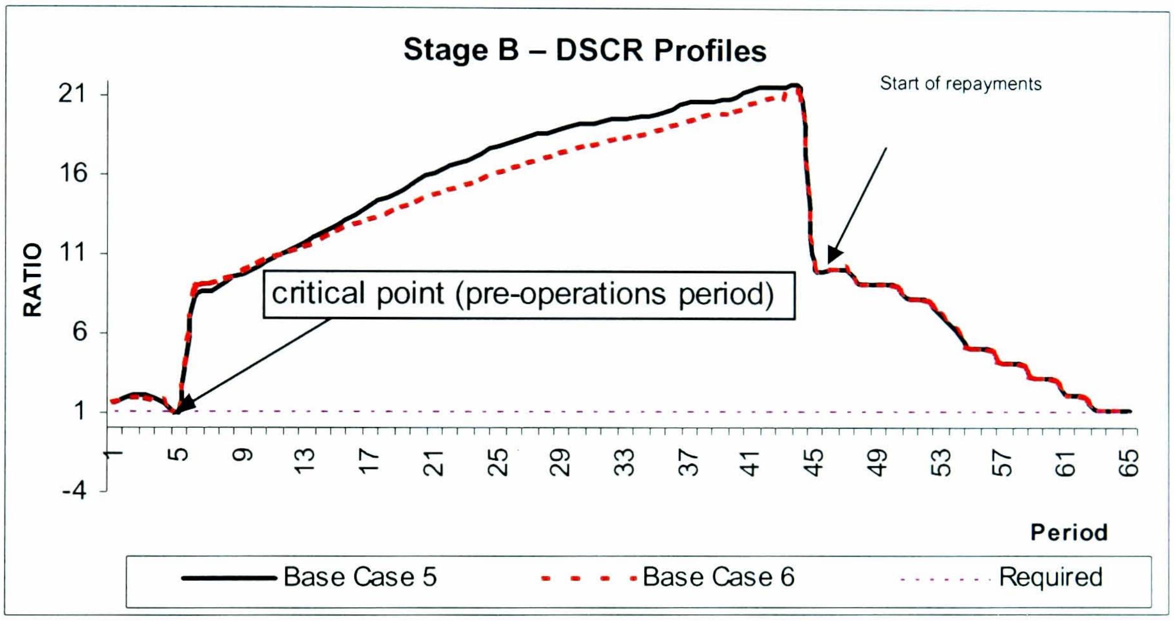


Figure 10.4: Stage B DSCR profiles.

It is obvious from the results that both cases provide shareholders returns that are not too dissimilar whilst satisfying all criteria. However from the figures highlighted earlier it is also clear that the fixed bond structure demands revenue with an NPV that is £30 million less than that for the indexed bond. From the modelling process it was apparent that the indexed bond package (Base Case 6) could be optimised to provide more favourable outputs than these if the repayment profile/ amortisation schedule was changed. However under the imposed conditions the fixed bond provides better value for the project.

10.3 Stage C – Blended Equity Composition

Stage C simulated changed polarity in the composition of the blended equity. A high/low split of the subordinated debt/pure equity and vice versa was explored. The results of the simulations are outlined in section 9.3. Base Case 7 was simulated with a higher proportion of subordinated debt and Base Case 8 with higher pure equity.

The relatively high revenue recorded for Base Case 8 can be attributed to the LLCR restrictions. As defined in Chapter Seven the LLCR in any period is the NPV of all cash flow available for debt service over the life of the loan, i.e. loan life cash flow, divided by debt outstanding as of that period. Reduction of Base Case 8 revenue as may appear desirable, effects a reduction in the loan life cash flow, resulting in lower LLCR's. However reference to Figure 10.5 which charts the LLCR of Base Case 8, shows that during the early years of the project LLCR is not much greater than the minimum of 1.18 and as such an attempt to reduce the revenue would almost certainly result in a breach of LLCR limits particularly in period 6.

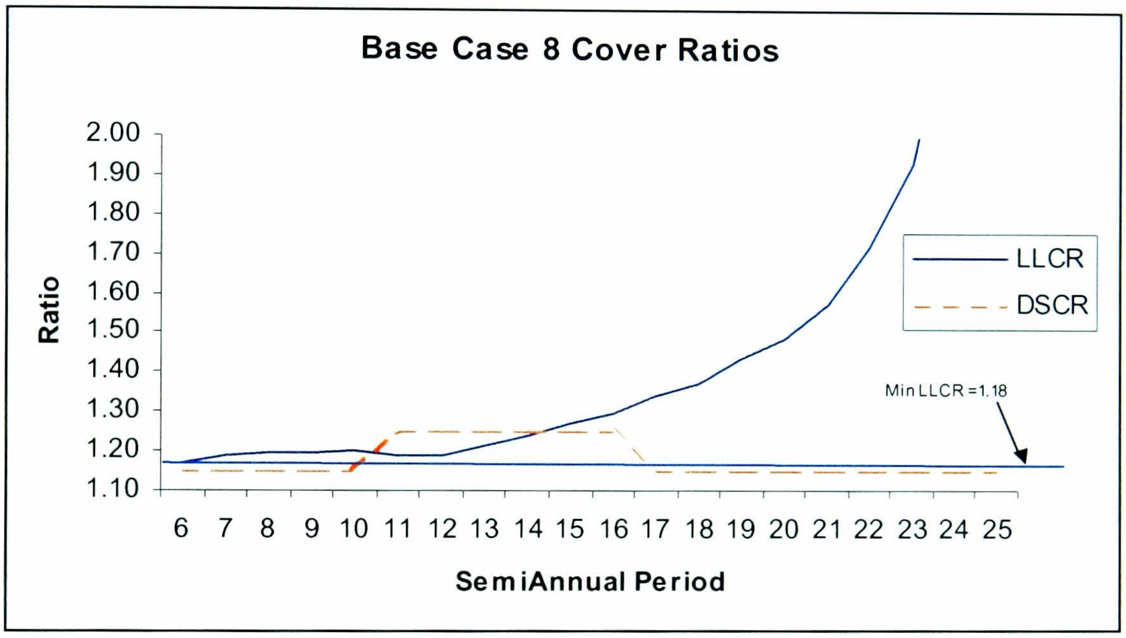


Figure 10.5: LLCR profile for Base Case 8

As subordinated debt is cheaper than equity it is to be expected that the use of more pure equity, as in the case of Base Case 8, should increase the costs and therefore decrease the returns to the shareholders. In other words sharing in the same returns for a larger investment of equity should reduce returns (IRR). The results (see Table 9.4) however seem to suggest otherwise with the increased proportion of pure equity in Base Case 8 giving rise to higher shareholder returns; increasing from 15% to 28%. This higher return cannot be viewed in isolation but instead can be attributed to the much larger revenue input for Base Case 8.

As a result of the high revenue required to meet the LLCR restriction as discussed above, the loan is repaid rapidly (average life = 6.5 years). This early repayment of the senior debt implies that cash, after debt service, is made available for distribution to shareholders much earlier on in the project, as subordinated debt service is minimal. This is confirmed by an inspection of the financial statements and the cash dedication mechanism, which show that with relatively low subordinated debt service required, most cash left over after debt service is available for distribution to shareholders. This earlier and larger distribution of cash increases the shareholder IRR for Base Case 8. Figure 10.6 charts the cash available for distribution to shareholders and clearly shows the increased Base Case 8 distributions after the senior debt is repaid that is responsible for the increased shareholder IRR.

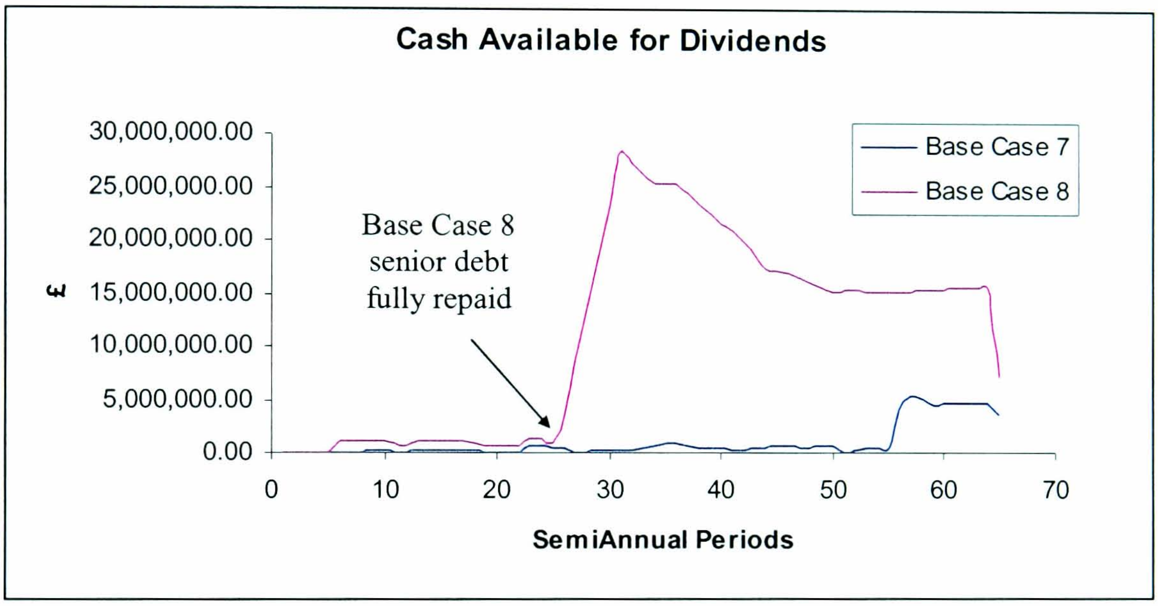


Figure 10.6: Stage C - Cash available for shareholder distribution

Further variants of Base Case 8 were simulated for further analysis: Base Case 8 was remodelled and optimised as Base Case 8a disregarding the minimum shareholder return requirement; Base Case 8b as a control simulation, re-optimised Base Case 8a with shareholder restrictions, and Base Case 8c explored simulating a different repayment option. Base Case 8a was able to achieve a financial model close to that of Base Case 7 and with a similar revenue demand. However as indicated in the previous chapter the results show key differences in the DSCR and IRR indicators: average DSCR is much higher for Base Case 8a (4.96) than Base Case 7 (1.25) and the shareholder IRR for Base Case 8a is 9% whilst that for Base Case 7 is 15.06%.

Analysis of Base Case 8a's financials show that the revenue levels arrived at result in a sustained retained loss, which is not fully diminished by the project profits until period 50 of the model. As dividend payouts are dependent on a retained profit there are no shareholder distributions from the available cash for Base Case 8a until after period 50. The relatively high average DSCR for the model is as a result of the locked in cash, which cannot be distributed. This late and low level of distributions is one of the reasons for the low shareholder IRR. The IRR difference could also be explained by the fact that pure equity is more expensive than subordinated debt. For this reason it would be expected that increasing the pure equity proportion of the blended equity would give rise to a decrease in shareholder IRR. Simply put, increasing the amount of equity invested whilst sharing the same profits implies a reduced rate of return.

The relative impact on IRR reduction, of the increased equity versus the cash locked in the model has not been measured. This measurement would be further complicated by the fact that a decrease in the subordinated debt leads to a decrease in funding requirements as a result of reduced interest costs (see results sheets in Appendix F). Some of these savings in interest costs may be available for shareholder distribution.

Base Case 8b is an alteration of Base Case 8a to meet the shareholders requirements of a minimum IRR of 13%. During the optimisation process it was noted that once the shareholders requirements were met the LLCR requirements became critical, as with Base Case 8 described previously. The earlier analysis of Base Case 8 is further substantiated by the very similar results for the optimisation of Base Case 8b (see Tables 9.4 and 9.5 of Chapter Nine). Overall, the evidence from Base Cases 7, 8, 8a and 8b provide evidence that it is more favourable to increase the subordinated debt component of the blended equity rather than the pure equity.

Base Case 8c was simulated to establish whether altered repayment profiles would improve the financial package resulting from an increased pure equity component (as in Base Case 8). From the simulations a profile that repaid the senior and subordinated debt as annuities proved to be most favourable. Table 9.5 shows that the repayment of senior and subordinated debt as annuities for Base Case 8c satisfies all the criteria with a revenue demand of just over £139 million. It is clear though from the cover ratios, that in this case there is also some degree of cash lock-up. This implies that the cash flow may not be efficient and that the model is somewhat sub-optimal with regards to distributions to shareholders. The revenue requirement though lower than Base Case 8 still remains far greater than that for Base Case 7. It should also be noted that the results do not indicate which ratio of pure equity to subordinated debt at which a change in the repayment profile ought to be considered. This has not been pursued here as this is considered to be outside the scope of this thesis.

10.4 STAGE D – GEARING

This stage considered financing the project at different levels of gearing. Table 10.2 lists the various gearings that were explored during these simulations and the results are outlined in section 9.4; the model was unable to be optimised fully at 95.59% and above, as the minimum loan life cover ratio requirement of 1.18 could not be met. Increasing the revenue only served to increase the shareholder return figures whilst the minimum LLCR remained breached. Lowering of revenues whilst restricting shareholder returns also did not overcome the LLCR breach. This behaviour was even more pronounced at higher levels of gearing. Base Case 3 was as simulated in Stage A.

	Model D1	**Model D2**	**Base Case 3**	**Model D3**	**Model D4**
Gearing	89.00%	91.19%	93.38%	95.59%	97.80%

Table 10.2: Stage D Gearings.

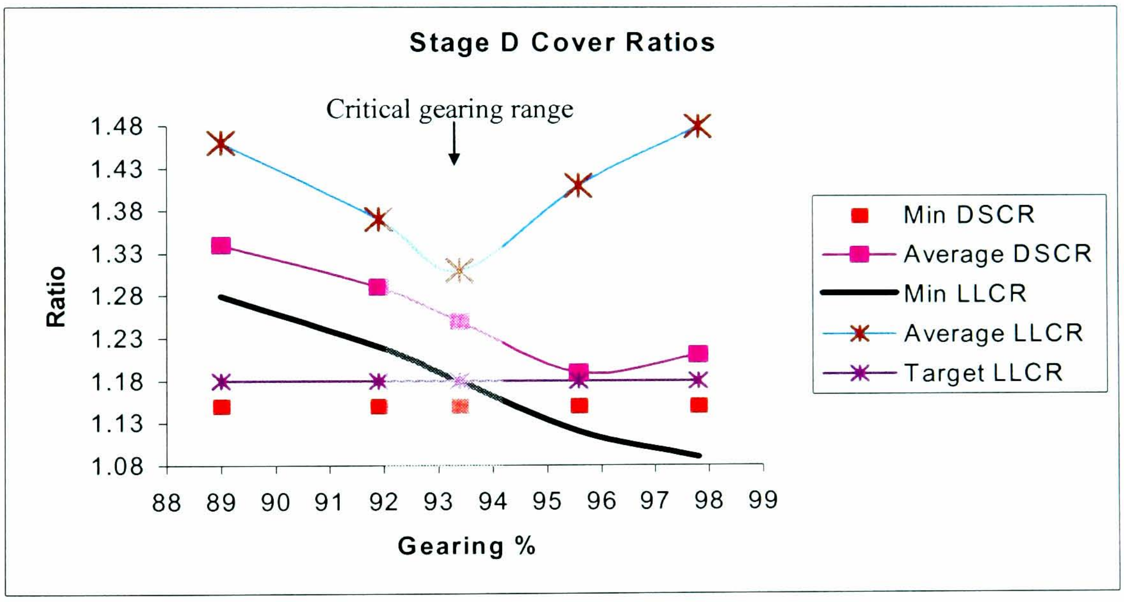


Figure 10.7a: Stage D – Cover ratios.

Figure 10.7a plots the cover ratios for the above simulations and shows that the model displays a minimum average LLCR within the gearing range of 92% to 94%, i.e. either side of Base Case 3 gearing. The figure also illustrates that the target minimum LLCR is breached between 93% and 94% gearing; beyond this the minimum LLCR requirement of 1.18 cannot be met. This breach point also coincides with the gearing range identified around the point of inflection of the average LLCR curve. The ranges identified above all fall within the range indicated on the figure as the critical gearing range, i.e. the range within which the model displays critical changes.

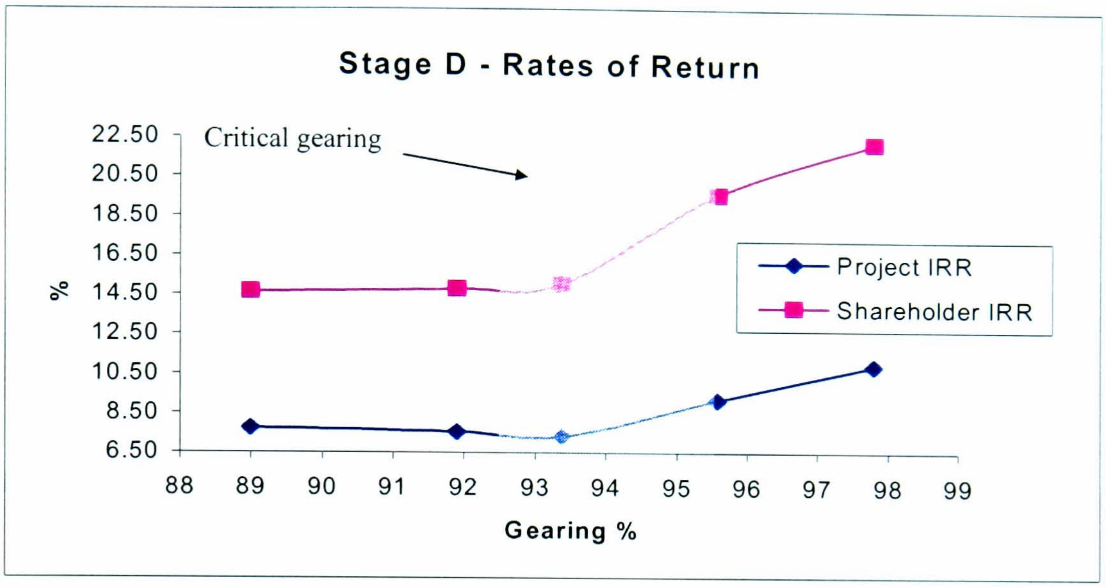


Figure 10.7b: Stage D – Rates of return.

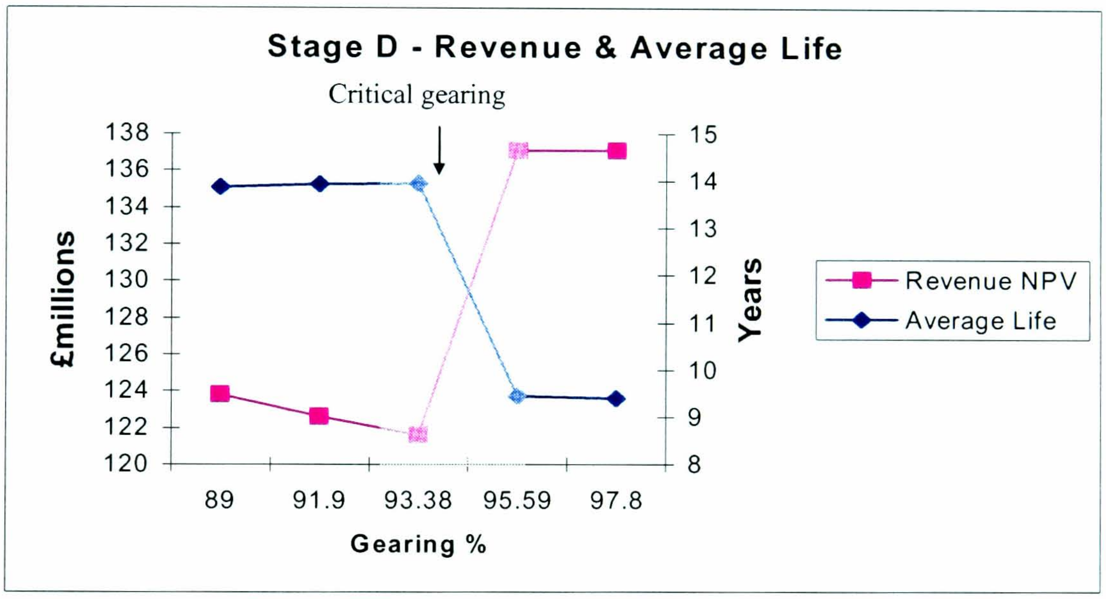


Figure 10.7c: Stage D – Revenue and average life of senior debt.

A similar trend can be identified on inspection of Figures 10.7b and c. Figure 10.7b plots the rates of return of the project and shows that the model exhibits somewhat stable project and shareholder IRR's between 89% and 93% gearing. There is an obvious change in this trend between 93% and 96% gearing with the IRR values showing a sharp increase. This increase continues beyond the 96% gearing. At similar levels of gearing the slightly increasing trend displayed by the average life of senior debt is suddenly reversed. Figure 10.7c, which charts the revenue NPV and average life figures for Stage D simulations, shows that this corresponds to a sudden increase in revenue input to the model. Previous analysis suggests that this drop in the average life from 14 years to just over 9 years is a result of excess cash from higher revenue being used to pay off debt rapidly. However, as was pointed out earlier this increased revenue does not correct the LLCR breach that occurs above gearing levels of 95.6%. The critical gearing range again identified for the change in Figure 10.7c is from 93% to 95%.

Further simulations were run in an attempt to corroborate the observations above and to narrow the identified range. The results of these further simulations are listed in Table 10.3 alongside those for 93.38% gearing, i.e. Base Case 3. Two further gearings were simulated: 92.28% and 94.48%. These were selected to highlight the trend just before the 93% mark and just beyond 94%. At 94.48 % the model was unable to be fully optimised, as the minimum LLCR requirement could not be satisfied as indicated by the figures in bold type in Table 10.3.

	Model D5	**Base Case 3**	**Model D6**
Gearing	92.28%	93.38%	94.48%
Target Min DSCR	*1.15*	*1.15*	*1.15*
Min DSCR	1.15	1.15	1.15
Average DSCR	1.27	1.25	1.21
Target Min LLCR	*1.18*	*1.18*	*1.18*
Min LLCR	1.20	1.18	**1.15**
Average LLCR	1.38	1.31	1.31
Revenue NPV	£122.3M	£121.6M	£121.9M
Project IRR	7. 46%	7.34%	7.34%
Shareholder IRR	14.94%	15.06%	15.44%
Average Life of Senior Debt	13.89yrs	13.96yrs	13.60yrs

Table 10.3: Outputs for Models D5 and D6

Comparing the results in Table 10.3 with earlier results confirms that the change in the observed trend discussed above must occur between 92.28% and 94.45%. With increasing gearing the average life rises to 13.96 years at 93.38% and then falls to 13.6 years at 94.48%, and substantially lower beyond a gearing of 95%. Significantly, the average LLCR, which falls gradually between 89% and 93.38% gearing in Table 9.6 before rising again beyond 93.38%, can be seen to effectively 'plateau' in Table 10.3 at 1.31 between a gearing of 93.38% and 94.48%. The same trend occurs with the revenue NPV: decreasing from 89% gearing, down to a minimum at 93.38% before rising again at 94.48% and above.

Figure 10.8 charts the returns for Models D5 and D6 imposed on those derived from earlier results. The diagram shows the position on the chart, of the IRR values for Models D5 and D6; dashed lines have been used to represent a more accurate trend between 92% and 96% incorporating the results for gearings of 92.28% and 94.48%. The figure confirms that the range for the critical gearing identified earlier lies between 92.28% and 94.48% and is probably very close to 93.38%.

The evidence above suggests that an 'optimum' gearing for the generic project exists, of a value within the critical range identified. At this optimum gearing revenue demands are the lowest achievable whilst still meeting the cover ratio requirements. Beyond this optimum gearing the cover ratio requirements are unable to be satisfied and below it the revenue NPV is higher that could otherwise be achieved. The issue of optimal gearing as evidenced above is further explored below.

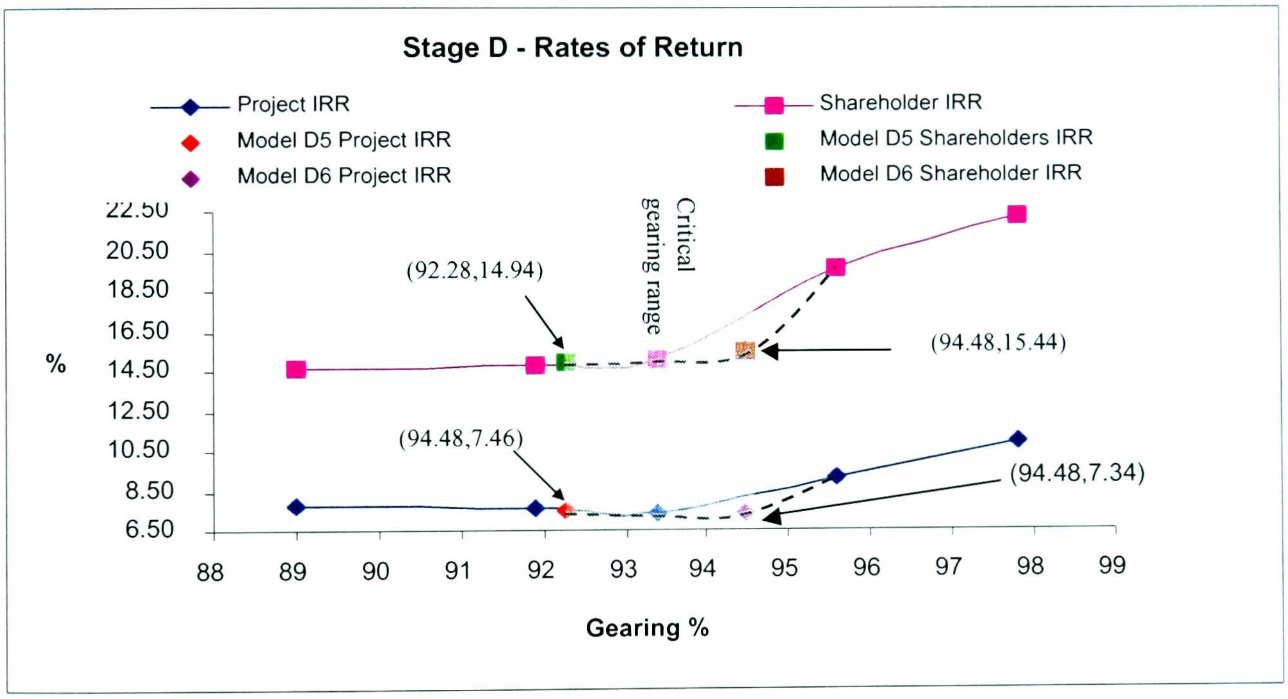


Figure 10.8: Stage D – Further analysis of rates of return.

10.4.1 Optimal Gearing

The response exhibited by the model above to different gearings at a fixed/stated cost of debt (interest rate), minimum cover ratio stipulation, and fixed cost of equity (return to shareholders), may be further explained by the following simplified example. This illustration considers a project with the following specific details:

- Project A asset value = £1,000.

- Cost of debt over loan life = 7%
- Cost of equity over loan life = 13%
- Required Minimum Loan Life Cover Ratio (LLCR) = 1.20.

The £1,000 required financing could be separated into the debt and equity components for different levels of gearing (from 0% to 100%) as has been done in Table 10.4. From this the actual value of debt cost can be calculated by applying the percentage cost of debt. The same is performed for the cost of equity i.e. return on equity. The results for these calculations are also shown in Table 10.4. All values are in £ sterling except where indicated.

Gearing (%)	0	10	20	30	40	50	60	70	80	90	100
Debt Component	0	100	200	300	400	500	600	700	800	900	1000
Equity Component	1000	900	800	700	600	500	400	300	200	100	0
Cost of Debt	0	7	14	21	28	35	42	49	56	63	70
Cost of Equity	130	117	104	91	78	65	52	39	26	13	0
Cost of debt @ LLCR = 1.20	*0*	*8*	*17*	*25*	*34*	*42*	*50*	*59*	*67*	*76*	*84*
Cost of Financing	130	124	118	112	106	100	94	88	82	76	70

Table 10.4: Optimal Gearing - cost of debt and equity.

The cost of debt resulting from achieving the required loan life cover ratio of 1.20 would be higher than if no cover was required and this is reflected by simply multiplying the cost of debt by the minimum LLCR. From the values in Table 10.4, the graph in Figure 10.9 can be plotted to show the cost of debt and the cost of financing, i.e. cost of debt + return on equity, for Project A. As debt is cheaper than equity (7% as opposed to 13%) the financing cost declines with increasing gearing. The cost of debt increases with increased gearing and is equal to cost of financing cost, i.e. intersects on the graph, at 100% gearing.

The finance structure for this project must fall under the area of the graph bounded by cost of debt and cost of financing. A horizontal line which when drawn from any point on the vertical axis, intersects with the boundary of this area, does so at a point from which a vertical line would indicate on the horizontal axis the maximum gearing sustainable at this financing cost i.e. at this cost of debt and return on equity.

When the cover ratio restriction is applied, the cost of debt changes as calculated in Table 10.4; a line representing the cost of debt at the stipulated LLCR is shown on the graph. This line effectively shifts the boundary provided by the cost of debt line further into the bounded area, reflecting the level of cash flow cover required by the lender. For the project finance structure to satisfy a minimum LLCR of 1.2 the structure must now fall within the area bounded by the cost of financing and the line for debt cost at LLCR = 1.2. This area of the graph is indicated by a dotted pattern.

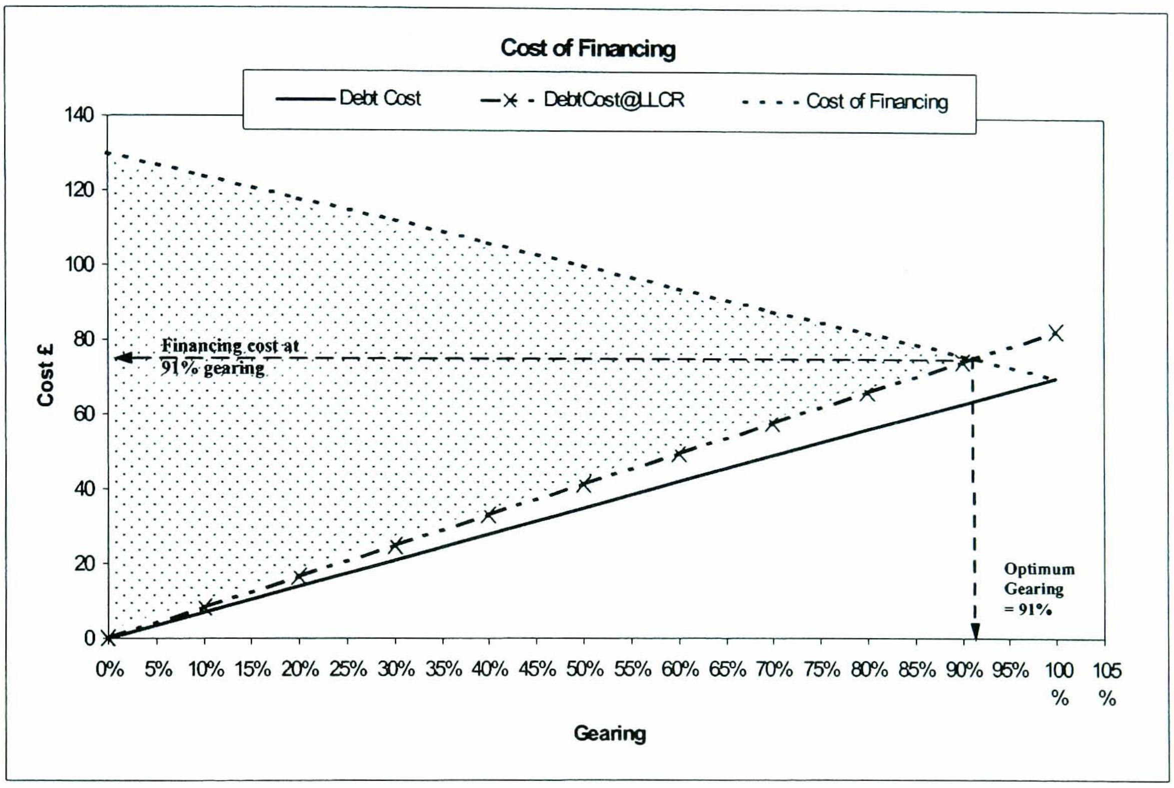


Figure 10.9: Illustration of optimal gearing.

The debt cost line for LLCR = 1.2 can be seen to intersect with the cost of financing at a gearing of approximately 92%. Therefore any gearing below 92% will satisfy the cover ratio and equity return requirements. However from the figure it is obvious that the lowest financing cost at which the cover ratio requirement is met is at a gearing of 92% and for this reason 92% is regarded as the optimum gearing for financing Project A. At higher levels of gearing the cover ratio requirement will not be met and at lower levels the cost of financing increases.

From the above illustration it is then obvious that although debt is a cheaper form of financing and project companies are advised to maximise debt, as a result of the requirements for debt service cover, there is an optimum level of gearing beyond which the financing becomes ill structured. For optimal financing, once this level of gearing has been established the rest of the financing should be tailored to suit this level of debt.

Discussions with Andrew Porter, Director at PricewaterhouseCoopers London, support the example of optimal gearing given above. Porter also notes that although a level of gearing may be shown as optimal, lenders may still stipulate a lower maximum gearing, (Porter 2002). This is a reflection of the lenders' perceptions of risk, market driven or otherwise, that may be attributed to the sector in question, and of their overall risk exposure as a result of other lending activities. A lower maximum gearing would imply that further equity would have to be provided thereby increasing the cost of financing. To minimise this increase project companies will usually utilise the cheaper options of subordinated debt or some sort of mezzanine financing rather than pure equity. This has been borne out by the simulations performed in Stage C, which show that it is preferable to increase the subordinated debt component of the blended equity rather than the pure equity, as the financing costs are lower and the cover ratio requirements are more likely to be met.

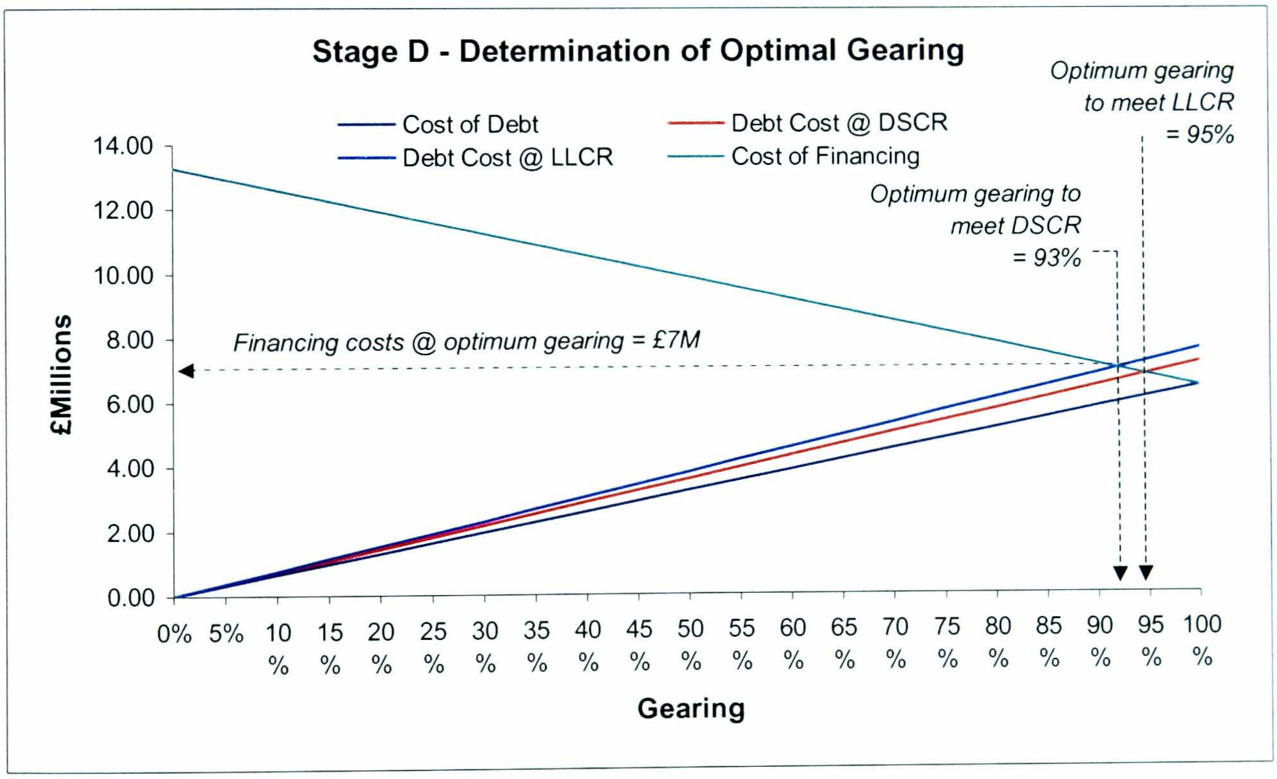


Figure 10.10: Determination of optimal gearing for Generic Model.

The process described in the illustration above was applied to the generic model for possible verification of the evidence from Stage D results. The determination of the optimal gearing of the generic model is charted in Figure 10.10. The optimal gearing has been determined using both the minimum DSCR and minimum LLCR restrictions.

Reference to the figure indicates that the optimal gearing to satisfy the LLCR is 95% whilst that to satisfy the DSCR is 93%. In this case 93% would be considered the optimal gearing as higher values may cause the DSCR restriction to be breached. These results substantiate the evidence already displayed by the analysis of Stage D results, which place the optimal gearing in the range of 92.3% to 94.5% (see Figure 10.8). Review of Base Case 3 and Model D5 also show that the financial costs highlighted in Figure 10.10 for the optimal gearing (£7 million) are not too dissimilar to the financing costs (circa £8 million) of the simulated models.

Any difference can be attributed to the use of subordinated debt in the generic model's financing structure, and the level of inaccuracy that is to be expected in comparing the results from actual simulations for this study to the optimal gearing determination theorised above.

It must be noted here that in reference to optimal gearing, the effects of the use of subordinated debt as part of the blended equity have not been accounted for, although logic suggests that as subordinated debt is cheaper than equity this would have the effect of lowering the gradient of the cost of financing line in Figure 10.10, thereby lowering the gearings at which the cost of debt lines intersect. The exact impact of the blended equity structure has not been quantified here. A more accurate level of optimal gearing to account for the use of subordinated debt could be achieved by considering a weighted average cost of debt but this has not been pursued here as this is considered outside the scope of this thesis.

10.5 Stage E1 – Inflation Sensitivity of Bank Loan Packages

Sensitivity of the model to inflation was tested and Stage E1 simulated the impact of inflation changes on the model when structured for bank loan financing. The results of the simulations shown in section 9.5.1 are further discussed here. For the bank loan structure 40% of the revenue stream is indexed to inflation whilst 100% of operational costs, excluding interest costs, are subject to inflation.

At 3.2% inflation the results show a restricted shareholder distribution profile resulting from the sculpted repayments, which maximise debt repayment. In this case dividend payments are unable to be made until the debt is fully repaid.

Figure 10.11 illustrates the DSCR profile of the project; the irregular DSCR is a result of the sculpting process, which ensures that higher cover ratios are imposed where necessary to make sufficient cash available for reserve accounts whilst sculpting the debt repayment to meet the meet the minimum DSCR criterion. The revenue and total operational costs also exhibit a gradually increasing profile that changes once the inflation is altered.

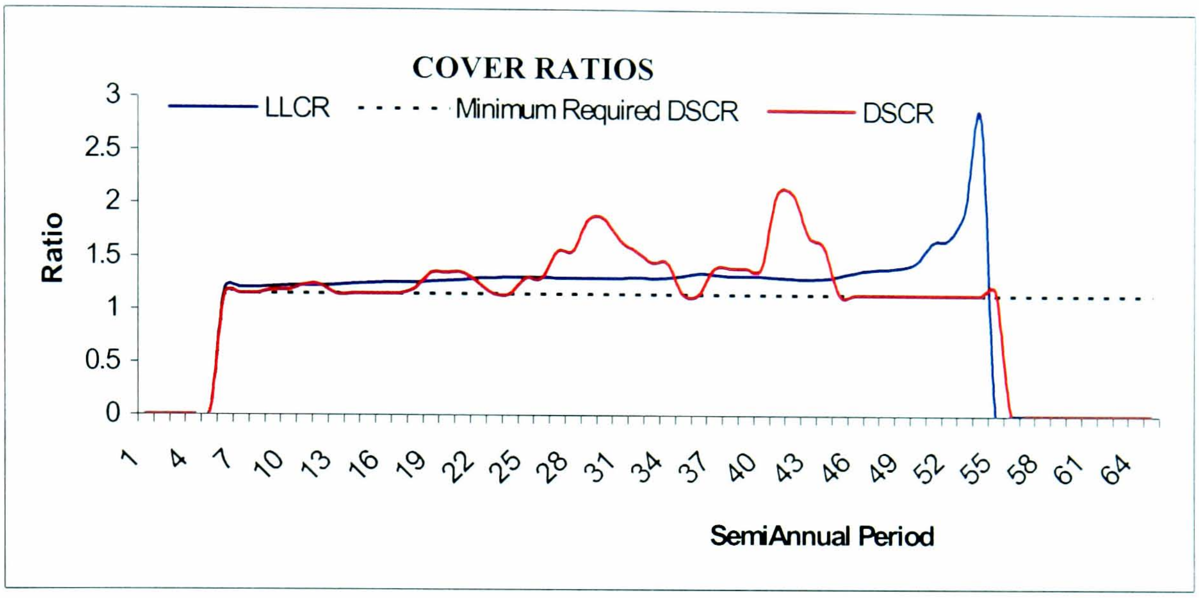


Figure 10.11: Stage E1- Cover ratios for bank loan structure at 3.2% inflation.

The results show that should inflation drop to zero, there would be some significant impacts on the model. The revenue profile flattens as a result of no escalation and total operational costs decrease. This decrease occurs as the interest cost element of the total operational costs is reduced due to lessening loan outstanding with each successive principal repayments. The cash available for debt service also changes significantly from the previous profile, increasing rapidly in this case after period 22, and peaking in period 51 at over £15 million. Review of the model's cost schedule indicates that this peak coincides with the sudden reduction of major maintenance expenditure and suggests that the increased cash flow is a result of the release of cash tied up at 3.2% inflation for the inflated major maintenance costs. Although there is a build up of cash available in the model it is obvious that shareholder distributions are still not made early in the project. This has been attributed to accounting restrictions, which require the diminishing of retained losses.

The reduction of the inflation level to zero from 3.2% gives rise to a mismatch between the sculpted repayments and the cash flow available. For this reason further sculpting of the repayments becomes necessary. The outputs at the re-sculpted repayment profile are graphed in Figure 10.12, and this shows that the project can exploit the increased cash flow for earlier debt repayment.

Figure 10.12 illustrates that the debt can be paid off earlier in the event of reduced inflation: by period 52 as opposed to period 55 as with earlier results for 3.2% inflation. This is reflected in the average life of senior debt, which reduces to 13.5 years from 14.4 years. An increase in shareholder returns is also confirmed: 15.40 %; up from 15.13%. This slight increase is due to the earlier retirement of the senior debt allowing earlier distribution of cash to shareholders.

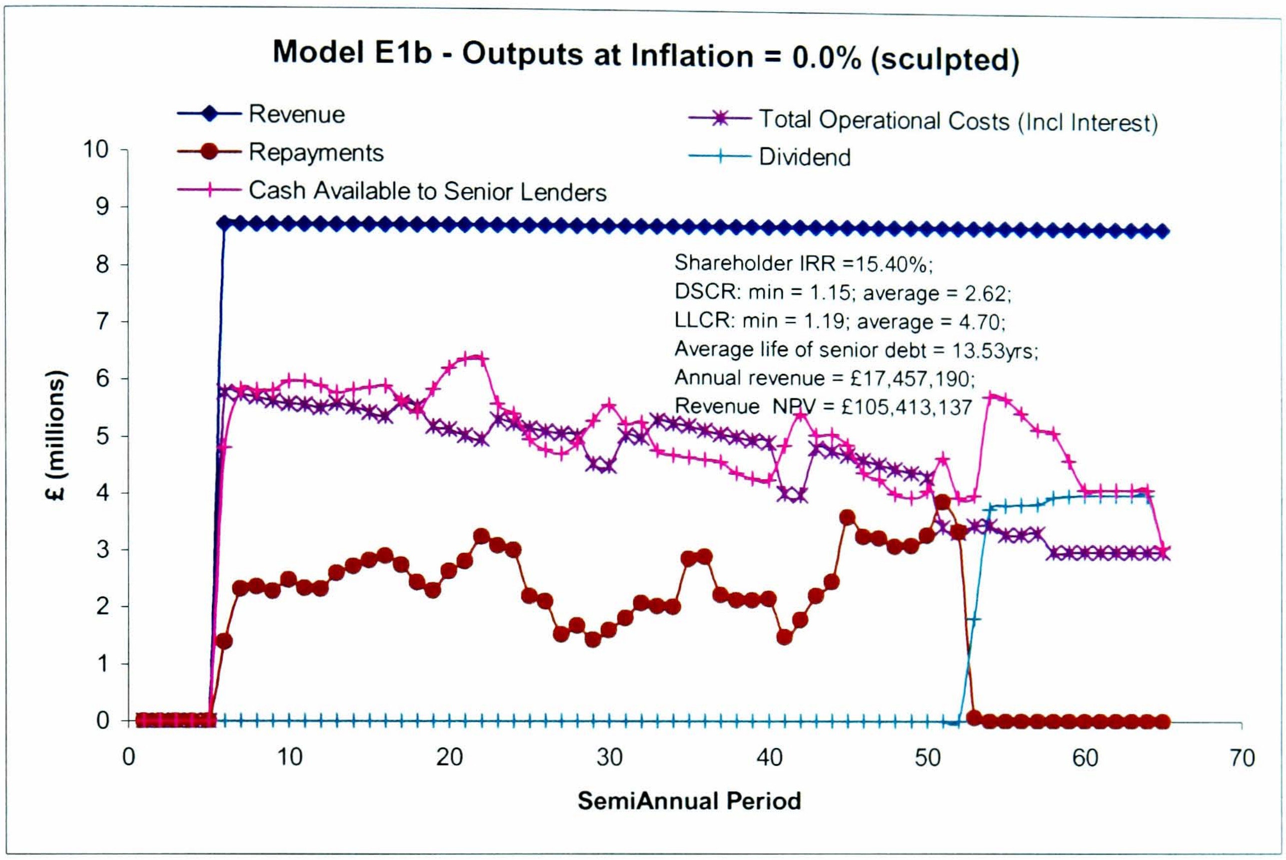


Figure 10.12: Bank loan structure at 0.0% inflation; debt repayments sculpted.

Review of other model outputs reveal that reduced inflation results in a reduction on the pre-funding required for the MMRA as the major maintenance costs are reduced. The excess cash from the initial pre-fund input therefore feeds into, and improves early cash flow. It is also possible to push back/delay the debt repayments keeping the average life at 14.4 years whilst sculpting individual periods to ensure that DSCR requirements are met. This way the excess cash can be taken out straight after the retained losses are diminished thereby further increasing IRR.

The effect of high levels of inflation was explored by changing inflation to 7.5% and re-running the model. At this level of inflation the total operational costs escalate faster than the revenue stream with the costs almost equal in value to the revenue in some periods. Funding the greatly escalated costs bring about a severe reduction in the cash available to the senior lenders. This falls below zero between periods 36 and 60. This lack of cash in the project also results in no distributions being made to shareholders until the end of the project around period 60. The increased inflation obviously impacts on the net present value of the annual revenue payments which have not been changed increasing this to over £162 million. The results show that at this level of inflation the financial structure fails with the costs and lenders' and shareholders' requirements unable to be satisfied.

Review of the model establishes that the minimum DSCR is breached in period 22 and falls to less than 1.0 in period 23 and beyond. Due to the greatly inflated costs in this case, the MMRA requires more pre-funding than is provided and the benefits of the MMRA are eroded. As before, repayment was re-sculpted to suit the cash flow at this level of inflation; however the greatly reduced cash flow remained insufficient to retire the debt fully. Further simulation showed that full retirement of the senior loan is achievable with an increase of £0.65 million in annual revenue payments, although this still results in periodic negative cash flows from period 23 onwards, primarily during major maintenance. The bank loan structure is therefore unable to sustain this high level of inflation without increased revenues and some remodelling, i.e. changing the inputs and re-optimising to suit the bank loan structure.

10.6 STAGE E2 – FIXED BOND PACKAGES

Stage E2 tested the sensitivity to inflation when the project was financed using a fixed rate bond. The results as presented in section 9.5.2 are further discussed here. As with the bank loan case 40% of the revenue stream is indexed to inflation.

At the default inflation rate of 3.2% the bond is fully amortised with an average life of 28 years. From the charts in the results one of the effects of using a back-ended amortising bond is immediately obvious; there is a build up of cash over the initial years of the project. This is due to the fact that all the debt finance is raised at the beginning with the bond issue with principal repayments not being made until the latter periods of the project. The coupon payments however are made right from the first period (after bond issue) till the bond is fully retired.

Although the costs rise with inflation they are met throughout the simulated project, as the repayment of debt does not start until much later in period 45. The start of amortisation also occurs towards the end of the major maintenance schedule, and as such coincides with a fall in the total operational costs due to reduced major maintenance and coupon payments, which decrease with retirement of debt. This reduction in coupon payable and in major maintenance costs causes an increase in the cash available to the senior lender allowing higher levels of principal repayment to be made in the latter periods.

The model displays a late and low shareholder distribution profile as a result of retained losses in the model; shareholder IRR is 13.54%. By financing with a bond issue the finance is raised on day one and drawn down during construction for costs and coupon payments. As there is no revenue during construction the bond proceeds diminish and the DSCR is normally lowest in the last period before operations. The bond issue amount therefore must be calculated to ensure that the minimum required DSCR is not breached before operations and must be sufficient to ensure that cash flow, once operational, is able to meet coupon payments in the first years of operations.

At zero inflation the fixed bond model displays a flat revenue stream profile as expected due to the lack of escalation. The operational cost profile also flattens fluctuating only as a result of the major maintenance schedule, before declining after the start of amortisation due to reduced coupon payments and a gradual cessation of major maintenance costs.

Whilst the cash available at 3.2% inflation peaks at £110 million in period 58 before declining rapidly, at zero inflation the cash profile is similar but only up until the start of amortisation, peaking at £80 million before declining for the rest of the project. Although the zero inflation does not increase the revenue, the reduced costs allows the timely repayment of debt and also allows more shareholder distributions; this is reflected in the results by the increased shareholder IRR

The performance of the fixed bond structure under high levels of inflation was explored by changing inflation to 7.5%. The results show that at this level of inflation the total operational cost profile is steeper than that for the revenue but in this case the costs rapidly escalate above the revenue stream between periods 34 and 40 and even more so between periods 44 and 51. The amount of pre-funding required for the MMRA also increases from £93,000 to £115,000.

At 7.5% inflation the cash profile is also significantly changed, with the increased inflation improving revenues and creating an earlier build up of cash more than sufficient to meet the costs. The cash available peaks however in period 26 at £60 million and rapidly declines afterwards. This can be attributed to the effect of escalation on the major maintenance and other operational costs matched with a reduced escalation of the revenue (40%).

Review of the model indicates that whilst the cover ratio requirements are not met, the model is robust enough to withstand this level of inflation until very late in the project. The LLCR is not actually breached until period 44 and the DSCR breaches the 1.15 minimum in period 59, and is only unable to meet the principal repayments, i.e. DSCR <1.0, after period 60 as is indicated in Figure 10.13. This implies that the bond would not be fully retired at an inflation level of 7.5% although default would not occur until the last few years of the project. The ability of the project to avoid default for this long is a result of the back-ended nature of bond repayment, in this case amortising over the last ten years. An even more back-ended profile may well satisfy the cover ratio requirements.

Should this potential default become apparent during the course of the project, rearrangement of the financial package, by re-sculpting debt repayment as undertaken for the bank loan case for example, would prove very difficult, due to the inflexible nature of bond financing and the complications involved in negotiating with several or numerous bondholders.

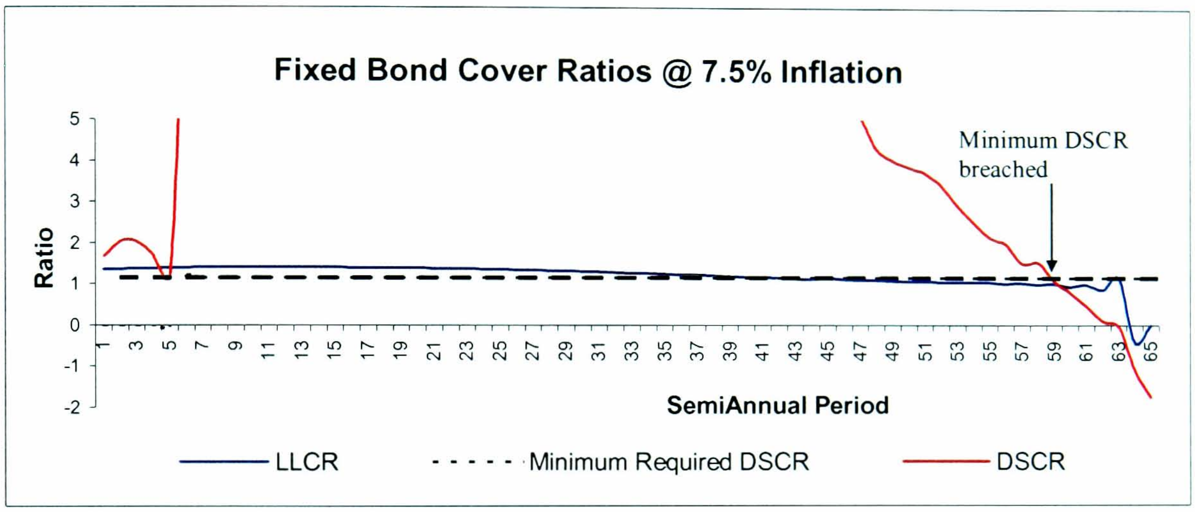


Figure 10.13: Cover ratios for fixed bond structure at 7.5% inflation.

Further modelling also showed that the repayment profile was unable to be re-sculpted around the initial inputs, to match the cash flows at 7.5% inflation. For the model to sustain this level of inflation would require an increase in the proportion of indexed revenue or an increase in the annual revenue payments. However in practice these can only be implemented before financial close of the deal, as all parties are contractually bond to the terms after close. In this case further simulation indicated that a slight increase of the annual revenue stream from £17.3 million to £17.5 million would be sufficient for the fixed bond structure to withstand inflation at 7.5%.

10.7 STAGE E3 – INDEXED BOND PACKAGES

The results for the sensitivity tests conducted on the model financed with an index-linked bond are outlined in section 9.5.3. Those results are discussed in detail below and should be referred to when considering the analysis below.

At the default inflation rate of 3.2% the shareholder IRR is higher than with other financing structures but the annual revenue payment in this case is also larger than for other cases. This is in line with the analysis in section 10.2, which suggests that an indexed bond package would require higher revenue levels for similar returns as a fixed bond or bank loan package.

The results show that at 3.2% inflation dividend payments are made from period 26, i.e. before the start of debt repayment, and a distribution to shareholders is sustained throughout the bond amortisation. The debt repayment profile is the same as in previous bond structures but the profile of cash available is much steeper due to 100% revenue indexation, peaking at a much higher value (circa £160 million) and falling from period 30 rather than rising, as with the fixed bond package. The values of debt repayment in each period (and therefore total debt repaid) are also higher in the case of indexed bond as any outstanding principal is also subject to inflation. The average life of the indexed bond of 28 years is similar to that of the fixed bond and is a reflection of the back-ended nature of the amortisation profile.

Compared to the model at 3.2% inflation the cash availability profile at zero inflation shows an obvious skew to the right. This is due to the slower build-up of cash from the reduced revenues. At zero inflation the revenue available to the project is reduced and the cash available also rapidly drops from the start of the amortisation schedule. This impacts on the shareholder distribution, as the project is unable to make dividend payments until much later from period 40; this is reflected in the drop of shareholder IRR from 25% to 18%.

Notwithstanding the reduced revenue to the project, the debt repayments are met at zero inflation, and this model retires the bond slightly earlier with average life down from 28 to 26 years. This is possible as the zero inflation implies that the outstanding value of debt does not escalate and hence the periodic repayments are much lower than at higher levels of inflation.

The results show that at 7.5% inflation, revenue and total operational costs rise dramatically. The initial results at 7.5% do not satisfy the requirements and Figure 10.14a shows the resulting profiles before the impact of inflation on the repayment profile is taken into account. The figure shows that at 7.5% inflation the cash available profile is initially skewed to the left as the indexed bond structure exhibits a rapid cash build-up in the years preceding repayment. Again, as at 3.2% inflation, the cash available peaks around period 30 but the levels of cash are much greater; in excess of £180 million (as opposed to £160 million). It is apparent that indexing 100% of the revenues ensures that the revenue and total cost profiles remain divergent even at high levels of inflation; with the revenue stream always higher than costs in this case. The cost line in this case does not tail off during amortisation and this is a result of the cumulative effect of continued inflation on any outstanding debt, which in turn results in increasing coupon outgoings.

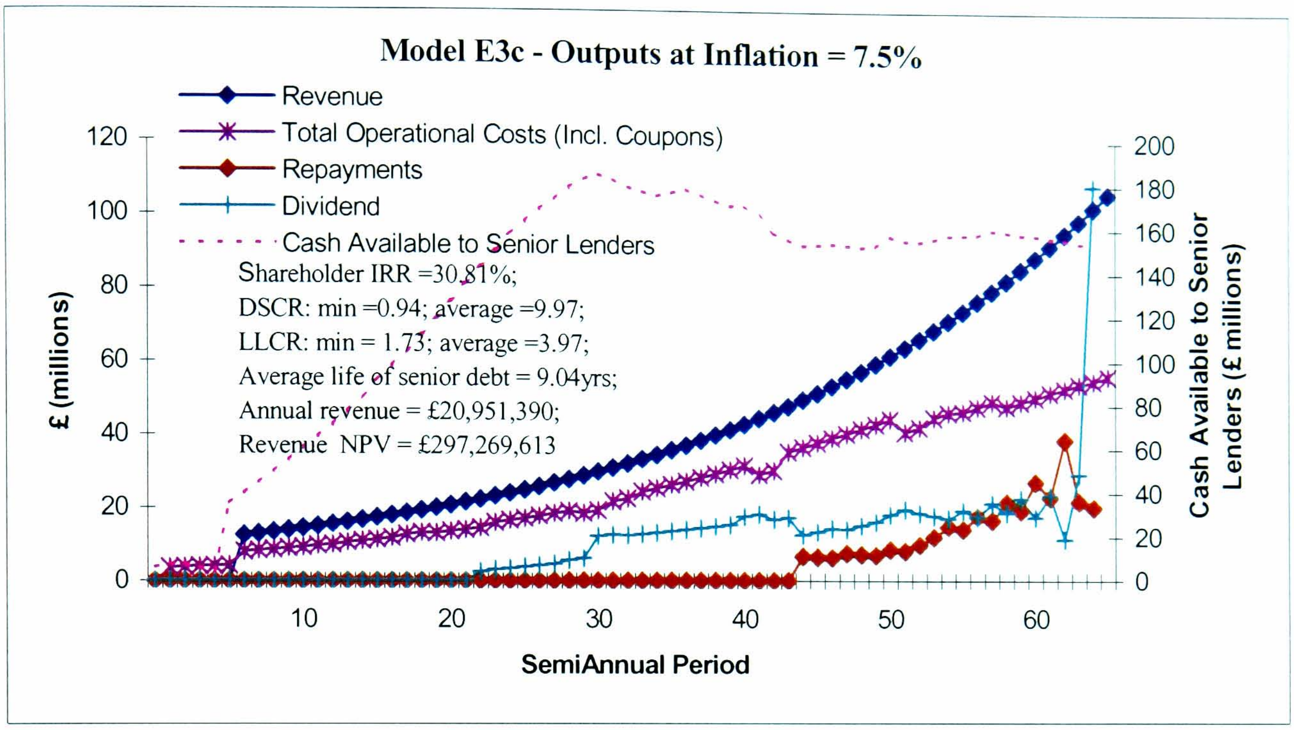


Figure 10.14a: Indexed bond structure at 7.5% - initial results.

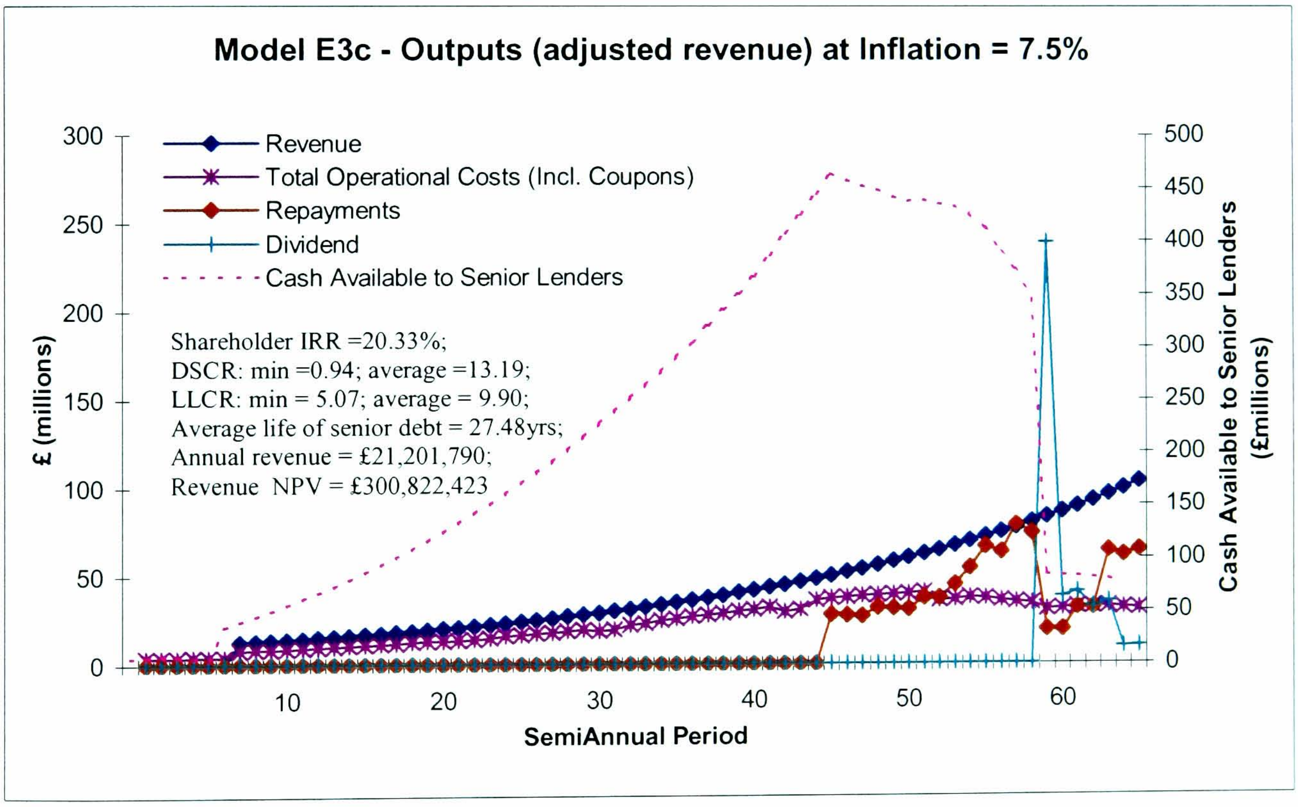


Figure 10.14b: Indexed bond structure at 7.5%; revenue adjusted; bond not fully repaid.

Figure 10.14b charts the profiles after the repayments are made to reflect the high level of inflation. The annual revenue payment was increased in an attempt to provide for the full repayment of the bond. The figure shows however that although the minimum and average LLCR's, and the average DSCR are greatly increased, the minimum DSCR is still breached at higher levels of revenue. Closer inspection of the model's cover ratios show that this breach occurs in the pre-operations period i.e. period 5, identified earlier as critical for a bond package (see Figure 10.4).

This is due to the increased drawdowns for debt service/coupons during construction, which depletes the bond issue proceeds quicker than at lower inflation levels. No revenue is earned during this time to offset this increase in coupon payments. At these increased levels of inflation the amount of pre-funding required for the MMRA is also increased to £115,000 whilst the model has provided for £93,000. This would increase the strain on the cash flow in period 5, which is when the pre-funding is injected.

The repayment profile indicated in Figure 10.14a is unchanged from the profile at 3.2% inflation and due to the rising value of debt outstanding there is a repayment shortfall with £87.7m of principal (nominal) outstanding at maturity. Adjusting the revenue and sculpting the repayments to match the cash flows at this level of inflation as in Figure 10.14b, result in an increase in earlier shareholder distributions and debt repayment but still leaves £82.7m outstanding. It was found that by stopping the shareholder distributions from period 39 to 64 the cash flow is sufficient to repay the bond fully as illustrated in Figure 10.15. This restriction of dividends was found to still leave the shareholder IRR at a comfortable 28.64%. This implies that for the indexed bond structure with 100% indexed revenues; in the event of high inflation the revenue is such that restriction of shareholder distributions can ensure full debt repayment whilst high levels of return can still be achieved.

Figure 10.15 shows the result of restricting distributions on the indexed bond financial package: the cash available can be seen to flatten out when accounting restrictions allow for shareholder distribution. The figure also shows that no distributions are made between periods 39 and 64 and that excess cash, after full repayment of the bond, is distributed to the shareholders as a 'cash sweep' at the very end of the project.

The profiles for debt outstanding for all simulations are outlined in Appendix G and show that the re-sculpting and limitation of dividend payments for the indexed bond structure as above, which allows for satisfaction of all stakeholders requirements in the event of very high inflation, also results in a profile for debt outstanding very similar to that for inflation levels of 3.2%. From this the inference can also be made that this profile, illustrated in Figure 10.16, is the desired profile for debt outstanding when financing a project with an index-linked bond issue. Attaining a similar profile can be assumed to indicate a more viable financing structure.

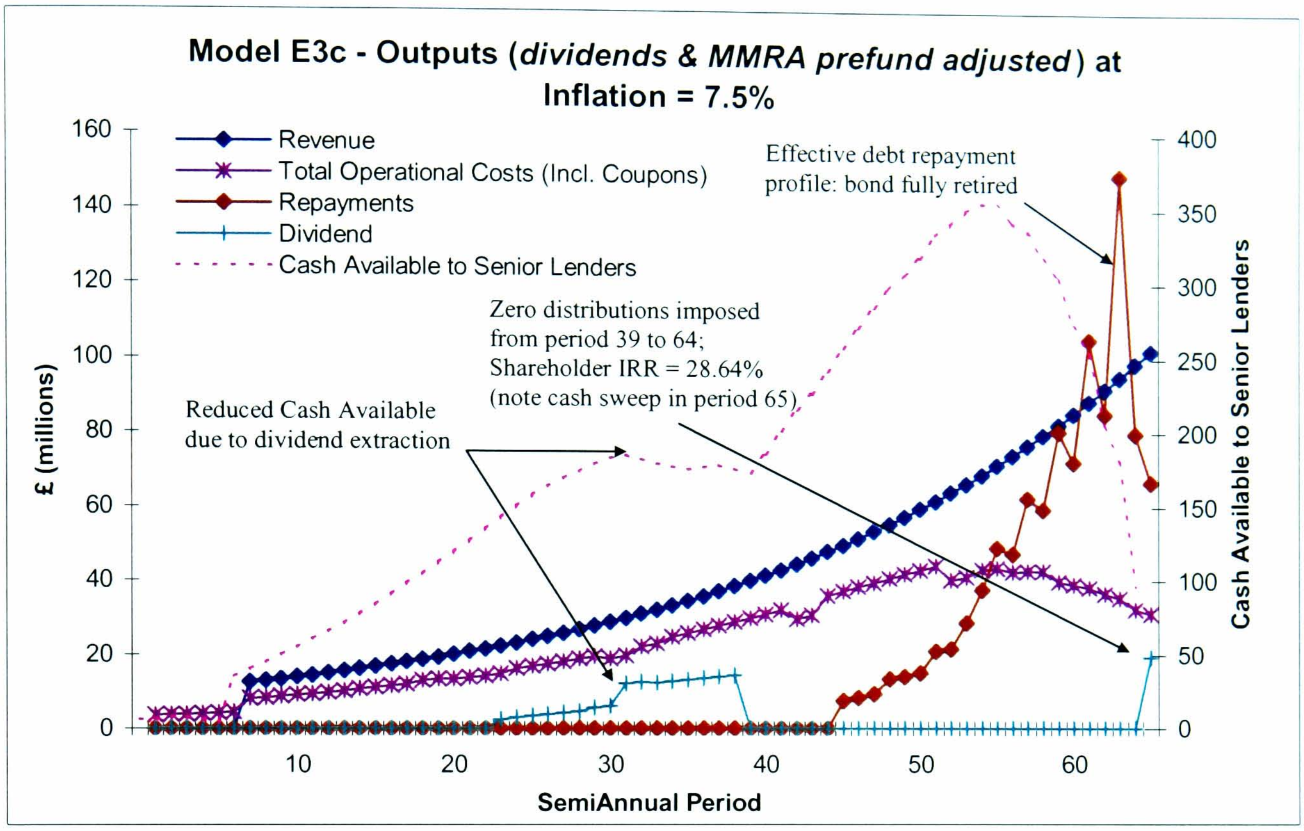


Figure 10.15: Indexed bond structure at 7.5%; adjusted and bond fully retired.

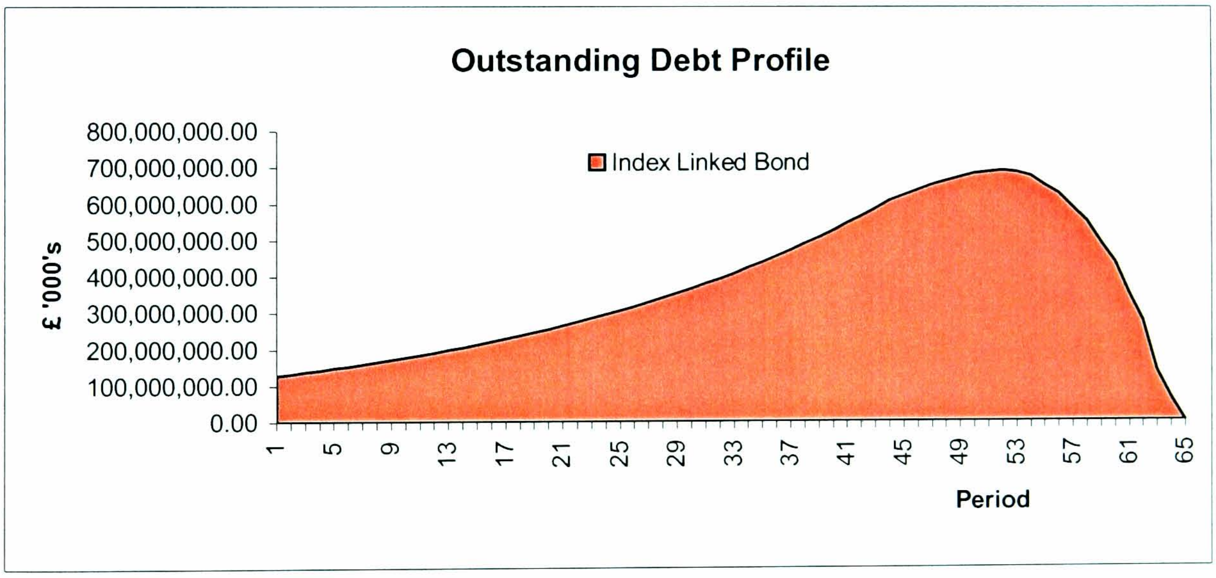


Figure 10.16: Desired profile for debt outstanding for an index-linked bond issue

10.8 STAGE F – MONOLINE WRAPPING

The results for the simulation of monoline wrapping as applied to the bond financing are outlined in section 9.6. As explained with the development of the model, the wrapping fee is calculated per period based on the value of bond outstanding at the end of the period. The monoline insurer demands upfront payment, made in period 1, of 33% of the NPV of the monoline fee calculated for the model. The balance of 67% is paid over the life of the project.

The fee calculations for the models indicate that the upfront fees for wrapping the bond issues are £2.9 million for the fixed bond and £4.6 million for the indexed bond. This upfront fee, like the coupon has to be paid from the proceeds of the bond issue. Review of the results sheets for the models in Appendix F shows that the bond issue amount is increased to cope with the increase in fees. The total financing fees, approximately £0.9 million for both the unwrapped fixed and indexed bond structures, also increase substantially as a result of the wrapping: up to £4.6 million for the fixed bond and £7.3 million for the indexed bond. Over the life of the bond the fixed bond pays the balance for monoline fees of £6 million and the indexed bond issue £9.4 million.

It is clear then that the indexed bond option is much more expensive to wrap; this can be attributed to the cumulative effect of inflation on the amount of principal outstanding in any period, which is the basis of the monoline fee calculation. For this reason the impact on the monoline fee on an indexed bond structure can be expected to be even greater in an environment of high inflation; with zero inflation resulting in wrapping fees of the same magnitude as for an equivalent fixed bond structure.

Whilst the wrapping of a bond increases the attraction of the bond to investors, the cost versus benefits must be considered before adoption. The simulations have shown that higher levels of revenue are required to meet the costs of monoline wrapping. The results also indicate that the models require higher revenue levels than the unwrapped bond options as a result of these increased financing costs. For the assumed monoline fee of 0.35% or 35 basis points per annum, an increase of approximately 3% in the annual revenue payments is required to meet the increase in financing fees for both the fixed and indexed bond issues. It must be noted however that the results show that this increase in the index linked bond issue resulted in a lower shareholder IRR that was exhibited by the unwrapped issue and hence the assumption can be made that the increase in revenue required for the indexed issue to attain the same IRR may be somewhat higher than 3%.

10.9 SUMMARY

This chapter has reviewed and analysed the results and observations of the simulations reported in Chapter Nine. The analysis has been aided by the use of charts and references to the results in the appendices to this thesis. Where necessary further tests have been conducted and the models scrutinised even closer.

The results of the simulations were readily interpreted and exhibited logical patterns allowing for easier analysis. The analysis conducted and reported within this chapter helps to explain the dynamic relationships that exist between model components and the model's response to various inputs. The outcome of the simulations demonstrate the existence of a level of gearing which can be deemed optimal in terms of satisfying the lenders cover ratio demands, whilst achieving the low revenue requirements critical for competitive tendering. The results also expose the possibility of using increased pre-funding of reserve accounts in bond-financed structures to counter early strain on cash flow. The analysis conducted in this chapter suggests that repayment of senior debt is better sculpted to match the cash flow than repayment on an annuity basis and shows that monoline wrapping of bond issues has no discernible impact on the model aside from a direct increase in financing costs and therefore revenue requirements.

CHAPTER ELEVEN

CONCLUSION

11.0 INTRODUCTION

This final chapter brings together the salient points and findings made during the research. This thesis melds practice in the real world with information in academia. This is made possible by the adopted approach, which couples incisive review of literature with practical aspects of the study integrated closely with working alongside project finance professionals. This method helped to focus the thesis such that the areas studied are not only significant to research but also of commercial interest to industry in terms of application and implementation. This study has focused on one, if not the most, fundamental aspect of privately financed projects: that of financial engineering.

The sections below show that the contents of this thesis realise each objectives set out in Chapter One and ergo achieve the aim of this research, i.e. improving the understanding of financial instruments used in project financing and the process of financial engineering, and providing decision aiding notes and observations on the optimal engineering of financial structures in project finance.

Due to the growth of the European Union and the accompanying development of infrastructure, events and practice in Europe of relevance to the project finance market have been a great source of information for this thesis. However much of the PFI/PPP practices as outlined in this thesis relate to the UK market. Whilst this does not negate inferences that may be made towards practice in other countries, the possible existence of peculiarities must be borne in mind. Possible differences may arise in areas concerned with legislation, vehicles and initiatives to facilitate private financing, payment mechanisms and the readily available sources of finance.

Projects privately financed using different mechanisms and in various sectors have been touched upon throughout this thesis. For the simulations run however, the sample used to generate the generic project was limited to concession projects in the UK health sector. As such the simulations were run on a financial model with features attributed specifically to the health sector. Care must be taken in applying any of the information in this thesis to other sectors, as differences may exist between the sectors, which have significant impact on interpretation of outputs. The financial model used for the simulations was also structured to reflect the payment mechanism that typically exists in health sector projects where the revenue stream is based on an availability fee, payable by the client/public sector to the project, for proven predetermined levels of service availability. Outputs may differ for projects where the revenue is dependent on other payment mechanisms such as those based on market related or 'user pays' principles.

Interpretation of the information in this thesis and of the conclusions outlined below, within the limitations described above and in Chapter One, offers insightful knowledge on the process of financial engineering for project finance, and on the various instruments and mechanisms that can be employed for project profitability and financial robustness.

11.1 CONCLUSIONS

Here the key conclusions of this study are outlined. These are structured below as the significant findings made during realisation of the objectives, which were set for this thesis in Chapter One. These objectives are also listed below.

1. To review the project finance market, tracing its origins and development, and determining its current form
2. To explore the instruments used in financing projects and their development and application in today's market
3. To collect, analyse and interpret data from the project finance market and explore permutations of financial structures, using financial tools that may be applied directly to this data.
4. To verify and validate the results and outputs of the thesis.
5. To provide discernible notes and observations on processes necessary for the formulation of an optimal financial structure for a privately financed project.

11.1.1 Objective 1

Review the project finance market, tracing its origins and development, and determining its current form.

The financing of projects in the private sector is one of the options for the provision of infrastructure and public services. This thesis has identified early private sector involvement in such provision as occurring as far back as in the seventeenth century in Europe, driven by the sudden growth and demand for long distance travel and commerce. Evolution of private sector provision has also been identified in the form of concession contracts awarded to private entrepreneurs such as the Perrier brothers who provided water to the city of Paris by financing the construction of an aqua-duct, subsequently recouping costs plus profits by charging for the water supplied.

As the demand for infrastructure and public services outstripped the supply by the private sector particularly due to the industrial revolution, responsibility for provision fell to the public sector; this remained the norm up until a few decades ago. The author has traced the evolution of such provision highlighting that with further increasing demand for public services and greater levels of required renewal and repair of infrastructure, the demands on public sector resources has now grown to unsustainable levels. This has been the driver in the last few decades for the resurgence of private sector involvement, but to a much larger degree than ever before. Currently numerous projects continue to be delivered by the private sector, in most cases under a concession contract where the private sector raises the finance, designs and constructs the facility, and then operates and maintains the asset, providing a service for which revenue is received over a predetermined period. This study goes on to identify the current form and current practice in the project finance market.

In the UK the Private Finance Initiative (PFI) and the Public Private Partnerships (PPP) are examples of supporting structures put in place to encourage private provision. There are various similar mechanisms used for implementation in other countries. Despite the variety of mechanisms, the purpose for these remains the same: to attract private sector capital for the provision of infrastructure and public services, and to foster and facilitate private sector involvement in such provision.

The current form of the project finance market is heavily orientated towards a partnering approach between the public and private sectors particularly for socially desirable but economically uncertain projects. The current appetite of sovereign states for off-balance sheet financing, and the growing demand for improved infrastructure and services in the developed and developing world, set against a background of oversubscribed resources, imply that the current partnering between the public and private sector for the realisation of required projects will remain undiminished. Indeed further experience and opportunity will only make for faster evolution within the project finance market.

Currently project finance is also implemented in many areas different from the traditional sphere of infrastructure provision. Financial engineering in project finance is now being used to procure services as well as assets, and within the corporate world for securitisations, mergers and acquisitions. The use of bond issues for financing projects is also on the increase as project sponsors realise that there are further returns to be made from active involvement in innovative financial engineering.

11.1.2 Objective 2

Explore the instruments used in financing projects and their development and application in today's market.

The key to the success of a privately financed project is the finance package that is put in place for its realisation. There are several sources of funds for projects, some of which have been identified in this thesis as agencies or authorities within the public sector, commercial banks, development banks, Islamic banks, pension funds and project participants or stakeholders. The finance is provided using equity and debt instruments, and in some cases as direct grants.

Equity is effectively risk capital that is provided by investors in return for payments or dividends in proportion to the amount of equity provided. Equity is raised through domestic and international equity or stock markets. Developing countries are often limited to the international equity markets due to unsophisticated domestic markets.

Debt is often the largest component of a project's financial package and is broadly classified into senior and subordinated debt. Senior debt is ranked first by its security over all project assets and agreements and most borrowings from commercial lenders for project financing will be in the form of senior debt. Subordinated debt can also be secured but by a lesser ranking over all assets and agreements and is often more akin to equity than debt, as it can rank after unsecured creditors in the event of liquidation. Subordinated debt can be provided by stakeholders in the project or by third party investors such as pension funds whose involvement in the project is limited to the provision of finance.

For projects requiring very large sums of debt in the form of loans, syndication is often used, with one bank often serving as the lead bank for the syndicate. Providers of the senior debt often have a large degree of control over the project and have set conditions precedent to the loan provision. Debt can also be provided by way of a bond issue; the consortium awarded the concession essentially issues pieces of paper that state that the issuer (the borrower) promises to pay whoever owns the bond (the lender or bondholder) certain interest payments at specified dates in the future. Repayments of the principal may be by way of amortisation of the bond on an agreed instalment basis or by a bullet repayment at the end of the bond term. Bond rating firms such as Moody and Standard and Poor provide services where bond issues are rated as a means for investors to evaluate and compare bonds. Most bonds in project finance have to achieve an investment grade rating at the least, to attract investors. This thesis highlights that the use of bonds in project finance is growing as promoters seek higher returns or greater control over the project.

The author has revealed that the development of instruments and mechanisms is driven by the risk perceptions of the finance providers. The study has also found that such development is also affected by the existing rule of thumb that the higher the perceived risk surrounding a project, the larger the proportion of equity or risk capital required. Conversely, projects deemed to be safe or low risk are able to raise a larger proportion of the finance in the cheaper form of debt, i.e. are highly geared. Most projects are financed at gearing levels from 70% to 90%. With growing experience on all sides in project financing, today's market is able to offer increasingly competitive terms of finance. For this reason, financial engineering today demonstrates greater reliance on innovative financing structures and mechanisms. Mezzanine financing is one such mechanism where third party funds or loans are used as a cheaper option to sponsor provided equity. The innovative structuring of mezzanine finance makes it more akin to equity than debt and therefore more often referred to as quasi equity.

The author's research has found that to create a source of funds to the project, the project sponsors often incorporate commercial opportunities into the contractual structure. The study has however identified that more often than not, commercial opportunities that bring a source of funds during the course of the project stem from value added by the project's subsistence, and often such value is difficult to capture. This thesis provides illustrations of projects employing a degree of commercial innovation and exploitation.

The creditworthiness of the parties seeking financing has been highlighted as key to successfully achieving robust financing. The author shows however that instruments such as monoline insurance and guarantees can be used to enhance the credit of the project thereby improving funding opportunities. Other instruments used in financial engineering include interest rate swaps and leasing. Financing instruments are so developed and sophisticated today that firms develop and market expertise in selling elements of financial engineering which become marketable on their own. An example is the sale or purchase of interest rate swaps independently of a project.

11.1.3 Objective 3

Collect, analyse and interpret data from the project finance market and explore permutations of financial structures, using financial tools that may be applied directly to this data.

During data collection for the thesis the assumption was made that within the health sector privately financed projects require similar assets and equipment, and are expected to deliver similar levels of service. Whilst some of the financing mechanisms are also similar across health projects, the relative commonality in the underlying project asset enables focus to be shifted to comparison of the financial structures. From the data collected it was therefore possible to derive ranges that could be considered typical of health sector projects and as such create a generic project. The cost and financial profile for this project was achievable using typical ranges from the data gathered.

A complex financial model was developed by the author for this generic project to investigate the behaviour of the financial structure under different circumstances. The discussion and review within this thesis, of the development of the generic financial model and of issues arising during the development, provide a clearer insight into the workings and assembly of a financial model and a better understanding of the different components.

The author was able to simulate various financial permutations using the generic model thereby exploring bank loan and bond financing and the subsequent debt repayment. The financial model developed allowed the implementation of various tools such as monoline wrapping, reserve accounts and examination of different debt repayment options. The author showed, through the simulations, that the model performed differently at different levels of gearing and its sensitivity to levels of inflation was dependant on the debt option in place and the profile for debt repayment.

This thesis explains approaches to the arrangement of financing structures for the best levels of economic robustness. The role and importance of optimisation of the financial package during modelling are also demonstrated affording the reader a better understanding of the dynamics of a financial model and its components. This ultimately improves awareness of financial engineering, and enhances skills for navigation of financial models to identify significant indicators, and interpret behaviour or performance of the model.

11.1.4 Objective 4

Verification and validation of the thesis outputs.

Verification and validation of the thesis was carried out at different stages. This was required as the conceptual structure for the financial model designed by the author had to be subjected to initial V&V, and then the model actually developed from the design had to be verified and validated prior to research use. The verification and validation was conducted at a macro and micro level at the conceptual stage, and also during and after development. Much of the V&V was done by assessment by experts and comparisons with other real models.

Initial outputs from the model were presented to experts for comment and as detailed within this thesis, this contributed to the verification and validation of the model, allowing sufficient confidence to be placed in the model structure, such that its outputs can be considered accurate representations of the project finance field under study. This confidence can be extended to the outputs of the simulations, which were run using the verified and validated model, and hence to the outcomes of the analysis conducted on the results.

11.1.5 Objective 5

Provide discernable notes and observations on processes necessary for the formulation of an optimal financial structure for a privately financed project.

This thesis has for the first time married theory with practice in researching the process of financial engineering and the nature and, crucially, the dynamics between the different components of project finance structures. The extensive discussion and information provided on the engineering of financial packages in the preceding chapters form part of the outputs of this thesis. Issues and considerations when using the various options of debt and equity have also been outlined with results from the simulations providing evidence for the conclusions and observations.

This thesis has identified that the integration of the development of the financial model with the procurement process is fundamental to the success of the bidding strategy and to the project overall. The author developed a complex and commercially applicable financial model with similar capacity to those in practice, to show the characteristics of different components of financial structures and to determine the nature of the dynamic that exists within such structures. The role and requirements of the key components of the financial model have been identified and explained, as have tests that should be run when considering and structuring the financial structure for a project. From subsequent discussion and analysis of the simulation results a real insight is provided into some of the implications of different financial instruments, and the performance of the instruments, and the model as a whole, under different conditions and financial structures.

Significantly, the author has also provided evidence for the first time that, for each financial package of known debt and equity cost, and minimum cover ratio stipulation, there exists an 'optimal' or best level of gearing at which revenue demands for the model are the lowest achievable whilst still meeting the cover ratio requirements. The results have shown that beyond this optimal gearing the cover ratio requirements are unable to be satisfied, and below it the revenue NPV is higher that could otherwise be achieved. From the lenders' perspective this optimal gearing can be referred to as the maximum gearing at which the project could be funded. For sponsors the ability to determine the optimal gearing allows maximisation of project returns and minimisation of financing costs. This will also allow the sponsors to only seek sustainable levels of debt. Comparison of the optimal gearing level for a project with the tendered finance package will go some way to allowing the procurer ascertain the robustness of a bidder's financial package.

This thesis uniquely details the process of optimisation during financial modelling, elaborating by illustration on the dynamic relationships between key components of the process. Cover ratios, shareholder returns and gearing have been identified as fundamental to optimisation and their roles have been discussed with illustrations given by detailing the adopted optimisation method during simulations. The author has within the chapters of this report, outlined the steps taken during optimisation such as with the sculpting of debt repayment, explaining the effects on the outputs, as a result of the model's structure and dynamics.

The author has also highlighted the discovery during the research, of the possibility of using increased pre-funding of the major maintenance reserve account in bond financed structures, as a means of introducing cash into the model in the pre-operations period; this was found to improve strained cash flow in the initial periods of operations due to coupon payments being made throughout the construction phase, during which no revenue is received. The results have shown that the pre-operations period is often the period of greatest cash flow stress for bond-financed structures particularly for indexed bond structures in the event of increased levels of inflation.

Notably, the results also indicate that for index linked bond packages, the finance structure is likely to fail in the event of high inflation, even with 100% indexation of revenues, if limitations are not put in place to restrict increased dividend distributions to shareholders. Failure to do so will most likely result in inability to fully retire the bond during the repayment or amortisation periods. Monoline wrapping of bonds has also been shown to have no significant impact on the financial model aside from a direct increase in the cost of financing. Overall, wrapping of fixed or indexed bonds has been shown to require an increase to the annual revenue payments by a factor roughly equivalent to the monoline fee multiplied by 10.

Importantly this thesis has also demonstrated that regardless of the repayment schedule for the subordinated debt, the repayment of senior debt is better scheduled on a sculpted basis rather than as an annuity. In the simulations run for this thesis the favoured repayment profile combination for debt was the sculpted repayment of senior debt with repayment of the subordinated debt as an annuity.

11.2 Further Research

During the course of this research areas were uncovered which, though deemed to be outside the scope of this study, were identified as areas that would benefit from further investigation. These included the identified possibility that it may become beneficial to consider a change in the debt repayment profile for a project, at a certain proportion of pure equity within the blended equity component. In other words should the very small pure equity component of the blended equity be increased gradually, there may exist a point at which the existing repayment profile becomes ill adapted or unsuitable for the project.

Research into financial engineering would also benefit from further exploration of optimal gearing. Whilst the existence of an optimal level of gearing has been brought to light by this study, no study has been performed on the impact of the sponsor provided debt on any ascertained level of optimal gearing. Further research could be conducted considering mechanisms for optimal gearing determination that include a weighted cost of debt. Such a mechanism would have to reflect the source of subordinated debt, i.e. whether provided by the sponsors, who consider this as part of the equity cost, or by third party lenders with no equity holdings in the project.

REFERENCES

Ahluwalia, M.S. (1997). *Financing private infrastructure: lessons from India*, Choices for efficient private provision of infrastructure in East Asia, (eds.) Harinder Kohli, Ashoka Mody and Michael Walton, the International Bank for Reconstruction and Development/ The World Bank, August 1997, pp85-104

Alces (1983). *The efficacy of guaranty contracts in sophisticated commercial transactions*, 61 N. CAR. L. REV. 655, 1983

Allen, F. (1989). *The changing nature of debt and equity: a financial perspective,* in R. Kopcke and E.S. Rosengren (eds), *are the distinctions between debt and equity disappearing?* (1989), pp12-14

Al-Yousuf, A. (2001). *Turkey's 'B+/B' Ratings Placed on CreditWatch* Negative After Political Tension, Standard and Poors Ratings Direct, February 21, 2001, (www.standardandpoors.com/ratingsdirect)

Anderson, G. (1989). *Lessons from regional experiences,* Conference on New Opportunities and Issues in BOT projects, Institute for International Research Jakarta, Indonesia

Attajasurit, T. (1988). *The Thai government's perspective on BOT projects,* Asian Conference on Planning, packaging and Implementing BOT Projects, Construction Industry Development Board, Singapore

Babcock and Brown (2000). http://www.hyperinteractive.co.uk/bb/index.html

Balci, O (1994) Validation, Verification, and Testing Techniques Throughout the Life Cycle of a Simulation Study. *Annals of Operations Research* 53: 121-173

Banks, J., Haddock, J., McKay, K.N. and Rothenberg, J (1988) Panel Session: Validation: Expanding the boundaries, Proceedings of the 1998 Winter Simulations Conference, p402-407

Barrett, M. (1987). P*utting your equity on the line*, Euromoney, London, September 1987, pp119-128

Baum, W.C., Tolbert, S.M. (1985), *Investing in development – lessons of World Bank experience,* Oxford University Press, Oxford

BBC (2002) New legal challenge over the tube. *http://news.bbc.co.uk/1/hi/england/2057528.stm*

Beidleman, C.R., Veshosky, D. and Fletcher, D. (1991). *Using project finance to help manage project risks,* Project Management Journal, June 1991, Iss.2, Vol. 22, p33

Blaiklock, Martin. T. (1992). *Financing infrastructure projects as concessions*, PTRC European Transport, Highways and Planning, XXth Summer Annual Meeting, Financing Transport Infrastructure, Proceedings of Seminar J, 14-18 September 1992, pp211-223

Bousquet, F. and Fayard, A. (1995). *Analysis of the interface between road financing and road management – observation of current trends in Europe.*23rd European Transport Forum, Warwick University, UK, 11-15 September 1995.

Bull, P. (1993). *Leasing: a marriage of asset finance techniques*, Project and Trade Finance, London, July 1993, Iss 123 p41

Bull, P. (1995). *Capital leasing in project finance*, Project Finance in Europe, Shaughnessy, H., ed., John Wiley and Sons, 1995, pp117-138

Byers, P. (1995). *Infrastructural investments,* Paper presented to "Financing Infrastructure Projects", Sydney, 1995

Caouette, J.B., Altman, E.I. and Narayanan, P. (1998). *Managing Credit Risk: the next financial challenge,* John Wiley & Sons, Inc

Carlile, J.L. (1994). *Private funding of public highway projects,* Journal of the Institute of Civil Engineers, 1994, pp55 -63

Checkland, P. (1981) *Systems Thinking, systems practice.* Wiley, Chichester, UK

Clarke, E. and Lousada, M. (1998). *Interest rate swaps in PFI projects,* PFI European Review, 1998, UK PFI, pp4-6

Clyne, J. and Brimblecombe, S. (1998). *Pension funding financing of transport infrastructure projects,* European Transport Conference, Proceedings of Seminar H, Infrastructure Development, Financing and Implementation, 14-18 September 1998, p47-61

Colucci, D.M. (1999). *Is leasing the key to European projects?,* International Financial Law Review, London Aug 1999, Vol. 18, Iss. 8, pp18-20

Companies Act 1995, ch. 6, 258 et seq (ENG.): *Standard No. 5 Reporting the Substance of Transactions*, Accounting Standards Board's Financial Reporting Standards, April 1994)

Connell, T. (1995). *Credit ratings for project finance,* Project Finance in Europe, Shaughnessy, H., ed., John Wiley and Sons, 1995, pp53-81

Cornwell, P. (2000). *Rationale behind privatising road maintenance and operation in the Accession Countries of Central and Eastern Europe,* European Transport Conference 2000, proceedings of Seminar B, 11-13 September 2000, pp1-10

Culley, C. (2002) Financial Modelling For Project Finance. In-house modelling course designed for PricewaterhouseCoopers. London

DFID (2001). UK Department For International Development web pages, http://www.dfid.gov.uk/

Douglas, A (2000) Head of Project Finance, Bank of America. London.

EBRD (2000). *The EBRD: its role and activities (E),* European Bank for Reconstruction and Development, London

ECGD (2001). Homepage of the Export Credit and Guarantee Department of the UK's Department of Trade and Industry, www.ecgd.gov.uk

Eddy, Jane (1995). *The municipal revenue bond market in the United States*, Project Finance in Europe edited by Shaughnessy, H., John Wiley & Sons Ltd., pp97-115

El Diwany, Tarek (2000), *Islamic Banking isn't Islamic*, Islamic Business and Finance Network, E-library in Islamic Economics and Finance, (http://www.islamic-finance.com/indexnew.htm)

Emmerson, (1962). *Survey of problems before the construction Industries*, UK 1962.

EPAC (1995). *EPAC Private infrastructure task force final report*, September 1995, Australian Government Publishing Service, Canberra

EuroWeek (1998a). *AMBAC wraps long-term hospital finance.* Euromoney Publications *plc*, London, Jun 19, 1998

EuroWeek (1998b). *Barclays in first wrapped, index-linked PFI. Euromoney Publications plc*, London, Jul 10, 1998

EuroWeek (1999a). *Endeavour takes indexed route to $137m financing. Euromoney Publications plc*, London, Aug 13, 1999

EuroWeek (1999b). *PFI project bond revives in UK*, Euromoney Publications plc, London, Mar 26, 1999

EuroWeek (2000a). *FSA wraps first Welsh hospital securitisation, Euromoney Publications plc*, London. May 12, 2000

EuroWeek (2000b). *UK spying centre taps bond market with largest PFI deal.* Euromoney Publications plc, London, Jun 16, 2000

Farrell, S. (1999). Financing European transport infrastructure, policies and practice in Western Europe, Macmillan Press Ltd., Hampshire, 1999, p24

FCN (1998). Finance Center's Newsletter May 1998, Vol. 10, http://www.wfc.fhwa.dot.gov/MAY.HTM

Ferreira, D. and Khatami, K. (1996). *Financing private infrastructure in developing countries,* World Bank Discussion Paper No. 343

Garwood, J. (1995) *Public-private investment partnership,* Project Finance in Europe (ed) H. Shaughnessy, John Wiley & Sons Ltd. 1995, pp33-52

Gerardin, B. (1994). *Financing The European High Speed Rail Network*, PTRC Financing Transport Infrastructure, edited by Sheila Farrell, 1994 p39-46

Guasch, J.L. (1996). *Infrastructure concession design and financing issues,* Privatising monopolies: lessons from the telecommunications and transport sectors in Latin America, edited by Ramamurt, Ravi, John hopkins University Press, 1996

Hass, J.J. (1987). *Insights into lender liability: an arguments for treating controlling creditors as controlling shareholders,* University of Pennsylvania Law Review 1,321

Heald, D. and Geaughan, N. (1997). Accounting for infrastructure assets: financial reporting, project finance and concession. Public Money and Management, July 1997.

Heggie, I.G. (2000a). *First Generation Road Funds: what went wrong?* European Transport Conference 2000, proceedings of Seminar B, The privatization of road maintenance and operation, 11-13 September 2000, Vol. P437, p12-15

Heggie, I.G. (2000b). *Second Generation Road Funds: the way ahead*, European Transport Conference 2000, proceedings of Seminar B, The privatization of road maintenance and operation, 11-13 September 2000, Vol. P437, p16-19

Heggie, I.G. and Vickers, P. (1998). *Commercial management and financing of roads*, Technical paper 409, World Bank, Washington, D.C

Highways Agency (1998) *DBFO – Value in Roads, A case study on the first eight DBFO road contracts and their development*, produced by the Private Finance Panel Executive of the Highways Agency, UK, http://www.ogc.gov.uk/taskforce/series_other/library/dbfo/

HM Treasury (2002) *Selling into wider markets: a policy note for public bodies*. Enterprise and Growth Unit, HM Treasury, December 2002. (http://www.hm-treasury.gov.uk/media/ED8AB/New_WM_Guidance.pdf)

Hoffman, S.L (1989). *A practical guide to the transactional project finance: basic concepts, risk identification, and contractual consideration*, Business Lawyer, Vol. 45, November 1989, p22

Hoffman, S.L (1998). *The law and business of international project finance: a resource for governments, sponsors, lenders, lawyers and project participants*, Kluwer Law International

Howcroft, B. (1985). *Syndicated lending by banks,* Cardiff University Press

IBRD (2001). *About the IBRD*, (World Bank Group Web pages) http://www.worldbank.org/html/extdr/backgrd/ibrd/role.htm

IDA (2001). *How IDA resources are allocated*, (World Bank Group Web pages) http://www.worldbank.org/ida/idalloc.htm

IDB (2000). *Basic Facts*, Inter-American Bank, http://www.iadb.org/exr/pdf/basic/eng_basic2000.pdf

IsDB (2000), Islamic Development Bank Web Page, (http://www.isdb.org/english_docs/idb_home/IDB-M-C.htm)

IFC (1999). *Colombia; Breaking the ice,* www.ifc.org, June 1999.

Infrastructure Finance (1997). *Brazils pension funds target privatisations,* Infrastructure Finance, New York, Mar 1997, Vol. 6, Iss 2, p22

IFC *(1996). Financing private infrastructure*, The World Bank and International Finance Corporation, 1996

IPPR (2001). *Building better partnerships,* the final Report from the Commission on Public Private Partnerships, June 2001, London

IYM – Islamic Youth Movement, (1995), *Islamic Funding Structures And Financing Vehicles,* Nida'ul, Islam magazine, Islamic Youth Movement Media Office, Australia (http://www.usc.edu/dept/MSA/economics/nbank2.html), Iss. 10, November – December 1995

Jessop, A. (1998). *An equity investor's view of PFI with particular reference ot Law Hospital,* PFI European Review 1998, UK PFI, p11-13

Jones, I., Zamani, H. and Reehal, R. (1996). *Financing models for new transport infrastructure,* Transport Research, APAS, Strategic Transport Research, VII – 20, Luxembourg: Office for the Official Publications of the European Communities 1996, 136pp

Kerslake, M. (1995). *Debt financing issues for project,* Paper presented to "Financing Infrastructure Projects" Conference, Sydney, 1995, p10

Kleijnen, J.P. C (1995) *Verification and validation of simulation models.* European Journal of Operational Research Vol. 82, No. 6

Kohli, H., Mody A. and Walton, M. (1997). *Making the next big leap: systemic reform for private infrastructure in East Asia;* Choices For Efficient Private Provision of Infrastructure in East Asia, The World Bank 1997, p1 –20

Kumar, A., Gray, D., Mangesh, H., von Klaudy, S. and Ruster, J. (1997). *Mobilising domestic capital markets for infrastructure financing: international experience and lessons for China*, World Bank discussion paper no. 311, p11

Law, A and Kelton, D (1991) Simulation Modelling and Analysis. McGraw-Hill, Inc.

Levine, L. M. (1998). *Filling a financing shortfall with mezzanine capital*, Mergers and Acquisitions Journal. http://www.majournal.nvst.com

Levy, Haim, Sarnat, Marshal (1994) Capital Investment and Financing Decisions 5th edition, Prentice Hall; London, 1994. p180)

Lewis, M.K. and Davis, K.T. (1987). *Domestic and international banking*, Philip Alan, Oxford

Lynch, P (1996) A Practical Introduction to Financial Modelling For Project Finance. Euromoney Publications. London

Mackie, P. (2000). Project Finance Module Lecture, The University of Leeds.

Macquarie (1996). *Project finance - The guide to financing transport projects* Macquarie Corporate Finance Limited, Australia

Manoj, P. (2000). *Golden Quadrilateral Project – NHAI takes the annuity road*, The Hindu Business Line, Internet Edition, 11 December 2000. http://www.hindubusinessline.com/2000/12/11/stories/091140gq.htm

Marsh, J.R. and Wild, D.G. (1988). *Practice of banking*, Part 2, Pitman, London

Merna, T (1994). *Concession contracts,* Projects Procured by Privately Financed Concession Contracts, (eds) T. Merna and N.J. Smith, UMIST, 1994

Merna, T. and Owen, G. (1998). *Understanding the Private Finance Initiative- the new dynamics of project finace,* Asia and Law Practice Publishing Ltd., Hong Kong,1998.

MoD (2003a) *PFI guidelines: The phases of a PFI project – procurement.* Ministry of Defence, UK. (http://www/mod.uk/business/ppp/guidelines/procurement)

MoD (2003b) *PFI guidelines: procurement issues – financial.* Ministry of Defence, UK. (http://www/mod.uk/business/ppp/guidelines/financial)

Monzer, K. and Tariqullah, K. (1989). *Principles of Islamic financing: a survey,* Islamic Research and Training Institute, Islamic Development Bank, 1989, (http://www.kahf.net/English/islamic%20financing%20survey.html)

Morash, D.M. (2001). *Powering up,* Asset Finance International, London, March 2001, Iss. 281, pp30-32

Morris (1994a). *The management of projects*, Thomas Telford, London 1994, pp237

Moyer, R.C., Mcguigan, J.R. and Kretlow, W.J (1984). *Contemporary financial management*, second edition, West Publishing Company, United States of America

Muranyi, Miklos (1998). *Methods and alternatives for financing transport infrastructure development in Central Eastern Europe*, European Transport Conference, 14-18 September, proceedings of seminar H, infrastructure Development, Financing and Implementation, p1-16

Nakagawa, D. and Matsunaka, R. (1997). *Funding transport systems: a comparison among developed countries*, Oxford: Elsevier 1997, pp65-72

Nevitt, P.K. (1983). *Project financing*, 4th edition

Newman (2000) Interview. Manager, PricewaterhouseCoopers. London.

Newman (2003) Interview. Manager PricewaterhouseCoopers. Leeds.

NAO (2000) *The financial analysis for the London Underground Public Private Partnerships*. National Audit Office, HC 54 Session 2002-2001: 15 December 2000

NHS (2001) BAFO submissions to Southern Derbyshire Acute Hospitals NHS Trust.

OECD (2001). Homepage of the Organisation for Economic Co-operation and Development, www.oecd.org

OGC (1999) *A step-by-step guide to the PFI procurement process.* (http://www.ogc.gov.uk/sdtoolkit/reference/ogc_library/PFI/series_1/step/step0)

Partnership Act 1890, (UK), s 3

Pensions and Investments (1993a). *Infrastructure fear calmed,* Pensions and Investments, Chicago, Vol.21, Iss. 7, April 5, 1993, pp3-5

Pensions and Investments (1993b). *Infrastructure investing,* in Pensions and Investments, Chicago, Vol.21, Iss. 1, January 11, 1993, p10

Perkin, H (1971) *The age of the railway,* David and Charles, Newton Abbot, 1971

PfI (2000). If the deal is big enough do a bond, PfI *Intelligence Bulletin Smi Newsletter,* Iss. 10, November 2000

PFP- Private Finance Panel (1996). *Practical guidance to the private finance initiative: transferability of equity.* London, October 1996

PFU (2002) *OGC Guidance on certain financing issues in PFI contracts.* Private Finance Unit, UK Office of Government Commerce. London

Pidd, M (1998) Computer simulation for operational research in 1984, in *Developments in Operational Research,* Eglese R.W. and Rand, G.K. (eds), Perganon Press, Oxford.

Porter, A (2002) Interview - Director, Infrastructure and Government Utilities, PricewaterhouseCoopers. London.

Price, A.D.F. (1995). *Financing international projects*, Geneva, International Labour Office 1995, (International Construction Management Series No.3)

Project Finance (1999). *What went wrong with Nodco?* Project Finance January 1999, Euromoney Publications

Project Finance (2000). *PG&E repeats with La Paloma,* Project Finance April 2000, London, Iss. 204, p19

Pudney, J. (1968) *De Lessops' Canal,* J.M Dent, London

PwC (2002) Project Finance procurement guidelines, Infrastructure and Government Utilities Group, PricewaterhouseCoopers. London.

Rendbaek, O. (1982). *Master project planning for large publicly financed projects.* Proceedings of the 7th Internet World Congress

Richmond-Coggan, D. (1995). *Financial risks in construction.* Risk, Management and Procurement in Construction, ed J. Uff & A.M Adams, Kings College Centre of Construction Law and Management, London. 1995, pp297-308

Ritter, L.S. and Silber, W.L. (1986). *Principles of money banking and financial markets*, fifith edition, Basic Books, Inc., New York.

Robinson, J.S. (1972), *Multinational Banking,* A.W. Sijthoff, New York, p4

Robinson, S (1994) *Successful simulation: a practical approach to simulation projects.* McGraw-Hill, Maidenhead, UK.

Robinson, S (1997) *Simulation model verification and validation: increasing the users confidence.* Proceedings of the 1997 Winter Simulation Conference, S. Andradottir, K.J. Healy, D.H. Withers and B.L Nelson (eds).

Roskin, M., Hussey, L.L. and Inman, M.,(1998). *Shadow tolling in the U.S.: A Viable Financing Approach*, Federal Highways Agency's Innovative Finance Quarterly, Vol. 4, No. 2. Spring 1998, p6 http://www.fhwa.dot.gov//////innovativefinance/ifq42.pdf

Sargent, R.G (1996) *Some subjective validation methods using graphical displays of data.* Proceedings of the 1996 Winter Simulation Conference.

Schanes, S.E. (1993). *Pressure on pension plans,* Pension World, Atlanta, Nov 1993, Vol.29, Iss 11, p5

Scheinkestel, N.L. (1997). *the debt-equity conflict: where does project financing fit?* Journal of Banking and Finance Law and Practice 1997, Vol. 8; No. 2, pp103-124

Shi, J.J (2002) *Three methods for verifying and validating the simulation of a construction operation.* Construction Management an Economics Vol.20: p483-491

Schmidt, J. (1986). *New approaches to financing communal investment,* Urban Infrastructure in Britain and Germany, Report on an Anglo-German conference, 5-7 November, 1986, pp135

Scriven, J. (1995) *A funder's view of risks in construction projects,* Risk, Management and Procurement in Construction, ed J. Uff & A.M Adams, Kings College Centre of Construction Law and Management, London. 1995, pp71-100

Sinding, A.G. (1997). *Private sector involvement in European road network financing: chances and pitfalls of trans-national road pricing and road privatisation,* European Transport Forum, proceedings of Seminar A, pp55, 1-5 September 1997, Pan- European Transport Issues

SMi (2002) *Financial modelling for PPP/PFI projects: the essential guide for PPP/PFI stakeholders.* SMi Publishing. London

Smith, A.J. (1999). *Privatised infrastructure- the role of the government,* Thomas Telford Publishing, London

Smith, N.J. (1998). *Managing risk in construction projects,* Blackwell Science, pp148

Smith, N.J. (1999) *Managing risk in construction projects,* Blackwell Science Ltd, 1999

Smith, N.J. (2001). Interview with Professor N. J. Smith; University of Leeds, UK

Tiong, R.L.K. (1995a). *Competitive advantage of equity in BOT tender,* Journal of Construction Engineering and Management, September 1995, p282-289

Tiong, R.L.K (1995b) *Impact of financial package versus technical solution in a BOT tender.* Journal of Construction Engineering and Management, Vol. 121, No. 3, September 1995.

Treasury Taskforce (2001). Clarification sought from former TTF's James Forman-Peck, 14th March 2001

Turner, A. (1990). *Building procurement,* Macmillan Education Ltd. 1990, pp47

Uff, J. and Adams, M.A. (1995). *Risk, management and procurement in construction,* Kings College Centre of Construction Law and Management, London

Vadillo, Umar Ibrahim (2000). *The fallacy of the 'Islamic Bank'* Islamic Business and Finance Network, E-library in Islamic Economics and Finance, (http://www.geocities.com/Athens/Delphi/6588/bfallacy.html)

Vinter, G. (1993). *United Kingdom,* International Financial Law Review, London, Aug 1993, p29

Walker, A. (1989). *Project management in construction,* second edition, Blackwell Scientific Publications, Oxford, 1989, pp191

Walker, C. and Smith, A.J. (1995). *Privatized infrastructure: the BOT approach,* ThomasTelford Services Ltd, London, 1995

Watkins, M. (1999). *Cross dressing,* Project Finance, Iss. 199 London, November 1999. p20-22

Watkins, M. (2000). *Road rage or rave*, Project Finance, London, May 2000

Weight, B.H. (1992). *New influences,* in T.H Donaldson (ed), *Project Lending,* 1992, pp21, 30-31

Whitham, J. (1999). *A new breed of PFI bonds emerges.* Project Finance, London, Sep 1999

Whittal, J. (2002) Interview – Manager, Infrastructure and Government Utilities, PricewaterhouseCoopers. London

Williams, F.S. (1883). *Our iron roads: their history, construction and administration,* Bemrose & Son, London

Williamson, O. (1984). *Corporate governance,* Yale Law Journal 1917 at 1,212

Williston, A. (1970).

Wood, J. (1999). *New model from irrigation,* International Water Power and Dam Construction, v 51, n 5, (1999) pp32-33

Woodings, N. (2002) Interview - Assistant Director, Infrastructure and Government Utilities, PricewaterhouseCoopers. London.

World Bank (1997). Global development finance, Vol. 1, Washington D.C.

Wu, G. (1991). *Build-operate-transfer: The Hopewell experience*, Conference on International Construction, Marketing and Project financing, Centre for Advanced Construction Studies, Singapore.

Yescombe, E.R. (2002) Principles of project finance. California: Academic Press.

APPENDIX A: SAMPLE INDICATIVE TERM SHEET

The Lead Arrangers have not sought or obtained the internal credit approvals, which are required before any formal undertaking of an extension of credit can be made. These indicative terms and conditions should not be construed as a commitment by the Lead Arrangers to enter into any specific transaction nor, other than as contemplated by this term sheet, are the terms and conditions set out below intended to be exhaustive. Participation by the Lead Arrangers is subject to completion of their usual credit, technical, legal, financial and other due diligence plus execution of acceptable project, credit, security and other agreed documentation and satisfaction of all conditions precedent.

Capitalised terms used in this term sheet are defined in the attached Annexure.

Borrower: A special purpose company incorporated in Victoria/New South Wales.

Lead Arrangers: ANZ Investment Bank, Dresdner Bank AG, National Australia Bank, The Toronto-Dominion Bank and Westdeutsche Landesbank Girozentrale, (severally and in equal proportions).

Description of Facilities: An Australian dollar loan note facility option to be syndicated domestically and internationally ('**Facility**'). A bill reliquification option will be included.

An Australian dollar working capital facility (including performance bonds) is to be provided by a single lender and documented separately. Conditions precedent, representations and warranties, undertakings, defaults and other terms are to be consistent with the loan note facility terms. Funding costs for the working capital facility will be the BBSY bid rate plus an agreed margin.

Facility Agent: [*To be determined*]

Security Trustee: The security trustee will be nominated by the Facility Agent and should be a related entity of the Facility Agent.

Facility Amount: [*To be determined. This may be subject to adjustment on or before the date of Financial Close to reflect the Banking Base Case Model as updated to reflect the actual interest rates to apply from the date of Financial Close.*]

Facility Purpose: To finance the acquisition of the assets in conjunction with sponsor's equity and to fund associated costs.

Availability: The Facility will be available for drawdown until 1 March 2000. Drawdown will occur on satisfaction or waiver of all outstanding Conditions Precedent. Any amount not drawndown on the first drawdown (apart from under the working capital facility) will be cancelled.

Repayment: 5 years from Financial Close.

Base Interest Rate: BBSY bid rate for the relevant interest period as displayed by the Reuters Monitoring System.

Margin: The margin will adjust based on the ratings matrix below:

Rating	Years 1-3	Year 4	Year 5
A-	0.75%	0.85%	0.95%
BBB+	0.80%	0.95%	1.05%
BBB	0.90%	1.05%	1.15%
BBB-/unrated	1.10%	1.25%	1.35%

Fees:

An underwriting fee of the aggregate of:

(a) the greater of 1.3% of:

(i) the amount drawn under the Facility on the first drawdown; and

(ii) 80% of the Facility Amount; and

(b) 0.5% of the amount (if any) which is the difference between the Facility Amount and the amount drawn under the Facility on first drawdown.

The underwriting fee will be payable to the Lead Arrangers on settlement of the acquisition of assets (whether or not the Facility is drawn down). The Borrower agrees to use the Facility if it is the successful bidder. The above fee structure is based on the assumption that conditions precedent to first drawdown will be limited to those of a mechanical nature.

The Borrower will pay the agreed fees of the Lead Arrangers' legal counsel and all agreed fees for consultant's engaged by the Lead Arrangers that are producing reports to satisfy conditions precedent.

Optional prepayment:

The Borrower may prepay, without penalty (other than break costs for payments other than on a rollover date), all or part of the Facility on providing 5 business days' notice. Prepayments must be at least A$10,000,000 and a multiple of A$5,000,000.

Drawings:

Drawings may be for 1, 2, 3 or 6 month terms. If necessary, the Borrower will agree to make drawings of 1 month duration for the first 6 months after first drawdown in order to facilitate syndication.

Security:

A security trust deed structure will be established with the nominated security trustee holding the securities on behalf of all lenders under the Facility, the working capital bank, swap providers in relation to the Facility (whether or not also lenders under the Facility) and, (subject to agreement) where intercreditor and subordination arrangements acceptable to the Lead Arrangers have been agreed, mezzanine debt lenders. Swap providers, in respect of their exposure under the swap, will only have a vote for their net swap exposure in the case of default. Mezzanine and subordinated debt providers will not have voting rights unless otherwise agreed by each of the Lead Arrangers.

Where any part of the Facility, swap or mezzanine debt is refinanced and the Security is not discharged, the refinancing lenders and swap providers are to become beneficiaries under the security trust and have the benefit of the Security on a pro rata basis with the lenders under the Facility, subject to intercreditor and subordination arrangements being agreed in relation to mezzanine debt (consistent with the initial financing arrangements).

The security trust structure is designed to minimise stamp duty and achieve efficiency in the transfer and sharing of the Securities.

The security trust deed will contain a guarantee and indemnity from each Project Group entity (other than the Borrower) in respect of the debts of the Borrower.

The security will be:

(a) a first ranking registered charge over each Project Group entity's assets and undertakings (except to the extent that any right under the Distribution Network Lease or any other asset (including contracts), cannot be charged);

(b) a registered mortgage of all leasehold and freehold land owned by any Project Group Entity; and

(c) an effective third party charge from each Sponsor over the shares it holds in the holding company within the Project Group (with limited recourse to only the shares held by the Sponsors).

The Security will be released if a Project Group entity obtains a credit rating of at least BBB+ (or equivalent) and the Borrower refinances (on an unsecured basis) at least 50% of the debt outstanding under the Facility. There will be no lender approval criteria for a refinancing if at least 50% of the debt outstanding is refinanced and a credit rating of at least BBB+ is maintained in respect of the debt after refinance. Refinancing in other circumstances will be subject to the approval of the Majority Lenders or on meeting certain agreed objective criteria. Thereafter a negative pledge will be provided by all Project Group entities to the Facility Agent on behalf of all lenders under the Facility. At that time all indebtedness of each entity of the Project Group will be unsecured other than debts mandatorily preferred by law.

Any debt used to refinance the Facility will rank equally with the debt under the Facility.

Conditions Precedent:

The conditions precedent to be satisfied before a drawing may be requested are:

(i) execution of the Finance Agreements (including ISDA documents but, subject to paragraph (ii), excluding Hedges) and the Equity Agreements in form and substance satisfactory to the Facility Agent (acting on the instructions of each of the Lead Arrangers);

(ii) execution of the Hedges that the Lead Arrangers and the Borrower have agreed must be entered into by Financial Close;

Note: The hedging requirements by Financial Close are to be discussed.

(iii) evidence, in form and substance satisfactory to the Facility Agent (acting on the instructions of each of the Lead Arrangers), of the payment of the equity subscriptions and shareholder loans as contemplated by the Equity Agreements to achieve a gearing ratio immediately after the first drawdown of [*]. The gearing ratio will be measured at Financial Close;

(iv) provision of a pre-funding certificate, in form and substance satisfactory to the Facility Agent (acting on the instructions of the Lead Arrangers), for each Project Group entity and each Sponsor attaching copies of:

(a) its constitution or a certificate confirming that there is no constitution;

(b) its certificate of registration; and

(c) extracts of minutes of meetings of its board of directors and, if required by the Lead Arrangers, of its shareholders approving the relevant Project Group entity or Sponsor to enter into the transaction), which evidences the resolutions authorising the signing and delivery of the Transaction Documents to which the Project Group entity or Sponsor is a party and observance of obligations under those documents;

(d) any Authorisations necessary for the execution or performance of the Transaction Documents;

(v) each original power of attorney under which a person signs a Transaction Document for a Project Group entity or a Sponsor showing evidence of stamping and registration (where required by law prior to execution);

(vi) certified copies of each of the following documents on the terms approved by each of the Lead Arrangers:

(a) the Sale Agreement and any associated documents;

(b) each of the Material Contracts;

(c) the Licences; and

(d) the Vesting Contracts.

(vii) confirmation from each of the Lead Arrangers that they have:

(a) completed all due diligence enquiries to their satisfaction and have received copies of due diligence reports provided to the Project Group entities and reliance letters from appropriate advisers to the Borrower and Sponsors in respect of the due diligence reports, in form and substance satisfactory to each of them; and

(b) received a certificate in form and substance acceptable to each of the Lead Arrangers from their insurance consultant confirming that insurance policies required to be maintained by the Borrower under the Finance Agreements have been effected, are current (or will at Financial Close be current), and the security trustee's interest is noted on the relevant policies;

The Finance Agreements will be drafted to incorporate the requirements of the Distribution Network Lease and the recommendations of the consultant. Consequently the certificate need only confirm the policies reflect the 'required insurance' under the Finance Agreements.

(c) received reports in form and substance acceptable to each of the Lead Arrangers from their consultants in relation to the regulatory and technical issues associated with the business;

(d) received a satisfactory opinion from their accountants in relation to the accounting and taxation consequences for the Lead Arrangers of the transactions contemplated by the Transaction Documents; and

(viii) the Lead Arrangers have received satisfactory legal opinions from:

(1) their legal advisers; and

(2) the legal advisers to the Project Group and Sponsors;

(3) legal advisers to any Project Group entity or Sponsor that is incorporated in a jurisdiction other than Australia;

(ix) evidence that all Licences are current and enforceable;

(x) provision of a certified copy of the Banking Base Case Model, in form and substance satisfactory to the Facility Agent (acting on the instructions of each of the Lead Arrangers), and associated audit report from auditors acceptable to the Lead Arrangers

APPENDIX B: DATA SHEET OUTLINE

DATA COLLECTION SHEET

SAMPLE PROJECT	1	2	3	4	5	Typical Project Range
Sector?	Health	Health	Health	Health	Health	
Project Details						
Project Length (Years)						
Construction Start Date						
Construction Start Period						
Construction End/Operations Start Date						
Length of Construction (months)						
Operations End Date						
Operations End Period						
NUMBER OF BEDS						
Start Dates for Escalation for:						
Construction Costs						
Period						
Development Costs						
Period						
Operating Costs						
Period						
Bond Indexation						
Period						
MacroEconomic Assumptions						
Annual Inflation (RPI)						
LIBOR						
Accounting Assumptions						
Type of Depreciation (Straight Line/Reducing Balance						
Length of Depreciation (years)						
Depreciate to						
Start of Capital Allowances Date						
Start of Capital Allowances Period						
Type						
Percentage of Capital allowable						
% to apply to Allowable %						
Corporation Tax						
Working Capital						
Receivables						
Payables						
No. of Days in Year						
No. of Days in SemiAnnual Period						
Financing						
Interest on Cash Balances (over Reference Rate)						
Interest on Overdraft (Over Reference Rate)						

Senior Debt	Project 1	Project 2	Project 3	Project 4	Project 5	Typical Range
% of Debt to Equity						

		Project 1	Project 2	Project 3	Project 4	Project 5	Typical Range
Bank Debt or Bond Debt ?							
Bank Loan 1							
Maximum Loan Amount	*1000						
Reference Rate							
% of Financing							
Margin over Reference Rate During Construction							
Margin over Reference Rate Post Construction							
Term of Loan							
Repayment type (Annuity or Sculpted)							
Swap Rate for Loan (% per annum)							
Swap Credit Charge							
MLA (%)							
Commitment Fees (% per annum on undrawn amounts)							
UpFront / Arrangement Fee (% of Facility)							
First Drawdown Date							
First Drawdown Period							
Last Drawdown Date							
Last Drawdown Period							
Start of Repayment Date							
Start of Repayment (Period)							
Last Repayment Date							
Last Repayment (Period)							
Interest Rolled up from date							
interest Rolled up from period							
Interest Rolled Up Until Date							
Interest Rolled up till (Period)							
Agency & Technical Fees							
Drawdown Timing							
Bank Loan 2							
Maximum Loan Amount	*1000						
Reference Rate							
% of Financing							
Margin over Reference Rate During Construction							
Margin over Reference Rate Post Construction							
Term of Loan							
Repayment type (Annuity or Sculpted)							
Swap Rate for Loan (% per annum)							
Swap Credit Charge							
MLA (%)							
Commitment Fees (% per annum on undrawn amounts)							
UpFront / Arrangement Fee (% of Facility)							
First Drawdown Date							
First Drawdown Period							
Last Drawdown Date							
Last Drawdown Period							
Start of Repayment Date							
Start of Repayment (Period)							
Last Repayment Date							
Last Repayment (Period)							
Interest Rolled up from date							
Interest Rolled up from period							
Interest Rolled Up Until Date							

		Project 1	Project 2	Project 3	Project 4	Project 5	Typical Range
Interest Rolled up till (Period)							
Agency & Technical Fees							
Drawdown Timing							
Bond							
Fixed or Index Linked (Fixed = 0, Indexed = 1)							
Monoline Wrapped ? (NO = 0, YES = 1)							
Max Facility Amount	*1000						
% of Financing							
Reference Gilt Rate (% pa)							
Spread over Reference Rate (% per annum)							
UpFront / Arrangement Fee (% of Facility)							
Interest on Bond Holding Account							
Tenor (years after Contract Execution)							
Month of first coupon payment (1-6)							
Repayment type (Annuity or Sculpted)							
Issue Date/First Drawdown Date							
	Period						
Last Drawdown Date							
	Period						
First Repayment Date							
	Period						
Last Repayment Date							
	Period						
Drawdown Timiing for Interest							
Wrapping Fee Upfront (% of amount)							
% Monoline paid over bond life							
Bond Maturity Date							
	Period						
Reserve Accounts							
Debt Reserve							
Maintenance Reserve							
Blended Equity							
TARGET IRR (Nominal)							
Equity Bridge Loan							
Bridge Loan In Use?							
Facility Amount	*1000						
% of Financing							
Margin over Reference Rate (% per annum)							
UpFront / Arrangement Fee (% of Facility)							
Commitment Fees (% per annum on undrawn amounts)							
Bullet Repayment Date							
Bullet Repayment Period							
First Drawdown Date							
	Period						
Last Drawdown Date							
	Period						
Interest Rolled Up Until							
	Period						
Interest Capitalised until							
	Period						
Drawdown Timing Factor							
Subordinated Debt							
% of Total financing							

Facility Amount	*1000		
Margin / Coupon			
UpFront / Arrangement Fee (% of Facility)			
Commitment Fees (% per annum on undrawn amounts)			
Repayment type (Annuity or Sculpted)			
Interest paid during the construction phase?			
First Drawdown Date			
First Drawdown Period			
Last Drawdown Date			
Last Drawdown Period			
Number of Repayments			
Repayment Start date			
Repayment Start Period			
Last Repayment date			
Last repayment Period			
Interest Rolled up - Start Date			
INTerest Rolled Up Start Period			
Interest Rolled up Until date			
Int Rolled up until Period			
Tenor (years)			
Equity			
% of Total financing			
Blended Return			
Facility Amount	*1000		
Injected Date			
Injected Period			
Repayment/Redemption Date			
Repayment/Redemption Period			

APPENDIX C: INITIAL BASE CASE INPUTS

Non-Time Based Inputs

Key Dates			
Concession Length (in months; including Construction)			360
Project start			01-Jun-00
Construction Start			01-Jun-00
Construction End			30-Nov-02
Operations start			01-Dec-02
Operations end			30-Nov-32
Start dates for Escalation		Start/Mid/End	
Construction Costs		**Mid**	01-Jun-00
Development costs		**Mid**	01-Jun-00
Revenues		**Mid**	01-Jun-00
Operating costs		**Mid**	01-Jun-00
Bond Indexation		**Mid**	01-Jun-00

Accounting assumptions			
Depreciation			
- start	Straight Line		**01-Jun-00**
- time	Years		**25**
Depreciation to zero (Yes = 1, No = 0)			0
Taxation			
		% of Capital	@
Capital allowances	reducing balance	**30%**	**25%**
	straight line	**20%**	**4%**
Capital allowances start			**01-Jun-00**
Owners costs set against tax when they occur			
All interest & fees set against tax when they occur			
Corporation tax			**30%**
Assumed that tax year is calendar year			
Tax Payment: 50% of last periods tax bill paid + 50% of this periods bill			**50%**
Loss carried forward is unlimited			
Deferred taxation assumed to be nil			

Non-Time Based Inputs

Financing			
Initial (lowest in sensitivities sheet) Annual LIBOR			3.63%
		from 28/03/03 (Bank of England	
Initial (lowest in sensitivities) Annual Inflation			3.20%
inflation sourced from http://www.moneyworld.co.uk/glossary/gl00278.htm			
Interest on cash on deposit (annual)	Reference Rate +		-1.00%
	SemiAnnual		-0.50%
Interest on overdrafts	Reference Rate +		1.50%
	SemiAnnual		0.75%
GEARING			
	Senior Debt		94%
	Blended Equity		6%
		sub debt	5.85%
		pure equity	0.15%

Senior Loan		Loan 1	Loan 2
Diff b/w Max and Min (0to5000+ve)		369	0
Maximum amount	→	**116,821,485**	**0**
% of Total Financing		94%	0%
% of Senior Debt		100%	0%
minimum required		116821115.8	0
Fees on loan			
- Front End Fee (Arrangement)		**1.30%**	**2.00%**
- Commitment fee		**0.50%**	**0.50%**
Term of Loan (Years)		**25**	
Margin on loan		**1.13%**	**1.20%**
First drawdown		**01-Jun-00**	**01-Jun-00**
Last drawdown		**30-Nov-02**	**30-Nov-02**
Repayment Start		**01-Dec-02**	**01-Dec-02**
Last Repayment		**31-Jan-28**	**31-Jan-28**
Interest rolled up until		**30-Nov-02**	**30-Nov-02**
Interest & fees capitalised until		**01-Dec-02**	**01-Dec-02**
Drawdown timing factor		**50%**	
	0%		

Non-Time Based Inputs

Bond		
	Diff must be +ve (0to5000)	122558804
Maximum Amount (Issue)	→	**122,558,804**
% of Financing		0%
	minimum required 0	
Fees		
- Upfront Fee (% of Bond Amount)		**0.63%**
- Agency Fees		???
Monoline Wrapped?		**Monoline**
- % per annum		**0.35%**
- Paid Upfront		**33.00%**
Initial (lowest in sensitivities) Annual Fixed Gilt		**5.50%**
Initial (lowest in sensitivities) Annual Indexed Gilt		**6.30%**
Spread over reference rate		**0.17%**
Tenor (Years after contract execution)		**30**
First Coupon Payment(Months after construction)		**6**
Interest on Proceeds Holding Account		**5.68%**
Drawdown timing factor for Interest		**100.00%**
Issue Date/1st Drawdown Date		**01-Jun-00**
Last Drawdown Date		**31-Dec-02**
First Repayment Date		**01-Dec-02**
Last Repayment Date		**30-Nov-32**

Blended Equity		
Facility Amount	8104416.4 Input →	**8,105,380**
% of Financing		6%
Equity Bridge Loan In Use ?		**No**
Fees on Bridge Loan		
- Front End Fee (Arrangement)		**0.90%**
- Commitment Fee		**0.30%**
Margin on Loan		**0.40%**
First Drawdown		**01-Jun-00**
Last drawdown		**30-Dec-02**
Bridge Repayment date		**30-Nov-02**
Interest Rolled Up Until	Bullet Repayment Date	**31-Dec-02**
Interest Capitalised Until		**30-Jun-03**
Drawdown Timing Factor		**50.00%**

Non-Time Based Inputs

Subordinated Debt		
Facility Amount	7902745.5 Input →	**7,902,773**
As % of Blended Equity		97.50%
Fees on Loan		
- Front End Fee (Arrangement)		**2.00%**
- Commitment Fee		**0.00%**
Coupon		**13.00%**
First Drawdown		**01-Jun-00**
Last Drawdown		**30-Nov-02**
Repayment start		**01-Dec-02**
Last Repayment		**31-Jan-30**
Interest Roll Up Start		**01-Jun-00**
Interest Capitalised Until		**31-Dec-02**
Drawdown Timings		50.00%

Equity (Share Capital)	
Facility Amount	**202,635**
As % of Equity & Bridge	2.50%
Date Injected	**01-Jun-00**
Date Redeemed	**31-Dec-32**

Time-Based Inputs

Semi Annual Schedule		Constn Start					Op Start			
Period Start		01-Jun-00	01-Dec-00	01-Jun-01	01-Dec-01	01-Jun-02	01-Dec-02	01-Jun-03	01-Dec-03	01-Jun-04
Period End		30-Nov-00	31-May-01	30-Nov-01	31-May-02	30-Nov-02	31-May-03	30-Nov-03	31-May-04	30-Nov-04
Period		2000.1	2000.2	2001.1	2001.2	2002.1	2002.2	2003.1	2003.2	2004.1
Semi Annual Period Count		1	2	3	4	5	6	7	8	9
Annual Period Indicator		1.1	1.2	2.1	2.2	3.1	3.2	4.1	4.2	5.1
Annual Period Count		1	1	2	2	3	3	4	4	5
MacroEconomic Assumptions										
Annual Interest Rate (LIBOR)	3.63%									
Semi Annual Interest Rate (LIBOR)		1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%
Annual Inflation rate	3.20%									
Semi Annual Inflation Rate		1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%
Inflation Indices										
Construction Costs										
Start		-	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13
Mid		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
End		1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14
Development costs										
Start		-	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13
Mid		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
End		1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14
Revenues										
Start		-	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13
Mid		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
End		1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14
Operating costs										
Start		-	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13
Mid		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
End		1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14
Bond Indexation										
Start		-	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13
Mid		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
End		1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14
End		1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14
Mid		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
Start		-	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13
Deflation factor to real terms		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13

x = Period Number and the resulting y value is Per Bed

Mean Unit Revenues Over Operating Period (nominal)

Equation and R2 Value: $y = 16.801x^{0.2311}$, $R^2 = 0.6834$ — Type: Power

Mean Unit Operating Costs Over Operating Period (nominal)

Equation and R2 Value: $y = 5.9057x^{0.376}$, $R^2 = 0.899$ — Type: Power

Revenues (Real)		17,370,890 Service Payment Per Annum (input in Control!)								
Operations Period Flag		0	0	0	0	0	1	1	1	1
Scenario 1		0	0	0	0	0	8685445	8685445	8685445	8685445
Scenario 2	FIXED ADSCR	0	0	0	0	0	7387715.384	6657559.205	6609068.004	6501009.079
Scenario 3 *using formula*		0	0	0	0	0	12709.71728	13170.65256	13583.42322	13958.23739
Scenario in use										
Scenario 1		0	0	0	0	0	8685445	8685445	8685445	8685445
Discount Rate	6.00%	3000000								
Operating costs (Real)		0	0	0	0	0	3000000	3000000	3000000	3000000
using formula from calcd from sample		*0*	*0*	*0*	*0*	*0*	*5791.969366*	*6137.595307*	*6453.617494*	*6745.848285*
Major Maintenance Costs (Real)	*straight from sample*	0	0	0	0	0	0	0	0	0

Monthly Cost Schedule		Constn Start								
	Period Starting	01-Jun-00	01-Jul-00	01-Aug-00	01-Sep-00	01-Oct-00	01-Nov-00	01-Dec-00	01-Jan-01	01-Feb-01
	Period Ending	30-Jun-00	31-Jul-00	31-Aug-00	30-Sep-00	31-Oct-00	30-Nov-00	31-Dec-00	31-Jan-01	28-Feb-01
	Period No.	2000.1	2000.1	2000.1	2000.1	2000.1	2000.1	2000.2	2000.2	2000.2
Monthly Period Count		1	2	3	4	5	6	7	8	9
Construction Period Flag		1	1	1	1	1	1	1	1	1

Time-Based Inputs

Construction Costs

Sample's Average Cost Profile (Per Bed)	6386.76	5227.23	4775.56	5957.95	4218.51	4497.72	5252.30	5985.71	7419.65

Below is the trend line for the Average Monthly
Construction Costs for a Health Sector PFI project
x = Period Number and the resulting y value is Per Bed (£000's)

Monthly Construction Costs
$y = -0.0131x^2 + 0.4097x + 4.328$
$R^2 = 0.7949$

Scenario 1 (Using Sample's Average Cost Profile)	3193380.482	2613616.528	2387777.87	2978976.4	2109256.2	2248861.496	2626150.341	2992852.62	3709822.991
Scenario 2 (Using Sample's Cost Trend Line)	2362300	2547500	2719600	2878600	3024500	3157300	3277000	3383600	3477100
Scenario in use									
Scenario 1 (Using Sample's Average Cost Profile)	**3193380.482**	**2613616.528**	**2387777.87**	**2978976.4**	**2109256.2**	**2248861.496**	**2626150.341**	**2992852.62**	**3709822.991**

Development Costs

From the Data collected and analysed the following formula has been arrived at for the Development Costs for a Health Sector PFI project
y = Development Cost applied only in the first Project Period

Development Costs (First Period)
y = 4.64% of Total Financing

First Period Flag	1	0	0	0	0	0	0	0	0

Bank Switch	1
Bond Switch	0

Development Costs - Upfront	6172697.444	0	0	0	0	0	0	0	0
Prefund DSRA	0	0	0	0	1363000	0	0	0	0
Prefund MMRA (3 periods before 1st MM outgoing)	0	0	0	0	79068	0	0	0	0

APPENDIX D: EXPERTS CONSULTED DURING VERIFICATION AND VALIDATION OF THIS THESIS

Alan Douglas, Head of Project Finance, Bank of America, London. UK.

Andrew Porter, Director, PricewaterhouseCoopers, London. UK.

Chris Tanner, Assistant Director, PricewaterhouseCoopers, London. UK

Nigel Smith, University of Leeds. UK.

Neil Woodings, Director PricewaterhouseCoopers, London. UK.

Paul Newman, Manager PricewaterhouseCoopers, London. UK

APPENDIX E: INITIAL SIMULATION INPUTS

Initially 'optimise' the base cases (Bank and Bond): Try all repayment combos and sculpting meet the lenders and investors criteria and have the lowest NPV

			Snr Loan	Bond	Sub Debt	Equity	Bank or Bond (1) Bank or (2) Bond	Interest Rate = 3.63%	Inflation (1) 3.2% (2) 0.0% (3) 7.5%	Senior Loan Repayment (1) Annuity (2) Sculpted	Bond Amortisation over last 4yrs (1) Annuity (2) Sculpted	Sub Debt Repayment (1) Annuity (2) Sculpted	Bond Indexation (1) Fixed (2) Indexed	Bond Monoline Wrapping (1) Unwrapped (2) Wrapped	% of Revenue Indexed (1) 40% (2) 100%
Stage A - Bank Base Case															
	1	Base Case 1	**94.0%**	0.0%	5.85%	0.15%	1	1	1	1		1			1
	2	Base Case 2	**94.0%**	0.0%	5.85%	0.15%	1	1	1	1		2			1
	3	Base Case 3	**94.0%**	0.0%	5.85%	0.15%	1	1	1	2		1			1
	4	Base Case 4	**94.0%**	0.0%	5.85%	0.15%	1	1	1	2		2			1
Stage B - Bond Base Case (Find Bond Optimal Gearing first)															
B	5	Base Case 5	0.0%	**94.0%**	5.85%	0.15%	2	1	1		2	1	1	1	1
	6	Base Case 6	0.0%	**94.0%**	5.85%	0.15%	2	1	1		2	1	2	1	2
Stage C - Change in Blended Equity															
	7	Base Case 7	**94.0%**	0.0%	5.85%	0.15%	1	1	1	2		1			1
	8	Base Case 8	**94.0%**	0.0%	0.15%	5.85%	1	1	1	2		1			1
Stage D - Change in Gearing															
	9	Model D1	**90.0%**	0.0%	9.85%	0.15%	1	1	1	2		1			1
	10	Model D2	**92.0%**	0.0%	7.85%	0.15%	1	1	1	2		1			1
	11	Model D3	**96.0%**	0.0%	3.85%	0.15%	1	1	1	2		1			1
	12	Model D4	**98.0%**	0.0%	1.85%	0.15%	1	1	1	2		1			1
	13	Model D5	**100.0%**	0.0%	0.00%	0.00%	1	1	1	2		1			1
Stage E - Sensitivity to Inflation															
E1	14	Model E1a	**94.0%**	0.0%	5.85%	0.15%	1	1	1	2		1			1
	15	Model E1b	**94.0%**	0.0%	5.85%	0.15%	1	1	2	2		1			1
	16	Model E1c	**94.0%**	0.0%	5.85%	0.15%	1	1	3	2		1			1
Fixed Bond															
E2	17	Model E2a	0.0%	**94.0%**	5.85%	0.15%	2	1	1		2	2	1	1	1
	18	Model E2b	0.0%	**94.0%**	5.85%	0.15%	2	1	2		2	2	1	1	1
	19	Model E2c	0.0%	**94.0%**	5.85%	0.15%	2	1	3		2	2	1	1	1
Indexed Bond															
E3	20	Model E3a	0.0%	**94.0%**	5.85%	0.15%	2	1	1		2	1	2	1	2
	21	Model E3b	0.0%	**94.0%**	5.85%	0.15%	2	1	2		2	1	2	1	2
	22	Model E3c	0.0%	**94.0%**	5.85%	0.15%	2	1	3		2	1	2	1	2
Stage F - Monoline Wrapping															
	23	Model F1	0.0%	**94.0%**	5.85%	0.15%	2	1	1		2	1	1	2	1
	24	Model F2	0.0%	**94.0%**	5.85%	0.15%	2	1	1		2	1	2	2	2

APPENDIX F: SIMULATION RESULTS SHEETS

RESULTS SHEET

Scenario/Simulation :	Model F2
Run on:	May-30-2003 (07:13 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Indexed)	133,548,078
Blended Equity	8,054,785
Subordinated Loan	7,853,446
Prefund DSRA (max required)	0
Prefund MMRA (min required)	93,289
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.96 : 7.04
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	Yes
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	86.32%
Capitalised Interest	1,265,647	1.11%
Prefund DSRA	0	0.00%
Prefund MMRA	123,000	0.11%
Financing Fees	7,324,343	6.40%
Bid/Development Costs	6,944,116	6.07%
	£114,440,194	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	16.26%
Project IRR (Post Tax)	Nominal	16.26%
Project IRR (Pre Tax)	Real	12.66%
Project IRR (Post Tax)	Real	12.66%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	23.82%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	19.98%
Equity (Dividends) IRR	Nominal	46.73%
Equity/Cash IRR (Post Tax)	Nominal	66.27%
Equity (Dividends) IRR	Real	42.18%
Equity/Cash IRR (Post Tax)	Real	61.12%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	106,384,073	92.96%
Subordinated Debt	7,886,358	6.89%
Equity	169,762	0.15%
	£114,440,194	100.00%

Cash Balances		Total
Maximum Cash Balance		148,354,377
Minimum Cash Balance		0
NPV's	discounted at	
Revenue Stream NPV	6%	£182,197,022.42

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		13.77
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		2.65
LLCR - Average (Inc Reserve + Cash b/f)		3.40
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-00

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.73

RESULTS SHEET	
Scenario/Simulation :	Model F1
Run on:	May-30-2003 (07:13 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	130,790,388
Blended Equity	7,675,864
Subordinated Loan	7,483,971
Prefund DSRA (max required)	0
Prefund MMRA (min required)	93,289
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.97 : 7.03
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	Yes
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	88.56%
Capitalised Interest	1,220,316	1.09%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.08%
Financing Fees	4,666,881	4.18%
Bid/Development Costs	6,780,994	6.08%
	£111,544,567	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	9.04%
Project IRR (Post Tax)	Nominal	8.38%
Project IRR (Pre Tax)	Real	5.66%
Project IRR (Post Tax)	Real	5.02%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.54%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	10.02%
Equity (Dividends) IRR	Nominal	5.10%
Equity/Cash IRR (Post Tax)	Nominal	5.05%
Equity (Dividends) IRR	Real	1.85%
Equity/Cash IRR (Post Tax)	Real	1.80%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	103,704,796	92.97%
Subordinated Debt	7,674,285	6.88%
Equity	165,486	0.15%
	£111,544,567	100.00%

Cash Balances		Total
Maximum Cash Balance		69,551,207
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£124,573,481.64

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		11.62
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.20
LLCR - Average (Inc Reserve + Cash b/f)		1.39
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-25

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.31

RESULTS SHEET		Scenario/Simulation :	Model E3cSculpted
		Run on:	May-30-2003 (07:12 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Indexed)	128,648,078
Blended Equity	7,543,585
Subordinated Loan	7,355,046
Prefund DSRA (max required)	0
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	91.74%
Capitalised Interest	1,153,695	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	115,602	0.11%
Financing Fees	951,151	0.88%
Bid/Development Costs	6,669,318	6.19%
	£107,672,853	100.00%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	100,128,008	92.99%
Subordinated Debt	7,385,066	6.86%
Equity	159,779	0.15%
	£107,672,853	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	21.01%
Project IRR (Post Tax)	Nominal	21.01%
Project IRR (Pre Tax)	Real	12.57%
Project IRR (Post Tax)	Real	12.57%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	28.64%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	19.67%
Equity (Dividends) IRR	Nominal	62.04%
Equity/Cash IRR (Post Tax)	Nominal	-0.19%
Equity (Dividends) IRR	Real	50.73%
Equity/Cash IRR (Post Tax)	Real	59.22%

Cash Balances		Total
Maximum Cash Balance		303,598,813
Minimum Cash Balance		(755,481)
NPV's	discounted at	
Revenue Stream NPV	6%	£297,269,613.31

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		0.95
DSCR - Average (Excl Reserves)		10.61
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		4.91
LLCR - Average (Inc Reserve + Cash b/f)		8.35
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-00

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	29.09

RESULTS SHEET

Scenario/Simulation :	Model E3c
Run on:	May-30-2003 (07:12 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Indexed)	128,648,078
Blended Equity	7,543,585
Subordinated Loan	7,355,046
Prefund DSRA (max required)	0
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	91.76%
Capitalised Interest	1,153,653	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	951,151	0.88%
Bid/Development Costs	6,669,318	6.20%
	£107,650,498	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	21.01%
Project IRR (Post Tax)	Nominal	21.01%
Project IRR (Pre Tax)	Real	12.57%
Project IRR (Post Tax)	Real	12.57%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	30.81%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	21.68%
Equity (Dividends) IRR	Nominal	62.88%
Equity/Cash IRR (Post Tax)	Nominal	1.70%
Equity (Dividends) IRR	Real	51.52%
Equity/Cash IRR (Post Tax)	Real	59.21%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	100,107,034	92.99%
Subordinated Debt	7,383,718	6.86%
Equity	159,745	0.15%
	£107,650,498	100.00%

Cash Balances		Total
Maximum Cash Balance		162,074,888
Minimum Cash Balance		(805,323,358)
NPV's	discounted at	
Revenue Stream NPV	6%	£297,269,613.31

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		0.94
DSCR - Average (Excl Reserves)		9.97
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.73
LLCR - Average (Inc Reserve + Cash b/f)		3.97
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-32

Checks		
Balanced Sheet Balanced ?		YES
Cashflow positive ?		NO
Senior debt repaid	87703971.84	NO
Sub debt repaid		YES
DSRA fully funded		YES

Average Life Senior Debt (yrs)	9.04

RESULTS SHEET

Scenario/Simulation :	Model E3b
Run on:	May-30-2003 (07:11 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Indexed)	128,648,078
Blended Equity	7,543,585
Subordinated Loan	7,355,046
Prefund DSRA (max required)	0
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	0.00%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	91.76%
Capitalised Interest	1,153,653	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	951,151	0.88%
Bid/Development Costs	6,669,318	6.20%
	£107,650,498	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	11.85%
Project IRR (Post Tax)	Nominal	10.34%
Project IRR (Pre Tax)	Real	11.85%
Project IRR (Post Tax)	Real	10.34%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	17.94%
	Real	13.86%
Blended Equity IRR (Post Tax)	Real	17.94%
Equity (Dividends) IRR	Nominal	30.09%
Equity/Cash IRR (Post Tax)	Nominal	-2.58%
Equity (Dividends) IRR	Real	30.09%
Equity/Cash IRR (Post Tax)	Real	-2.58%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	100,107,034	92.99%
Subordinated Debt	7,383,718	6.86%
Equity	159,745	0.15%
	£107,650,498	100.00%

Cash Balances		Total
Maximum Cash Balance		132,456,035
Minimum Cash Balance		0
NPV's	discounted at	
Revenue Stream NPV	6%	£126,512,443.22

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.32
DSCR - Average (Excl Reserves)		19.20
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.64
LLCR - Average (Inc Reserve + Cash b/f)		1.99
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-00

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	26.19

RESULTS SHEET

Scenario/Simulation :	Model E3a
Run on:	May-30-2003 (07:11 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Indexed)	128,648,078
Blended Equity	7,543,585
Subordinated Loan	7,355,046
Prefund DSRA (max required)	0
Prefund MMRA (min required)	93,289
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	91.76%
Capitalised Interest	1,153,653	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	951,151	0.88%
Bid/Development Costs	6,669,318	6.20%
	£107,650,498	100.00%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	100,107,034	92.99%
Subordinated Debt	7,383,718	6.86%
Equity	159,745	0.15%
	£107,650,498	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	15.75%
Project IRR (Post Tax)	Nominal	15.75%
Project IRR (Pre Tax)	Real	12.16%
Project IRR (Post Tax)	Real	12.16%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	24.86%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	20.99%
Equity (Dividends) IRR	Nominal	49.55%
Equity/Cash IRR (Post Tax)	Nominal	68.27%
Equity (Dividends) IRR	Real	44.92%
Equity/Cash IRR (Post Tax)	Real	63.05%

Cash Balances		Total
Maximum Cash Balance		144,334,412
Minimum Cash Balance		0
NPV's	discounted at	
Revenue Stream NPV	6%	£176,967,658.31

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		14.17
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		2.70
LLCR - Average (Inc Reserve + Cash b/f)		3.44
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-00

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.73

RESULTS SHEET

Scenario/Simulation :	Model E2cSculpted
Run on:	May-30-2003 (07:10 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.01%
Capitalised Interest	1,148,228	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,362,615	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.79%
Project IRR (Post Tax)	Nominal	7.78%
Project IRR (Pre Tax)	Real	1.20%
Project IRR (Post Tax)	Real	0.26%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.63%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	5.71%
Equity (Dividends) IRR	Nominal	9.92%
Equity/Cash IRR (Post Tax)	Nominal	4.83%
Equity (Dividends) IRR	Real	2.25%
Equity/Cash IRR (Post Tax)	Real	-2.48%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,841,523	92.99%
Subordinated Debt	7,361,770	6.86%
Equity	159,322	0.15%
	£107,362,615	100.00%

Cash Balances		Total
Maximum Cash Balance		58,539,543
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£162,927,229.92

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		10.91
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.18
LLCR - Average (Inc Reserve + Cash b/f)		1.42
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-26

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	29.32

RESULTS SHEET

Scenario/Simulation :	Model E2b
Run on:	May-30-2003 (07:09 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.01%
Capitalised Interest	1,148,228	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,362,615	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.35%
Project IRR (Post Tax)	Nominal	7.41%
Project IRR (Pre Tax)	Real	0.79%
Project IRR (Post Tax)	Real	-0.08%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.04%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	5.15%
Equity (Dividends) IRR	Nominal	#DIV/0!
Equity/Cash IRR (Post Tax)	Nominal	5.88%
Equity (Dividends) IRR	Real	#DIV/0!
Equity/Cash IRR (Post Tax)	Real	-1.50%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,841,523	92.99%
Subordinated Debt	7,361,770	6.86%
Equity	159,322	0.15%
	£107,362,615	100.00%

Cash Balances		Total
Maximum Cash Balance		55,666,651
Minimum Cash Balance		(12,752,496)
NPV's	discounted at	
Revenue Stream NPV	6%	£160,416,650.24

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		-1.79
DSCR - Average (Excl Reserves)		9.24
Minimum DSCR Year (Exc Reserves)		01-Jun-32
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		-0.42
LLCR - Average (Inc Reserve + Cash b/f)		1.21
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-31

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.32

RESULTS SHEET

Scenario/Simulation :	Model E2b
Run on:	May-30-2003 (07:09 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.01%
Capitalised Interest	1,148,228	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,362,615	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.35%
Project IRR (Post Tax)	Nominal	7.41%
Project IRR (Pre Tax)	Real	0.79%
Project IRR (Post Tax)	Real	-0.08%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.04%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	5.15%
Equity (Dividends) IRR	Nominal	#DIV/0!
Equity/Cash IRR (Post Tax)	Nominal	5.88%
Equity (Dividends) IRR	Real	#DIV/0!
Equity/Cash IRR (Post Tax)	Real	-1.50%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,841,523	92.99%
Subordinated Debt	7,361,770	6.86%
Equity	159,322	0.15%
	£107,362,615	100.00%

Cash Balances		Total
Maximum Cash Balance		55,666,651
Minimum Cash Balance		(12,752,496)
NPV's	discounted at	
Revenue Stream NPV	6%	£160,416,650.24

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		-1.79
DSCR - Average (Excl Reserves)		9.24
Minimum DSCR Year (Exc Reserves)		01-Jun-32
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		-0.42
LLCR - Average (Inc Reserve + Cash b/f)		1.21
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-31

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.32

RESULTS SHEET

Scenario/Simulation :	Model E2bSculpted
Run on:	May-30-2003 (07:09 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	0.00%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.01%
Capitalised Interest	1,148,228	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,362,615	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.50%
Project IRR (Post Tax)	Nominal	7.78%
Project IRR (Pre Tax)	Real	8.50%
Project IRR (Post Tax)	Real	7.78%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.81%
	Real	13.86%
Blended Equity IRR (Post Tax)	Real	13.81%
Equity (Dividends) IRR	Nominal	13.31%
Equity/Cash IRR (Post Tax)	Nominal	4.72%
Equity (Dividends) IRR	Real	13.31%
Equity/Cash IRR (Post Tax)	Real	4.72%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,841,523	92.99%
Subordinated Debt	7,361,770	6.86%
Equity	159,322	0.15%
	£107,362,615	100.00%

Cash Balances		Total
Maximum Cash Balance		76,462,250
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£104,174,062.21

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		12.22
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.25
LLCR - Average (Inc Reserve + Cash b/f)		1.61
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-25

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	27.74

RESULTS SHEET

Scenario/Simulation :	Model E2b
Run on:	May-30-2003 (07:09 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**0.00%**

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.01%
Capitalised Interest	1,148,228	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,362,615	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.50%
Project IRR (Post Tax)	Nominal	7.79%
Project IRR (Pre Tax)	Real	8.50%
Project IRR (Post Tax)	Real	7.79%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.75%
	Real	13.86%
Blended Equity IRR (Post Tax)	Real	13.75%
Equity (Dividends) IRR	Nominal	12.37%
Equity/Cash IRR (Post Tax)	Nominal	4.73%
Equity (Dividends) IRR	Real	12.37%
Equity/Cash IRR (Post Tax)	Real	4.73%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,841,523	92.99%
Subordinated Debt	7,361,770	6.86%
Equity	159,322	0.15%
	£107,362,615	100.00%

Cash Balances		Total
Maximum Cash Balance		76,462,250
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£104,174,062.21

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		12.38
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.26
LLCR - Average (Inc Reserve + Cash b/f)		1.47
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-25

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.32

RESULTS SHEET

Scenario/Simulation :	Model E2a
Run on:	May-30-2003 (07:08 PM)

Inputs

Financing		(Max amounts)
Senior Loan 1		0
Senior Loan 2		0
Bond (Fixed)		123,670,388
Blended Equity		7,362,017
Subordinated Loan		7,178,121
	Prefund DSRA (max required)	0
	Prefund MMRA (min required)	93,289
MacroEconomics		
	Annual Interest Rate	3.63%
	Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2 50%
	Subordinated Loan	97 50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1 13%
Loan 2	1 20%
Bond (over reference rate)	0 17%
Subordinated Loan	13 00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.01%
Capitalised Interest	1,148,228	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	93,289	0.09%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,362,615	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8 46%
Project IRR (Post Tax)	Nominal	7 68%
Project IRR (Pre Tax)	Real	5 10%
Project IRR (Post Tax)	Real	4 35%
Subordinated Debt IRR	Nominal	13 86%
Blended Equity IRR (Post Tax)	Nominal	13 54%
	Real	10 33%
Blended Equity IRR (Post Tax)	Real	10 02%
Equity (Dividends) IRR	Nominal	4 13%
Equity/Cash IRR (Post Tax)	Nominal	5 07%
Equity (Dividends) IRR	Real	0 90%
Equity/Cash IRR (Post Tax)	Real	1 81%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,841,523	92.99%
Subordinated Debt	7,361,770	6.86%
Equity	159,322	0.15%
	£107,362,615	100.00%

Cash Balances		Total
Maximum Cash Balance		65,446,278
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£120,792,584.73

Cover Ratios		
	Target Minimum DSCR	1 15
DSCR - minimum (Excl Reserves)		1 15
DSCR - Average (Excl Reserves)		11 56
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1 18
LLCR - Minimum (Inc Reserve + Cash b/f)		1 20
LLCR - Average (Inc Reserve + Cash b/f)		1 39
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-25

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.32

RESULTS SHEET

Scenario/Simulation :	Model E1cRevenue
Run on:	May-30-2003 (07:08 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,370,077
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.94%
Capitalised Interest	8,432,645	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	115,602	0.09%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,137,547	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	9.60%
Project IRR (Post Tax)	Nominal	8.07%
Project IRR (Pre Tax)	Real	1.96%
Project IRR (Post Tax)	Real	0.53%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.93%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	7.84%
Equity (Dividends) IRR	Nominal	23.61%
Equity/Cash IRR (Post Tax)	Nominal	384.72%
Equity (Dividends) IRR	Real	14.99%
Equity/Cash IRR (Post Tax)	Real	350.90%

Funding Sources	Total	%
Senior Loan 1	116,855,866	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,106,623	6.48%
Equity	175,057	0.14%
	£125,137,547	100.00%

Cash Balances		Total
Maximum Cash Balance		4,250,670
Minimum Cash Balance		(545,111)
NPV's	discounted at	
Revenue Stream NPV	6%	£168,359,380.48

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.33
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.24
LLCR - Average (Inc Reserve + Cash b/f)		1.46
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	14.26

RESULTS SHEET

Scenario/Simulation :	Model E1cSculpted
Run on:	May-30-2003 (07:07 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,372,850
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2 50%
	Subordinated Loan	97 50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1 13%
Loan 2	1 20%
Bond (over reference rate)	0 17%
Subordinated Loan	13 00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,353	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	93,289	0.07%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,114,942	100.00%

Funding Sources	Total	%
Senior Loan 1	116,834,643	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,275	6.48%
Equity	175,024	0.14%
	£125,114,942	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8 59%
Project IRR (Post Tax)	Nominal	7 29%
Project IRR (Pre Tax)	Real	1 02%
Project IRR (Post Tax)	Real	-0 20%
Subordinated Debt IRR	Nominal	13 86%
Blended Equity IRR (Post Tax)	Nominal	15 27%
	Real	5 92%
Blended Equity IRR (Post Tax)	Real	7 23%
Equity (Dividends) IRR	Nominal	21 26%
Equity/Cash IRR (Post Tax)	Nominal	378 26%
Equity (Dividends) IRR	Real	12 80%
Equity/Cash IRR (Post Tax)	Real	344 90%

Cash Balances		Total
Maximum Cash Balance		31,649,506
Minimum Cash Balance		(15,825,504)
NPV's	discounted at	
Revenue Stream NPV	6%	£162,324,690.80

Cover Ratios		
	Target Minimum DSCR	1 15
DSCR - minimum (Excl Reserves)		-0 39
DSCR - Average (Excl Reserves)		7 51
Minimum DSCR Year (Exc Reserves)		01-Dec-23
	Target Minimum LLCR	1 18
LLCR - Minimum (Inc Reserve + Cash b/f)		1 18
LLCR - Average (Inc Reserve + Cash b/f)		1 13
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-32

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	NO
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	20 95

RESULTS SHEET

Scenario/Simulation :	Model E1c
Run on:	May-30-2003 (07:07 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,373,344
Prefund MMRA (min required)	115,602
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	7.50%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,353	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	93,289	0.07%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,114,942	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.59%
Project IRR (Post Tax)	Nominal	7.26%
Project IRR (Pre Tax)	Real	1.02%
Project IRR (Post Tax)	Real	-0.22%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	14.70%
	Real	5.92%
Blended Equity IRR (Post Tax)	Real	6.70%
Equity (Dividends) IRR	Nominal	19.32%
Equity/Cash IRR (Post Tax)	Nominal	383.98%
Equity (Dividends) IRR	Real	11.00%
Equity/Cash IRR (Post Tax)	Real	350.21%

Funding Sources	Total	%
Senior Loan 1	116,834,643	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,275	6.48%
Equity	175,024	0.14%
	£125,114,942	100.00%

Cash Balances		Total
Maximum Cash Balance		656,502
Minimum Cash Balance		(30,885,298)
NPV's	discounted at	
Revenue Stream NPV	6%	£162,324,690.80

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		-7.30
DSCR - Average (Excl Reserves)		-0.82
Minimum DSCR Year (Exc Reserves)		01-Dec-25
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		-3.07
LLCR - Average (Inc Reserve + Cash b/f)		0.77
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-26

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	14.38

RESULTS SHEET

Scenario/Simulation :	**Model E1bSculpted**
Run on:	**May-30-2003 (07:07 PM)**

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,373,692
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**0.00%**

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,353	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	93,289	0.07%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,114,942	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.60%
Project IRR (Post Tax)	Nominal	7.49%
Project IRR (Pre Tax)	Real	8.60%
Project IRR (Post Tax)	Real	7.49%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.40%
	Real	13.86%
Blended Equity IRR (Post Tax)	Real	15.40%
Equity (Dividends) IRR	Nominal	22.29%
Equity/Cash IRR (Post Tax)	Nominal	372.72%
Equity (Dividends) IRR	Real	22.29%
Equity/Cash IRR (Post Tax)	Real	372.72%

Funding Sources	Total	%
Senior Loan 1	116,834,643	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,275	6.48%
Equity	175,024	0.14%
	£125,114,942	100.00%

Cash Balances		Total
Maximum Cash Balance		2,040,249
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£105,413,137.68

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		2.62
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.19
LLCR - Average (Inc Reserve + Cash b/f)		4.70
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Average Life Senior Debt (yrs)	13.53

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

RESULTS SHEET

Scenario/Simulation :	Model E1b
Run on:	May-30-2003 (07:02 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,373,344
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	0.00%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,353	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	93,289	0.07%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,114,942	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.60%
Project IRR (Post Tax)	Nominal	7.51%
Project IRR (Pre Tax)	Real	8.60%
Project IRR (Post Tax)	Real	7.51%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.33%
	Real	13.86%
Blended Equity IRR (Post Tax)	Real	15.33%
Equity (Dividends) IRR	Nominal	22.02%
Equity/Cash IRR (Post Tax)	Nominal	368.30%
Equity (Dividends) IRR	Real	22.02%
Equity/Cash IRR (Post Tax)	Real	368.30%

Funding Sources	Total	%
Senior Loan 1	116,834,643	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,275	6.48%
Equity	175,024	0.14%
	£125,114,942	100.00%

Cash Balances		Total
Maximum Cash Balance		11,761,809
Minimum Cash Balance		(204,801)
NPV's	discounted at	
Revenue Stream NPV	6%	£105,413,137.68

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.08
DSCR - Average (Excl Reserves)		2.61
Minimum DSCR Year (Exc Reserves)		01-Jun-08
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.22
LLCR - Average (Inc Reserve + Cash b/f)		1.53
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	NO
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	14.38

RESULTS SHEET

Scenario/Simulation :	Model E1a
Run on:	May-30-2003 (07:01 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,373,344
Prefund MMRA (min required)	93,289
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,353	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	93,289	0.07%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,114,942	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.60%
Project IRR (Post Tax)	Nominal	7.43%
Project IRR (Pre Tax)	Real	5.23%
Project IRR (Post Tax)	Real	4.10%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.13%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.56%
Equity (Dividends) IRR	Nominal	21.20%
Equity/Cash IRR (Post Tax)	Nominal	374.89%
Equity (Dividends) IRR	Real	17.45%
Equity/Cash IRR (Post Tax)	Real	360.16%

Funding Sources	Total	%
Senior Loan 1	116,834,643	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,275	6.48%
Equity	175,024	0.14%
	£125,114,942	100.00%

Cash Balances		Total
Maximum Cash Balance		1,668,836
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£122,229,325.56

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.33
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.19
LLCR - Average (Inc Reserve + Cash b/f)		1.35
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Average Life Senior Debt (yrs)	14.38

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

RESULTS SHEET

Scenario/Simulation :	Model D6
Run on:	May-30-2003 (07:01 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	118,115,117
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	6,723,793
Subordinated Loan	6,522,083
Prefund DSRA (max required)	1,394,730
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages	
Required/Desired Gearing	95 : 5
Actual Gearing	94.48 : 5.52
Composition of senior debt	
Senior Loan 1	0%
Senior Loan 2	0%
Bond	0%
Composition of Blended Equity	
Pure Equity	3.00%
Subordinated Loan	97.00%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	79.02%
Capitalised Interest	8,289,246	6.63%
Prefund DSRA	1,394,730	1.12%
Prefund MMRA	79,068	0.06%
Financing Fees	10,360,571	8.29%
Bid/Development Costs	6,104,510	4.88%
	£125,011,212	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.56%
Project IRR (Post Tax)	Nominal	7.34%
Project IRR (Pre Tax)	Real	5.19%
Project IRR (Post Tax)	Real	4.01%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.44%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.86%
Equity (Dividends) IRR	Nominal	21.63%
Equity/Cash IRR (Post Tax)	Nominal	383.02%
Equity (Dividends) IRR	Real	17.86%
Equity/Cash IRR (Post Tax)	Real	368.04%

Funding Sources	Total	%
Senior Loan 1	118,114,545	94.48%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	6,721,584	5.38%
Equity	175,083	0.14%
	£125,011,212	100.00%

Cash Balances		Total
Maximum Cash Balance		1,807,111
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£121,946,458.46

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.21
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.15
LLCR - Average (Inc Reserve + Cash b/f)		1.31
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	13.60

RESULTS SHEET

Scenario/Simulation :	Model D5
Run on:	May-30-2003 (07:00 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	115,603,541
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	9,491,968
Subordinated Loan	9,288,573
Prefund DSRA (max required)	1,394,730
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		93 : 7
Actual Gearing		92.28 : 7.72
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.14%
	Subordinated Loan	97.86%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	78.86%
Capitalised Interest	8,577,299	6.85%
Prefund DSRA	1,394,730	1.11%
Prefund MMRA	79,068	0.06%
Financing Fees	10,191,493	8.14%
Bid/Development Costs	6,244,859	4.99%
	£125,270,535	100.00%

Funding Sources	Total	%
Senior Loan 1	115,603,539	92.28%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	9,491,956	7.58%
Equity	175,040	0.14%
	£125,270,535	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.60%
Project IRR (Post Tax)	Nominal	7.46%
Project IRR (Pre Tax)	Real	5.24%
Project IRR (Post Tax)	Real	4.13%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	14.94%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.38%
Equity (Dividends) IRR	Nominal	21.02%
Equity/Cash IRR (Post Tax)	Nominal	409.91%
Equity (Dividends) IRR	Real	17.27%
Equity/Cash IRR (Post Tax)	Real	394.10%

Cash Balances		Total
Maximum Cash Balance		1,888,144
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£122,296,541.50

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.27
Minimum DSCR Year (Exc Reserves)		01-Dec-23
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.20
LLCR - Average (Inc Reserve + Cash b/f)		1.38
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	13.89

RESULTS SHEET

Scenario/Simulation :	Model D4
Run on:	May-30-2003 (06:59 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	121,883,052
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	2,564,530
Subordinated Loan	2,372,247
Prefund DSRA (max required)	1,394,730
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		98 : 2
Actual Gearing		97.8 : 2.2
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	7.50%
	Subordinated Loan	92.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	79.27%
Capitalised Interest	7,857,567	6.31%
Prefund DSRA	1,394,730	1.12%
Prefund MMRA	79,068	0.06%
Financing Fees	10,614,711	8.52%
Bid/Development Costs	5,893,365	4.73%
	£124,622,528	100.00%

Funding Sources	Total	%
Senior Loan 1	121,882,907	97.80%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	2,564,473	2.06%
Equity	175,147	0.14%
	£124,622,528	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	10.94%
Project IRR (Post Tax)	Nominal	9.09%
Project IRR (Pre Tax)	Real	7.50%
Project IRR (Post Tax)	Real	5.70%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	22.22%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	18.43%
Equity (Dividends) IRR	Nominal	32.25%
Equity/Cash IRR (Post Tax)	Nominal	416.99%
Equity (Dividends) IRR	Real	28.15%
Equity/Cash IRR (Post Tax)	Real	400.96%

Cash Balances		Total
Maximum Cash Balance		9,136,750
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£137,140,062.72

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.21
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.09
LLCR - Average (Inc Reserve + Cash b/f)		1.47
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	9.40

RESULTS SHEET

Scenario/Simulation :	Model D3
Run on:	May-30-2003 (06:59 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	119,372,352
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	5,336,672
Subordinated Loan	5,136,647
Prefund DSRA (max required)	1,394,730
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		96 : 4
Actual Gearing		95.59 : 4.41
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	3.75%
	Subordinated Loan	96.25%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	79.10%
Capitalised Interest	8,145,300	6.52%
Prefund DSRA	1,394,730	1.12%
Prefund MMRA	79,068	0.06%
Financing Fees	10,445,390	8.36%
Bid/Development Costs	6,034,125	4.83%
	£124,881,700	100.00%

Funding Sources	Total	%
Senior Loan 1	119,370,505	95.59%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	5,336,090	4.27%
Equity	175,105	0.14%
	£124,881,700	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	10.92%
Project IRR (Post Tax)	Nominal	9.15%
Project IRR (Pre Tax)	Real	7.48%
Project IRR (Post Tax)	Real	5.76%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	19.62%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	15.91%
Equity (Dividends) IRR	Nominal	31.53%
Equity/Cash IRR (Post Tax)	Nominal	401.39%
Equity (Dividends) IRR	Real	27.46%
Equity/Cash IRR (Post Tax)	Real	385.84%

Cash Balances		Total
Maximum Cash Balance		9,986,503
Minimum Cash Balance		0
NPV's	discounted at	
Revenue Stream NPV	6%	£137,140,062.72

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.19
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.12
LLCR - Average (Inc Reserve + Cash b/f)		1.41
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	9.45

RESULTS SHEET

Scenario/Simulation :	Model D2
Run on:	May-30-2003 (06:59 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	114,291,237
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	10,871,886
Subordinated Loan	10,668,107
Prefund DSRA (max required)	1,342,281
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**3.20%**

Percentages	
Required/Desired Gearing	92 : 8
Actual Gearing	91.19 : 8.81
Composition of senior debt	
Senior Loan 1	0%
Senior Loan 2	0%
Bond	0%
Composition of Blended Equity	
Pure Equity	1.88%
Subordinated Loan	98.13%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	78.82%
Capitalised Interest	8,719,685	6.96%
Prefund DSRA	1,342,281	1.07%
Prefund MMRA	79,068	0.06%
Financing Fees	10,098,806	8.06%
Bid/Development Costs	6,312,028	5.04%
	£125,334,955	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.66%
Project IRR (Post Tax)	Nominal	7.54%
Project IRR (Pre Tax)	Real	5.29%
Project IRR (Post Tax)	Real	4.21%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	14.80%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.24%
Equity (Dividends) IRR	Nominal	20.87%
Equity/Cash IRR (Post Tax)	Nominal	382.31%
Equity (Dividends) IRR	Real	17.12%
Equity/Cash IRR (Post Tax)	Real	367.36%

Funding Sources	Total	%
Senior Loan 1	114,288,527	91.19%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	10,871,505	8.67%
Equity	174,923	0.14%
	£125,334,955	100.00%

Cash Balances		Total
Maximum Cash Balance		2,128,407
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£122,646,624.55

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.29
Minimum DSCR Year (Exc Reserves)		01-Jun-22
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.22
LLCR - Average (Inc Reserve + Cash b/f)		1.37
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Average Life Senior Debt (yrs)	13.94

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

RESULTS SHEET

Scenario/Simulation :	Model D1
Run on:	May-30-2003 (06:58 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	111,749,542
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	13,636,037
Subordinated Loan	13,431,501
Prefund DSRA (max required)	1,311,540
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		90 : 10
Actual Gearing		89 : 11
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	1 50%
	Subordinated Loan	98 50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1 13%
Loan 2	1 20%
Bond (over reference rate)	0 17%
Subordinated Loan	13 00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	78.68%
Capitalised Interest	9,007,038	7.17%
Prefund DSRA	1,311,540	1.04%
Prefund MMRA	79,068	0.06%
Financing Fees	9,925,601	7.91%
Bid/Development Costs	6,450,603	5.14%
	£125,556,937	100.00%

Funding Sources	Total	%
Senior Loan 1	111,746,672	89.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	13,635,440	10.86%
Equity	174,825	0.14%
	£125,556,937	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8 83%
Project IRR (Post Tax)	Nominal	7 75%
Project IRR (Pre Tax)	Real	5 46%
Project IRR (Post Tax)	Real	4 41%
Subordinated Debt IRR	Nominal	13 86%
Blended Equity IRR (Post Tax)	Nominal	14 65%
Subordinated Debt IRR	Real	10 33%
Blended Equity IRR (Post Tax)	Real	11 10%
Equity (Dividends) IRR	Nominal	20 91%
Equity/Cash IRR (Post Tax)	Nominal	362 11%
Equity (Dividends) IRR	Real	17 16%
Equity/Cash IRR (Post Tax)	Real	347 78%

Cash Balances		Total
Maximum Cash Balance		2,613,173
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£123,792,096.28

Cover Ratios		
	Target Minimum DSCR	1 15
DSCR - minimum (Excl Reserves)		1 15
DSCR - Average (Excl Reserves)		1 34
Minimum DSCR Year (Exc Reserves)		01-Jun-11
	Target Minimum LLCR	1 18
LLCR - Minimum (Inc Reserve + Cash b/f)		1 28
LLCR - Average (Inc Reserve + Cash b/f)		1 46
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Average Life Senior Debt (yrs)	13 88

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

RESULTS SHEET

Scenario/Simulation :	Base Case 8c
Run on:	May-30-2003 (05:58 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	115,814,985
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	206,433
Subordinated Loan	5,211
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		94.32 : 5.68
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	97.50%
	Subordinated Loan	2.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Annuity
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	80.45%
Capitalised Interest	7,084,241	5.77%
Prefund DSRA	1,363,000	1.11%
Prefund MMRA	79,068	0.06%
Financing Fees	10,087,248	8.22%
Bid/Development Costs	5,392,975	4.39%
	£122,789,618	100.00%

Funding Sources	Total	%
Senior Loan 1	115,814,966	94.32%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	205,888	0.17%
Equity	6,768,765	5.51%
	£122,789,618	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	11.33%
Project IRR (Post Tax)	Nominal	9.41%
Project IRR (Pre Tax)	Real	7.87%
Project IRR (Post Tax)	Real	6.01%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.17%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	9.66%
Equity (Dividends) IRR	Nominal	13.16%
Equity/Cash IRR (Post Tax)	Nominal	58.60%
Equity (Dividends) IRR	Real	9.65%
Equity/Cash IRR (Post Tax)	Real	53.68%

Cash Balances		Total
Maximum Cash Balance		66,320,906
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£139,339,284.43

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.48
DSCR - Average (Excl Reserves)		11.12
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.52
LLCR - Average (Inc Reserve + Cash b/f)		2.38
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	16.19

RESULTS SHEET

Scenario/Simulation :	Base Case 8b
Run on:	May-30-2003 (05:57 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	116,532,395
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	7,016,217
Subordinated Loan	175,406
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		94.32 : 5.68
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	97.50%
	Subordinated Loan	2.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	79.95%
Capitalised Interest	7,156,553	5.79%
Prefund DSRA	1,363,000	1.10%
Prefund MMRA	79,068	0.06%
Financing Fees	10,108,658	8.18%
Bid/Development Costs	6,058,208	4.90%
	£123,548,574	100.00%

Funding Sources	Total	%
Senior Loan 1	116,532,386	94.32%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	207,255	0.17%
Equity	6,808,933	5.51%
	£123,548,574	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	15.90%
Project IRR (Post Tax)	Nominal	13.04%
Project IRR (Pre Tax)	Real	12.31%
Project IRR (Post Tax)	Real	9.53%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	27.62%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	23.66%
Equity (Dividends) IRR	Nominal	27.82%
Equity/Cash IRR (Post Tax)	Nominal	33.33%
Equity (Dividends) IRR	Real	23.86%
Equity/Cash IRR (Post Tax)	Real	29.20%

Cash Balances		Total
Maximum Cash Balance		21,625,272
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£174,837,705.45

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.20
Minimum DSCR Year (Exc Reserves)		01-Jun-03
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.19
LLCR - Average (Inc Reserve + Cash b/f)		1.62
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Average Life Senior Debt (yrs)	6.48

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

RESULTS SHEET

Scenario/Simulation :	Base Case 8a
Run on:	May-30-2003 (05:57 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	115,814,985
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	206,433
Subordinated Loan	5,211
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		94.32 : 5.68
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	97.50%
	Subordinated Loan	2.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	80.45%
Capitalised Interest	7,084,241	5.77%
Prefund DSRA	1,363,000	1.11%
Prefund MMRA	79,068	0.06%
Financing Fees	10,087,248	8.22%
Bid/Development Costs	5,392,975	4.39%
	£122,789,618	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.63%
Project IRR (Post Tax)	Nominal	7.09%
Project IRR (Pre Tax)	Real	5.26%
Project IRR (Post Tax)	Real	3.77%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	8.67%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	5.30%
Equity (Dividends) IRR	Nominal	8.61%
Equity/Cash IRR (Post Tax)	Nominal	17.80%
Equity (Dividends) IRR	Real	5.25%
Equity/Cash IRR (Post Tax)	Real	14.15%

Funding Sources	Total	%
Senior Loan 1	115,814,966	94.32%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	205,888	0.17%
Equity	6,768,765	5.51%
	£122,789,618	100.00%

Cash Balances		Total
Maximum Cash Balance		24,899,914
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£121,905,148.66

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.16
DSCR - Average (Excl Reserves)		4.96
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.18
LLCR - Average (Inc Reserve + Cash b/f)		1.95
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Average Life Senior Debt (yrs)	13.91

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

RESULTS SHEET

Scenario/Simulation :	Base Case 8
Run on:	May-30-2003 (05:56 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	115,814,985
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	206,433
Subordinated Loan	5,211
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		94.32 : 5.68
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	97.50%
	Subordinated Loan	2.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	80.45%
Capitalised Interest	7,084,241	5.77%
Prefund DSRA	1,363,000	1.11%
Prefund MMRA	79,068	0.06%
Financing Fees	10,087,248	8.22%
Bid/Development Costs	5,392,975	4.39%
	£122,789,618	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	16.01%
Project IRR (Post Tax)	Nominal	13.11%
Project IRR (Pre Tax)	Real	12.41%
Project IRR (Post Tax)	Real	9.61%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	27.96%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	23.99%
Equity (Dividends) IRR	Nominal	28.17%
Equity/Cash IRR (Post Tax)	Nominal	33.72%
Equity (Dividends) IRR	Real	24.20%
Equity/Cash IRR (Post Tax)	Real	29.57%

Funding Sources	Total	%
Senior Loan 1	115,814,966	94.32%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	205,888	0.17%
Equity	6,768,765	5.51%
	£122,789,618	100.00%

Cash Balances		Total
Maximum Cash Balance		21,583,907
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£174,837,705.45

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.21
Minimum DSCR Year (Exc Reserves)		01-Jun-03
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.20
LLCR - Average (Inc Reserve + Cash b/f)		1.66
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	6.46

RESULTS SHEET

Scenario/Simulation :	Base Case 7
Run on:	May-30-2003 (05:55 PM)

From Non-Time Based Assumptions Sheet

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages	
Required/Desired Gearing	94 : 6
Actual Gearing	93.38 : 6.62
Composition of senior debt	
Senior Loan 1	0%
Senior Loan 2	0%
Bond	0%
Composition of Blended Equity	
Pure Equity	2.50%
Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

From Summary Sheet

Funding Uses	Total	%
CAPEX	98,783,087	78.96%
Capitalised Interest	8,432,167	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	79,068	0.06%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,100,535	100.00%

Funding Sources	Total	%
Senior Loan 1	116,821,116	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,104,416	6.48%
Equity	175,003	0.14%
	£125,100,535	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.50%
Project IRR (Post Tax)	Nominal	7.34%
Project IRR (Pre Tax)	Real	5.14%
Project IRR (Post Tax)	Real	4.01%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.06%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.49%
Equity (Dividends) IRR	Nominal	20.93%
Equity/Cash IRR (Post Tax)	Nominal	370.55%
Equity (Dividends) IRR	Real	17.18%
Equity/Cash IRR (Post Tax)	Real	355.96%

Cash Balances		Total
Maximum Cash Balance		1,644,025
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£121,625,082.22

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.25
Minimum DSCR Year (Exc Reserves)		01-Jun-17
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.18
LLCR - Average (Inc Reserve + Cash b/f)		1.31
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	13.96

RESULTS SHEET

Scenario/Simulation	Base Case 6
Run on:	May-30-2003 (05:55 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Indexed)	128,648,078
Blended Equity	7,542,585
Subordinated Loan	7,354,046
Prefund DSRA (max required)	0
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	91.78%
Capitalised Interest	1,153,624	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	79,068	0.07%
Financing Fees	951,131	0.88%
Bid/Development Costs	6,669,224	6.20%
	£107,636,134	100.00%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	100,093,559	92.99%
Subordinated Debt	7,382,850	6.86%
Equity	159,724	0.15%
	£107,636,134	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	12.83%
Project IRR (Post Tax)	Nominal	12.83%
Project IRR (Pre Tax)	Real	9.33%
Project IRR (Post Tax)	Real	9.33%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	14.93%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.37%
Equity (Dividends) IRR	Nominal	20.60%
Equity/Cash IRR (Post Tax)	Nominal	2.98%
Equity (Dividends) IRR	Real	16.86%
Equity/Cash IRR (Post Tax)	Real	-0.21%

Cash Balances		Total
Maximum Cash Balance		144,731,534
Minimum Cash Balance		0
NPV's	discounted at	
Revenue Stream NPV	6%	£150,812,813.50

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		11.38
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		2.19
LLCR - Average (Inc Reserve + Cash b/f)		2.93
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Jun-00

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.21

RESULTS SHEET

Scenario/Simulation :	Base Case 5
Run on:	May-30-2003 (05:55 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.02%
Capitalised Interest	1,148,201	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	79,068	0.07%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,348,367	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.45%
Project IRR (Post Tax)	Nominal	7.67%
Project IRR (Pre Tax)	Real	5.09%
Project IRR (Post Tax)	Real	4.34%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.54%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	10.02%
Equity (Dividends) IRR	Nominal	4.12%
Equity/Cash IRR (Post Tax)	Nominal	5.10%
Equity (Dividends) IRR	Real	0.89%
Equity/Cash IRR (Post Tax)	Real	1.84%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,828,155	92.99%
Subordinated Debt	7,360,911	6.86%
Equity	159,300	0.15%
	£107,348,367	100.00%

Cash Balances		Total
Maximum Cash Balance		72,158,834
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£120,720,467.62

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		11.93
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.20
LLCR - Average (Inc Reserve + Cash b/f)		1.39
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-25

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.19

RESULTS SHEET

Scenario/Simulation :	Base Case 5
Run on:	May-30-2003 (05:55 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	0
Senior Loan 2	0
Bond (Fixed)	123,670,388
Blended Equity	7,362,017
Subordinated Loan	7,178,121
Prefund DSRA (max required)	0
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**3.20%**

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		92.99 : 7.01
Composition of senior debt		
	Senior Loan 1	0%
	Senior Loan 2	0%
	Bond	94%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	No
Senior Loan Repayment Option	n/a
Bond Repayment Option	Sculpted
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	92.02%
Capitalised Interest	1,148,201	1.07%
Prefund DSRA	0	0.00%
Prefund MMRA	79,068	0.07%
Financing Fees	916,502	0.85%
Bid/Development Costs	6,421,508	5.98%
	£107,348,367	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.45%
Project IRR (Post Tax)	Nominal	7.67%
Project IRR (Pre Tax)	Real	5.09%
Project IRR (Post Tax)	Real	4.34%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	13.54%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	10.02%
Equity (Dividends) IRR	Nominal	4.12%
Equity/Cash IRR (Post Tax)	Nominal	5.10%
Equity (Dividends) IRR	Real	0.89%
Equity/Cash IRR (Post Tax)	Real	1.84%

Funding Sources	Total	%
Senior Loan 1	0	0.00%
Senior Loan 2	0	0.00%
Senior Bond Issue	99,828,155	92.99%
Subordinated Debt	7,360,911	6.86%
Equity	159,300	0.15%
	£107,348,367	100.00%

Cash Balances		Total
Maximum Cash Balance		72,158,834
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£120,720,467.62

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		11.93
Minimum DSCR Year (Exc Reserves)		01-Jun-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.20
LLCR - Average (Inc Reserve + Cash b/f)		1.39
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-25

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	0 YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	28.19

RESULTS SHEET

Scenario/Simulation :	Base Case 4
Run on:	May-30-2003 (05:54 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**3.20%**

Percentages	
Required/Desired Gearing	**94 : 6**
Actual Gearing	**93.38 : 6.62**
Composition of senior debt	
Senior Loan 1	100%
Senior Loan 2	0%
Bond	0%
Composition of Blended Equity	
Pure Equity	2.50%
Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Sculpted

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.96%
Capitalised Interest	8,432,167	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	79,068	0.06%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,100,535	100.00%

Funding Sources	Total	%
Senior Loan 1	116,821,116	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,104,416	6.48%
Equity	175,003	0.14%
	£125,100,535	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.55%
Project IRR (Post Tax)	Nominal	7.35%
Project IRR (Pre Tax)	Real	5.18%
Project IRR (Post Tax)	Real	4.02%
Subordinated Debt IRR	Nominal	13.88%
Blended Equity IRR (Post Tax)	Nominal	15.28%
Subordinated Debt IRR	Real	10.35%
Blended Equity IRR (Post Tax)	Real	11.70%
Equity (Dividends) IRR	Nominal	21.56%
Equity/Cash IRR (Post Tax)	Nominal	372.56%
Equity (Dividends) IRR	Real	17.79%
Equity/Cash IRR (Post Tax)	Real	357.90%

Cash Balances		Total
Maximum Cash Balance		1,304,762
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£121,905,148.66

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.21
Minimum DSCR Year (Exc Reserves)		01-Dec-02
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.18
LLCR - Average (Inc Reserve + Cash b/f)		1.31
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	14.02

RESULTS SHEET

Scenario/Simulation :	Base Case 3
Run on:	May-30-2003 (05:54 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,821,485
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,363,000
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**3.20%**

Percentages	
Required/Desired Gearing	**94 : 6**
Actual Gearing	**93.38 : 6.62**
Composition of senior debt	
Senior Loan 1	100%
Senior Loan 2	0%
Bond	0%
Composition of Blended Equity	
Pure Equity	2.50%
Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Sculpted
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.96%
Capitalised Interest	8,432,167	6.74%
Prefund DSRA	1,363,000	1.09%
Prefund MMRA	79,068	0.06%
Financing Fees	10,270,516	8.21%
Bid/Development Costs	6,172,697	4.93%
	£125,100,535	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.50%
Project IRR (Post Tax)	Nominal	7.34%
Project IRR (Pre Tax)	Real	5.14%
Project IRR (Post Tax)	Real	4.01%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.06%
	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.49%
Equity (Dividends) IRR	Nominal	20.93%
Equity/Cash IRR (Post Tax)	Nominal	370.55%
Equity (Dividends) IRR	Real	17.18%
Equity/Cash IRR (Post Tax)	Real	355.96%

Funding Sources	Total	%
Senior Loan 1	116,821,116	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,104,416	6.48%
Equity	175,003	0.14%
	£125,100,535	100.00%

Cash Balances		Total
Maximum Cash Balance		1,644,025
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£121,625,082.22

Cover Ratios		
	Target Minimum DSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		1.25
Minimum DSCR Year (Exc Reserves)		01-Jun-17
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.18
LLCR - Average (Inc Reserve + Cash b/f)		1.31
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	13.96

RESULTS SHEET

Scenario/Simulation :	**Base Case 2**
Run on:	**May-30-2003 (05:54 PM)**

Inputs

Financing	(Max amounts)
Senior Loan 1	116,835,985
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,375,513
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	**3.63%**
Annual Inflation	**3.20%**

Percentages		
Required/Desired Gearing		**94 : 6**
Actual Gearing		**93.38 : 6.62**
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Annuity
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Sculpted

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,571	6.74%
Prefund DSRA	1,375,513	1.10%
Prefund MMRA	79,068	0.06%
Financing Fees	10,272,615	8.21%
Bid/Development Costs	6,173,370	4.93%
	£125,116,224	100.00%

Funding Sources	Total	%
Senior Loan 1	116,835,828	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,371	6.48%
Equity	175,025	0.14%
	£125,116,224	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.59%
Project IRR (Post Tax)	Nominal	7.53%
Project IRR (Pre Tax)	Real	5.23%
Project IRR (Post Tax)	Real	4.19%
Subordinated Debt IRR	Nominal	13.83%
Blended Equity IRR (Post Tax)	Nominal	14.73%
Subordinated Debt IRR	Real	10.30%
Blended Equity IRR (Post Tax)	Real	11.17%
Equity (Dividends) IRR	Nominal	19.86%
Equity/Cash IRR (Post Tax)	Nominal	446.66%
Equity (Dividends) IRR	Real	16.15%
Equity/Cash IRR (Post Tax)	Real	429.71%

Cash Balances		Total
Maximum Cash Balance		19,823,154
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£122,181,714.26

Cover Ratios		
	Target Minimum ADSCR	1.15
DSCR - minimum (Excl Reserves)		1.15
DSCR - Average (Excl Reserves)		3.65
Minimum DSCR Year (Exc Reserves)		01-Dec-26
	Target Minimum LLCR	1.18
LLCR - Minimum (Inc Reserve + Cash b/f)		1.23
LLCR - Average (Inc Reserve + Cash b/f)		1.32
Minimum LLCR Year (Inc Reserves + Cash b/f)		01-Dec-02

Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

Average Life Senior Debt (yrs)	16.20

RESULTS SHEET

Scenario/Simulation :	Base Case 1
Run on:	May-30-2003 (05:54 PM)

Inputs

Financing	(Max amounts)
Senior Loan 1	116,835,985
Senior Loan 2	0
Bond (Bond)	0
Blended Equity	8,105,380
Subordinated Loan	7,902,773
Prefund DSRA (max required)	1,375,513
Prefund MMRA (min required)	79,068
MacroEconomics	
Annual Interest Rate	3.63%
Annual Inflation	3.20%

Percentages		
Required/Desired Gearing		94 : 6
Actual Gearing		93.38 : 6.62
Composition of senior debt		
	Senior Loan 1	100%
	Senior Loan 2	0%
	Bond	0%
Composition of Blended Equity		
	Pure Equity	2.50%
	Subordinated Loan	97.50%

Switches	
Equity bridge in Use ?	No
Bond Monoline Wrapped ?	n/a
Senior Loan Repayment Option	Annuity
Bond Repayment Option	n/a
Subordinated Debt Repayment Option	Annuity

Spreads/Margins	
Loan 1	1.13%
Loan 2	1.20%
Bond (over reference rate)	0.17%
Subordinated Loan	13.00%

Outputs

Funding Uses	Total	%
CAPEX	98,783,087	78.95%
Capitalised Interest	8,432,571	6.74%
Prefund DSRA	1,375,513	1.10%
Prefund MMRA	79,068	0.06%
Financing Fees	10,272,615	8.21%
Bid/Development Costs	6,173,370	4.93%
	£125,116,224	100.00%

Funding Sources	Total	%
Senior Loan 1	116,835,828	93.38%
Senior Loan 2	0	0.00%
Senior Bond Issue	0	0.00%
Subordinated Debt	8,105,371	6.48%
Equity	175,025	0.14%
	£125,116,224	100.00%

Project IRR's		
Project IRR (Pre Tax)	Nominal	8.71%
Project IRR (Post Tax)	Nominal	7.59%
Project IRR (Pre Tax)	Real	5.34%
Project IRR (Post Tax)	Real	4.25%
Subordinated Debt IRR	Nominal	13.86%
Blended Equity IRR (Post Tax)	Nominal	15.09%
Subordinated Debt IRR	Real	10.33%
Blended Equity IRR (Post Tax)	Real	11.52%
Equity (Dividends) IRR	Nominal	21.03%
Equity/Cash IRR (Post Tax)	Nominal	449.79%
Equity (Dividends) IRR	Real	17.27%
Equity/Cash IRR (Post Tax)	Real	432.74%

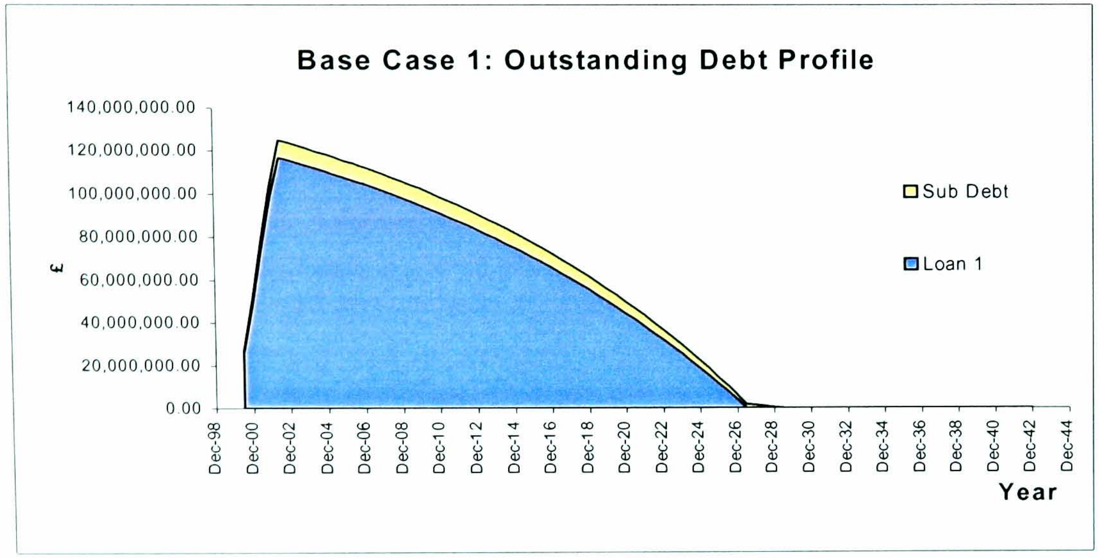
Cash Balances		Total
Maximum Cash Balance		20,204,911
Minimum Cash Balance		(0)
NPV's	discounted at	
Revenue Stream NPV	6%	£122,901,835.09

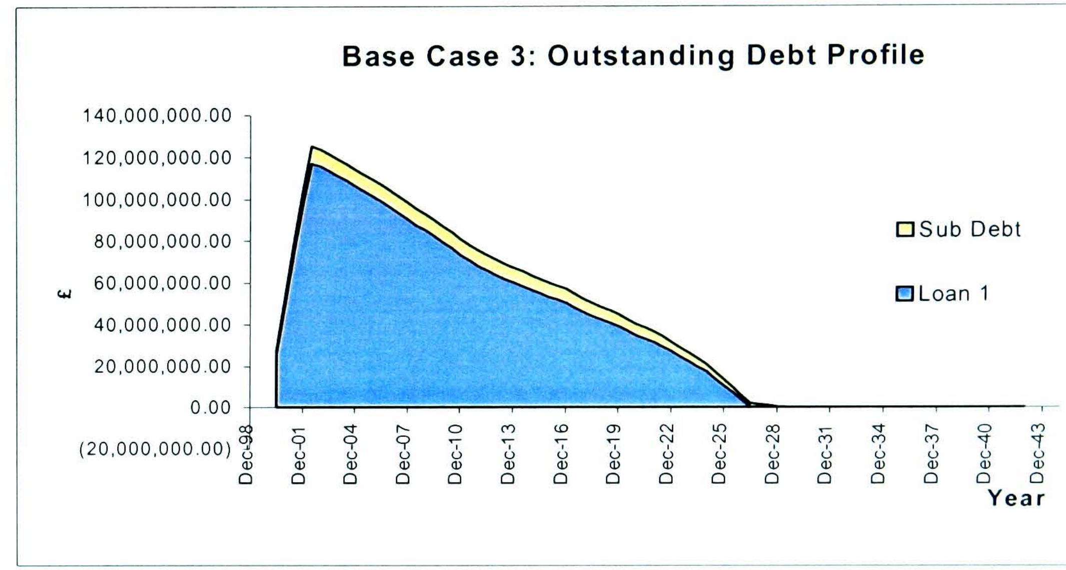
Cover Ratios		
	Target Minimum ADSCR	1.15
DSCR - minimum (Excl Debt Reserve)		1.15
DSCR - Average (Excl Debt Reserve)		3.75
Minimum DSCR Year (Inc Debt Reserve)		01-Jun-27
	Target Minimum LLCR	1.18
LLCR - Minimum (exc Debt Reserve + Cash b/f)		1.24
LLCR - Average (exc Debt Reserve + Cash b/f)		1.33
Minimum LLCR Year (exc Debt Reserve + Cash b/f)		01-Dec-02

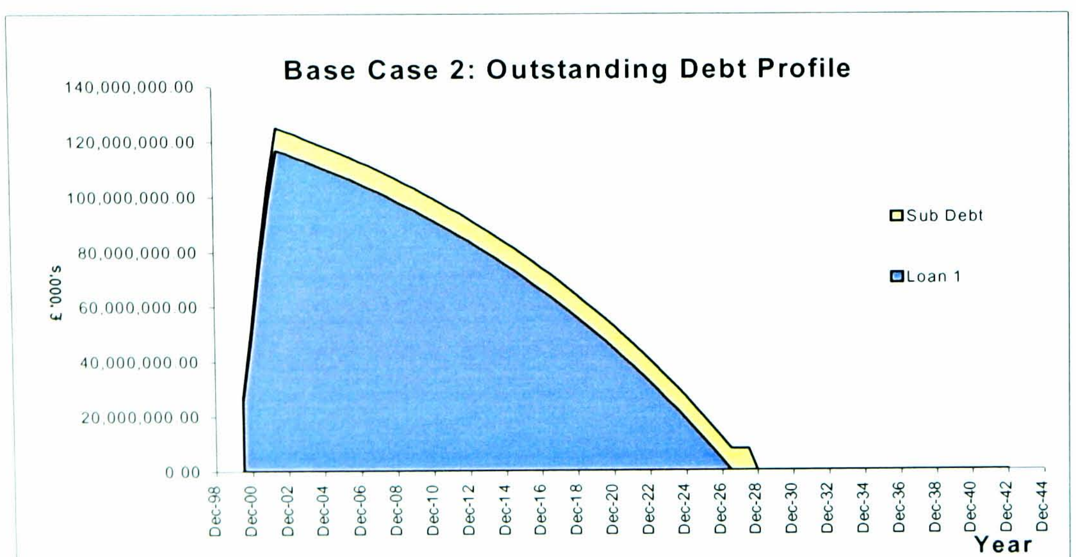
Checks	
Balanced Sheet Balanced ?	YES
Cashflow positive ?	YES
Senior debt repaid	YES
Sub debt repaid	YES
DSRA fully funded	YES

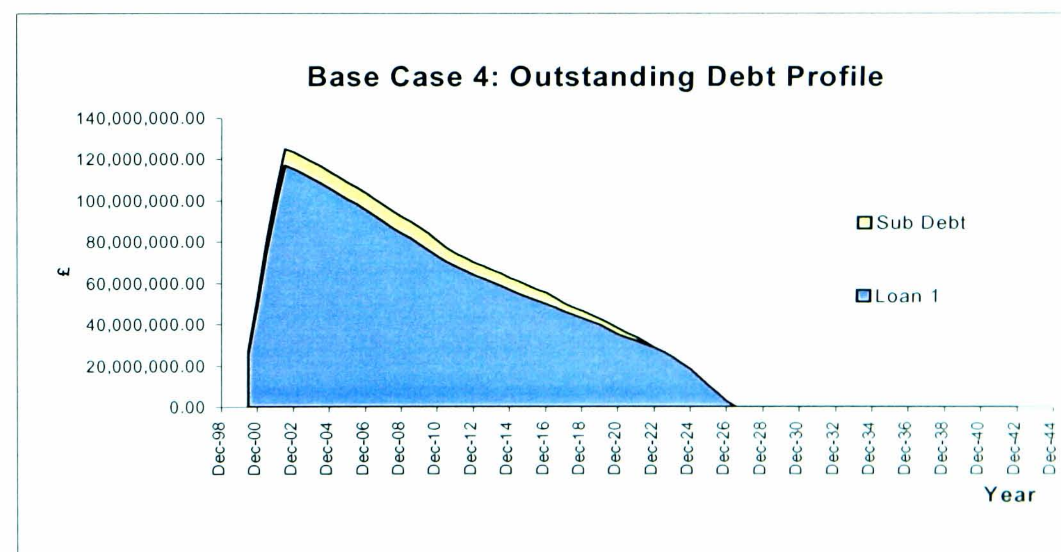
Average Life Senior Debt (yrs)	16.20

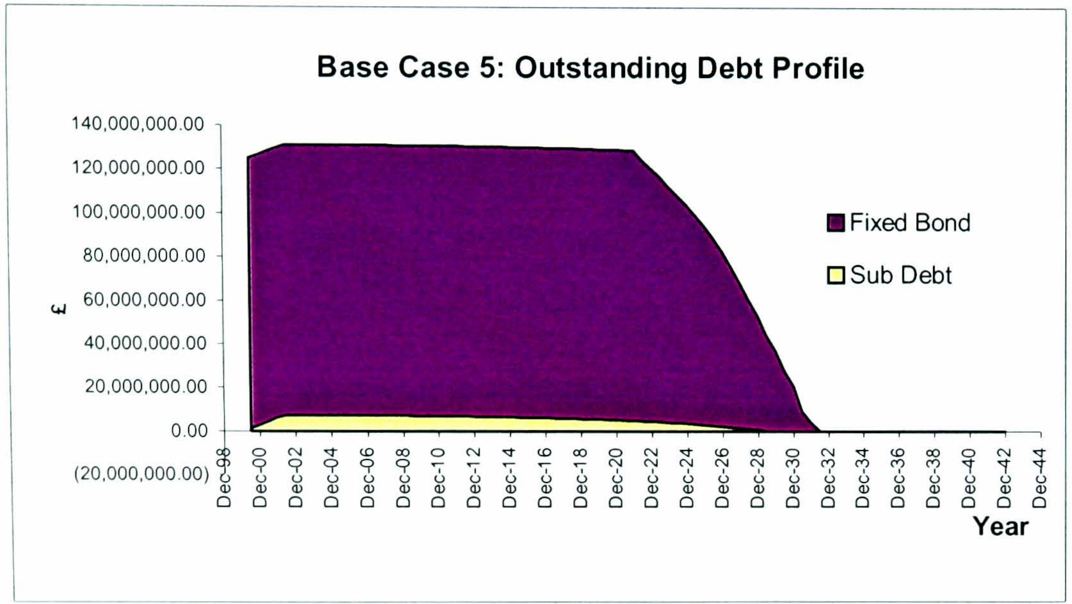
APPENDIX G: MODEL PROFILES FOR DEBT OUTSTANDING

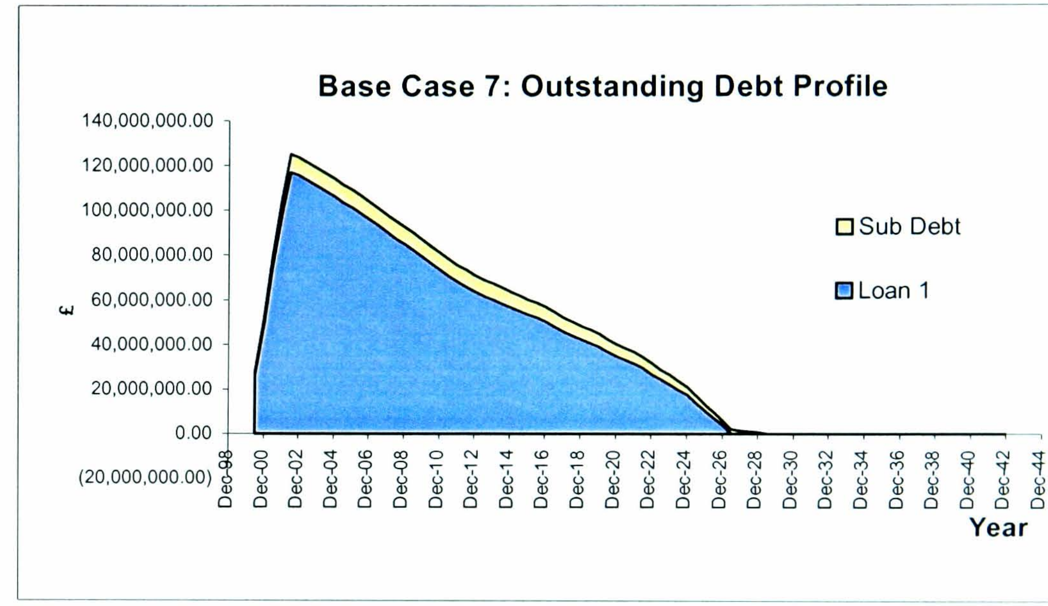


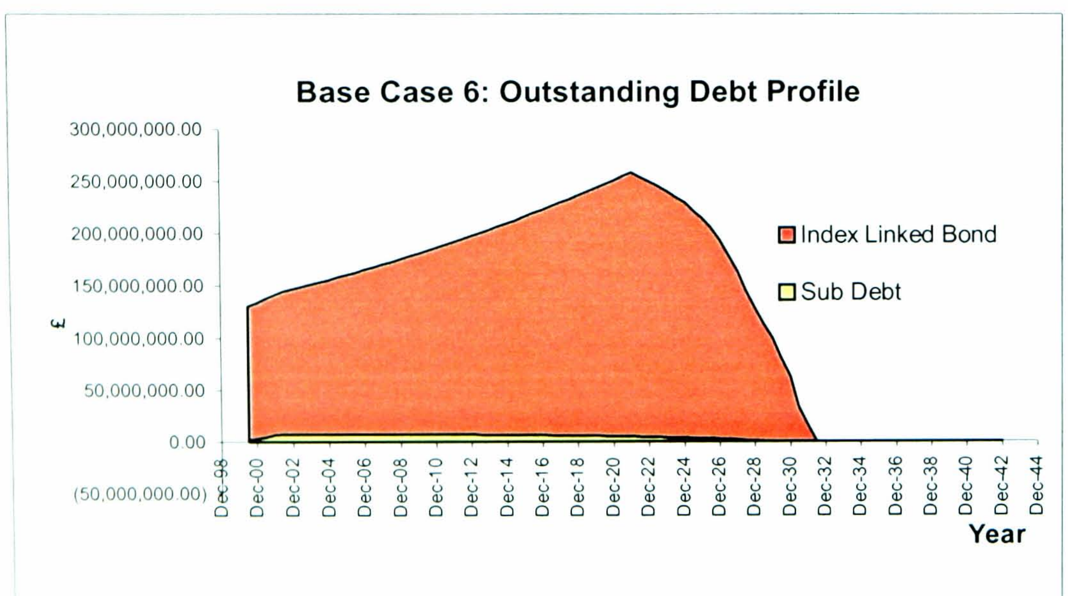


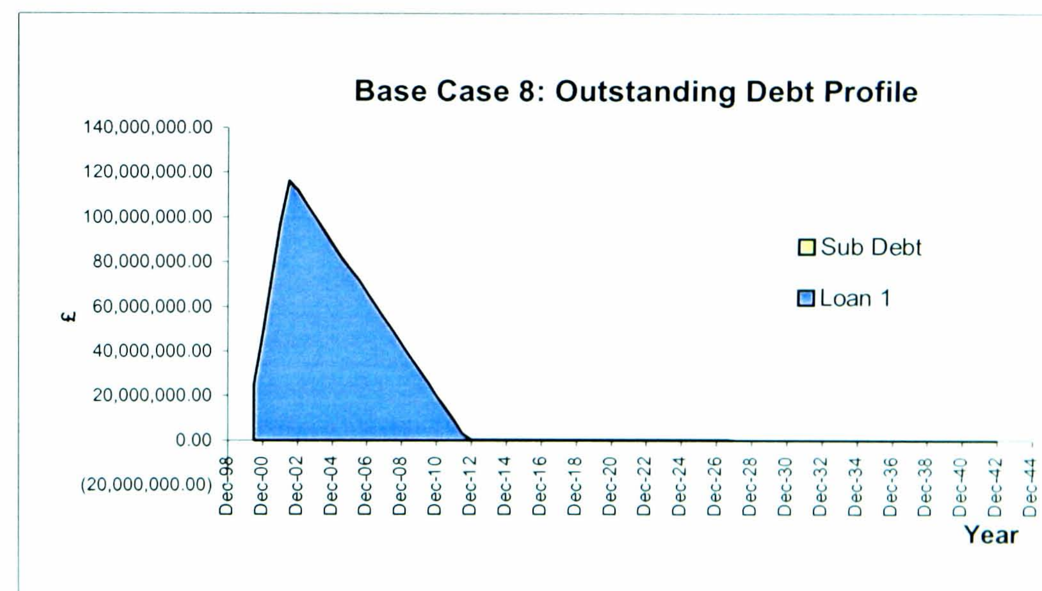


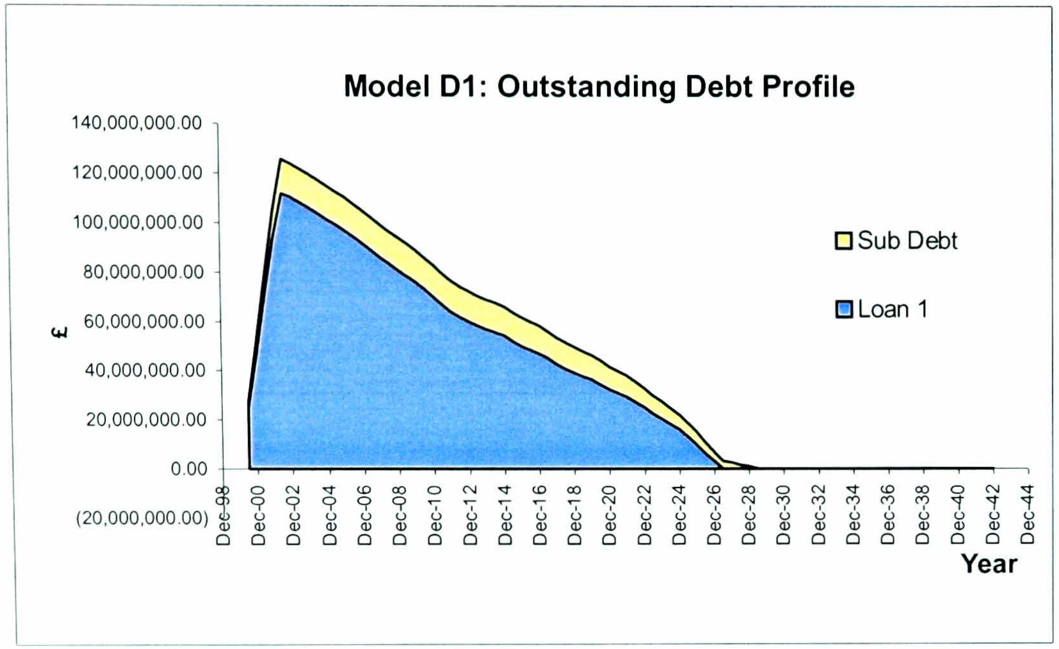


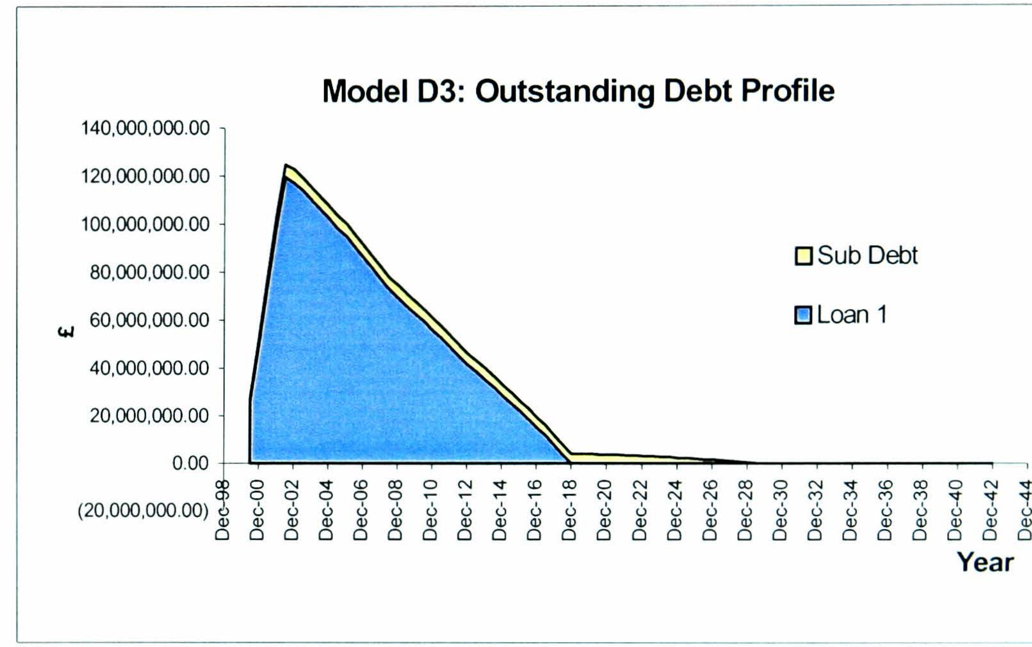

Base Case 5: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Fixed Bond
Sub Debt
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

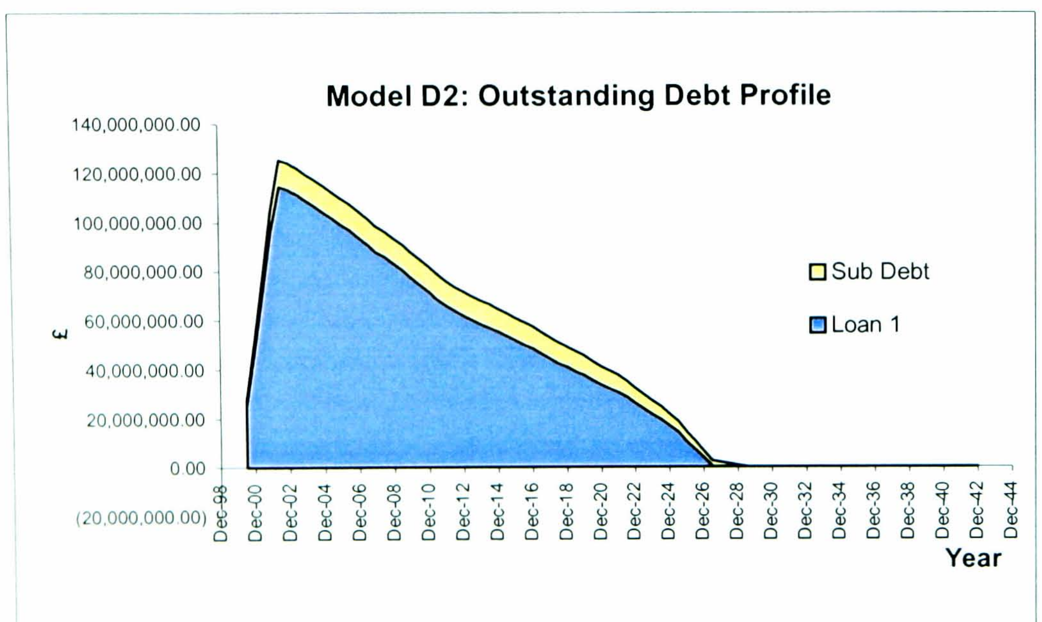

Base Case 7: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Sub Debt
Loan 1
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

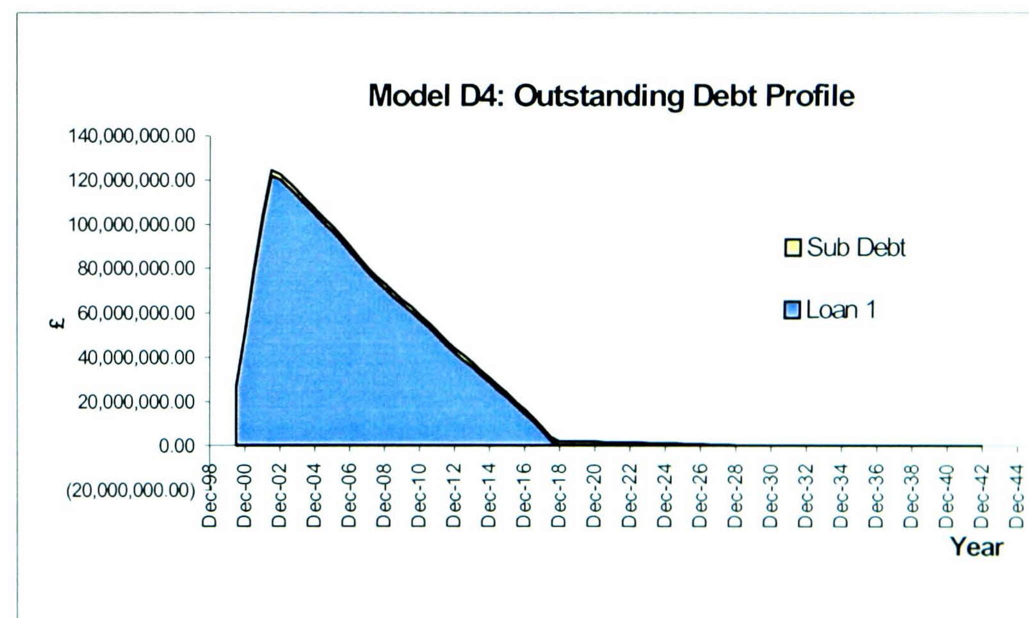

Base Case 6: Outstanding Debt Profile
300,000,000.00
250,000,000.00
200,000,000.00
150,000,000.00
100,000,000.00
50,000,000.00
0.00
(50,000,000.00)
£
Index Linked Bond
Sub Debt
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

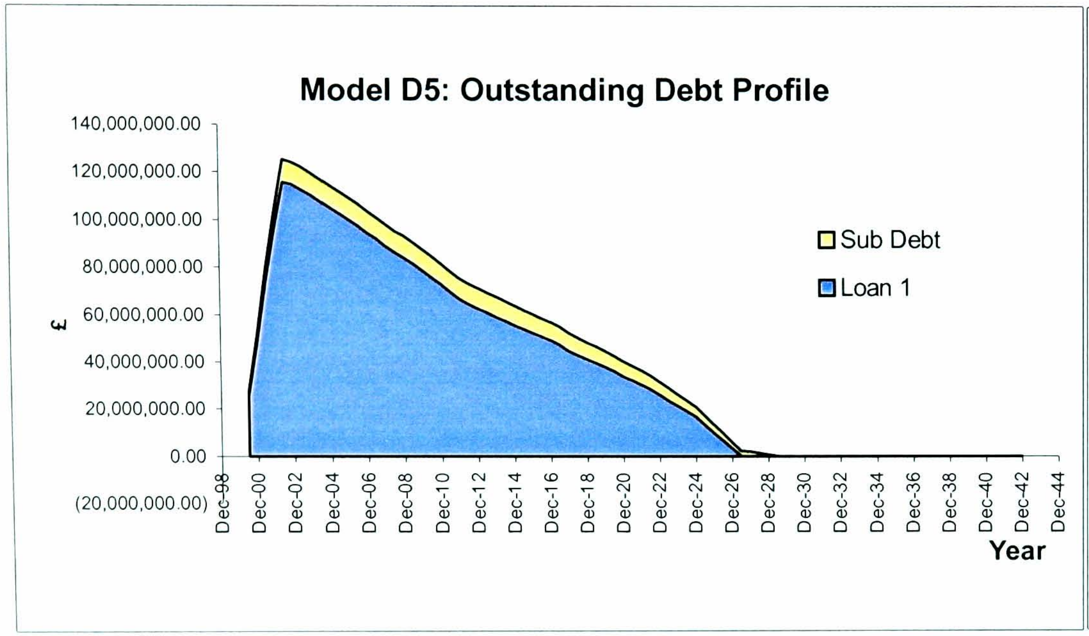

Base Case 8: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Sub Debt
Loan 1
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

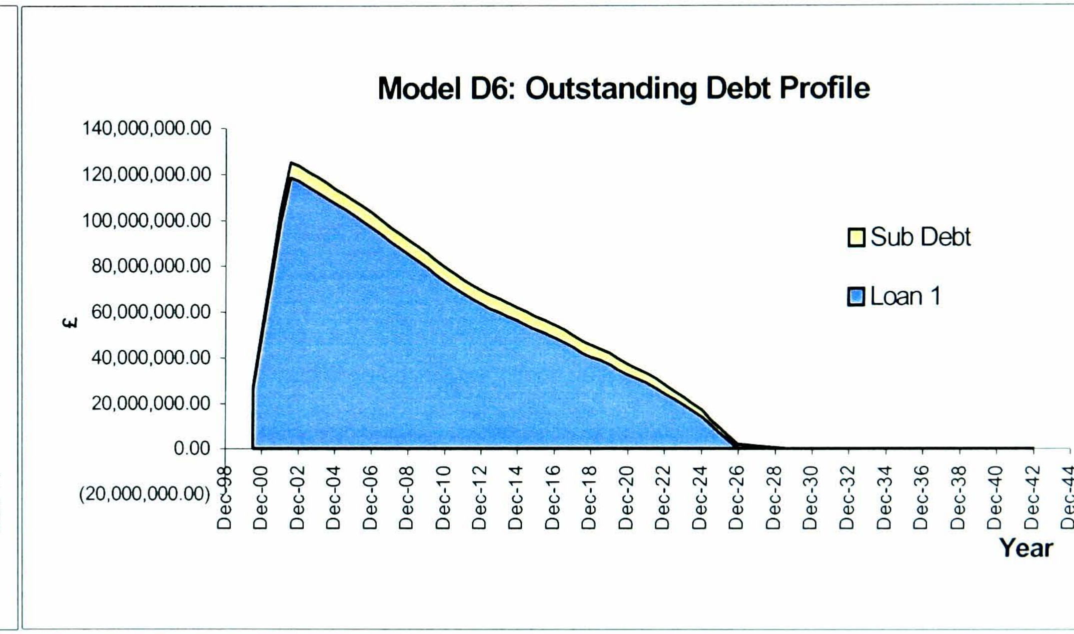

Model D1: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Sub Debt
Loan 1
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

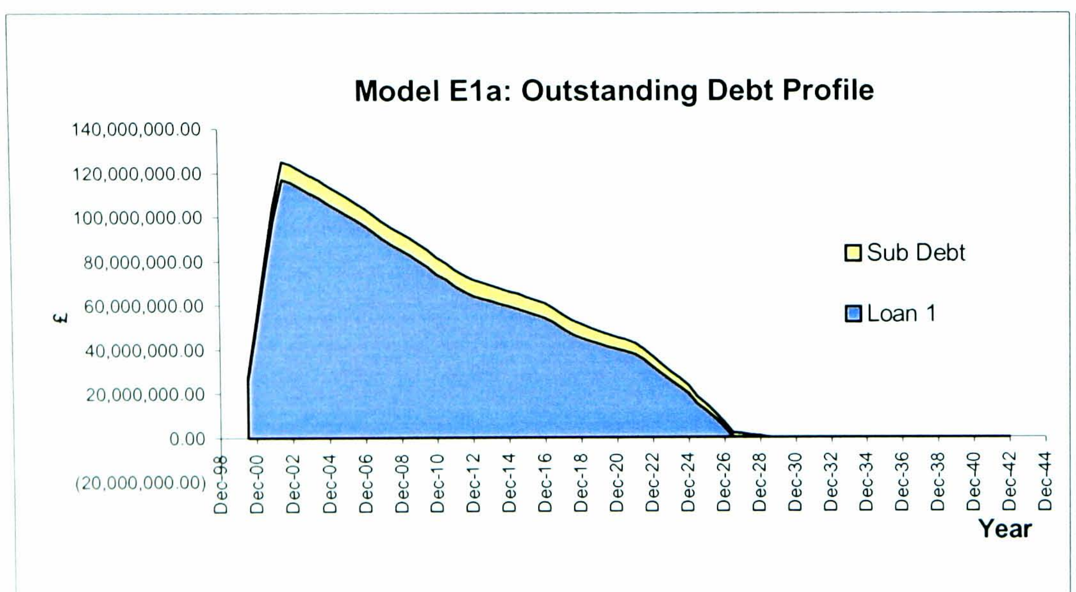

Model D3: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Sub Debt
Loan 1
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

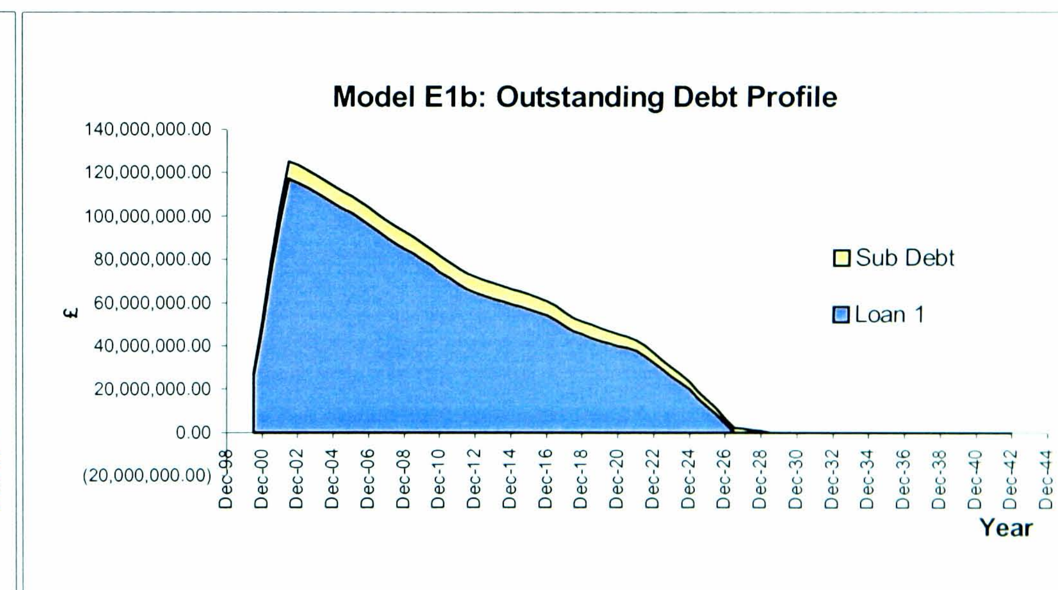

Model D2: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Sub Debt
Loan 1
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

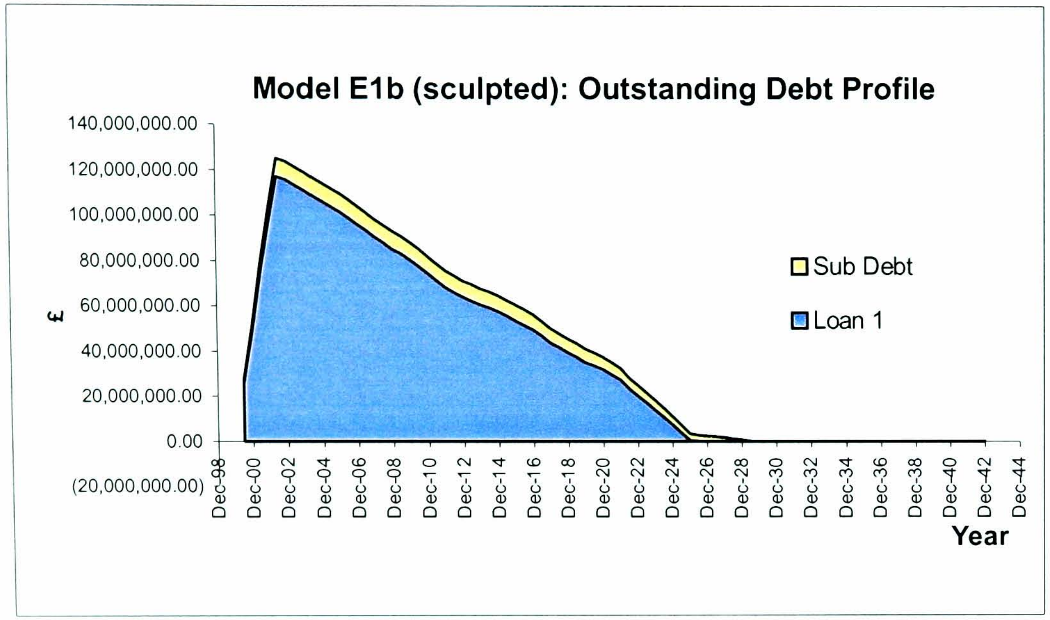

Model D4: Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Sub Debt
Loan 1
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

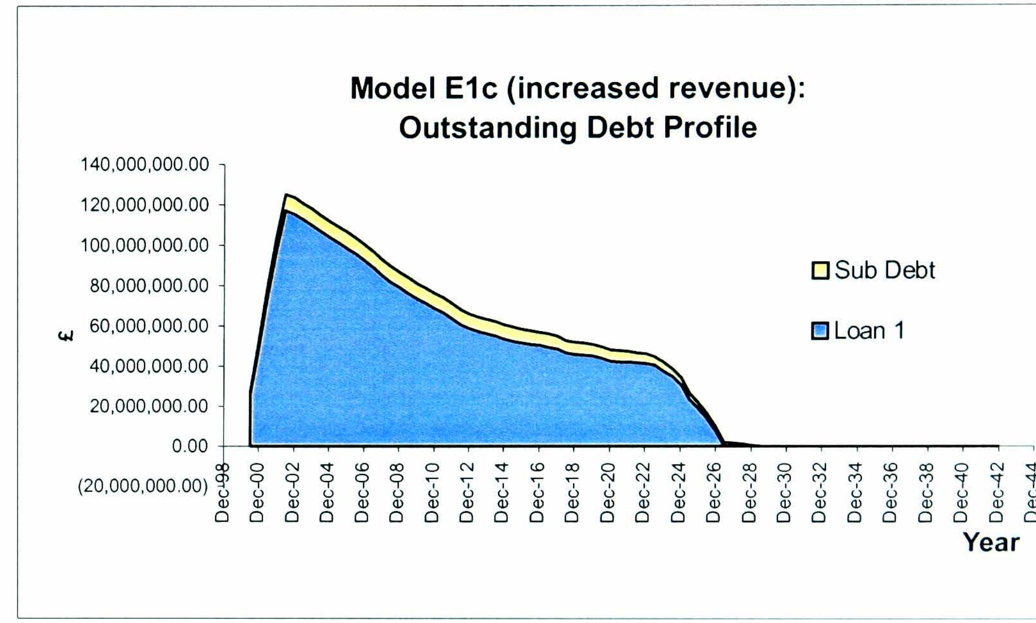

Model D5: Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Sub Debt
Loan 1
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year

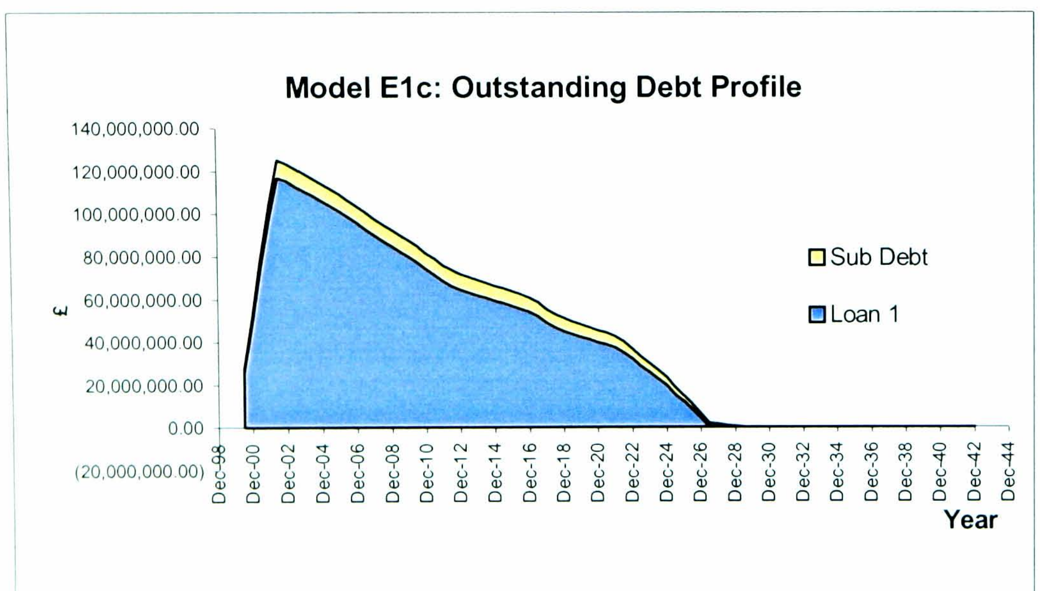

Model D6: Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Sub Debt
Loan 1
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year

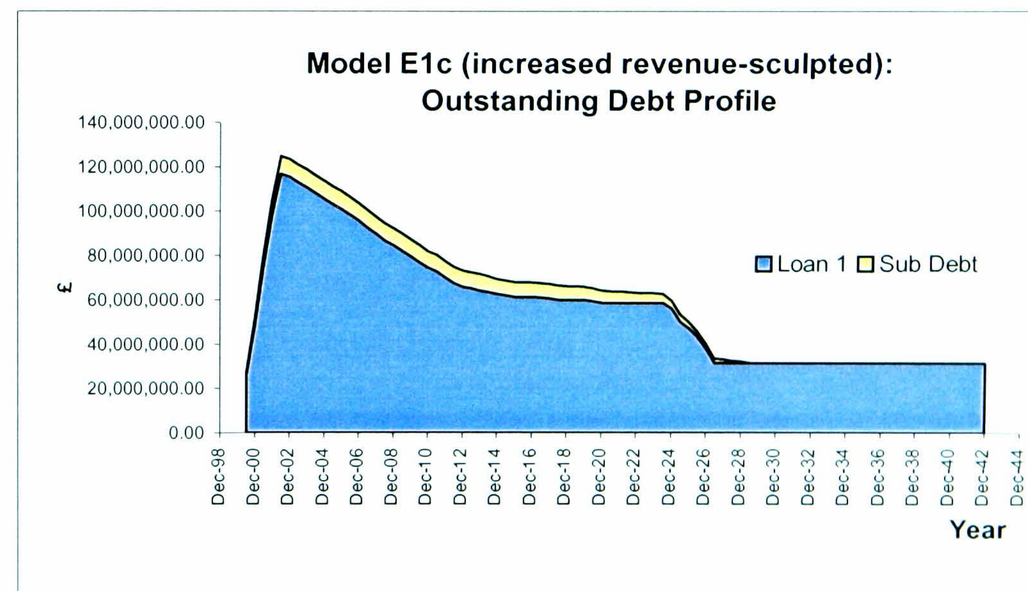

Model E1a: Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Sub Debt
Loan 1
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year

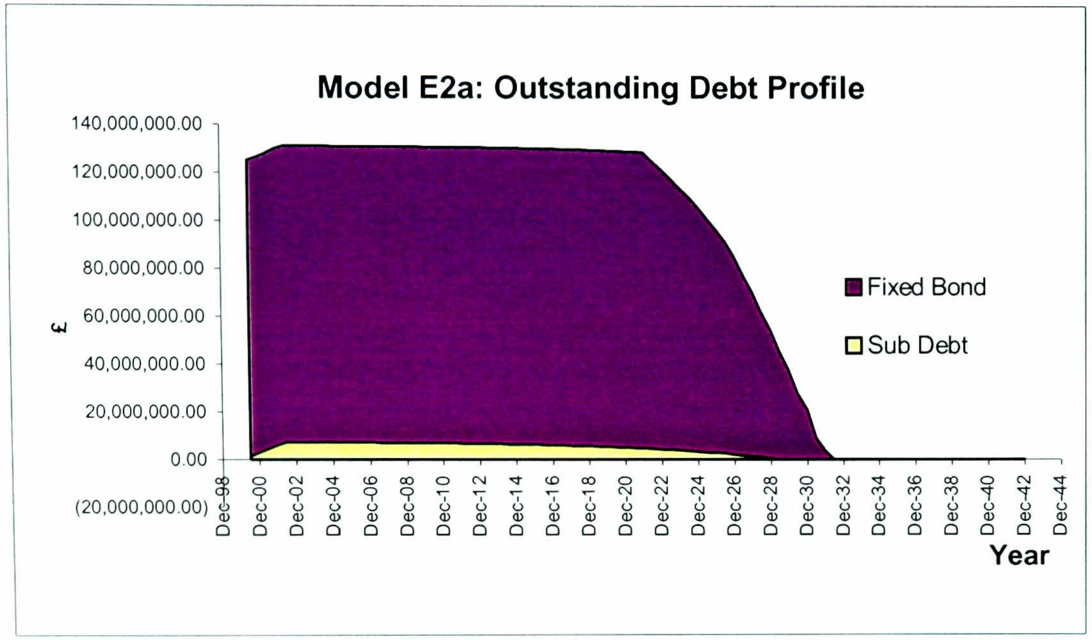

Model E1b: Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Sub Debt
Loan 1
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year

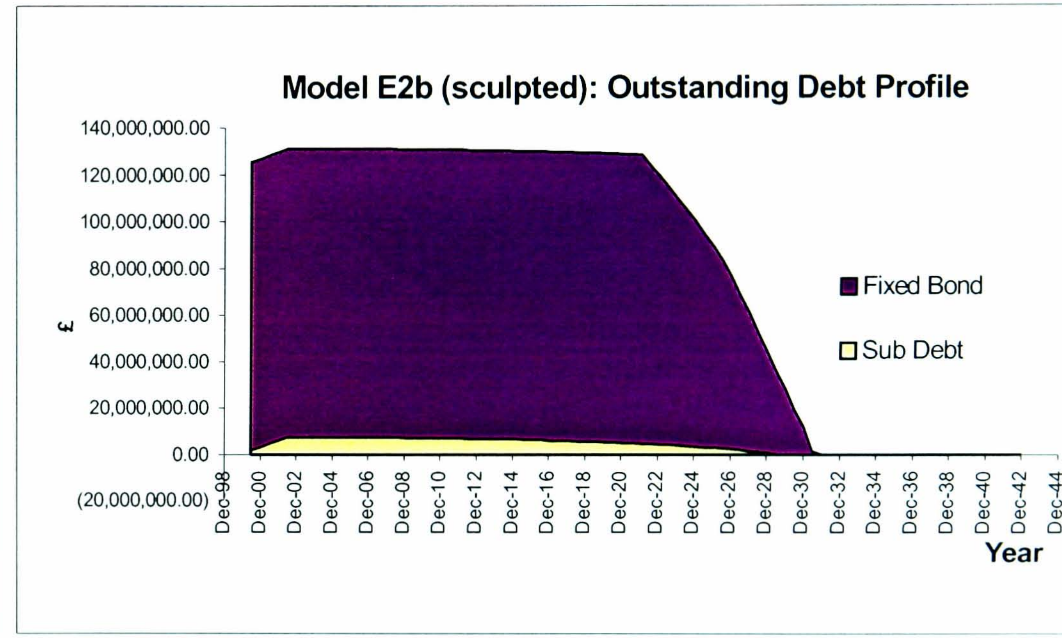

Model E1b (sculpted): Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year
Sub Debt
Loan 1

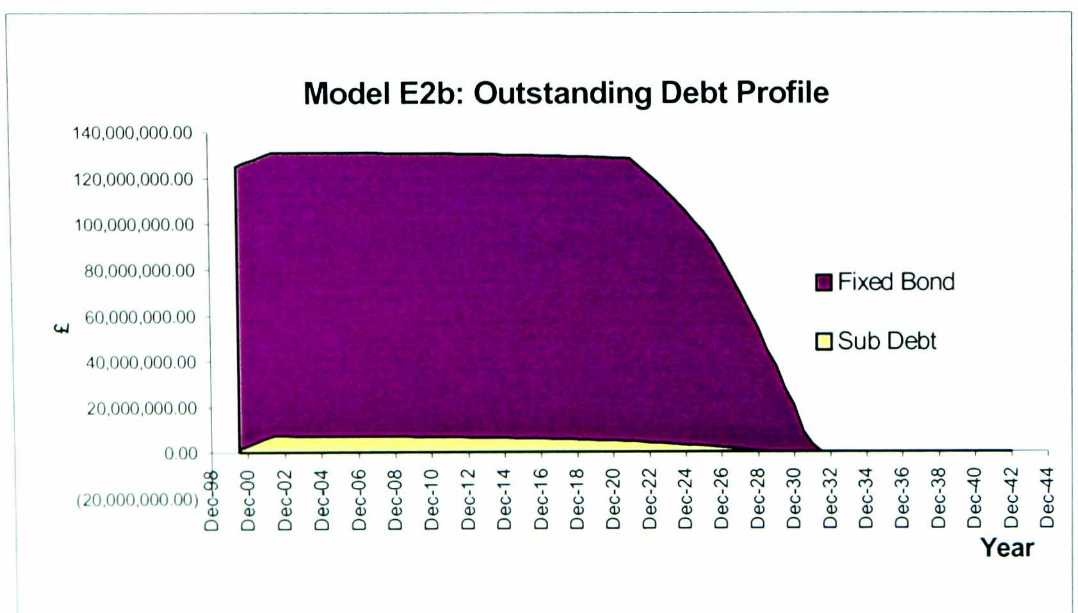

Model E1c (increased revenue):
Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year
Sub Debt
Loan 1

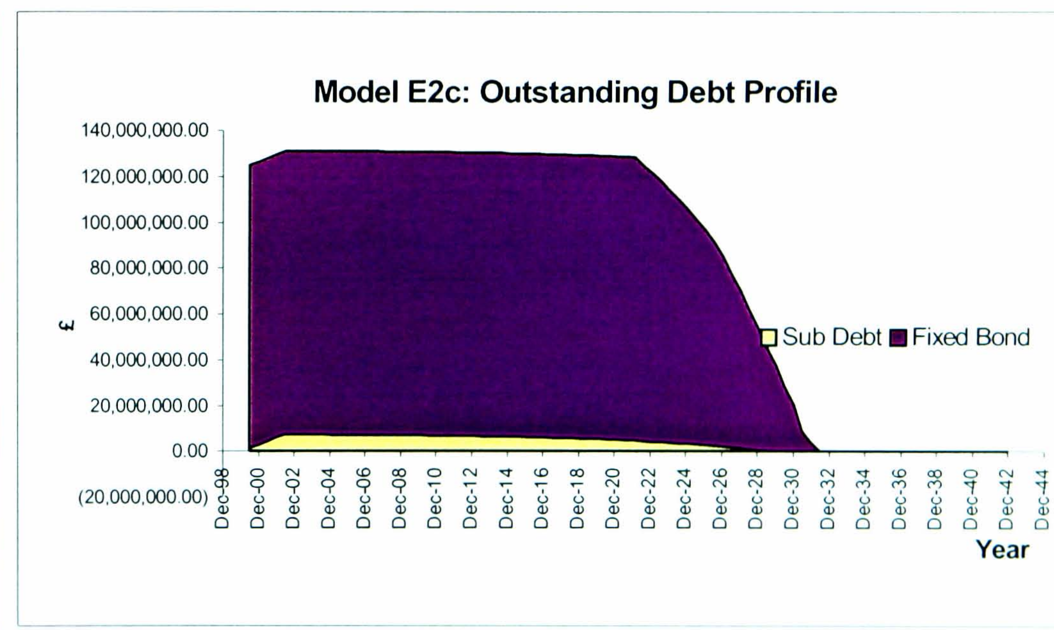

Model E1c: Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year
Sub Debt
Loan 1

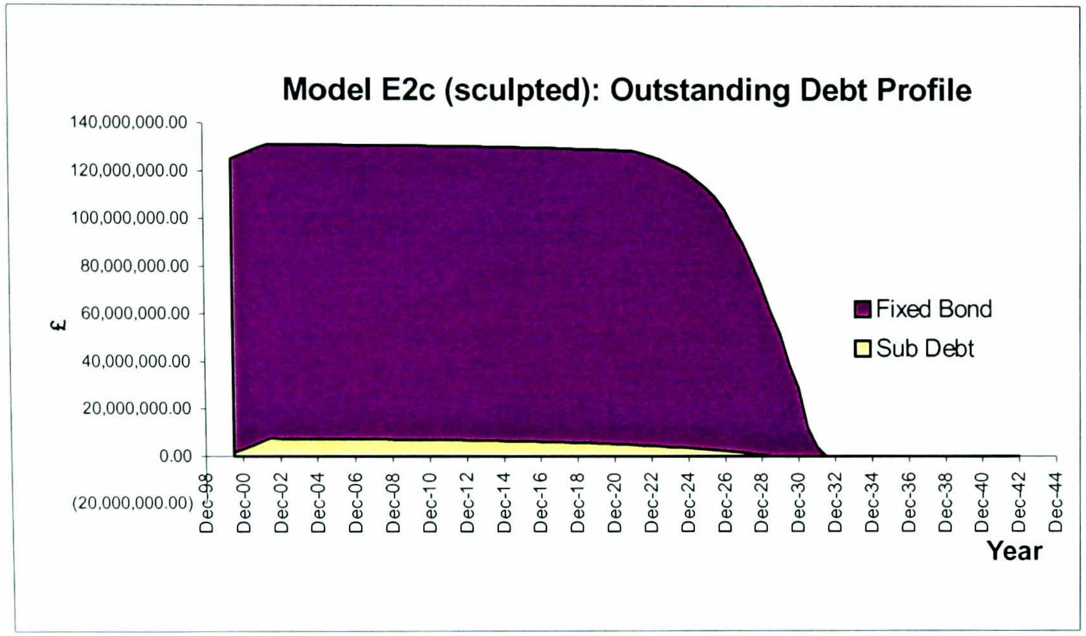

Model E1c (increased revenue-sculpted):
Outstanding Debt Profile
£
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year
Loan 1
Sub Debt

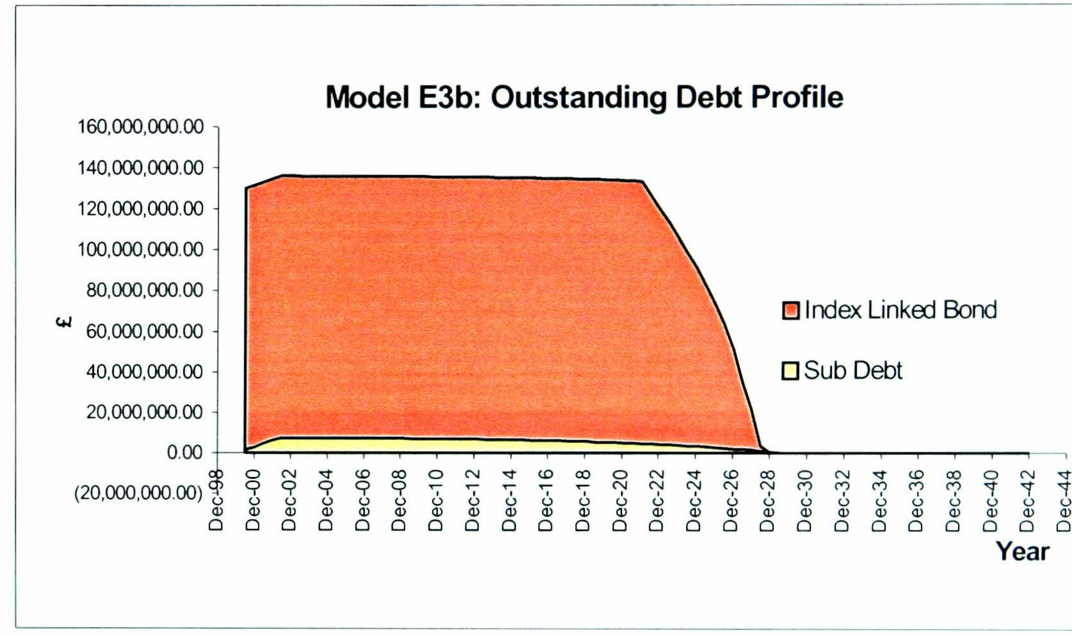

Model E2a: Outstanding Debt Profile
£
Year
Fixed Bond
Sub Debt
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44

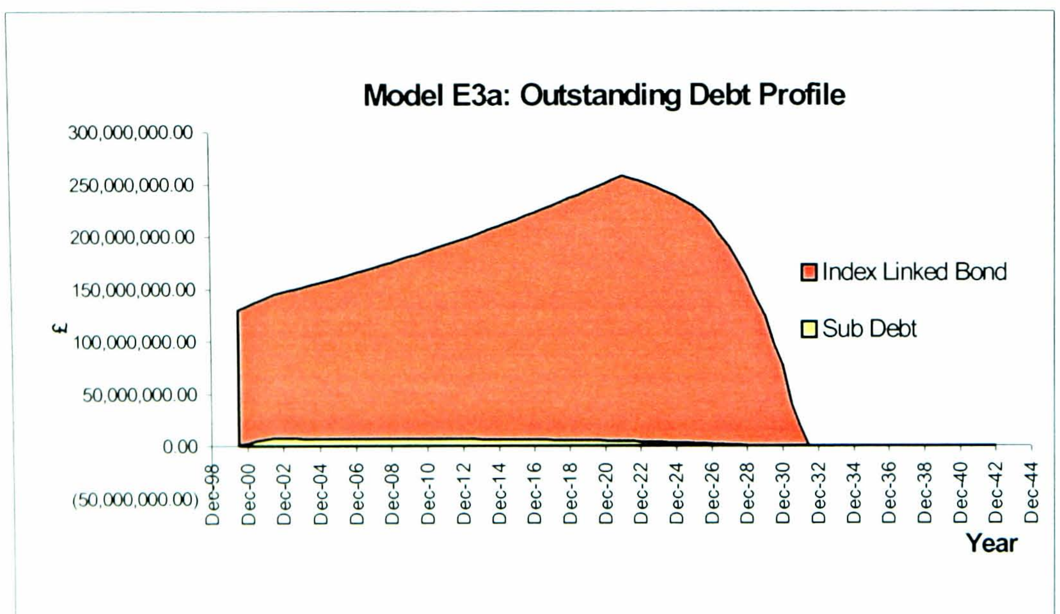

Model E2b (sculpted): Outstanding Debt Profile
£
Year
Fixed Bond
Sub Debt
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44

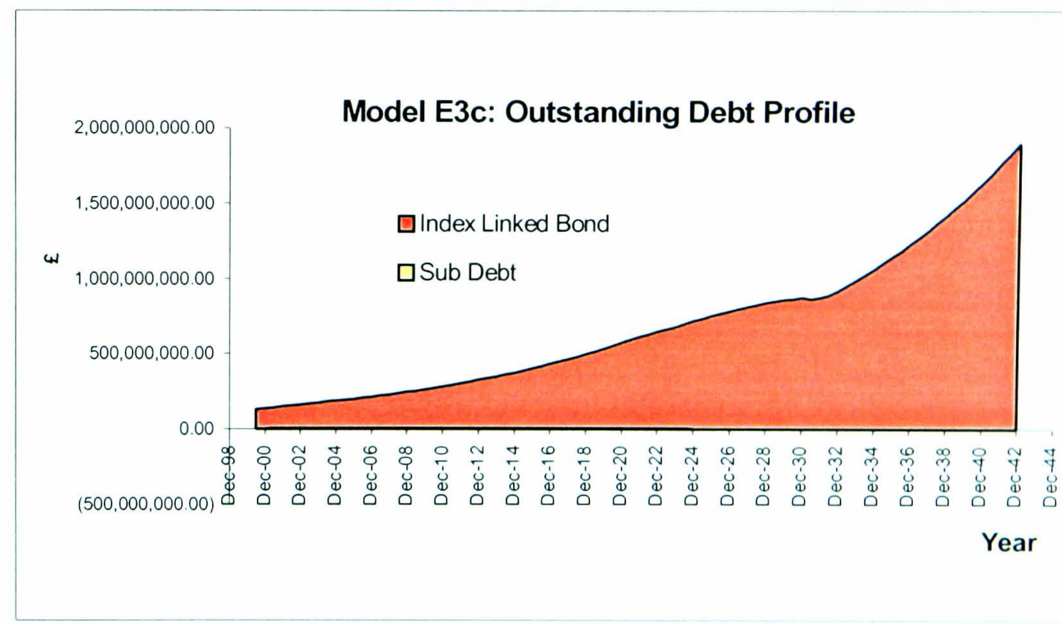

Model E2b: Outstanding Debt Profile
£
Year
Fixed Bond
Sub Debt
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44

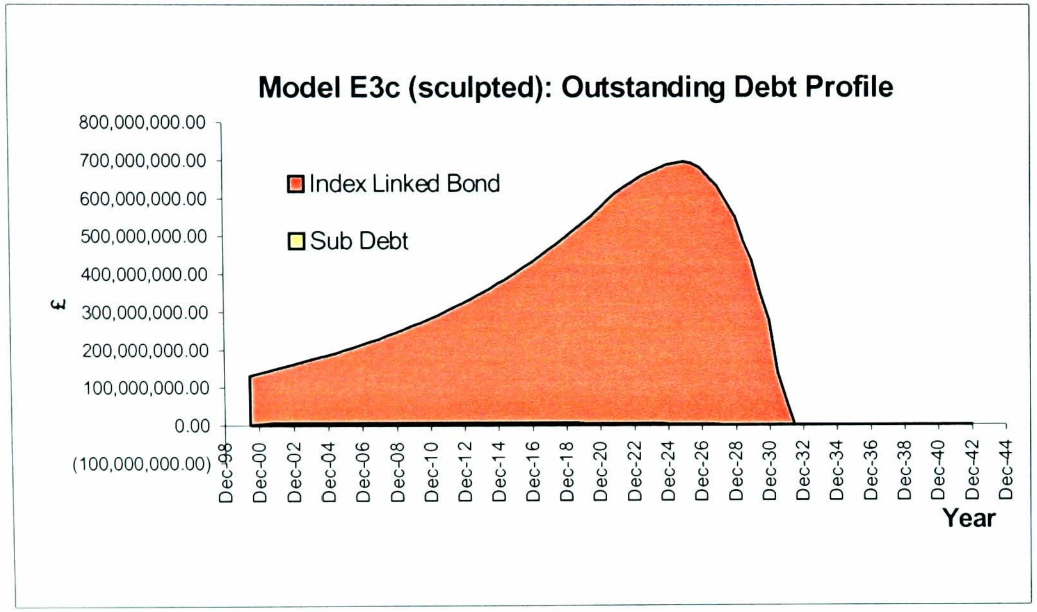

Model E2c: Outstanding Debt Profile
£
Year
Sub Debt
Fixed Bond
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44

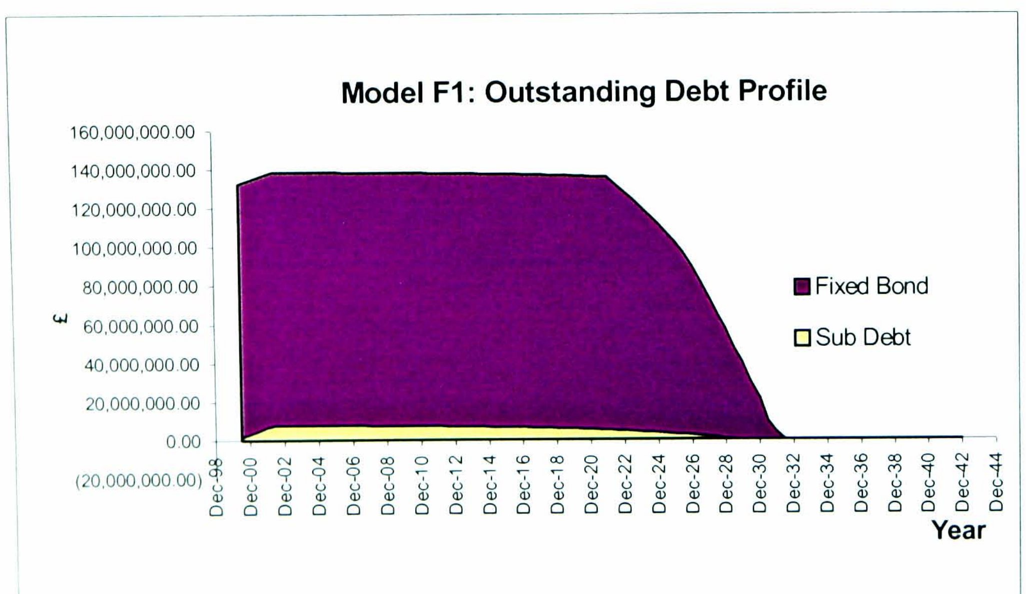

Model E2c (sculpted): Outstanding Debt Profile
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Fixed Bond
Sub Debt
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year

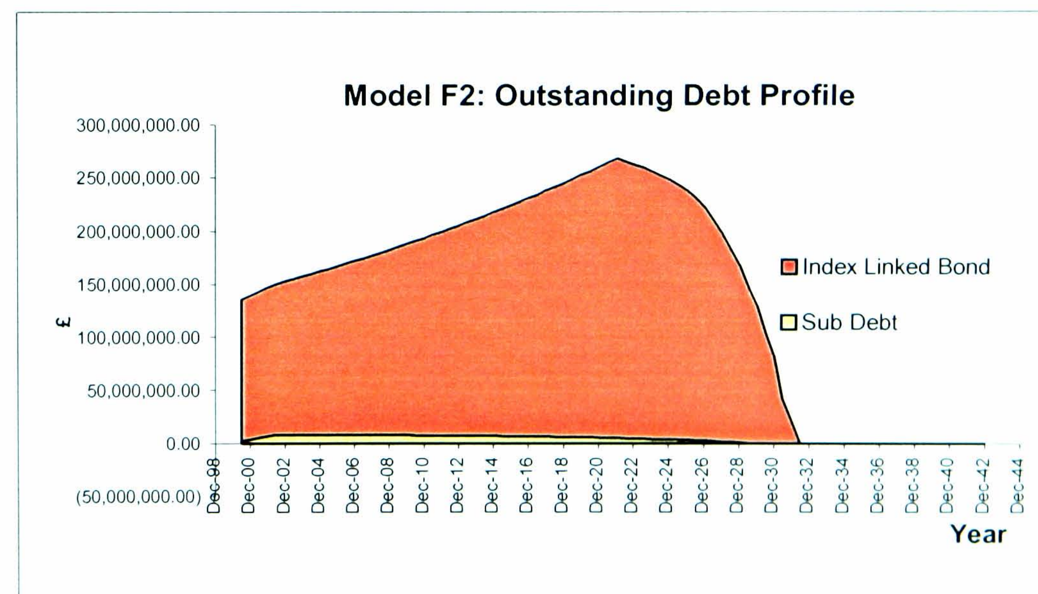

Model E3b: Outstanding Debt Profile
160,000,000.00
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Index Linked Bond
Sub Debt
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year


Model E3a: Outstanding Debt Profile
300,000,000.00
250,000,000.00
200,000,000.00
150,000,000.00
100,000,000.00
50,000,000.00
0.00
(50,000,000.00)
£
Index Linked Bond
Sub Debt
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year


Model E3c: Outstanding Debt Profile
2,000,000,000.00
1,500,000,000.00
1,000,000,000.00
500,000,000.00
0.00
(500,000,000.00)
£
Index Linked Bond
Sub Debt
Dec-98 Dec-00 Dec-02 Dec-04 Dec-06 Dec-08 Dec-10 Dec-12 Dec-14 Dec-16 Dec-18 Dec-20 Dec-22 Dec-24 Dec-26 Dec-28 Dec-30 Dec-32 Dec-34 Dec-36 Dec-38 Dec-40 Dec-42 Dec-44
Year


Model E3c (sculpted): Outstanding Debt Profile
800,000,000.00
700,000,000.00
600,000,000.00
500,000,000.00
400,000,000.00
300,000,000.00
200,000,000.00
100,000,000.00
0.00
(100,000,000.00)
£
Index Linked Bond
Sub Debt
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year


Model F1: Outstanding Debt Profile
160,000,000.00
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
(20,000,000.00)
£
Fixed Bond
Sub Debt
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year


Model F2: Outstanding Debt Profile
300,000,000.00
250,000,000.00
200,000,000.00
150,000,000.00
100,000,000.00
50,000,000.00
0.00
(50,000,000.00)
£
Index Linked Bond
Sub Debt
Dec-98
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Dec-14
Dec-16
Dec-18
Dec-20
Dec-22
Dec-24
Dec-26
Dec-28
Dec-30
Dec-32
Dec-34
Dec-36
Dec-38
Dec-40
Dec-42
Dec-44
Year