Corporate Governance and Financial Management

Siti Nuryanah

Sardar M. N. Islam

Computational Optimisation Modelling and Accounting Perspectives

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Siti Nuryanah
Department of Accounting, Faculty of Economics, University of Indonesia, Indonesia

Sardar M. N. Islam
VISES, College of Business, Victoria University, Australia

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Foreword

As there is a need for more large-scale real-life computational optimisation studies in accounting, *Corporate Governance and Financial Management: Computational Optimisation Modelling and Accounting Perspectives* has made a valuable contribution to the literature by performing a study on computational optimisation modelling of corporate finance based on the integrated framework and foundations of accounting theories, financial engineering, risk management, and corporate governance principles and issues.

For more than a decade, corporate governance has been an expanding topic discussed by academics and practitioners as corporate failures and the global financial crisis demonstrates the importance of complying with good corporate governance (GCG) best practices.

This book provides a comprehensive study of this issue integrating corporate governance, corporate finance and accounting in the formulation of sound financial management strategies. It also offers practical steps for managers on how to formulate sound financial management strategies using an integrated optimisation financial model for achieving GCG practices, which lead to lower risks and higher firm value.

Offering an integrated solution for achieving GCG practices, this book adopts value-based management (shareholder value maximisation) and stakeholder approaches. Moreover, the model shown in the book applies a free cash flow (FCF) valuation and financial ratio analysis, incorporates external governance mechanisms and examines how internal governance instruments discipline managers in the process of shareholder value maximisation.

This book makes a significant contribution to the literature by providing an integrated framework based on managerial and financial accounting perspectives for achieving the benefits of GCG practices. The framework incorporates risk-management practices, accommodates external regulatory environments and addresses the importance of cost of capital. From practitioners' point of view, this unique study gives new insight into an application of the optimisation approach as a methodology for corporate governance study and provides an understanding for integrating the accounting concept in the linear optimisation model.

The book also has implications for GCG practices, as it provides a practical decision-making model for formulating sound financial strategies for achieving the benefits of GCG practices. The model quantifies broad concepts of GCG practices and normative GCG principles into monetary units so that GCG practices can be monitored and evaluated.

Finally, the book contributes to improving financial accounting practices by providing valuable insights into the importance of alignment of accounting standards with other regulations such as tax policy and the importance of using cash based-accounting concepts for measuring a company's financial health.

Professor Bruce Rasmussen, PhD
Director, Victoria Institute of Strategic Economic Studies
Victoria University, Australia

Preface

Large-scale real-life computational optimisation studies in Accounting have been rare in the literature and this book is trying to fill in this gap by undertaking such a study on computational optimisation modelling of financial statements based on the foundations of accounting theories and financial engineering, risk management and corporate governance issues.

Background, existing literature and its limitations

The phenomena of corporate failures and the global financial crisis demonstrates that complying with good corporate governance (GCG) best practices alone neither gives any guarantee for a company to achieve the potential benefits offered by GCG practices, nor protects a company from corporate failure. Good financial management strategies are necessary to achieve the benefits of GCG practices.

Despite the importance of the subject matter, there have been no comprehensive studies integrating corporate governance, corporate finance and accounting in the formulation of sound financial management strategies, especially in an optimisation framework using a case study method.

The existing optimisation models for formulating financial management strategies have several limitations. First, most of the models are non-contemporary, as they do not address the current GCG practices. Second, the existing models use an unreliable proxy, such as accrual accounting–based valuation which contains accounting noise. Finally, the models are not based on managerial and financial accounting perspectives.

Purpose

The main objective of this research is to formulate sound financial management strategies using an integrated optimisation financial model (computational optimisation in Accounting) for achieving GCG practices that lead to lower risks and higher firm value. This model is an integration of the value-based management (shareholder value maximisation) and stakeholder approaches. It accommodates current GCG practices and is developed from managerial and financial accounting perspectives. Integrating the external governance mechanisms reflected by capital market and regulatory environments, such as tax policy, accounting standards and practices, industry practices and market risks, this book examines how internal governance instruments such as leverage, executive compensation and risk-management practices discipline managers in the process of shareholder value maximisation.

Conceptual framework

The framework of this study is conceptualised by incorporating internal and external corporate governance mechanisms relevant for formulating sound financial management strategies capable of increasing shareholder value. The framework is based on the elements of: (1) GCG practices, especially internal and external governance instruments; (2) financial management practices, including the basic principles of corporate finance, theory of corporate finance and risk management; and (3) managerial and financial accounting practices, including accounting's role in corporate governance and the application of free cash flow (FCF) valuation and financial ratio analysis.

Research methodology: computational optimisation in accounting

An integrated financial model is developed and justified based on a quantitative research methodology using a multi-period optimisation approach. FCF is chosen as a proxy for measuring shareholder value, as it has minimal accounting noise compared to the accrual accounting–based measurements. FCF also measures the economic value of the company and reflects GCG principles.

The constraints of the model are derived from GCG practices, and managerial and financial accounting perspectives. They are listed as follows: (1) definitional and accounting equation constraints; (2) corporate governance policy: accounting policy constraints; (3) corporate governance policy: risk management, financial and investment policy constraints; and 4) other corporate governance policy constraints, such as compensation for the executives. An Indonesian public company is chosen as a case study to examine the effect of dynamic economic conditions. Premium Solver is used for model simulation.

Results and implications

The model of this study is found to be valid in that it adopts an integrated and comprehensive approach to formulate optimal financial management strategies. It can be applied consistently under different case study backgrounds and produce results that are consistent with the findings of other studies, relevant theories and principles.

The modelling (computational optimisation in Accounting) process shows that the integrated financial optimisation model and the output of the model, which are related to financial management practices that reflect internal and external governance mechanisms, such as leverage, executive compensation and risk-management practices, can provide optimal financial management strategies for achieving benefits of GCG practices in an organisation.

This book contributes to the academic literature by providing an integrated framework based on managerial and financial accounting perspectives for achieving the benefits of GCG practices. The framework incorporates risk-management practices, accommodates external regulatory environments and addresses the importance of the cost of capital.

This research provides a new insight into an application of the optimisation approach as a methodology for the study of corporate governance. It also provides an understanding for integrating the accounting concept in the linear optimisation model. This study, using a FCF approach as a measurement of firm value, is unique and makes a significant contribution to the literature.

This study has implications for GCG practices, as it provides a practical decision-making model for formulating sound financial strategies for achieving the benefits of GCG practices. The model quantifies broad concepts of GCG practices and normative GCG principles into monetary units so that GCG practices can be monitored and evaluated. This study provides a framework for analysing numerical results to illustrate risk-management activities. Through an integration of the value-based management and stakeholder approaches, the framework can be used to mitigate the risks of external regulatory environments and risks related to other internal governance mechanisms, and hence increase shareholder value.

Finally, this study also contributes to improving financial accounting practices by providing valuable insights into the importance of alignment of accounting standards with other regulations such as tax policy and the importance of using cash based-accounting concepts for measuring a company's financial health.

Limitations and conclusions

Limitations of this thesis include: (1) not forecasting the future value of the company; (2) using a linear programming model with a single objective function; (3) not covering complex risk-management problems such as derivatives; and (4) not covering non-financial governance instruments such as board governance.

Despite its limitations, this study shows that by having sound financial management strategies that have been formulated using an integrated reliable management optimisation approach, management can not only achieve the benefit of GCG practices, but also strengthen the company's financial position to ensure its ability to survive in crises.

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2. Nuryanah, S. 2011a, 'Achieving Good Corporate Governance Using a Financial Optimisation Model: Managerial and Financial Accounting Perspectives', *Conference on Financial Markets and Corporate Governance and PhD Colloquium*, La Trobe University, Melbourne.
3. —— 2011b, 'Measuring and Managing the Value of Companies Using a Financial Optimization Model: A Corporate Governance Perspective',

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4. —— 2011c, 'Measuring and Managing the Value of Companies Using a Financial Optimization Model: A Corporate Governance Perspective', *Global Science and Technology Forum (GSTF) Business Review – GBR*, vol. 1, no. 1 (invited submission).

The authors thank Global Science and Technology Forum (GSTF) Business Review for allowing materials from Nuryanah (2011c), above, to be published in this book.

List of Abbreviations and Definitions

Abbreviations

ASX	Australian securities exchange
BCG	Boston consulting group
CAPM	Capital pricing asset model
CAR	Capital adequacy ratio
COSO	Committee of sponsoring organisations of the treadway commission
DCF	Discounted cash flows
DDM	Dividend discount model
EMH	Efficient market hypothesis
EPS	Earnings per share
ESOP	Employee stock option planning
FIFO	First in first out
GAAP	Generally accepted accounting standards
GCG	Good corporate governance
GP	goal programming
IASB	International accounting standards board
IDX	Indonesia stock exchange
IFRS	International financial reporting standards
ISO	International management standards
IPO	Initial public offering
LIFO	Last in first out
LHS	Left-hand side(s)
LP	Linear programming
MOP	Multiple objective programming
NYSE	New York stock exchange
OHS	Occupational health and safety
RHS	Right-hand side(s)
SROs	Self-regulatory organisations
WACC	Weighted average cost of capital

Definitions

ATD	Accounting-tax difference
$ARTO_t$	accounts receivable turnover in period *t*
$\overline{ARTO_t}$	accounts receivable turnover in period *t* based on industry or average of company's historical data
$\overline{AR_t}$	net accounts receivable in period *t* in period *t* based on industry or average of company's historical data
ATO_t	assets turnover in period *t*
$\overline{ATO_t}$	assets turnover in period *t* in period t based on industry or average of company's historical data
$Accdepr_t PPEdisp$	accumulated depreciation of PPE disposed in period *t*
$AddPIC_t$ C/S	additional paid in capital from common stocks in period *t*
$AddPIC_t$T/S	additional paid in capital from treasury stocks in period *t*
$Accamrt_t$ IAdisp	accumulated amortisation of IA disposed in period *t*
CA_t	current assets in period *t*
CL_t	current liabilities in period *t*
CFO_t	net cash flows from (for) operating activities in period *t*
CFIt	net cash flows from (for)investing activities in period *t*
CFFt	net cash flows from (for) financing activities in period *t*
CFOt	adjusted cash flows from operating activities in period *t*
$CiFI_t PPE$	cash inflows from investing activities (disinvestments) of PPE in period *t*
$CoFI_t PPE$	cash outflows used by investing activities (investments) in PPE in period *t*
$CiFI_t IA$	cash inflows frominvesting activities (disinvestments) of IAin period *t*
$CoFI_t IA$	cash outflows used by investing activities (investments) in IAin period *t*

$CiFI_tLTI$	cash in flows from investing activities (disinvestments) of LTI in period *t*
$CoFI_tLTI$	cash out flows used by investing activities (investments) in LTI in period *t*
$CiFF_t$	cash in flows from financing activities in period *t*
$CoFF_t$	cash out flows used by financing activities in period *t*
$CiFF_tLTD_t$	cash in flows from LTD issuancein period *t*;
$CoFF\ LTD_t$	cash out flow for debt principals (including financial lease payment and preferred stock dividends) in period *t*
$CiFF_t\ C / S$	cash in flows from issuing C/S in period *t*
$CoFF_t\ C / S$	cash out flows for retiring C/S in period *t*
$CiFI_tT / S$	cash in flows from issuing T/S in period *t*
$CoFI_tT / S$	cash outflows for buying T/S in period *t*
CR	Current ratio
C / S_t	common stocks in period *t*
$C / S_{(t-1)}$	common stocks in period (*t*–1)
$COGS_t$	cost of goods sold in period *t*
DTL	Deferred tax liabilities
DTA	Deferred tax assets
DTE_t	deferred tax expensein period *t*
$DiscLTD_t$	discount of LTD in period *t*
DsC_t	debt – service coveragein period *t*
$\overline{DsC_t}$	debt – service coveragein period t based onindustry or average of company' s historical data
EBT_t	pretax financial income (earnings beforetax) in period *t*
EBIT	earnings before interest and taxes
EC	Executive compensation
FUNDS	Available funds for investments
$FCFE_t$	free cash flows to equity in period *t*
$FCFF_t$	free cash flows to the firm in period *t*
$Gaindisp_t\ PPE$	gain on disposal of PPE in period *t*
$Gaindisp_t\ IA$	gain on disposal of IA in period *t*
$Gaindisinv_t\ LTI$	gain on disinvestment of LTI in period *t*
$GainLTDred_t$	gain extraordinary in long term debt redemption in period *t*
IA_t	intangible assets in period *t*
IA_{t-1}	intangible assets in period *t*–1
$\overline{Int_t}$	net interest payment (net of tax) in period *t* based on industry or average of company's historical data

Int_t	interest payment in period *t*
IP_t	interest payable in period *t*
$IP_{(t-1)}$	interest payable in period *t*–1
ITO_t	inventory turnover in period *t*
$\overline{ITO_t}$	inventory turnover in period *t* based on industry or average of company's historical data
Inv_t	inventory (average) in period *t*
$\overline{Lev_t}$	average long term debt in period *t*
$Lossdisp_t$ IA	loss on disposal of IA in period *t*
$Lossdisinv_t$ LTI	loss on disinvestment of LTI in period *t*
$LossLTDred_t$	loss in long term debt redemption in period *t*
LTI_t	long term investment in period *t*
LTI_{t-1}	long term investment in period *t*–1
LTD_t	long term debt in period *t*
$LTD_{(t-1)}$	long term debt in period *t*–1
LTA_t	long term assets in period *t*
$Lossdisp_t PPE$	loss on disposal of PPE in period *t*
MV Eq	market value of equity
NDE	Non-deductible expenses
$NCinv_t$ in PPE	noncash investment in PPE in period *t*
$NCdisp_t$ of PPE	noncash disposal of PPE in period *t*
$NCinv_t$in IA	noncash investment in IA in period *t*
$NCdisp_t$ of IA	noncash disposal of IA in period *t*
$NCinv_t$ in LTI	noncash investment in LTI in period *t*
$NCdisinv_t$ of LTI	noncash disinvestment of LTI in period *t*
$NCLTDiss_t$	noncash long term debt issuance in period *t*
$NCLTDred_t$	noncash long term debt redemption in period *t*
NCC / $Siss_t$	noncash C/S issuance in period *t*
$Opex_t$	operating expenses including adjustment from noncash charges
PPE_t	property, plant equipment in period *t*
PPE_{t-1}	property, plant equipment in period *t*–1
$\overline{\varphi PPE_t}$	PPE growth in period *t*
$\overline{\varphi PPE}$: PPE	PPE growth during period (t_1–t_5) based on industry or average of company's historical data
n PPEt	changes in PPE in period *t*
Pd_t	permanent difference in period *t*
$PremLTD_t$	premium of LTD in period *t*
RE	retained earnings

$Rexm_t$	remuneration expenses for employees in period *t*
$Rexx_t$	remuneration expenses for executives in period *t*
$Sales_t$	net sales in period *t*
$Sales_{(t-1)}$	net sales in period (*t*–1)
$\underline{\varphi Sales_t}$	sales growth in period *t*
φSales	average sales growth during period ($t_{1-}t_5$) based on industry or the historical data
n $Sales_t$	changes in net sales in period *t*
TA	total assets
TL	total liabilities
$Totex_t$	total expenses in period *t*
Tax_t	income tax expense in period *t*
Td_t	temporary difference in period *t*
TP_t	income tax payable (current tax expense)in period *t*
TP_{t-1}	tax payable in period t–1
n T / St	changes in treasury stocks in period *t*
$TRex_t$	total remuneration expense in period *t*
$Unamdisc_t$ LTI	unamortised discounts of LTI disposed in period *t*
$Unampre_t$ LTI	unamortised premium of LTI disposed in period *t*
$Unamdisc_t$ LTD	unamortised discounts of LTD in LTD redemption in period *t* Unampret
$Unampre_t$ LTD	unamortised premium of LTD in LTD redemption in period *t*
WC	working capital
τ	corporate income tax rate
α	percentage basis for the management incentives
α_m	portion of remuneration expenses for employees
α_x	portion of remuneration expenses for executives

1
Sound Financial Management Strategies for Achieving Good Corporate Governance Practices

1.1 Introduction

The subject of this book is the formulation of sound financial management strategies for achieving the economic benefits of good corporate governance (GCG) practices through an optimisation financial model developed from managerial and financial accounting perspectives. This chapter presents the background of this study: the phenomenon of corporate failures, the current global financial crisis and the need for sound financial management strategies for achieving GCG practices. Good financial management strategies that incorporate elements of GCG practices are essential for a company's survival. This chapter also provides an initial discussion of an optimisation approach as one of the methods for formulating sound financial management strategies. The chapter then emphasises the uniqueness of the current study and lists the aims of and motivation behind the research. A short discussion of the research methodology underpinning the study is presented next, followed by the contributions of the book, and a description of its structure.

1.2 Background of the study

The fragility and volatility of the global economy has had a considerable impact on companies regarding the certainty of their business activities. GCG practice, which offers potential economic benefits for individual companies and the national economy (Clarke 2004), has been suggested as one of the methods to address the issue of corporate failures (OECD 2004, 2009). Despite GCG practice now being mostly compulsory for listed companies around the world, previously few companies viewed

GCG practice as a good risk oversight, with one reason being that it is costly to implement (Dallas 2004; Fabozzi and Modigliani 2009). Some companies simply applied the 'tick-boxes' style of corporate governance practice (HIH Royal Commission 2003) and ignored the substance of GCG practices such as good management practices, which in turn led to corporate failures (Love 1991; Sarre 2003). The recent corporate failures again highlight the importance of corporate governance. There are ongoing discussions and debates on 'what went wrong, who was responsible, and what lessons [can be learned] to prevent [corporate failures from] happening again' (Nordberg 2011, p. 15). While there are many perspectives that can be used to answer these questions, this book attempts to contribute to the discussions from the perspective of insiders of corporations by using managerial and financial accounting perspectives. This book is motivated by reports on the investigation of corporate failures which found that, apart from the unethical behaviour of management, poor management practice, such as lack of sound financial management practice, was one the main reasons for the failures (HIH Royal Commission 2003; Watts 2002).

This book furthermore views that although GCG practice is believed to be one of the key elements in ensuring the long-term survival of a company, the recent phenomenon of corporate failures suggests that GCG practices in form alone do not imply that a company employs sound financial management strategies. For example, reports investigating failed companies found that these companies overlooked the 'substance over form' concept in their GCG practices by not embedding and deriving quantitative financial measurements from the GCG principles in their companies' strategies. In addition, these companies had also failed to take into account the changing economic conditions globally and the dynamism of business environments when formulating their strategies. Complex business environments require a company to incorporate business regulatory environments such as tax, the financial market and the current GCG practices and integrate them into their financial management strategies. By reflecting the real environments faced by a company, these strategies will be effective not only for tackling the risks faced by the company, but also for achieving the economic benefits of GCG practices, for example minimising risks and increasing shareholder value. The question is how to formulate these sound financial management strategies and how to measure the effectiveness of these strategies on GCG practices.

It is argued that an optimisation approach is a useful method for decision-making analysis and hence a valuable approach for formulating optimal financial management strategies. However, a critical review of the literature reveals a number of limitations to the existing financial optimisation models for formulating sound strategies. The main limitations of the previous models can be summarised as: first, they are not contemporary, since they were not developed in the context of current GCG practices. They do not integrate GCG principles in their objective function and constraints. Secondly, most of the existing models reflect more short-term goal orientation such as profit maximisation or costs minimisation. These non-long-term goals are not sufficient for maximising shareholders' wealth. Thirdly, the objective functions of previous models are mostly based on accrual accounting–based measurements which contain accounting noise such as earnings management. Finally, the previous models do not incorporate managerial and financial accounting perspectives and therefore they are impractical for management decision-making.

In response, this study attempts to develop an integrated financial optimisation model for formulating sound financial management strategies that can achieve GCG practices. Using managerial and financial accounting perspectives, the model integrates current corporate governance practices, the complex regulatory environments and the dynamic business environment, including risks faced by a company. The integrated financial optimisation model will be developed based on theories of corporate governance, corporate finance and accounting. Corporate governance requires management to perform in the best interest of shareholders and to comply with the external system. Corporate finance and accounting theories provide policies that discipline managers to achieve the benefits of GCG practices. Based on these relevant theories, the model reflects the interrelationships between GCG, risk management, corporate finance and accounting practices.

The output of the integrated financial optimisation model is sound financial management strategies that are useful for achieving the benefits of GCG practices. The way sound financial management strategies could support GCG practices is briefly discussed in the next section. The effectiveness of these strategies on GCG practices, in the end, will be assessed based on their impacts on reducing risks and improving a company's performance.

1.3 Good corporate governance practices and sound financial management strategies

As discussed in the previous section, the global and competitive economy has had a significant impact on companies' business activities, for example, in companies' ownership and control, and in fulfilling stakeholders' rights and distributing the value they create (Clarke and Rama 2008). As the company grows and expands its activities globally, the effective governance of the company becomes even more important since failure would also have a negative impact on the economy and society. In this context corporate governance is defined as 'the entire network of formal and informal relations involving the corporate sector and their consequences for society in general' (Keasey et al. 1997, p. 2). Corporate governance also has an important role in guiding a company to comply with the legal, cultural and institutional arrangements it is operating in. Moreover, GCG means that a company needs to consider and embed the relevant risks, including regulations and other external systems controlling a company, such as self-regulation systems and 'best practice' norms, and other relevant risks, at the centre of its corporate structure (Farrar 2008; Iskander and Chamlou 2000). However, it is necessary to narrow this broad definition of GCG practices to more specific financial management strategies that can be applied to a company's business activities so that the benefits of GCG practices can be achieved.

In this way good financial management practices are important for GCG practices since they provide strategies for a company to manage its financial resources efficiently and therefore it can achieve its ultimate goal which is, under theory of corporate finance, to maximise shareholders' wealth. While this objective is specific to shareholders, it also brings value to the society (Petty et al. 2009). Therefore good financial management practices guide a company to directly fulfil the interests of shareholders which in the end could also benefit other stakeholders. This is relevant to broad GCG principles which ensure that a company protects not only shareholders but also other stakeholders (Brown and Caylor 2009; OECD 2004).

Good financial management and GCG are interrelated. Good financial management practices provide basic principles specific to financial decision-making. These principles complement the broader GCG principles which cover the non-financial area. One of the financial management principles is 'the agency problem' which underlies GCG practice. The agency problem is an effect of the separation of management of the firm that 'managers won't work for owners unless it's in their best interests' (Petty et al. 2009, p. 14). Both good financial management and GCG play their roles in mitigating the agency problem through their controlling instruments. Internal governance instruments cover both financial and non-financial policies. The examples are board governance function, managerial incentive plans, capital structure (leverage), dividend growth policy, risk management practices, and so forth. The financial policies are, in fact, subjects of financial management practices. Broader than good financial management practices, GCG practices require a company to follow GCG best practice and external governance mechanisms, such as external regulatory environments, while it creates value for the owners of a company. If a company does not comply with regulations, the company will face legal risks and potentially incur economic costs that in turn sacrifice shareholders' wealth. Under financial management practices, the external governance mechanisms are recognised as external threats which need to be accommodated into a company's strategy.

To conclude, good financial management is part of the internal governance instruments which discipline the managers to perform in the best interests of shareholders (the owners) and hence minimise agency costs. It enables management to review and manage the company's financial position. Moreover, financial management strategies ensure the achievement of the company's long-term goal by maximising shareholder wealth. Therefore this is in parallel with the objective and principles of GCG practice which in the end ensures the sustainability of the company. To be effective, however, financial management strategies need to be formulated in integrated ways by incorporating the external regulatory environments and the framework of GCG practice; hence, sound strategies minimise the risks and enhance the economic benefit of GCG practices, that is, improve the company's value.

1.4 Elements of sound financial management strategies

Sound financial management strategies for achieving GCG practices should have the characteristics described below.

1.4.1 Good corporate governance practices

Corporate governance consists of many dimensions. Inside a company, corporate governance is reflected in the organisation's structure, including its board structure, supporting board committee, risk-management activities and other internal controls of the company. As external governance instruments, corporate governance comprises formal and informal institutions, laws, regulations and rules which regulate the stewardship of a company to comply with the external systems so that the company achieves not only its financial goals, but also its environmental and social goals (Clarke and Rama 2008; Manzoni and Islam 2009).

Accordingly, good financial management strategies can successfully achieve the benefits of GCG practices if they incorporate the internal and external governance instruments, especially the financial instruments, as stated above. These sound strategies also need to reflect the broad principles of GCG practices that relate to, for example, shareholders' rights, so that the effectiveness of the company's corporate governance practices can be monitored and evaluated.

1.4.2 External regulatory environments

Financial management practices, as mentioned in Section 1.3, view external regulatory environments as business constraints since there will be compliance costs or penalties for non-compliance. Therefore, sound financial management strategies have to accommodate the environments in which a company operates. The strategies need to reflect the dynamics of the market, corporate governance regulations, accounting standards and industry practices. This study incorporates external environments in the formulation of sound financial management strategies. These strategies will guide management to comply with the regulations while minimising the costs incurred for compliance, and hence improve firm value.

1.4.3 Managerial and financial accounting perspectives

Sound financial management strategies have to be developed based on managerial and financial accounting perspectives so that the strategies are of significant value for practical managerial decision-making and practical GCG practices. Based on managerial and financial accounting perspectives, sound financial management strategies will show an interrelationship between corporate governance, corporate finance and accounting. Financial statements as a product of management and accounting will be used as an input for developing sound financial management strategies.

For formulating sound financial management strategies that can achieve the benefits of GCG practices, the relevant managerial and financial accounting proxies, policies or measurements are used in this study. The examples are risk-management practices, free cash flows (FCF), leverage, executive compensation, liquidity policy, solvency policy and profitability policy.

1.5 An integrated financial optimisation model based on managerial and financial accounting perspectives as a new approach to formulating sound financial management strategies

An optimisation model is a mathematical model that represents a problem of interest and is a method to solve that problem optimally.

It is very useful for decision-making analysis since it helps determine realistic and practical outcomes for management decision-making and design processes (Sarker and Newton 2008). The optimisation model is of value to management for decision-making since the results of the model suggest the available decisions for management to consider, with limited resources. In spite of the various classifications of optimisation models based on objective function, types of constrained or unconstrained problems, variable types and function types, the optimisation model used in this book is a constrained dynamic multi-period linear optimisation model with a single objective function.

The proposed model follows Morris and Daley (2009), Demski (2008), Ho and Lee (2004), Carleton (1970), Hamilton and Moses (1973) and Ijiri et al. (1963) by using accounting information for managerial decision-making so that it reflects managerial and financial accounting practices. It is also based on the underlying concepts of the interrelationships among corporate governance, corporate finance and accounting. Specifically, the model follows the concept of the financial optimisation model of Carleton (1970), as discussed in Lee et al. (2009), and the corporate model of Ho and Lee (2004).

This book extends previous models by incorporating GCG practices in objective function and constraints. In the objective function, this book will use FCF to measure firm value compared to other studies which used a dividend stream (Carleton 1970), earnings per share (EPS) (Hamilton and Moses 1973) and additional retained earnings (Ijiri et al. 1963). Compared to Carleton (1970), who focused on the company's long-term financial planning, this book extends the constraints to the operating and investing activities of the company so that the model will be a corporate one similar to Ho and Lee (2004) but incorporate GCG practices.

Current GCG practices and managerial and accounting policies that will be incorporated in the model are, for example, leverage, bankruptcy risks, management compensation and risk-management practice. The constraints are constructed based on the accounting equations and reflect generally accepted accounting principles (GAAP). Thus the equations show the relationships among the balance sheet, income statement and cash-flows statement of the company. Finally, this is a dynamic multi-period linear programming model applied in a case-study context. The cost of capital as the discount factor of the model reflects the external risks of the case study. It uses risk-free interest rate and rate calculated based on the capital pricing asset model (CAPM).

1.6 Aims of the research

Sound financial management strategies, which integrate GCG practices, risk-management practices and external governance instruments such as tax policy, accounting practices and industry practices, are essential for achieving the economic benefits of GCG practices, that is, reducing risks and increasing shareholder value. The main objective of this research is to formulate these sound financial management strategies for achieving benefits of GCG practices using an integrated optimisation financial model developed from managerial and financial accounting perspectives. The specific aims of this research are to:

- determine the GCG practices, business risks and regulatory environments that should be incorporated into the financial management strategies of a company;
- quantify the policy and mechanisms of GCG practices, and identify the right proxy for them;
- design an integrated multi-period financial optimisation model based on managerial and financial accounting perspectives (computational optimisation in accounting);
- use a FCF approach, which is believed to be the best approach, to quantify the economic benefits of GCG practice;
- implement the model for formulating sound financial management strategies that reflect good risk-management activities and GCG practices.

1.7 Research methodology

To achieve GCG and to help measure its benefits, a quantitative financial optimisation method as a business simulation tool to generate sound financial management strategies will be incorporated in this project. Using a quantitative approach, a mathematical model (computational optimisation in accounting) will be built by making use of quantitative data of accounting, finance and the capital market. This project captures the dynamism of business environments by using a dynamic multi-year linear programming model.

To examine the dynamic economic condition, a developing country case study is developed since this will reflect a more dynamic economic condition than if a developed country was used as the case study. The project is based on a case study of an Indonesian public company. Eight-year historical data (2004–2011) are used due to its availability. Covering more than five years, these data are useful in providing management with a strategic view for the future. The data needed for the project include financial statements and stock prices which were obtained from the Indonesian Stock Exchange, Datastream and Yahoo Finance. Other data, such as interest rates, discount rates, tax rates and other relevant regulatory environments, were collected from international or national (financial/investment/official) institutions such as Statistics Indonesia and the Central Bank of Indonesia. The project is executed using Microsoft Excel and the Premium Solver optimisation tool.

1.8 Contribution to knowledge and statement of significance of the study

The current financial crisis has called for sound financial management strategies as the basis for achieving GCG practice and its benefits. However, the phenomenon of corporate failures due to lack of sound financial management strategies has motivated the need for integrated ways in the formulation of sound financial management strategies. Previous to the present study, the integration of the interrelationships among corporate governance, corporate finance and accounting, especially in an optimisation framework using a specific case-study method, has not been addressed in the literature. This study fills this literature gap by formulating sound financial management strategies for achieving the benefits of GCG practices using an integrated financial optimisation model which is developed based on managerial and financial accounting perspectives.

1.8.1 Contribution to knowledge

This study contributes to theoretical corporate governance by first providing an integrated framework for formulating sound financial management strategies that can achieve the benefits of GCG practices. The framework integrates risk-management measures and analysis with GCG practices. Secondly, it provides an understanding of concepts of accounting and corporate finance, and how they relate to GCG practices. The results of the study provide an extended understanding of the importance of correct cost of capital for a business valuation so that the valuation accommodates the economic risk and market risk faced by a company.

1.8.2 Contribution to a methodological approach

The study also provides methodological contributions by providing a new insight into an application of the optimisation approach as a methodology for corporate governance study (computational optimisation in accounting). In addition, it takes the first step in integrating the accounting concept in the linear optimisation model. Then, using a FCF approach as a measurement of firm value, this study is unique in the literature.

1.8.3 Contribution to practice

The practical implications of this study for GCG practices are many. First, it provides a practical decision-making model for formulating sound financial strategies based on managerial and financial accounting perspectives that can achieve the benefits of GCG practices. The model quantifies broad concepts of GCG practices and normative GCG principles into monetary units so that GCG practices can be monitored and evaluated. The study offers valuable insights into the implementation of GCG practices in three main value-creation channels: operating, investing and financing. A further insight is afforded into risk-management practices which is of significant value for risk managers. Finally, this book has implications for regulatory bodies, including accounting standard-setters, by providing an insight into the importance of harmonisation of regulations and the necessity of incorporating a cash-based accounting concept for improving current GCG practices.

1.9 Structure of the book

This book consists of eight chapters as depicted in Figure 1.1. Chapter 1 introduces the subject of the study and sketches the content of the book. Chapter 2 presents a critical literature review as a foundation for formulating sound financial management strategies and developing an integrated financial model based on managerial and financial accounting perspectives. The relevant theory and a critical review of the existing literature as a basis for the framework of the study are also discussed in Chapter 2. The conceptual framework, methodology and the general model of the study are presented in Chapter 3. Type of data and the computer program used in formulating the sound financial management strategies are also discussed in this chapter. Details of the integrated financial optimisation model as a business simulation model for formulating the financial management strategies for achieving the benefits of GCG practices are presented in Chapter 4. Chapter 5 then presents a context of a case study in which the model will be simulated. Chapter 6 presents the results and analysis of the model relating to optimal financial management strategies. The results and their implications, such as

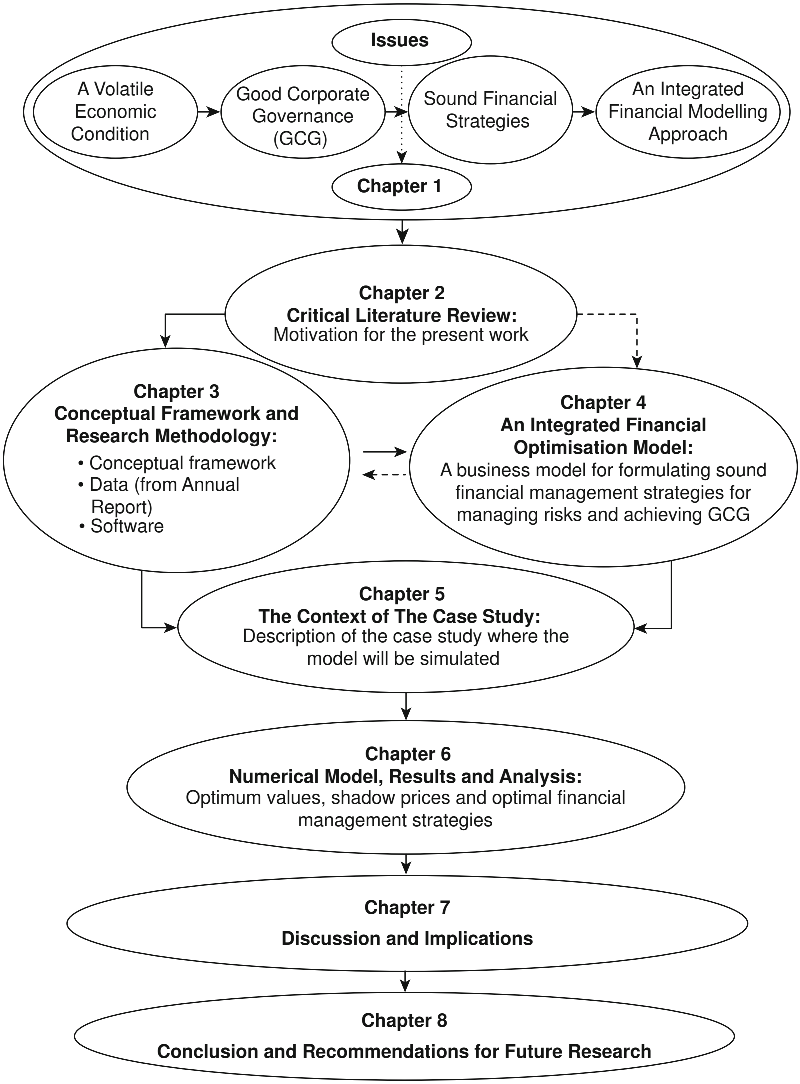


Figure 1.1 Research design and plan

theoretical and methodological implications, practical and regulatory implications for GCG, and managerial and financial accounting practices, are discussed in Chapter 7. The final chapter, Chapter 8, summarises and concludes all of the discussion in the book.

1.10 Summary

This chapter introduced the subject of the book. Arguing the need for sound financial management strategies for achieving the benefits of GCG practices, the chapter initially presented a background to the book. Next, the underlying theories of the study and the elements of optimal financial management strategies as the main subject of this study were previewed. The aims of and motivations behind the research were outlined next, followed by an overview of the research methodology, which uses an optimisation approach. Highlighting the limitations of previous studies, this chapter explained how this study fills the research gap, with an emphasis on its unique contribution to the literature and potential contributions in terms of the methodology used and its practical application. Finally, the structure of the book was briefly detailed. The following chapter discusses the fundamental theories underpinning the formulation of the sound financial strategies. It also presents a literature review as a basis for the study.

2

The Foundations for Formulating Sound Financial Management Strategies Using an Integrated Financial Optimisation Model

A Critical Literature Review

2.1 Introduction

As discussed in Chapter 1, to achieve the benefits of good corporate governance (GCG) practices a company needs sound financial management strategies. It is necessary that the formulation of these strategies is based on the interrelationships among corporate governance, corporate finance and accounting practices. Therefore this chapter presents three relevant theories and explanation of how they are interrelated as the basis for formulating sound strategies. The role of a mathematical model is also presented as a tool for formulating the strategies and for assessing the effectiveness of these strategies on achieving the benefits of GCG practices.

Specifically, as shown in Figure 2.1, the structure of this chapter is as follows. Section 2.2 argues the importance of sound financial management strategies for achieving the benefits of GCG practices. Section 2.3 discusses underlying theories for formulating sound financial management strategies for achieving GCG practices. In this section, interrelationships among corporate governance, externals/capital market, and accounting, and how they influence a company's business activities, are discussed based on fundamental theories of corporate governance, corporate finance and accounting. This section also addresses governance-controlling mechanisms which are derived from the underlying theories, and how they control a company in the process of achieving the economic benefits of GCG practices by reducing risks and stimulating

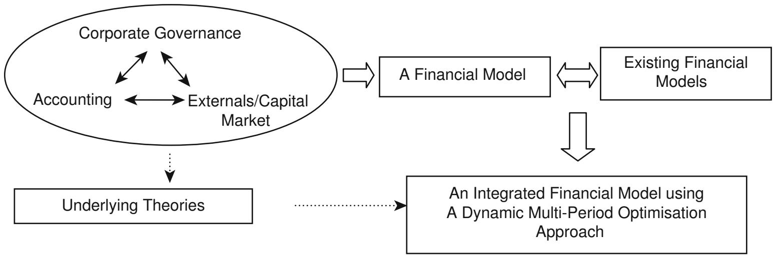


Figure 2.1 Structure of Chapter 2

a company's performance. Section 2.4 is focused on a modelling section. The role of a mathematical model and a financial model for modelling the complex issues faced by a company is presented. Literature on the existing financial optimisation model is discussed as the basis for developing a new integrated financial optimisation model which is used for formulating optimal financial management strategies. The last section of this chapter, Section 2.5, integrates and constructs all the underlying theories and relevant issues in an integrated multi-period financial optimisation model.

2.2 The importance of sound financial management strategies for achieving GCG practices

Good corporate governance (GCG) practice as the way corporations are governed has had a significant impact, not only for individual companies but also for the wider communities (Clarke & Rama 2008). GCG practice offers potential economic benefits for the national economy by: (1) protecting and facilitating the rights of shareholders and the key ownership functions; (2) ensuring the equitable treatment of shareholders, including the minority and foreign shareholders; (3) recognising the right of stakeholders and interrelating the stakeholders in 'creating wealth, jobs, and the sustainability of financially sound enterprises'; and (4) promoting high levels of disclosure and transparency (Clarke 2004; OECD 2004, p. 21). For individual companies, the benefits of GCG are: '(1) reduce risk; (2) stimulate performance; (3) improve access to capital markets; (4) enhance marketability of product/services by creating confidence among stakeholders; (5) improve leadership; (6) demonstrate transparency and accountability' (Collier & Agyei-Ampomah 2007, p. 84).

Having these potential benefits, GCG is argued to be one of the methods with which to tackle the corporate failure as well as to improve the performance of 'honestly managed and financially sound companies' (OECD 2004, 2009; Plessis et al. 2011, p. 15, quoted from Bosch 2002). Therefore, GCG practices have been compulsory mostly for public entities around the world. Nevertheless, the recent global financial crisis and phenomenon of corporate collapses have challenged GCG practices (Nordberg 2011). Few companies that purported to have GCG practices were collapsed (HIH Royal Commission 2003; Love 1991; Sarre 2003). The examples of these companies are Enron, Maxwell Communication, Lehman Brothers, HIH (insurance), One.Tel (telecommunications), Pasminco (resources), Harris Scarfe (retailing) and Centaur (resources) (Nordberg 2011; Watts 2002). The investigation of the corporate collapses reported that, apart from the unethical behaviour of management, poor management practice was the culprit (HIH Royal Commission 2003; Watts 2002). These failed companies lacked the concept of 'substance over form' in their GCG practices by only doing 'tick-boxes GCG practices' and not embedding the qualitative GCG principles into their companies' strategies, that is, by using quantitative financial measurements.

Good financial management strategies, therefore, are important for GCG practices since they guide a company to manage financial resources of a company and carry out the 'task of creating wealth for the firm's owner or shareholders' (Petty et al. 2009, p. 3). Petty et al. (2009) stated ten basic principles underlying good financial management strategies. These are: (1) the risk-return trade-off; (2) the time value of money; (3) cash-not-profits is king; (4) incremental cash flows; (5) the curse of competitive markets; (6) efficient capital market; (7) the agency problem; (8) taxes bias business decision; (9) all risk is not equal; and (10) ethical behaviour is doing the right thing, and ethical dilemmas are everywhere in finance. These principles intersect with GCG principles and therefore are relevant for achieving the benefits of GCG practices. Two main illustrations below explain interrelationships between GCG practices and sound financial management strategies.

First, the objective of a company under a financial management perspective is to maximise shareholders' wealth. While it is specific to shareholders, it does accommodate the interest of other stakeholders since it also guides management to 'provide the most productive use of society's resources' (Petty et al. 2009, p. 3). Therefore, the objects that sound financial management practices should serve are similar to those mentioned by GCG principles, that is, shareholders, other stakeholders and the national economy (OECD 2004, 2009).

Second, both sound financial management practices and GCG practices recognise agency problems in the process of achieving the company's objective. Therefore, to minimise agency costs, both good financial management practices and GCG practices provide controlling instruments. The instruments are called financial management strategies or policies or corporate governance instruments. Nevertheless, corporate governance instruments are wider than the financial management strategies since there are external governance instruments such as capital market characteristics and regulations which discipline companies as market players. On the other hand, financial management strategies are specific to internal company policies and they are recognised as internal governance mechanisms under GCG practices. The examples are capital structure, payout policies, risk management practices, and so forth. In addition, GCG practices have other non-financial instruments, such as board governance and supporting committees. To be effective, internal policies need to reflect the environment in which a company operates (Petty et al. 2009).

To conclude, good financial management is essential for GCG practices since it guides the managers to manage the company's resources and measure this process in monetary units. Specifically, sound financial management practices guide managers to achieve at least two of the benefits of GCG practices as mentioned by Collier and Agyei-Ampomah (2007) which are reducing risks and improving a company's performance through sound financial management strategies. The following sections discuss further the fundamental theories and issues for formulating sound financial management strategies that can achieve the benefits of GCG practices.

2.3 Underlying issues for formulating sound financial management strategies

This study is developed from the view that corporate governance, corporate finance and accounting are interrelated since they provide governance-controlling mechanisms and explain how these mechanisms discipline managers to perform in the best interest of shareholders in creating firm value (Brown et al. 2011). Therefore, this interrelationship needs to be highlighted in the process of formulating sound financial management strategies so that the strategies will be relevant and effective for achieving the economic benefits of GCG practices. This section discusses the bases of optimal financial management strategies which are controlling mechanisms that control a company in the process of creating firm value. The discussion will be based on underlying theories from where the controlling mechanisms are derived, which are theories of corporate governance, corporate finance and accounting.

2.3.1 Corporate governance: its external and internal governance mechanisms

Corporate governance has become a mainstream and fashionable concept globally in recent years. As defined by Claessens (2003, p. 5), corporate governance covers:

> the relationship between shareholders, creditors, and corporations; between financial markets, institutions, and corporations; and between employees and corporations. Corporate governance would also encompass the issues of corporate social responsibility, including such aspects as the dealings of the firm with respect to culture and the environment.

Based on the definition above, in its narrowest context corporate governance refers to 'a set of arrangements which define the relationship between managers and shareholders' as well as the system of accountability of the company, particularly related to the self-regulation system or capital/financial markets, and 'best practice' norms (Iskander and Chamlou 2000, p. 6; Farrar 2008). In the broader context it covers 'the entire network of formal and informal relations involving the corporate sector and their consequences for society in general' (Keasey et al. 1997, p. 2).

Due to differences in the nature of the legal system around the world, currently there are two corporate governance systems prominently adopted by developed countries, which are the Anglo-American 'market-based' model and the 'relationship-based' or 'Rhineland' model (Clarke 2007; Nuryanah et al. 2011). The legal system where the Anglo-American 'market-based' model is applied supports capital market economy in that the interests of large shareholders are accommodated and minority shareholders are protected. In this country, creditors or banks have relatively fewer rights than countries using the 'relationship-based' model. Comparing them to the rest of the world, Shleifer and Vishny (1997) found that many countries other than the United States, Germany and Japan provide less substantial legal protection of investors. In the case of Asia, the existence of controlling shareholders and the regulatory weaknesses become obstacles for the convergence towards the Anglo-American model (Allen 2000). Apparently, most Asian countries tend more to follow the 'form' rather than substance of corporate governance (of Anglo-American principles) (Allen 2000, p. 26).

In regard to the narrow context of corporate governance, the development of the board governance structure can be explained by underlying theories such as agency theory, managerial hegemony, stewardship theory and external pressure theories: resource dependence theory and institutional theory, and stakeholder theory (see further Clarke 2004 and Hung 1998). Stewardship theory argues that 'there is no conflict of interest between managers and owners' (Clarke 2004, p. 8) and hence it holds that managers are good stewards who will act in the best interests of the shareholders (Davis et al. 1997). Besides stewardship theory, however, other underlying theories support governance-controlling mechanisms which can discipline managers and minimise conflicts of interest between managers and owners, as well as reduce conflicts of interest among stakeholders.

Based on these underlying theories, two broad governance mechanisms that control management or a company's business activities can be listed: external mechanisms and internal mechanisms. External mechanisms are those factors outside of the company, such as regulation, business environment, capital market size and liquidity, banking and financial institutions and product market competition (Allen & Gale 2000; Bushman & Smith 2001; Douma & Schreuder 2008; Heinrich 2002). On the other hand, the internal mechanisms refer to the governance instruments within corporations such as board governance, management remuneration, ownership, leverage and internal policies, including internal control mechanisms. The following sections explain further each of the instruments, including the underlying CG theories and how they influence the company.

2.3.1.1 Capital market as an external CG mechanism

Agency theory as one of the underlying theories of corporate governance argues that the separation between management and financing of business entities has created principal-agency problems (Berle & Means 1933). Jensen and Meckling (1976, p. 5) define an agency relationship as 'a contract under which one or more persons (the principal[s]) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent'. The separation between the owners and the agent creates costs called agency costs which consist of monitoring and bonding costs, and residual loss.

Monitoring and bonding costs relate to costs for limiting aberrant activities of the agent and ensuring that the agent performs its services in the best interests of the principal. On the other hand, residual loss occurs as a result of incongruent decisions by agent and principal. Agency theory assumes that every individual has a self-interested, utility-maximising motivation; hence, as argued by Clarke (2004), efficient markets are the solution.

An efficient market for corporate control, management labour and corporate information will discipline the management – the agent of the company – by giving positive or negative feedback on corporate information. Figure 2.2 shows how the capital market plays its role as an external governance instrument. In this process, accounting information has an important role as a business language used by a company to send messages to the externals. The market's response to this information is reflected by changes in market share price. The market feedback is evaluated by management and becomes an important input for formulating its future strategies or policies. The response of the market to such information, however, is influenced by the efficiency characteristics of the capital market itself.

Three forms of market efficiency are strong, semi-strong and weak capital market (Jones et al. 2006). Under Efficient-Market Hypothesis (EMH), the prices on the market fully reflect the publicly available information; new information will be captured and responded to by the market immediately (Fama 1970). In a strong-form efficient capital market, price reflects all the publicly available and inside information. In this type of market all investors have the same information; therefore, no one could outperform the market. In contrast, in the weak and semi-strong efficient capital markets, one could take advantage of the market for various reasons. First, in the weak form, only historical information is reflected in the price; hence, it is possible to predict the

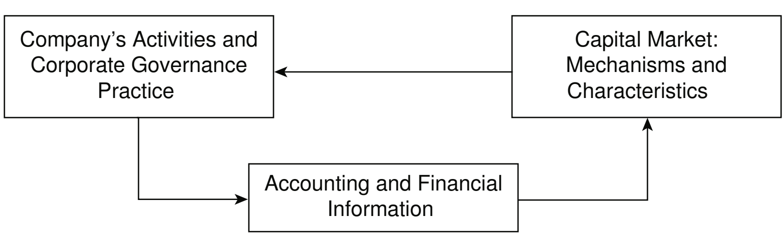


Figure 2.2 Capital market as an external governance instrument

future movement of the price. Second, in the semi-strong form, only the publicly available information is fully reflected in the price; hence, additional information would be valuable for investors to gain on the market.

The structure of the market is another factor that influences its characteristics and efficiency. The elements or participants in a capital market consist of investee, investor, regulators and other supporting institutions such as professionals, for example a public accountant, a lawyer, a trustee and so forth. The deficient players (investees) are publicly listed companies while the investors could be individuals or institutional companies (banks, financial institutions, pension funds, etc.). Regulators serve as authorised bodies responsible for ensuring the market-governance mechanisms so that all the market participants comply with the regulations. The supporting institutions also play important governance roles as, for example, a public accountant that, with its audit opinion on financial information, minimises information risk (Arens et al. 2008). An example of the organisation of a capital market is depicted in Figure 2.3. The figure shows institutions that play in the market and how they are related.

The literature found that GCG practice of a company is responded to positively by the market (Beiner et al. 2004; Black et al. 2006; Brown & Caylor 2009; Gompers et al. 2003; OECD 2004). The market pays a higher premium for companies that implement good corporate governance

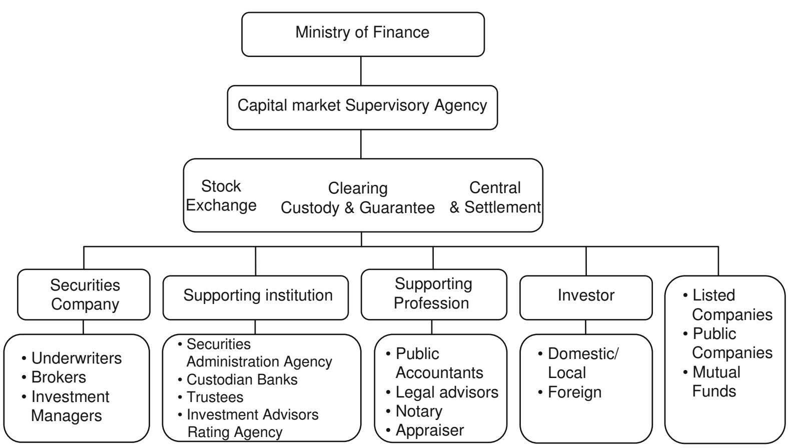


Figure 2.3 An example of capital market structure
Source: IDX (2007)

practice (Gompers et al. 2003). This can be shown also in the historical price movement of failed companies. The market price movement explained how the market responded negatively to the companies' failure. Figure 2.4 below depicts how the market reacted to the collapse

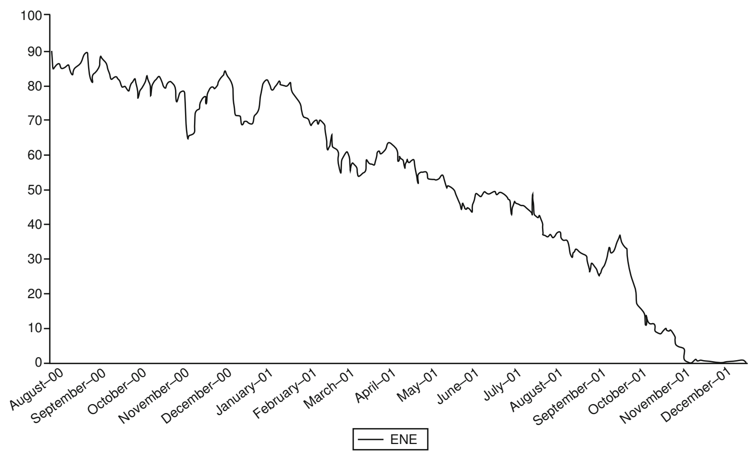


Figure 2.4 Enron stock price movement before collapse
Source: Enron Securities Litigation website (2005)

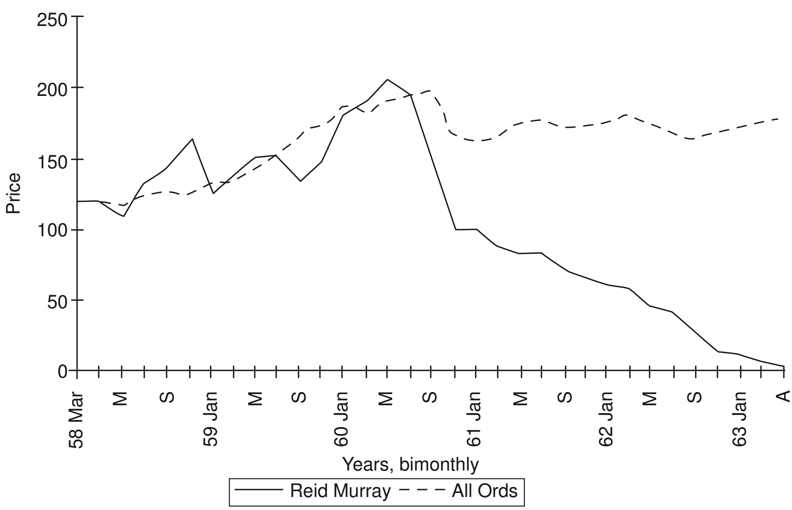


Figure 2.5 Reid Murray Holding Ltd stock price movement before collapse
Source: Clarke et al. (2003, p. 59).

of Enron. Similarly, Figure 2.5 shows the share price movement of the collapsed company, Reid Murray Holding Ltd., in the 1960s.

2.3.1.2 Business environments: Industrial codes of conduct, professional practices and regulations as external corporate governance instruments

In addition to agency theory which argues that the capital market is an important external governance instrument to minimise agency problem, resource dependency theory argues that to be successful an organisation needs to consider its environments (Clarke 2004; Lawrence & Lorsch 1967). The theory explains how a company should manage the uncertainty and dynamics of the environment so that it can access valuable resources and information for its benefit (Pfeffer & Salancik 2003). In addition, a company needs to consider the institutional forces in terms of regulations and market for corporate control in their corporate strategy as suggested by the institutional theorists (Clarke 2004; Eisenhardt 1988). Institutional theory argues that a company can create a governance network for sustaining its position in a volatile economy. A company builds its governance based on relationships, mutual interests and reputation, and does not rely on a formal structure of authority (Clarke 2004; Powell 1990). Similarly, stakeholder theory argues that external stakeholders are as important as the internal stakeholders and the relationship between the company and the external stakeholders is constrained by formal and informal rules which are set by the government and business/industry/professional practices (Clarke 2004; Freeman & Evan 1990).

The stakeholder theory and external pressure theories (resource dependency theory and institutional theory) suggest a company should consider its surroundings. Externals can be double-edged swords, which means that, although they are considered as part of governance mechanisms that discipline managers and market players, they are also considered as corporate risks which threaten corporate sustainability. Therefore, good corporate governance requires that the company adhere to regulations and business practices since they bind the company's activities. As depicted by Farrar (2008), the structure of corporate governance is outlined in Figure 2.6.

Consequently, a company needs to consider the business environment, professional practices, industry codes of conduct and regulations in its decision-making. This is consistent with organisation theory which states that a company must consider the external environment (Lawrence & Lorsch 1967; Pfeffer & Salancik 2003). Particularly in the

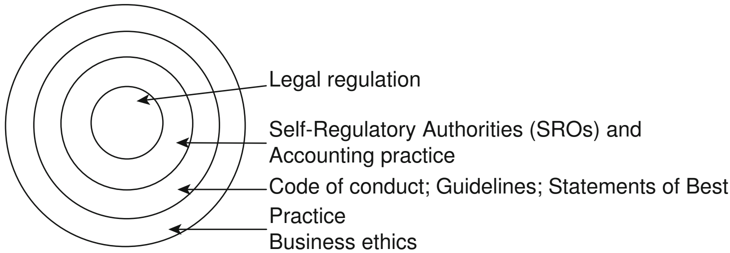


Figure 2.6 The structure of corporate governance

Source: Adapted from Farrar (2008, p. 4).

current economic condition globally, it is not easy for a company to gain benefits of GCG practices or even to be able to survive corporate collapses, therefore, as resource dependency theory suggests, a company needs to manage uncertainty to enable access to valuable resources and information (Pfeffer & Salancik 2003). Accordingly, the best practice of GCG proposes guidance as to how a company should adhere to the entire external environment in order to enable it not only to survive but also to gain the economic benefits of GCG practices.

Business environments that affect a company's business activities and influence the decision-making process are referred to as external governance mechanisms (Bushman and Smith, 2001). They include, for example: (1) industrial practices such as occupational health and safety (OHS) and international management standards (ISO); (2) professional practices such as accounting and auditing practices which influence the preparation of financial statements; (3) capital and financial markets characteristics; and (4) regulations such as tax code, company law, regulations issued by self-regulatory organisations (SROs) and market for corporate control. The market for corporate control is argued to alter the pressure on managers and cause changes to other (internal) governance mechanisms (Bushman et al. 2004), while product market competition reduces agency costs by requiring management to invest substantial free cash flows in invaluable activities or investments that create the company's future value (Jagannathan & Srinivasan 1999). While some business practices are optional or highly recommended, regulations such as company law, stock exchange and SROs law, and professional practices such as accounting standards and financial reporting standards are compulsory.

Accounting practice

Accounting standards are compulsory for all publicly listed companies. Developments and discussions in accounting standards have influenced the development of corporate business around the world since the preparation of financial statements as the basis on which investors and other external users make decisions are accounting standards. The vehemence of critics on accounting has motivated the accounting standard-setters around the world to develop standards that improve the quality of accounting information in terms of understandability, relevance, reliability, comparability and consistency which in the end can improve the decision-making process (Warfield et al. 2008; Weygandt et al. 2010). In this case, the shift to International Financing Reporting Standards (IFRS) has taken place and the convergence between IFRS and US GAAP is on the way. While there is cost for the convergence, it is clear that the convergence that brings single accounting practice into being around the world will increase the comparability of the financial statements, thereby benefitting the users and the whole economy.

Stock exchange and corporate law

Every stock exchange around the world issues some rules relating, for example, to listing, markets and transactions. Publicly listed companies are required to follow the listing rules issued by the stock exchange. Under the listing rules, a company has to provide, for example, continuous and periodic disclosure related to all material information such as changes in capital (including issuing new shares), transfer ownerships, non–arm's length transaction, significant transactions, companies' policies and so forth (ASX 2010; Nasdaq 2006; NYSE 2008a). A listed company also has to comply with regulations related to financial and corporate governance compliance (ASX 2010; Nasdaq 2006; NYSE 2008a). Financial compliance relates to how and when a listed company reports its financial results such as earnings, cash flows and all information related to its share performance (distribution, trading volume, market value and price) (Nasdaq 2010; NYSE 2008b). A listed company also has to comply with GCG practice which requires it to have sound governance structure such as corporate boards, independent directors and audit committee, and enhance disclosure and transparency (ASX 2007; Nasdaq 2010; NYSE 2008a, 2008b). In addition to stock exchange rules, company laws are applied generally to all public and non-public companies, listed and non-listed companies. These laws regulate the formation of a company, the rights and obligations of management and shareholders, and how a company should consider society in its business.

Tax act

Taxation law binds corporations as taxpayers to pay taxes, withhold taxes, report and file taxes, including income tax, value-added tax, sales tax and property tax. The Act requires a company to record transactions and to prepare fiscal financial statements based on a tax code. Apparently, to some extent the tax code differs from general accounting practice (accounting standards). Accordingly, to calculate an income tax expense, a company needs to calculate taxable income. Taxable income is income before taxes (also referred as pre-tax financial income, income for financial reporting purposes or income for book purposes; this is income based on accounting standards) which is adjusted based on the tax code. The process is known as fiscal reconciliation or adjustment.

The difference between tax code and accounting standards leads to book-tax differences. It can be due to temporary/timing or permanent differences. A temporary difference is 'the difference between tax basis of an asset or liability and its reported (carrying or book) amount in financial statements, which will result in taxable amounts or deductible amounts in future years' (Warfield et al. 2008, p. 966). This difference, which originates in one period will subsequently reverse in another year. Examples of this difference are depreciation expenses, warranty expenses, revenue from instalment sales and so forth. A permanent difference, on the other hand, affects only the period in which it occurs; it does not have any effect on either taxable amounts or deductible amounts in the future. The permanent difference comes from two items, including revenue and expenses, that '(1) enter into pre-tax financial income but never into taxable income, or (2) enter into taxable income but never into pre-tax financial income' (Warfield et al. 2008, p. 975).

In summary, every business activity of a company is subject to tax. Therefore it is necessary for a company to consider the impact of tax on every financial decision it makes since in the end it will affect shareholder value.

Practice and regulations specific to industry

Specific regulations or practices in an industry control a company's activities, a clear example being regulations for the banking and financial industry. This industry practice requires and restricts banks to meet minimum requirements, have a supervisory review and market discipline. The minimum requirement relates to minimum capital requirements such as capital adequacy ratio (CAR) and the minimum amount of reserve required in the central bank. The banking industry is under high supervision by authorities since banks are subject to contagion risk. The supervision consists of many layers: at the level of the bank itself (solo), consolidated, conglomerate and regulatory bodies. The layering supervision ensures the bank manages the risks efficiently so that the public is protected from the consequences of bank failure (Gleeson 2010).

According to these industry practices, a company uses its industry as a benchmark for its financial or company performance since investors carry out their investment analysis by comparing the company's performance with that of the industry (Jones et al. 2006). Therefore it is necessary for a company to compare its financial ratios, such as liquidity, solvency and profitability, with the industry's performance.

Summary of external regulatory environments: costs and benefits

The regulations and business practices listed above, which discipline companies and managements, have implications in terms of costs and benefits. The benefits of complying and following all of them are clear in that a company will be recognised as a good and healthy company; hence, it can easily access both capital and product markets. With good corporate governance, a company can obtain much cheaper financing (Aldamen et al. 2010), improve its market share price, establish its goodwill and, most importantly, can create sustainable value (Pitelis 2004).

On the other hand, the costs of compliance or non-compliance could be expensive. If a company does not comply, its life will not be long or, in accounting terms, it will not be 'a going concern.' If a company does not follow some ISO standards it will lose its customers. Similarly, if a company's financial reporting does not follow generally accepted accounting standards (AASB), its audit will not receive a clean opinion and the markets will react negatively (Arens et al. 2008). The costs of compliance could increase expenses, thereby minimising income and returns for the owners. Therefore, a company needs to conduct a cost-and-benefit analysis, but clearly compliance brings long-term benefit and creates value for the firm.

Having recognised the importance of business and regulatory environments, a company needs to focus on the following management functions: (1) compliance (and legal) function: a function that relates to a company's activity to adhere and comply with the legal systems by which it is bound; (2) internal audit function: a function that relates to 'assurance and consulting services' in the area of 'operational efficiency, risk management, internal controls, financial reporting, and governance process'; (3) legal and financial advisory function: a function that relates to legal advice, financial planning and financial advice; (4) external audit function: a function to fulfil public demand regarding the quality of financial statements (Rezaee 2007, p. 61). Strengthening these management functions, a company will have lower failure risks as well as higher opportunities to gain economic benefits for shareholders and also external stakeholders, thereby ensuring the achievement of sustainable value (Monks & Minow 2003; Rezaee 2007).

2.3.1.3 Managerial and financial accounting policies as internal corporate governance instruments

The previous sections discussed that all underlying theories of corporate governance except stewardship theory support external governance controlling mechanisms such as efficient market and business environments. External governance mechanisms can be inefficient because of the contractual hazards such as information asymmetries and self-interested opportunism (which stems from an inefficient market). Therefore, internal governance instruments as argued by agency theory, substitute the external governance by disciplining managers to run the company in the best interests of shareholders.

Agency theory furthermore argues that separation between management and financing of business entities gives opportunities for management to behave against the shareholders' interests, thereby creating agency costs (Berle & Means 1933). The separation between management and owners creates information asymmetry. As a result, management has more information than the shareholders and other parties and may use this information asymmetry to its own advantage. Internal governance instruments, argued by stakeholder theory, reflect a company's activities in considering and accommodating the external demands, hence they alleviate agency problems and discipline managers to fulfil their responsibility to stakeholders. These internal governance instruments are further reflected in the company's managerial and financial accounting policies such as internal control and risk-management practices.

Internal control of a company, as argued by the committee of sponsoring organisations of the Treadway Commission (COSO), disciplines management by requiring it to have: '(1) effectiveness and efficiency of operations; (2) reliability of financial reporting; (3) compliance with applicable laws and regulations' (Calder 2008, p. 109; COSO 2010). These objectives of internal control can be achieved by empowering the organisation structure (e.g., requiring high responsibilities of the board, strengthening the supervisory functions and ensuring that other functions at every stage of decision-making are effective and efficient) so that the organisation structure will make business operations run effectively and efficiently. The internal control will mitigate agency costs since it requires that financial reports become reliable, and will ensure the company complies with the regulations (Calder 2008; Dietl 1998; Jensen & Meckling 1976; OECD 2004; Rezaee 2007, p. 50). As part of internal governance mechanisms, an organisation structure can be applied in the form of, for example, size of the boards, composition of the boards, leadership of the boards, size of the company, ownership structure, and board committees: an audit committee, remuneration committee and corporate governance committee (Adams & Mehran 2003; Barnhart & Rosenstein 1998; Berghe & Levrau 2004; Gillan et al. 2003; Hermalin & Weisbach 1988; Rezaee 2007).

In addition to the organisation structure, risk-management policies are also important internal governance instruments which discipline managers. Good risk-management activities add to a company's value since they 'provide financial flexibility at minimum cost, enhance capital allocation and performance management, and leverage operational and strategic flexibility' (Léautier 2007, p. 5). Financial management strategies in operating activities, such as sales policy, profitability policy and liquidity policy for example, are specific internal controls which ensure the sustainability of the company's operating activities. By having current assets greater than the current liabilities, liquidity policy ensures that the company can pay its short-term liabilities and finance its daily operating activities.

Another managerial and financial accounting policy is management compensation policy. As argued by optimal contracting theory, management compensation can act as an efficient bargain to make managers perform in the best interests of the owners (Bebchuk & Weisbach 2010; Dicks 2012; Henderson 2007). Under stakeholder theory, however, an exaggerated amount of compensation would be viewed as unfair to other stakeholders, such as employees, since they would suffer from any economic crisis due to this exaggerated compensation activity. This is relevant to managerial power theory which argues that managers are often overpaid and inefficiently paid (Henderson 2007). Accordingly, the sensible amount and types of compensation have been reviewed following the corporate crisis in the beginning of 2008; in this regard, the G20 summits criticised current executive compensation practice (Winestock & Anderson 2009). GCG practices concern executive compensation which is 'not too much' and 'not too little' (Nordberg 2011).

Financing policy, which relates to finding financing for the company's core business activities, is also part of governance mechanisms. Similarly, investment policy, whether it is 'internal investment', such as creation of assets and plant/market expansion, or 'external investment', such as having ownership in other companies, is also one of the methods to create or increase the company's future value. Discussions on financing types and how they influence the company's value, as well as investment policy and the valuation methods that are relevant for investment, are discussed in the following section.

To conclude, internal governance mechanisms discussed in this section include internal control, organisation structure, board governance, managerial and financial accounting policies in operating activities, and management compensation. The following section will explain other governance mechanisms which are specific to the financing and investing activities of a company. They are discussed under corporate finance, another underlying theory which is also relevant to help formulate good financial management strategies.

2.3.2 Corporate finance

Despite the fact that internal control, organisation structure such as board governance and its committees, and managerial and financial accounting policies play important roles as governance instruments, managerial hegemony theory argues that management can still control the board and these internal governance mechanisms (Clarke 2004; Scott 1985, 1997; Zeitlin 1974). Therefore, other internal governance mechanisms, such as capital structure, are important to strengthen the monitoring function of the board. The policies are related to corporate financial management policy. Corporate financial management includes 'dividend policy, external funding, capital structure design, risk and return, and allocations of the firm's assets or future income' (Ho & Lee 2004, p. 493), hence it covers both the financing and investment activities of a company. This section discusses the other managerial and financial accounting policies (financing and investment policies) based on the theory of corporate finance.

2.3.2.1 Theory on capital structure

The leverage or capital structure is an important internal governance instrument which protects shareholders and manages the conflict of interests between shareholders and debtholders (Ghosh 2007; Heinrich

2002; Jensen 1986; Sarkar & Sarkar 2008). Debt can force a company into liquidation in a default case and require the company to disclose more information, thereby decreasing information asymmetry and protecting investors (Milton & Raviv 1990). Too many debts, however, can cause a company to face the risk of bankruptcy which in the end will have negative impacts on society by creating unemployment and social problems (Verwijmeren & Derwall 2010). Good management of external funding and capital structure would especially satisfy shareholders and creditors, and underpin firm performance (Berger & Bonaccorsi di Patti 2006; Simerly & Li 2000).

Modligiani and Miller (1958), however, initially argued that leverage or capital structure and dividend is only a way for a manager to repackage the company's operating cash flows for investors; the capital structure is irrelevant because the decision on leverage and dividend does not affect the company's earnings power, hence it does not affect the market value of the company either (Chew 2003b; Modigliani & Miller 1958). The theorem is under restrictions that there are no corporate or personal taxes, no contracting costs or reorganisation costs, corporate investment policy is fixed, investment decisions are not influenced by financing or dividend choices, and there are no information costs or informational asymmetries. This irrelevant leverage theorem has caused dissent among scholars. Myers (1993, p. 80) argued that now 'financial leverage matters more than ever.' Chew (2003b) concluded that the theorem implicitly states that capital structure and dividend are relevant in some conditions related to the capital market and regulatory environments and that: (1) capital structure and dividend reduce taxes paid by the company or the investors; (2) debt at some points can give leverage effect to the company's performance but it has an embedded risk, namely bankruptcy costs or financial distress; (3) there is a 'clientele effect' in that dividends send a positive signal to the market about the prospect of the company; (4) leverage and dividends encourage efficient management and value-adding investments.

As an instrument, debt is a double-edged sword for a company. On the one hand it has a leverage effect and a function to reduce agency cost of substantial free cash flows; on the other hand it embeds a bankruptcy risk (see further Jensen 1986). Examining the optimal capital structure that maximises firm value, Myers (1993, p. 80) argues that 'if there is an optimal capital structure, it should reflect taxes or some specifically identified market imperfections', hence 'the firm is supposed to substitute debt for equity, or equity to debt, until the value of the firm is maximised' (Myers 1984, p. 577). This debt–equity trade-off is called the static trade-off theory of optimal capital structure. It suggests the firm sets a target debt-to-value ratio and gradually moves towards it (Myers 1984). As shown in Figure 2.7, this theory argues that the optimum capital structure is achieved when firms balance the marginal present values of interest tax shields against the costs of financial distress. This theory goes for moderate capital structure since the problem will arise if managers deliberately take advantage for themselves by trading off the tax saving from debt financing against the costs of financial distress. It happens when 'rather than taking benefit from tax saving embedded in debt by having optimal capital structure, the manager puts too much risks by issuing too many debts, the risky debts, hence causes deadweight costs of possible liquidation or reorganisation' (Myers 1993, p. 80). Myers (1984, p. 589), however, argued that 'the static trade-off theory is weak because it cannot explain the firm's financing behaviour'. Myers (1993) further argued that the theory cannot explain how a company manages its capital structure over time; it does not mention in detail the effect of the transaction costs.

Myers (1984) proposed pecking-order theory which suggests a hierarchy of capital structure of a firm. Under the pecking-order theory, a firm 'has no well-defined target debt-to-value ratio' (Myers 1984, p. 576). This theory proposes how a company can maximise its value by minimising the expected information costs – that is, the costs due to asymmetric information (information disparity between managers and

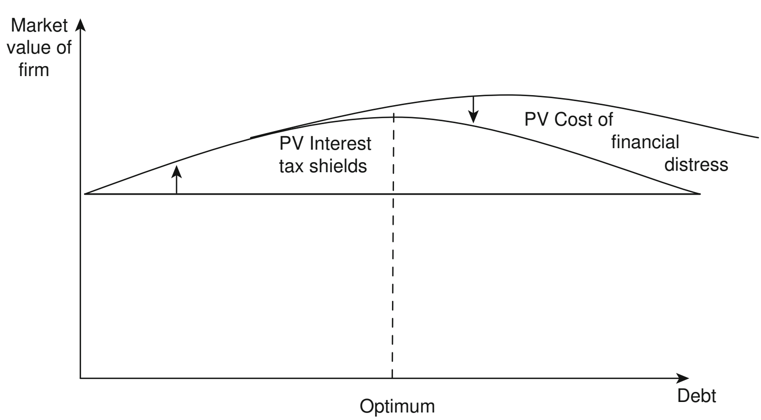


Figure 2.7 The static trade-off theory of capital structure
Source: Adopted from Myers (1993).

investors since managers have more information than investors) (Barclay et al. 1995). Therefore internal financing should be prioritised over external funding. If external financing is necessary, debt is better than equity as long as management has favourable information (Myers 1984). Information costs become the main consideration since the amount is quite material in a case of issuing securities (Barclay et al. 1995).

Internal financing, by using the retained earnings/profits, will be much cheaper in terms of effort and costs. Rather than returning the profits to the owners, the manager invests the profit for prospective investments, and it is the job of the innovative manager to find these prospective projects. Therefore, based on the economic model, returning the profits to the shareholders in terms of dividends could be seen as a failure of management (Stewart 1999). Compared to internal financing, external financing, whether by issuing debt or equity, is much more expensive since there are issuing and transaction costs, administrative and underwriting costs. Debt, however, involves borrowing costs and if a company has too much debt it will suffer bankruptcy costs. The amount of the borrowing cost will be as much as the required return for credit risk: the risk whether the company is able to meet its obligation to pay the principal and interest (Stewart 1999). Similarly, equity has costs as much as premiums to cover business risks and financial risks. The cost of equity is 'the return investors require to compensate them for the variability of bottom-line profits' (Stewart 1999, p. 432).

Ranking the sources of financing, this theory hypothesised further that the leverage changes when there are imbalances of internal cash flows, net of dividends, and real investment opportunities arise (Myers 1993). Then, considering all the information costs and asymmetric information, the pecking-order theory finally suggests that 'companies with few investment opportunities and substantial free cash flows will have low debt ratios – and that high-growth firms with lower operating cash flows will have high debt ratios' (Barclay et al. 1995, p. xx; Myers 1984). Consequently, under this theory firms with higher information asymmetry between managers and investors will be more reluctant to issue equity. Indeed, this pecking-order theory implies that the managers should depend more on internal sources, hence reduce their dependence on capital markets (Chew 2003a, p. 125). The powerful nature of pecking-order theory is supported by many studies such as those by Shyam-Sunder and Myers (1999), de Miguel and Pindado (2001), Graham and Harvey (2001), Fama and French (2002), Schlingemann (2004), Dong et al. (2005), Pattenden and Twite (2008), González and González (2008) and Beck et al. (2008). Shyam-Sunder and Myers (1999) found that the pecking-order theory can explain the capital structure of a company over time better than the static trade-off theory. Similarly, Fama and French (2002) supported the pecking-order theory, finding that more profitable companies have less debt (external financing). González and González (2008) suggested further that the pecking-order theory is chosen in countries in which protection of property rights is weak, whereas the trade-off theory is more applicable in countries with stronger property rights regulation.

In addition to static trade-off theory and pecking-order theory, another theory of capital structure is the market-timing theory proposed by Baker and Wurgler (2002). There are four types of studies showing evidence of market timing: (1) studies on actual financing decisions that show that issuing or repurchasing shares by a company is related to the historical market values; when its market value is high, a company issues shares and vice versa; (2) analyses of long-run stock return: a company issues stocks when the cost of equity is low and repurchases stocks when its cost is high; (3) analyses of earnings forecasts and realisations around equity issues: a company issues stocks when the market reacts positively to the company's prospects; (4) survey of managers' financial decisions: market timing is an important or very important consideration in whether to issue or repurchase the equity.

Consistent with this evidence, Baker and Wurgler (2002, p. 2) found that 'low leverage firms are those that raised funds when their market valuations were high, as measured by the market-to-book ratio, while high leverage firms are those that raised funds when their market valuations were low'. This theory argues that there is no optimal capital structure; simply, the capital structure shows market timing financing decisions, and it is just accumulated over time into the capital structure outcome. Empirical studies supporting this theory are, for example, those of Hovakimian et al. (2004) and Elliott et al. (2007).

To conclude, as mentioned by Barclay and Smith (2003), corporate financial policy can be explained by three broad categories: (1) taxes; (2) contracting costs; and (3) information costs. Taxes have made some financial instruments more interesting than others as, for example, issuing debt is more interesting than equity since in general tax regulation allows interest payments to be deductible expenses and therefore lower the income tax expense. Nevertheless, tax regulation is country-specific and it is difficult to generalise that the same capital structure policy in one country will have the same benefit when it is applied in other countries. Regarding the contracting costs, Barclay and Smith (2003) argued that financial managers make financial decisions by balancing the tax benefits of higher leverage against the probability of financial distress. Therefore the optimal capital structure is 'the one in which the next dollar of debt is expected to provide an additional tax subsidy that just offsets the resulting increase in expected costs of financial distress' (Barclay & Smith 2003, p. 156). Then, based on the information costs, the financial decision will be based on signalling and pecking order. The information costs suggest that managers have more information than the outside investors.

Finally, financing decision or capital structure is one of a company's important policies. All the theories on financial policy suggest a manager analyses the costs and the benefits related to whether to issue stocks or debt, or use its internal financing. Whether the capital structure can be explained by the static trade-off theory, pecking-order theory or market-timing theory is still unresolved, but the most important thing is that the capital structure, that is, the compositions of debt and equity should be designed in the best interests of the shareholders, adding value to the company and not putting the company at risk.

2.3.2.2 Theory on corporate payout policies

Having presented the theories on capital structure, this section will discuss other fundamental theories related to the company's financial policies, namely corporate payout policies. The following paragraphs will explain these policies, what factors influence them and how they affect company performance.

The previous section discussed that a company can acquire financing from internal resources, namely retained earnings, and external resources which can be raised by issuing shares or debts. When a company issues debts it will have an obligation to pay an interest expense as well as return the principal. Failing to do so may cause the company to risk bankruptcy. On the other hand, when a company raises finance by issuing stocks, there is no specific obligation that it needs to fulfil. Dividends are distributed compulsorily to preferred shareholders but not to common shareholders (subsequently called shareholders). It is up to the company whether or not to distribute dividends. However, from the shareholders' point of view, when they invest their money in a company, sooner or later they expect either a short-term or long-term return – whether in terms of capital gain, dividends, stock repurchases, or a combination of these.

Corporate payout policy is very complex since it creates major conflicts of interest, especially the principal–agency conflict (Jensen 1986). It is complicated because it is also about how to satisfy the market and shareholders, as every shareholder has his/her own idiosyncratic characteristics and the market is also influenced by many factors, including tax policy and capital market regulations. The tax regime and capital market regulations treat each type of payout differently, while the market, investors and shareholders have differing preferences as to amount, type and time of dividend payment (Ogden et al. 2003). All of these factors have given rise to divergent views on payout policy.

Miller and Modligiani (1961) argued that dividend policy is irrelevant if a perfect capital market exists, which means: (1) there are no taxes, security flotation, or transaction costs; (2) investors are rational, thereby creating fair market pricing; and (3) all information is available, hence market participants are symmetrically informed price-takers. If there is no asymmetric information, a stock market price will reflect all information in the market. In addition, since there is no significant cost, a company can raise financing without any costs and therefore it is not a problem whether the company uses financing from internal or external sources. Similarly, any type of return is not important for shareholders since any return has the same value because there are no accompanying taxes or transaction costs; investors or shareholders are indifferent to quantity, type and time of dividend payments (Keown et al. 2006).

Another assumption making dividend policy irrelevant is an investment policy that is assumed to be fixed or has been decided (DeAngelo et al. 2008; Handley 2008; Keown et al. 2006).[1] In this condition, dividend payout policy serves only as an option of the company's financing strategy. Shareholders have options other than dividends for receiving income from their shareholding. Assuming the capital market is relatively efficient, 'the shareholders can personally create any desired income stream, no matter what dividend policy [is] employed by the company' (Keown et al. 2006, p. 557), or the shareholders can create 'homemade dividends' (Van Horne & Wachowicz 2005, p. 472). Assuming that the market is efficient, whenever shareholders need instant cash they can sell their shares or, when they prefer future income, they can convert the dividends received by buying shares. In this case the only way for a company to make dividend policy adding value to the firm is by undertaking investment projects that have expected returns higher than the shareholders' required rate of return (Keown et al. 2006). It suggests further that when a company uses external financing, for example, by issuing stocks, it will use its retained earnings (internal funds) to pay high dividends, and when it uses its internal funds, it will need only small amounts of money to pay dividends. In an efficient market, when the latter condition is the case, the company's market price should increase, reflecting the accumulated retained earnings (which are higher compared to the first condition since the company would pay relatively lower dividends). As a result, internal funding offers high capital gain. Therefore, when an efficient capital market exists, the types of returns are not an issue since in the end they offer the same amount. Therefore, in aggregate, shareholders are only concerned with the total returns over the life of their investment in a company. This homemade dividend is an alternative for receiving dividend payments. However, DeAngelo et al. (2008) disagree and argue further that the homemade dividend cannot replace the need for corporate payouts. They point out the fallacy by showing that there is a time value of money that means the homemade dividends cannot be compared to the full value of corporate payouts; the homemade dividends depend on market value of the shares to be sold by investors, while the current market value is the present value of expected future distribution from investment activities.

To reflect the real world, the assumptions above need to be relaxed so that the relevance of payout policy on a company's market performance can be examined (DeAngelo et al. 2008). As found by many studies, some factors influencing a corporate payout policy are 'managerial signalling motives, clientele demands, tax deferral benefits, investors' behavioural heuristics, and investors' sentiment as well as asymmetric information framework and security valuation problems' (Brav et al. 2003; DeAngelo et al. 2008, p. 95). These factors that explain a corporate payout policy can be categorised further into: (1) a company's condition (including the availability of free cash flows and agency problems); (2) capital market regulations or industry practices; and (3) behaviours of investors/shareholders (Ogden et al. 2003). The interaction among these factors will influence the effect or efficiency of a corporate payout policy on the performance of a company's share price in the market and make the corporate payout policy indeed very complex. Regarding this, theories that discuss the relationship between dividend policy and share price are residual policy, clientele effect, information effect, agency costs and expectations theory (Keown et al. 2006, p. 561).

Residual-dividend policy is consistent with 'pecking-order' capital structure theory, which argues that a company prefers internal financing to other sources, and in this case a company will pay a dividend only if there are still residual retained earnings after the financing of new investments (Keown et al. 2006). Compared to residual policy, clientele-effect theory argues that shareholders have differing preferences for types of returns or dividends which in turn, as mentioned by Ogden et al. (2003), lead to dividend clienteles. Some investors need instant cash, therefore a company is expected to have high dividend payouts. On the other hand, there are also investors who prefer future income; rather than get a dividend today, these types of shareholders choose to accumulate their income and collect it in the future in terms of a higher share price or a high capital gain. Accordingly, dividend clienteles will be positive if a company implements a right corporate payout policy that appeals to unsatisfied investors in the market; this increases demand on the company's shares and thereby results in an increasing share price (Keown et al. 2006; Ogden et al. 2003).

In contrast to the first two theories, information-effect, agency-cost and expectations theory stem from asymmetric information. Information-effect theory argues that there is information asymmetry between management and the market which causes the share price to decrease. Therefore, an unexpected decrease in dividend sends a signal to the market about the company's financial condition; the decreasing dividend payouts have an indirect effect on share performance. Accordingly, an announcement or a good communication between managers and investors would alleviate the problem (Keown et al. 2006). Similar to information-effect theory, agency-cost theory suggests payout policy as one of methods for monitoring managers. For example, in the decision to issue stocks consequent to dividend payment in the future, managers are encouraged to provide information to convince shareholders that this method of financing (issuing of shares) will be used for profitable investments. Consistent with the free cash flows[2] hypothesis, in this case shareholders would also prefer to receive dividends if there were substantial free cash flow in the company since there would be a moral hazard if this free cash flow were to be idle; the managers waste the money on inefficient or unimportant activities, or by making an unprofitable investment which has a return below the cost of capital (Bhattacharyya 2007; Jensen 1986). Finally, expectations theory argues that because there is asymmetric information between the company and the investors, investors usually form an expectation about the company. This expectation is based on various factors, such as historical data, industry and current economic conditions. In the case of dividend payouts, share price will be affected if investors' expectations differ from the actual payouts (Keown et al. 2006; Ogden et al. 2003).

The theories above suggest that dividend policy is relevant to share price. However, these theories do not indicate in detail how big or what type of payouts and when the payouts satisfy the market hence give positive effect to the market (DeAngelo et al. 2008). As an investor, a shareholder requires an optimal return that increases his/her wealth not only in the short term but also in the long term.

While payouts inform the market about the health and ability of a company to produce cash (known as signalling motives), a company is constrained by the availability of free cash flows, the quantity of which depends on the company's resources over its life and the stage it has reached in its life/business cycle. Based on a corporate-level strategy approach, according to the Boston Consulting Group (BCG) matrix, a company generates large amounts of cash from 'cash cow' products – that is, products that are low growth but have high market share. Similarly, a company might have positive cash flows from star products – those products that have both high growth and high market share (Robbins & Coulter 2005). A new company is expected to have negative cash flows; in fact, it needs more capital to grow. On the other hand, a growing and/or mature company will have more cash flows than a new company (DeAngelo et al. 2008). Therefore it is expected that higher dividends will be paid by a company involved in stable and low-growth industries (Barclay et al. 1995; Stewart 2001).

Another problem of payout policy is changes in the policy (Keown et al. 2006). A changing policy informs about the uncertainty of the company. Uncertainty means risks and therefore the stability of payouts is important. As mentioned by expectations theory, unexpected dividend changes would affect the share price in the market. Signalling theory suggests that dividends can be a signal of expected cash flows in the condition of information asymmetry that outside investors do not have perfect information about the company's profitability and where tax on cash dividends is more costly than tax on capital gains (Bhattacharya 1979). Signalling theory suggests further that the benefit of paying dividends is the same for each firm but it is much more costly for a bad firm, since in the long run the bad firm needs external financing to cover its commitment to paying dividends; hence, only a good firm is able to fulfil its promise to pay a dividend (Ogden et al. 2003). Therefore, if a company fails in its commitment to pay dividends or even just changes to a non-dividend policy or a reduced dividend, it will send a negative signal to the market; thus, a company prefers to distribute low amounts of dividends or not pay dividends at all. As a result, it might be important for managers to anticipate and make investment projections for several years rather than a single year. The long-term residual would be appropriate. It suggests that if retained earnings are needed for financing the project, no dividend payout policy should be adopted; conversely, if there are residual retained earnings, they should be distributed evenly over the investment period (Keown et al. 2006, p. 567). Having considered the stability of payouts to be important, a company can adopt one of the following dividend payment policies: (1) a constant dividend payout ratio; (2) a stable dollar dividend per share; and (3) a small, regular dividend plus a year-end extra (Keown et al. 2006).

In addition to the discussion of how payouts affect the capital market, some factors influencing the payouts are tax regime, regulations such as corporate law, and the market, including the participants, since they treat each type of payout differently (Keown et al. 2006; Ogden et al. 2003; Van Horne & Wachowicz 2005). Specifically, acknowledgement of the effect of personal tax on payouts has been found in the literature (DeAngelo et al. 2008). The examples of tax policy adopted by a country and applied to a corporate payout policy, such as a dividend tax and a capital gain tax, are a dividend imputation system and undue retention of earnings. Tax on dividends, for example, from the shareholders' point of view will be more expensive than tax on share repurchases. Similarly, the tax regime gives rise to differing preferences of shareholders for dividends (dividend clientele) (Ogden et al. 2003). Some individual investors may face low or no taxes while others, such as high-income investors, are likely to face a high income tax. As a result, to minimise the tax expense as well as to achieve liquidity, some investors prefer cash dividends by having a buy-and-hold strategy, while others prefer to have a short-term investment strategy which is to buy and sell. In contrast to the dividend imputation system, some countries adopt undue retention of earnings 'to prevent companies from retaining earnings for the sake of avoiding taxes' (Van Horne & Wachowicz 2005, p. 476).

Some countries, however, restrict dividend payouts in order to prevent the capital impairment and insolvency of a company (Keown et al. 2006; Van Horne & Wachowicz 2005). The regulation requires that dividends be paid only out of profits, not out of capital. There is also the 'restrictive covenants' or insolvency rule that investors impose a condition to secure their money on management. The examples of restrictive covenants or insolvency rule are: (1) not declaring dividend prior to the payment of the debt; (2) a requirement for minimum working capital; and (3) a requirement for not paying dividends to common stockholders when there are outstanding dividends for preferred shareholders (Keown et al. 2006; Van Horne & Wachowicz 2005).

Accordingly, considering tax regulation, corporate law and constraints, a company can choose types of payout other than cash dividends which suit shareholders or investors best. Stock repurchases or share buy-backs have a similar effect to dividend payout in that a company repurchases its outstanding stocks to distribute cash to the shareholders. Stock repurchases, in fact, offer some advantages over cash dividends (DeAngelo et al. 2008). From the shareholders' viewpoint, given that the tax rate varies for different types of shareholders as the tax subjects, stock repurchases offer more flexibility for shareholders to manage their personal tax saving. Under this policy only investors who choose to sell their shares will receive cash, while under dividend payout policy all shareholders will get equivalent amounts of dividends (Ogden et al. 2003). Similarly, stock repurchases give more benefits to a company (DeAngelo et al. 2008, p. 237; Keown et al. 2006; Van Horne & Wachowicz 2005). First, stock repurchases offer financial flexibility since, compared to dividend payout policy, under this policy a company does not need to commit to continuing the payout policy. Also, by repurchasing the outstanding stocks, a company could change its financial leverage (debt-to-equity ratio). Second, stock repurchases offer a cheaper payout policy. A company can save transaction costs by reducing 'odd lot' holders from the owners' lists and avoid the losses that could be incurred in the dividend payout policy – for example, losses due to offsetting the ex-dividend day share price which declines in the case of the exercise of stock options. Third, stock repurchases offer ownership security. This policy enables a company to remove 'low valuation' shareholders who are eager to sell their shares at a low price, hence reducing the likelihood of unwanted takeover. The manager could also create a scenario to allocate the voting rights (and increase the managers' voting rights) by, for example, removing outside blockholders, and secure the company from unwanted bids. Next, stock repurchases offer a company the ability to improve earnings (a tool for investment policy), such as by correcting stock market undervaluation, offering opportunities to gain in the market by buying shares when they are undervalued and improving the reported earnings per share (EPS) (ceteris paribus, share buy-backs reduce the outstanding shares, hence boosting the EPS). In addition to these benefits, stock repurchases have another expected important function by bringing certainty to a case where the market expects the company to offer a buy-back when the shares are traded much higher than their earnings (Stewart 2001).

Overall, the discussion on payout policy suggests that the policy is still problematic. Therefore, a right combination of timing, types of payout and amount of payouts still needs to be formulated to make the payout relevant to the share price.

2.3.2.3 Investment and business valuation models

The previous section discussed the company's financing activities, including capital structure and payout policy, and the underlying theories, and how these activities influence shareholder value. This section discusses some other company activities – namely investment activities. Business valuation models are also visited as a tool to assess whether an investment is valuable and adds to the firm's value.

Investment activities Investments can be defined as 'putting money or funds into something with the expectation of gain, that upon thorough analysis, offers a high degree of security for the principal amount as well as security of return, within an expected period of time' (Graham et al. 1962). It differs from gambling and speculation in that gambling is investing money without thorough analysis, security of principal and return while speculation uses thorough analysis but without security of principal and return.

In this regard a company can invest its extra funds internally or externally. The investment activities of a company are reflected in the 'assets' section of its balance sheet (see Figure 2.8). Included in internal investments is business expansion of the company's capital such as property, plant, equipment, machines and so forth. External investments can be made indirectly through intermediaries such as banks, or by direct investment in other companies to gain ownership by buying stock. The external investments are reflected in the 'investment' section of the

ABC Inc.
Balance sheet
As of 31 December 20xx-1

(A) Assets	**(L) Liabilities**
(C) Cash	(AP) Account Payable
(AR) Account Receivable	(LTL) Long term Liabilities
(Inv) Investments	**Total Liabilities**
(PPE) Property, Plant and Equipment	
	(E) Equity
	(CS) Common stock xxx
	(TS) Treasury stock (xx)
	Common stock outstanding xxx
	(RE) Retained Earnings xxx
	Total Equity
Total Assets	**Total Liabilities and Equity**

Figure 2.8 Balance sheet

balance sheet. The types of security in which a company invests can be divided into debt investments or stock investments. Then, based on the intention of holding or selling investments in the future, investments can be divided into trading securities, available-for-sale securities and held-to-maturity securities (Weygandt et al. 2010).

In regard to investment activities, valuation models discussed in capital budgeting, such as internal rate of return (IRR), net present value (NPV), payback period and so forth, and the following business valuation models, are useful for valuing investments.

Business valuation models Business valuation models are used by companies or investors for predicting the value of a business for sale or an investment product. For example, if a company has a business line for sale, the company assesses its value for pricing purposes. Similarly, if a company wants to invest its funds by buying an investment product, the company needs to assess whether the product price reflects the value of the product itself. The business valuation models can also be used for predicting the value of a business in the future.

To set the right model of valuation, it is important first to assess the business's sustainability. The valuation model used for insolvent companies will be different from that for going-concern companies (Ratner 2009). Second, an investor needs to choose which business valuation model is suitable for assessing the particular investment.

Three types of approaches can be used for business valuation: an asset approach, an income approach, and a market approach (see further Ratner 2009 for the discussion). Miller and Modigliani (1961) propose four approaches for the valuation of shares: the stream of dividend, the investment opportunity, the discounted cash flow and the stream of earnings approach, all of which follow the income approach. The options for valuation models are shown in Figure 2.9.

Among the models, the income approach is mostly documented in corporate finance and corporate governance literature since it is more suitable for calculating the intrinsic value of a company – value that financial analysts, investors and other market players look for in order to assess the financial health and profitability of a company now and in the future. In this regard, dividends, market value of common stock and capital project/investment are used as the main proxies. Compared to the income approach, the market approach is 'a relative valuation approach' which compares a company's value with the market or similar companies (Ratner 2009, p. 28). On the other hand, the asset approach is used mostly to record business activities at a certain date. This is similar

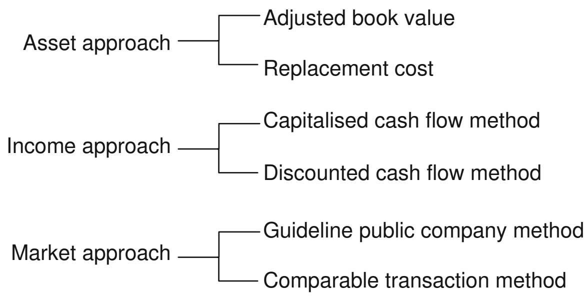


Figure 2.9 Business valuation models
Source: Adapted from Ratner (2009), p. 25.

to the accounting process which records business activities and presents them in a balance sheet.

For stock valuation, Stewart (1999) supports a different view of corporate value assessment. Rather than solely relying on accounting value, market players should give more consideration to economic reality and all relevant information available in the market. The accounting figures are not a reliable guide for the valuation since they reflect only real cash profitability and, worse, could misrepresent the operating cash flows of the company and, as a product of management, mislead the investors (Chew 2003b). On the other hand, the proposed valuation model, called an 'economic model takes the opportunity cost of the capital into account' (Copeland et al. 2000). Furthermore, consistent with the financial management principle that cash rather than profit is king, the economic model holds that the market value of stock and other securities in the market should be 'the present value of a company's future expected after-tax cash flows discounted at rates which reflect investors' required returns on securities of comparable risks' (Chew 2003b, p. xiii).

This economic model, which falls under the income approach, states that the share price of a company that reflects the intrinsic value of the company is determined by the expected value of 'free cash flows' to be generated over the life of the business which is discounted back by the cost of capital: the risk of the cash receipts. The economic model holds that neither earnings and their growth nor dividends matter. The model considers that dividend payment shows a management failure to find new prospective investments that will add value to the company, so management needs to return the income to the shareholders.

Having considered the importance of assessing the intrinsic value of a company and the possibility of accounting distortions, cash flows valuation methods are preferred over others. There are five models of discounted cash flows–based valuation (DCF) in the literature: (1) enterprise discounted cash flows; (2) discounted economic profit; (3) adjusted present value; (4) capital cash flows; and (5) equity cash flows (Koller et al. 2005, 2010). The enterprise DCF model is suitable for projects, business units and companies that manage their capital structure to a target level, while adjusted present value is more suitable for the case of changing capital structure. Discounted economic profit is more valuable when the valuation is focused on value creation. Then, compared to the other models, capital cash flows and equity cash flows are more difficult to implement. The capital cash flows method has a problem when the valuation includes some companies or business units and takes over time, since this method compresses free cash flows and the interest tax shield to one number. Similarly, the equity cash flows method is difficult to implement correctly since capital structure is embedded within the cash flows and it is best only for valuing financial institutions. The diagram of frameworks for the DCF-based valuation is shown in Table 2.1.

It is necessary that a good business valuation model should integrate and accommodate all business and regulatory environments. It also needs to consider the sustainability or future prospects of the business, taking all opportunities and risks into account, hence managers need to focus on long-run cash flows return rather than on the short-term measurement when they value and set correct financial goals, performance measures and valuation procedures. Arguably, the economic model under the income approach is preferred over an integrated valuation model.

Table 2.1 Frameworks for DCF-based valuation

Model	**Measure**	**Discount factor**
Enterprise discounted cash flows	Free cash flows	Weighted average cost of capital
Discounted economic profit	Economic profit	Weighted average cost of capital
Adjusted present value	Free cash flows	Unleveraged cost of equity and leveraged cost of equity
Capital cash flows	Capital cash flows	Unleveraged cost of equity
Equity cash flows	Cash flows to equity	Leveraged cost of equity

Source: Adapted from Koller, Goedhart and Wessels (2010, p. 102) with adjustments from the author.

2.3.3 Accounting and its governance role

Previous sections in this chapter discussed issues related to governance controlling mechanisms which are relevant for formulating optimal financial management strategies. This section discusses accounting and its role in corporate governance and in formulating optimal financial management strategies. In the context of corporate governance, accounting measures the business activities of a company in monetary terms. As an information system, the role of accounting is to identify and record the economic events of an entity, and then disseminate the record of the entity's financial activities to interested parties (Weygandt et al. 2010). This information is useful for both management and external users for decision-making purposes. It is 'a direct input to corporate control mechanisms designed to discipline managers to guide resources toward projects…and to prevent managers from expropriating the wealth of investors' (Bushman & Smith 2001, p. 295). Thus accounting is a tool for making effective business decisions in allocating scarce resources. The externals as reflected by the market then respond to this information. Negative or positive feedback is reflected through the price of the company's stock traded in the capital market. The feedback then is evaluated by the management and becomes an input for formulating future strategies. Therefore, accounting information promotes the efficient governance of corporations (Bushman & Smith 2001). The accounting cycle further explains the information system of a company and reflects the company's business cycle. In this case, financial statements are snapshots for the business activities of a company. The accounting cycle can be explained from sections of financial statements.

2.3.3.1 Balance sheet

The accounting cycle starts from recording all of a company's historical activities including corporate governance practices and the governance instruments. These activities are recorded along the company's business cycle which are finally summarised into financial statements at the end of the operating period (Bragg 2010). The balance sheet, as depicted in Figure 2.8, shows the position of the company's assets, liabilities and equity. Financing policies are reflected in the liability and equity sections of the balance sheet. This section depicts the sources of financing for a company that can be acquired through issuing stocks and debts, or from internal financing (reflected in retained earnings). The section furthermore outlines one of the internal governance mechanisms – that of capital structure or leverage (Ghosh 2007).

Investment policies that show an allocation of funds acquired from financing activities are shown in the assets section of the balance sheet. The funds can be invested in a company's operating assets such as property, plant and equipment (PPE) and/or other investment products such as buying other companies' securities (shown under 'investment'). The final position of the balance sheet must show the accounting equation: Assets = Liabilities + Equity. From this equation, the enterprise value of the company can be calculated by valuing both debt and assets (Koller et al. 2005, 2010).

These investment and financing activities are then derived further into daily management activities, namely operational planning and control. To support the main business of the company and its nature as a going concern, management needs to manage its fixed assets and working capital. Good fixed asset management ensures the production activity runs continuously, while positive working capital gives positive signals to outsiders, that is, investors, that the company is efficient and is in good financial health; hence, it is able to make interest payments to its creditors.

2.3.3.2 Income statement

An income statement depicts the operational activities of a company during its financial or operating year. Depicted in this statement are management controls for fixed assets, working capital and profit (see Figure 2.10). The income statement also reflects the expenses of the utilisation of other internal governance mechanisms such as qualified management, compensation for management (for example, in terms of Employee Stock Option Planning [ESOP]), board of directors/commissioners, audit committee and other board governance. They are generally shown under administrative expenses. The income statement also shows how regulations influence the company, which is reflected by its income tax expense.

2.3.3.3 Statement of stockholders' equity

The statement of stockholders' equity (see Figure 2.11) shows in details the composition of shareholders, including the company's policies on share-based compensation (ESOP), and payout. It also shows the internal financing of a company which comes from accumulated net income. A healthy business that meets its objectives will generate profit which could be distributed to shareholders in terms of cash dividends or share repurchases, or retained by the company to be reinvested in its activities.

ABC Inc. Income statement For the Year Ended 31 December 20xx	
Net Sales	xxxx
COGS	(xxx)
Gross Profit on Sales	*xxxx*
Selling Expense	(xxx)
Sales commission	
Administrative expenses*	(xxx)
Total selling and administrative expenses	(xxx)
Income from operations	*xxxx*
Other revenues and gains	xxx
Other expenses and losses	
Interest expense	(xxx)
Income before income taxes	*xxxx*
Income taxes	(xxx)
Net income	***NI***

ABC Inc. Comprehensive Income statement For the Year Ended 31 December 20xx	
Net income	***NI***
Other comprehensive income	O +
Comprehensive income	NI+O

* Section of Income Statement where costs of utilisation of board governance are shown (under salary and compensation – of management/directors and other board-).

Figure 2.10 Income statement

2.3.3.4 Cash flows statement

In addition to the statement of stockholders' equity and the income statement, a cash flows statement (see Figure 2.12) presents all the company's main activities – operating, financing and investing – but it only measures the effects of those activities on the company's cash position. It

ABC Inc.
Comprehensive Income statement
For the Year Ended 31 December 20xx

Net income	***NI***
Other comprehensive income	O
Comprehensive income	NI+O

ABC Inc.
Statements of Stockholders' Equity
For the Year Ended 31 December 20xx

	CS Outstanding	Com mon Stock	Additional Paid in Capital	Reserve for ESOP Debt Retirement	Accumulated Other Comprehensive Income	Retained Earnings	Total	Total CompIncome
Beginning Balance	C	C	Ad.C	ESOP	B	A	C+Ad.C+ESOP+B+A	
Comprehensive income#								
Net Income						***NI***	***NI***	***NI***
Other Comprehensive income					O		O	O
Dividends to shareholders								
Common						(D)	(D)	
Treasury purchase	(T)	(T)	Ad.T				(T)+Ad.T	
Employee plan issuances	E	E	Ad.E				E+Ad.E	
ESOP debt guarantee reduction				ESOP1			ESOP1	
Ending Balance	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx

#= figure is from balance sheet –equity section- last year

Figure 2.11 Statements of stockholders' equity

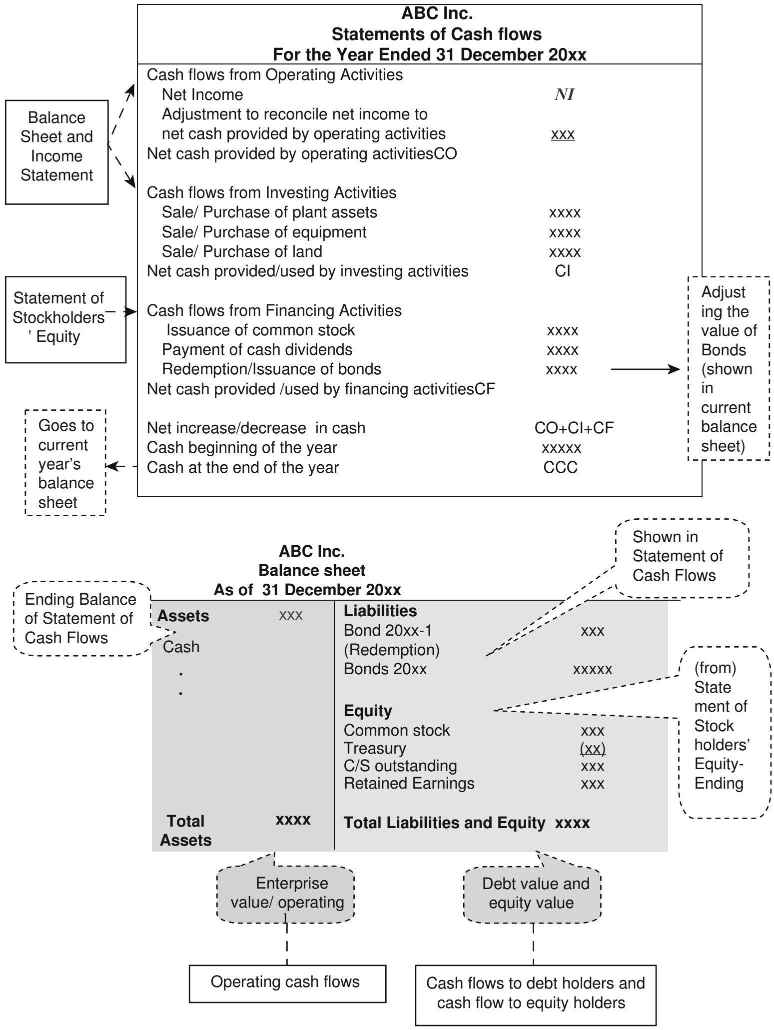


Figure 2.12 Statement of cash flow and enterprise value

summarises the cash flows from the operating, investing and financing activities of the company. This statement summarises all the company's activities which are shown in the balance sheet, income statement and statement of stockholders' equity. In this statement, rather than on an accrual basis, these activities are depicted on a cash basis.

The section of cash flows from operating activities shows the amount of cash provided by the company's main core business (sales). The section of cash flows from/used by investing activities shows the amount of cash that the company invests or receives from divestment in long-term investments such as plant assets, land and equipment. The section of cash flows from (used by) financing shows the amount of money that the company gets from issuing debt or equity instruments, or pays to fulfil its financing commitments, such as payment for cash dividends, redemption of bonds or repurchasing stock. The total of these three sections of cash flows (decrease or increase in cash) will adjust the previous cash balance; therefore the current cash balance shown in the balance sheet will be the previous amount of cash adjusted by any cash decrease/increase from the statement of cash flows.

2.3.3.5 Notes to financial statements

Notes to financial statements complement the other financial statements. They explain further the company's managerial and financial accounting policies and the accounting figures shown in the financial statements. This section also addresses the other internal governance mechanisms, such as ownership structure, board of directors/commissioners and audit committee structure, and other material issues for decision-making.

2.3.4 Summary: an integrated relationship between corporate governance, corporate financial management and accounting

The discussion on underlying issues for formulating sound financial management strategies reveals that corporate governance, corporate finance and accounting practices are interrelated since they provide governance-controlling mechanisms which can discipline managers to perform in the best interest of shareholders in creating firm value (Brown et al. 2011). Corporate governance practices provide a broader concept of how a company should be managed. GCG practices provide a set of arrangements that control the relationship between interested parties, such as management, shareholders and other stakeholders.

The controlling governance mechanisms can be divided into internal and external mechanisms. The characteristics of external governance mechanisms are beyond the control of shareholders and the board; they complement or substitute internal governance mechanisms (Brown et al. 2011). On the other hand, the internal governance mechanisms can possibly be intervened by management. While the internal governance mechanisms include policies that direct management to perform in the best interest of shareholders, they also reflect responses of a company to external business environments. The responses can be in the form of risk-management activities and can use concepts or policies of corporate finance, financial management and accounting practices. The company's responses are measured in monetary units by accounting practices and therefore the effectiveness of the corporate governance practices and all the company's business activities can be assessed and evaluated. Overall, corporate finance, financial management and accounting practices are part of internal governance mechanisms and they are interrelated to corporate governance. The interrelationships among corporate governance, corporate finance, financial management and accounting can be summarised through the business cycle of a company as described in Section 2.3.3. As shown previously in Figures 2.1 and 2.2, the interrelationships are further depicted in Figure 2.13.

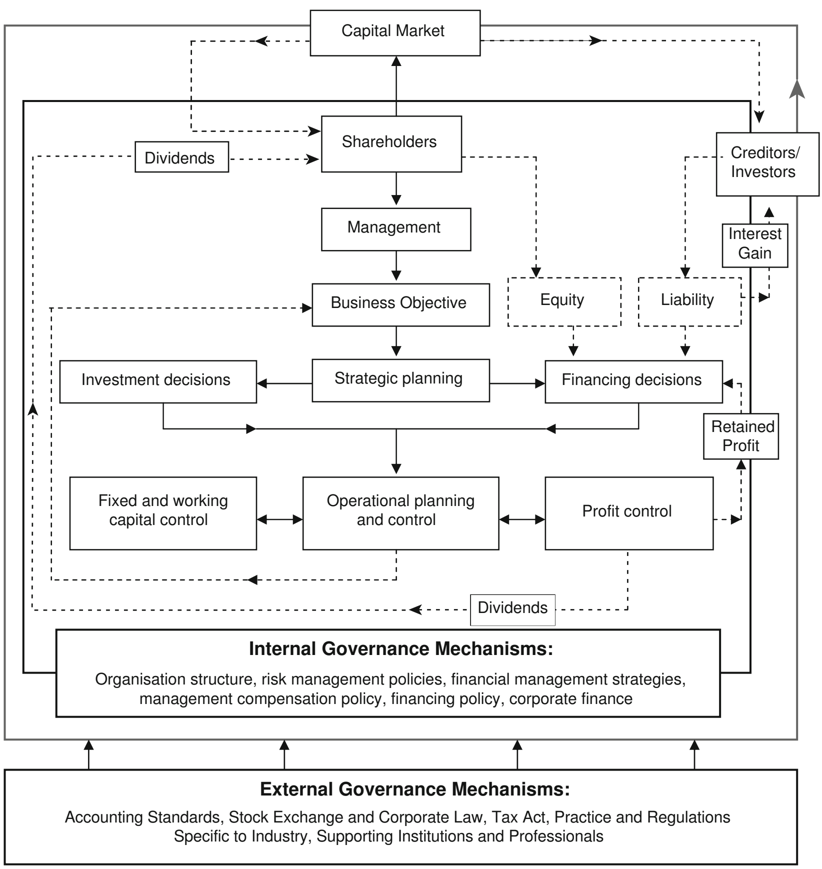


Figure 2.13 An integrated relationship between corporate governance, corporate financial management and accounting

The figure furthermore shows how a company's corporate governance is interrelated to the company's business activities which are the subjects of corporate finance, financial management and the accounting practices of the company. A shareholder is one of the major stakeholders on whom a company focuses. Shareholders' interests are reflected further in the business objective and strategic planning, and are defined in a financial concept as shareholder value. The strategic planning is then applied into financing and investment decisions, and operating activities of the company. The internal policies related to these activities are recognised as internal governance mechanisms since they guide management to increase shareholder value. The creation of shareholder value is recorded by accounting and then the information is disseminated in terms of accounting information to external users such as market participants. Due to the agency problem, there will be information asymmetry.

Therefore, since accounting information is produced by management, supporting institutions, professionals, regulations and other external governance instruments will play their roles to minimise the information asymmetry as well as the agency costs.

2.4 The role of a mathematical model

In order to quantify qualitative GCG practices, a mathematical model needs to be built. A mathematical model is essential for modelling the governance-controlling mechanisms mentioned above in order to generate optimal financial management strategies.

2.4.1 An optimisation approach

A mathematical model built in this study uses an optimisation approach, of which there are various types. A detailed survey of the model is given in Chapter 3. In a simple form, an optimisation model attempts to achieve, improve or find the best objective within constraints or problems which influence the objective achievement process (Kallrath & Wilson 1997). In business applications, an optimisation model will have an objective function, such as to maximise revenue, maximise profit or minimise costs, while the constraints will be, for example, the availability of resources: human, materials, time, and so forth. The optimisation model will be of value to management in its decision-making process since the results of the model will suggest viable decisions that could be considered given the limited resources available to a company.

2.4.2 Literature review on financial optimisation models and their limitations

The financial model as a management apparatus has been developed perhaps since the 13th century when accounting records started to be used as an input to the model. As an apparatus, a financial model assists management to make the optimal economic decisions with regard to the economic problem of resource scarcity.[3] The model has evolved ever since, and in the present it also uses an optimisation approach for financial decision-making purposes. In the 1970s and earlier, the models tended to focus on the areas of cash management, capital budgeting and financial planning. The following paragraphs review the literature on an optimisation approach based on area and type of optimisation model. This section concludes with a summary of limitations of existing optimisation models which are used for managerial decision-making.

2.3.4.1 Modelling area

a. Optimisation model

Research shows that optimisation models have been used in various managerial decision-making processes. In the cash-management models, Knight (1972) examined reserve-stock models applied to working capital accounts, that is, inventories, receivables and cash. He argued that under conditions of probabilistic demand, considerations of operating revenues, costs and profit need to be included in the analysis. He found that partial models of optimal current assets are suboptimal. Focusing on optimal financing of cyclical cash needs, Aigner and Sprenkle (1973) examined the optimal mix of short-term and long-term borrowing to finance cyclical cash needs. In their study, they conducted a comparative static analysis and simulated the model based on the different interest rates which varied over time. Similarly, Daellenbach (1974) examined cash management by simulation using optimisation models. Daellenbach, however, challenged the benefit of a cash-management model and argued that it is insufficient compared to the risk and efforts associated with the investment model which has been developed. Barbosa and Pimentel (2001) applied the cash-management model to a Brazilian industry case study. Their model accommodated new issues which had not been covered by previous models, including uncertainties, longer planning horizons and multiple subcontractors and suppliers.

In the capital-budgeting model, Weingartner (1963) was the first scholar to use mathematical modelling for capital budgeting. Weingartner used an integer model for constrained capital budgeting problems under certainty. Baumol and Quandt (1965) pointed out the limitations of this model and other existing models in three things: (1) possibility of funds invested outside the firm or consumed by the stockholders; (2) possibility of funds unused today to be consumed in the future; and (3) relationship between current investment yields and availability of funds for current investments. The studies of Baumol and Quandt (1965) and Weingartner (1963) were quoted by many other scholars. Bernhard (1969) criticised previous studies on capital budgeting and extended the literature by building a generalised deterministic model with uncertainty and various special cases of the model.

Forsyth (1969) developed a goal-programming model which linked production and capital expenditure decisions. The model was based on a single-period construction. Later, Hawkins and Adams (1974) developed a goal-programming model which was first mentioned by Charnes and Cooper (1961) to consider the multiple conflicting goals in capital budgeting. Similarly, Lee and Lerro (1974) developed a goal-programming model for capital budgeting. Their study analysed combinations of 15 different investment opportunities over a planning horizon of four years.

Myers (1972) commented on the debate between Weingartner (1963) and Baumol and Quandt (1965) by addressing the positives and negatives of these two studies. The Weingartner model was then reviewed by Bhaskar (1974) and was extended to the lending case. Sealey (1978) reviewed all these prominent studies by proposing a goal-programming model known as a utility-maximisation model. Bernhard (1980) extended Bhaskar's model (1974) by suggesting modifications to it as follows: (1) add objective function when borrowing is allowed; (2) put upper bounds on debt; and (3) add some constraints which are only allowed in the condition of post-T cash flow in a perfect capital market. This popular linear programming was also applied in the financial planning of banks (Sheldon & Shaw 1981) as well as multinational companies (Ness 1972).

In funds allocation, Charnes et al. (1959) examined theorems and computational apparatus of linear programming for allocation of funds. They explored some applications of linear programming to break-even analysis. The application was extended to build a pro forma of financial statements (Ijiri et al. 1963).

The model of Ijiri et al. (1963) focused on cost or managerial accounting. Demski (1967), however, highlighted the limitation of the traditional cost-accounting system by developing well-defined decision models. Structuring the accounting system using a linear programming model, Demski's study overcomes two shortcomings of traditional accounting techniques: certainty of data inputs to the decision model outside of the analysis, and ignorance of the decision alterations implied by deviations encountered.

b. Corporate finance optimisation model

Carleton (1969, 1970) developed a broader corporate financial model by addressing the points addressed by Baumol and Quandt (1965) on the model of Weingartner (1963). He extended the previous models by proposing: (1) building a larger objective function which is more related to shareholders' interest; (2) adding critical constraints to capital budgeting; (3) complete solution of an integrated financial plan for the firm (a long-range financial plan); and (4) designing capital budgeting models covering not only investing but also planned dividends and financing.

Gershefski (1969) explained that the implementation of a corporate financial model in a company is useful since it enables 'management to keep budgeted plans more in line with current results and to do more effective long-range planning through the simulation capacities of the computerized system'. Gershefski (1970) also argued that an optimisation approach can be used for industrial applications such as production scheduling, resource allocation and inventory management. In his paper, Gershefski (1970) discussed in general the structural qualities of corporate models, and methods of constructing corporate models including computer simulations. Nonetheless, Gershefski (1970) did not show a mathematical model of the financial model as Carleton (1970) did.

Hamilton and Moses (1973) developed a corporate financial planning model for strategic planning in a large diversified organisation. The model accommodates broader areas of financial decision by including internal capital budgeting, acquisitions, divestments, debt creation/repayment, stock issue/repurchase and dividend payout. This model, using mixed integer programming, examines optimal investment and financing programs over a multi-period planning horizon.

Similarly, Merville and Tavis (1974) developed a multi-period long-range financial-planning model using a goal-programming model. The model reflects a financial-planning problem under uncertainty and risk. Under risky decisions, the goals are a combination of capital-budgeting target, liquidity risk requirements, earnings target and cash flows constraints. On the other hand, under uncertainty conditions the goals are related to financial flexibility goals, sales targets and market-share goals.

The early models such as those of Hamilton and Moses (1973) and Carleton (1969, 1970; et al. 1973; 1982), are still of relevance and are often referred to in the current corporate financial model and financial planning (Ho and Lee 2004; Lee et al. 2009; Morris and Daley 2009). Ho and Lee (2004) and Morris and Daley (2009) explained and discussed specifically corporate financial models of which an optimisation is offered as one of models which management can use for making strategic decisions in, for example, investment and financing. In addition, Lee et al. (2009) offer a broader discussion on financial modelling by explaining further the application of the model in the capital market, including risk management, and also giving an example for a specific industry such as a financial institution.

Specifically, in their study Ho and Lee (2004) illustrated a dynamic financial analysis (DFA) approach to developing a firm model for optimal corporate financial decision-making. The DFA model was designed to address a broad range of corporate issues and covers the areas of operating, financing and investments. Ho and Lee (2004) discussed additional factors that need to be considered in developing a corporate model. These include defining the corporate objective, defining optimal strategies, linkages of corporate finance and capital markets, principles of financial statements and performance measures and so forth. This study developed the firm model by following two stages: developing a business model and developing a corporate model. The objective of the business model is to maximise firm value by optimising the capital expenditure, while the objective of the corporate model is to optimise dividend payments, provisions and the level of long-term debt, given the maximised firm value. Their study, however, was not implemented further in a case study, hence the model's validity and plausibility cannot be justified.

2.3.4.2 An optimisation approach

During its development, the optimisation model used for management decision-making is evolved from a linear programming approach to other approaches such as goal programming, multi-criteria decision approach, global optimisation, robust optimisation, dynamic model and non-linear model. Among scholars who discussed this issue are Benayoun et al. (1971), who described a solution technique for linear programming problems with multiple objective functions. They proposed 'best compromise' problem rather than 'optimum' problem. They discussed a method that involved a sequential exploration of solutions. Lin (1979) described simplex methods for applications of goal-programming for managerial accounting. Bhaskar (1979) discussed applications of goal programming and addressed the advantages and disadvantages of the goal-programming model. Bhaskar and McNamee (1983) discussed multiple-objectives modelling. They conducted a survey and found that most companies have more than one goal when an investment is being appraised, but still profitability generally remains their main goal. Their study supported analytical tools which use goal programming or multi-criteria decision-making for capital budgeting. Thanassoulis (1985) discussed methods for selecting a suitable solution for multi-objective programming in a capital budgeting problem; the proposed methods are within the explicit value function approach (EVFA) category which then can be subdivided into iterative and non-iterative methods.

At the beginning of the nineties, Lin and O'Leary (1993) reviewed mathematical model applications in financial management, and their research showed that goal-programming methods were widely used in this area. Similarly, Zopounidis and Doumpos (2002) reviewed tools for making financial decisions in a case of multi-criteria decisions. Kwak et al. (1996) also discussed the capital budgeting model which focused the application on an analytical hierarchy process (AHP) with multiple criteria and multiple constraint levels. Dowlatshahi (2001) extended the goal-programming application to a product life-cycle analysis. They developed models of concurrent engineering of a product and related the model with concepts of life-cycle costing (LCC) and time-based costing (TBC). In the most current study, García et al. (2010) used the popular goal programming for weighting company performance measures.

Other than a linear programming and a goal programming, Myers and Pogue (1974) also presented a financial planning model based on mixed integer linear programming. They argued that their practical model not only integrates capital market theory and finance theory, it also has implications for financial managers. In addition, Bogue and Roll (1974) discussed a mathematical concept for building a capital-budgeting model specifically for investment purposes in an 'imperfect' market. The model focuses on the development of an objective function which is to maximise shareholders' wealth using a proxy related to the market value of common stocks.

Apart from the models discussed above, Klevorick (1969) developed a non-linear model by integrating risk factor into capital budgeting, while Goldwerger and Paroush (1977) proposed an activity-analysis approach for separation between optimisation and efficiency in capital budgeting of interdependent projects. Moreover, in this decade the non-linear programming models also evolved into different approaches such as dynamic or stochastic optimisation models. Maranas et al. (1997), for example, used global optimisation to solve long-term financial planning. Hahn and Kuhn (2012a) designed a decision support analysis model using a value-based optimisation approach. They then used the approach to examine simultaneous investment, operations and financial planning in supply chains (Hahn & Kuhn 2012b). Specific to dynamic or stochastic optimisation models, their application can be found in, for example, a bank's assets portfolio model (Chi et al. 2007), asset and liability management model (Chiu & Li 2006), and a multinational financial conglomerate (Korhonen 2001).

Accommodating the uncertainty issue, Kalu (1999) developed a model for the uncertainty condition. Mulvey (2001) discussed multi-stage financial optimisation models which use dynamic stochastic control, stochastic programming and optimising a stochastic simulation approach. Mulvey (2001) addressed the pros and cons of these approaches and discussed their applications in the finance area. Mulvey and Shetty (2004) then developed financial planning using the multi-stage stochastic optimisation; this model is extended from their previous model which applied stochastic network programming for financial-planning problems (Mulvey & Vladimirou 1992). Tahar et al. (2007) also used a dynamic programming model to examine optimal investment problems under capital gains taxes. Similarly, Tziralis et al. (2009) applied the model for 'holistic' investment assessment. Wei and Ye (2007) used a multi-period optimisation portfolio with bankruptcy control in a stochastic market. Nwogugu's (2006) study included risk and corporate governance issues, proposing new dynamic models/algorithms and optimisation for bankruptcy decisions. Philosophov and Philosophov (1999, 2005) used another optimisation model which is the Bayesian approach for their studies on capital structure.

In addition to the literature above, some general textbooks that contain comprehensive reviews of the literature on theory, solution algorithms, computer programming and applications are Tapiero (2002), Cornuejols and Tütüncü (2007), Levy (2009), Taha (2011), Ragsdale (2012), Anderson et al. (2012), and Winston and Albright (2012).

2.3.4.3 Limitations of the previous financial optimisation models

Based on the review on optimisation studies above, it can be concluded that an optimisation model has been evolved from mathematical applications to financial applications. The models cover various business areas and they involve both linear and non-linear models. The linear model also varies in terms of the decision function – that is, single-objective or multi-objective functions. Similarly, a non-linear model can be stochastic, dynamic and so forth. The various types of optimisation models have been applied mostly in the area of capital budgeting, investment and short-term cash flow or current asset management. Based on the review of optimisation model literature, this book highlights the limitations of the previous models as follows:

1) *The previous models are non-contemporary*

The models discussed above were not developed in the context of current GCG practice. While corporate governance covers complex issues of management activities, the previous models were more focused on one or two specific issues which are not sufficient to reflect the risks and external factors faced by a company.

Few of the previous models are corporate models; however, these previous models neither integrated external governance mechanisms (i.e., regulatory environments including risks exposure to the company's business activities) nor comprehensively incorporated corporate governance and managerial and financial accounting policies such as leverage, bankruptcy risks and management compensation.

Bonazzi and Islam (2007) discussed one aspect of the governance instrument – board governance – in their model but they did not focus on other governance mechanisms which specifically relate to financial management strategies. Kalyebara and Islam (2014) accommodated corporate governance issues in an optimisation model but the model is specific to the capital budgeting model. Carleton (1970), Bhaskar (1974) and Bernhard (1980) accommodated one of the internal governance mechanisms, that of long-term debt, but their models did not incorporate other issues of GCG practices. Nwogugu (2006) included risk and corporate governance issues in his study but the study was more focused on modelling bankruptcy decision-making and legal reasoning. These studies have overlooked the integration of GCG principles by not taking into account the interests of one of the major stakeholders, the shareholder, in the company's objective. Further, they have not taken into account the interrelationship between corporate governance, corporate finance and accounting in the formulation of financial management strategies.

2) *Short-term goal orientation*

Related to point 1 above, since the previous models were not developed in the context of GCG practice, they did not reflect a long-term or more sustainable goal. The existing financial models mostly considered profit maximisation or costs minimisation which are short-term goals. Based on financial management and GCG practices, a company's goal should be to maximise shareholders' wealth, which is more viable for the long term. Bogue and Roll (1974) used market value of common stocks as proxy, while Carleton (1970) used dividend approach in the objective function. However, dividend approach is not relevant to a company that does not distribute dividends to its shareholders. Ho and Lee (2004) illustrated shareholder value in their objective function but their study did not explain further the proxy to measure shareholder wealth.

3) *Accounting noise proxy*

The models of Ijiri et al. (1963) and Hamilton and Moses (1973) used accrual accounting–based measurements such as profit, net income and earnings per share (EPS) in the objective functions. The limitation of this measurement is that it contains accounting noise such as earnings management. This measurement cannot reflect the real returns which are available to be distributed to the shareholders in terms of, for example, cash dividends.

4) *Impractical*

While the models of Ijiri et al. (1963), Carleton (1970), and Hamilton and Moses (1973) brought further implications for management and accounting practices, their models failed to incorporate managerial and financial accounting perspectives with corporate governance practices. Besides, most of the previous models did not clearly show the concept of generally accepted accounting standards (GAAP) and the interrelationship between accounts of financial statement. By integrating managerial and financial accounting perspectives and corporate governance practices, extensions on these previous models will bring wider practical implications for management and accounting practices. Ho and Lee (2004) offered a corporate model in their book but they did not explain in detail the application of their idea in a numerical model.

2.5 An integrated financial optimisation model and its elements for formulating sound financial management strategies that achieve GCG practices

The three opening sections of this chapter (Sections 2.3 and 2.4) discussed the importance of sound financial management strategies for achieving the benefits of GCG practices. These sections also reviewed governance-controlling mechanisms that need to be incorporated in financial management strategies. While these two topics are clearly explained in the literature, the tools that are used by management to model or represent the real problems they face are not rigorous enough to integrate the relevant factors of sound financial management strategies. Having reviewed the limitations of the previous models in Section 2.4, this study finds that no comprehensive study shows an integrated relationship among corporate governance, corporate finance and accounting in an optimisation framework using a case study as an illustration; this relationship, in fact, is important to consider when formulating sound financial management strategies. To fill the literature gap, this study proposes a new approach using an integrated financial optimisation model to formulate sound financial management strategies for achieving the benefits of GCG practices. The proposed model has qualities or elements that are discussed below.

2.5.1 Free cash flow valuation

This study uses the value of a firm as a proxy to measure shareholders' wealth. Compared to traditional accounting measurement, a free cash flow (FCF) valuation is more reliable, as it takes into account the interests of shareholders and is a more reliable approach for business valuation (Koller et al. 2010). As part of the income approach it is argued to be more robust than other valuation approaches since it is more suitable for calculating the intrinsic value of a company.[4] The FCF model as an economic model also accommodates economic reality and all relevant information available in the market (Koller et al. 2010; Ratner 2009).

2.5.2 GCG and risk-management practices

The model also addresses the current GCG practice or other current issues such as leverage, bankruptcy risks and management compensation in the constraints. Using these other governance instruments, this study overcomes the possibility of agency problems which may arise due to substantial FCF (Bhattacharyya 2007; Jensen 1986). The constraints also show the risk-management practices of a company in three main business areas: operating, investing and financing. In addition, the model accommodates economic and market risks through its cost of capital. Compared to the existing models, the cost of capital will be calculated rigorously based on the current practice or fundamental theories.

2.5.3 Managerial and financial accounting perspectives

As a model for management decision-making, the model is developed based on managerial and financial accounting perspectives. The objective and constraints of the model reflect the underlying principles and theories of corporate governance, corporate finance, financial management and accounting. Financial statements will be the basis for developing the model. The equations of the model follow generally accepted accounting principles (GAAP), therefore the model will include accounting equations that reflect interaction among income statement, balance sheet and cash flow statements.

2.6 Summary

This chapter addressed the importance of sound financial management strategies for reducing corporate failures as well as for achieving the economic benefits of GCG practices. Underlying issues for formulating sound financial management strategies and how these issues influence firm value were discussed based on the relevant fundamental theories. The literature review shows that previous optimisation models have limitations and are not sufficient for formulating sound financial management strategies. The proposed model – 'an integrated financial optimisation model' – will help to overcome the limitations of the previous models. The details of the development of the model as a tool for formulating optimal financial management strategies, including the methodology of this study, will be discussed in the following chapters.

3
Conceptual Framework and Research Methodology

3.1 Introduction

This chapter describes the conceptual framework of an integrated financial optimisation model for formulating sound financial management strategies in the context of good corporate governance (GCG) practices. The conceptual framework is developed to answer the main research question: *What financial management strategies can help to achieve the benefits of GCG practices and how can they do this?* From managerial and financial accounting perspectives the framework conceptualises and incorporates all factors relevant for sound financial management strategies for achieving the benefits of GCG practices. An integrated model that depicts the conceptual framework will then be tested and justified using a quantitative research methodology – namely a dynamic multi-period optimisation approach. Furthermore, proxies of GCG variables in the integrated model are carefully chosen so that the monetary effects of each variable of financial management strategies can be assessed and measured, thereby optimising the benefits of GCG practices which are to reduce risks and improve the value of a firm.

Based on normative foundations, the study proposes a prescriptive mathematical model to find an optimal solution for formulating sound financial management strategies. The integrated financial model can be used for corporate financial planning to predict the value of a firm. To simulate the model, a case study using secondary financial data of a relevant company will be employed. Solver analysis which is available in Microsoft Excel or optimisation software: Premium Solver will then be used to run the model.

The structure of this chapter is as follows. Section 3.2 presents the conceptual framework of the development of an integrated financial model. Section 3.3 discusses postulates and propositions of this book. Section 3.4 surveys research methodologies and mathematical models. Section 3.5 discusses the computer program and data to be used in this study. Finally, Section 3.6 concludes the chapter.

3.2 Conceptual framework

Chapter 2 reviewed the literature on corporate governance and showed that the main reason for corporate failures is poor management practice. It also discussed the potential benefits of GCG practices for individual companies as well as for the national economy. Sound financial management practice and strategies not only help a company to avoid corporate failure but also assist the company to reduce risks and improve firm value. The problem is what financial management strategies to employ, and how these strategies can benefit a company in the process of achieving the economic benefits of GCG. The literature review showed that previous studies have overlooked an integrated relationship among corporate governance, corporate finance and accounting, especially in an optimisation framework using a case-study method. Therefore the main objective of this study is to examine how to formulate good financial management strategies for achieving GCG practice that reduces risks and improves a firm's value. An optimisation approach using an integrated optimisation financial model is used to answer the research question. Specifically, the model is developed from managerial and financial accounting perspectives.

The structure of this study's conceptual framework is presented in Figure 3.1. This conceptual framework shows how this book examines sound financial management strategies by modelling the business activities of a company's GCG practice (as depicted previously in Figure 2.13) in an optimisation model. The framework is constructed on the basis of the interrelationships among corporate governance, corporate finance and accounting. Financial management strategies as the product of the analysis of this interrelationship will become a tool for achieving GCG practices. Financial management strategies reflect a company's corporate governance practices and risk-management practices, as well as managerial and financial accounting practices. Therefore, initially, GCG practices and their qualitative principles are modelled into quantitative measurements. Variables of the model are chosen from financial or accounting measurements so that they reflect managerial and financial accounting practices of the company. Moreover, as suggested by GCG practices, as an integrated model, the variables will also reflect both

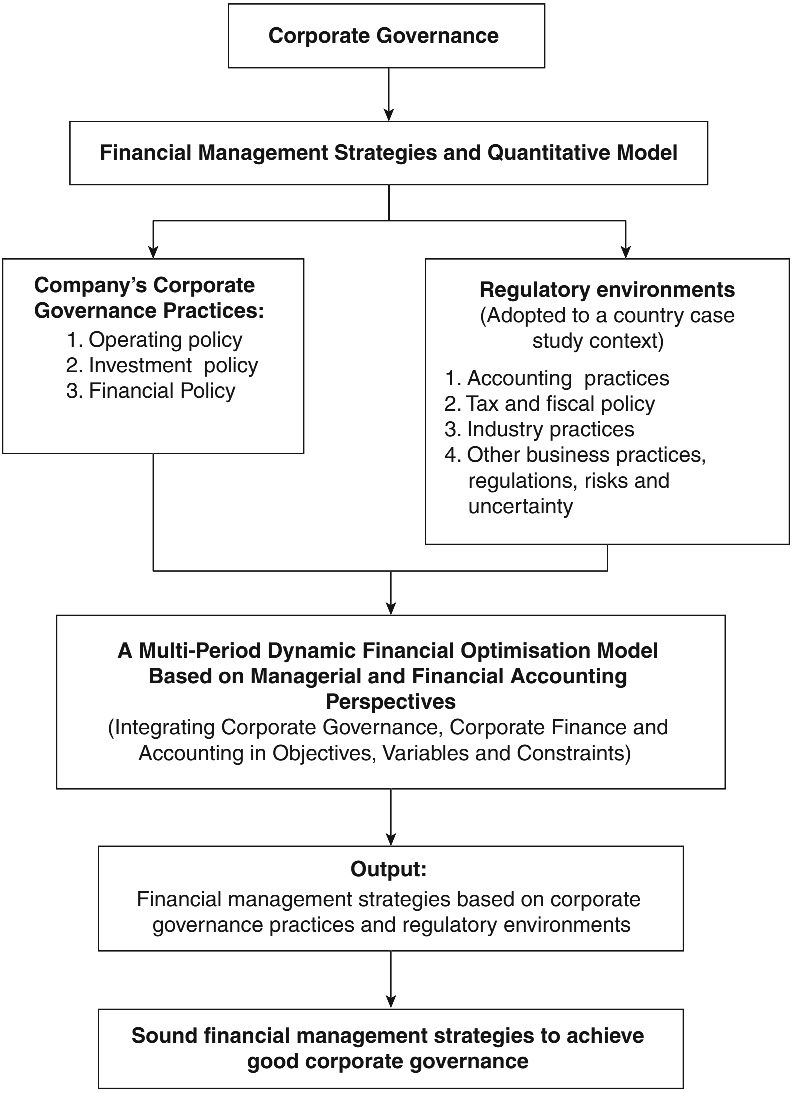


Figure 3.1 Conceptual framework for formulating sound financial management strategies that achieve GCG practices using an integrated financial optimisation model

the internal company's management activities and external business environments.

Specifically, variables of the model represent the internal managerial and financial accounting policies underpinning the company's main business activities: operating, investing and financing. Similarly, variables of the model need to represent external governance mechanisms which discipline managers and protect investors. The external mechanisms include elements such as accounting practices, tax policy, industry practices and other relevant factors such as economic and market risks.

Next, all the variables above are formulated in the proposed model which is called an integrated financial optimisation model. The equations of the model follow generally accepted accounting principles (GAAP); therefore, the model shows accounting equations which reflect the interaction among income statement, balance sheet and cash flows statements. The model will be justified based on corporate governance, management and accounting practices. Its output will be the basis for formulating sound financial management strategies which in the end can be used for achieving the economic benefits of GCG.

3.3 Research study postulates and propositions

To answer the research question, the framework of this study is developed under a postulate that many factors, both internally and externally, influence the business of a company (Clarke 2004). How internal factors influence a company's decision-making is explained by agency and managerial hegemony theory, whereas the way in which external factors shape a company's business is explained by external pressure theories and stakeholder theory.

The agency theory argues that a manager, as an individual, will maximise his/her own interests and, in doing so, his/her behaviour could sacrifice the interests of the owners (Jensen & Meckling 1976). Therefore, corporate governance instruments are created to minimise these agency costs (Clarke 2004). Managerial hegemony theory (Clarke 2004) argues, however, that the management can still control some internal governance mechanisms such as the board; hence, a good combination of internal governance mechanisms is needed – for example, by having debt monitoring.

The literature on corporate governance has documented internal governance mechanisms which discipline managers to perform in the best interests of shareholders. Internal control as one of internal governance mechanisms disciplines managers to comply with the regulations

(Calder 2008; Dietl 1998; Jensen & Meckling 1976; OECD 2004; Rezaee 2007, p. 50). Good risk management is argued to have positive impacts on the company's value creation (Léautier 2007). Risk management can be applied to discipline managers for improving the company's operating activities. The operating policies include improving the company's sales, reducing costs and increasing profitability. Risk management can be also applied to discipline managers in financing activities such as debt limitation, thereby preventing bankruptcy costs. Capital structure is an important internal governance instrument which protects shareholders and manages the conflict of interests between shareholders and debtholders (Ghosh 2007; Heinrich 2002; Jensen 1986; Sarkar & Sarkar 2008). Similarly, investment risk management helps management to improve the company's invesment returns. Executive remuneration and incentive design is recognised as one of the internal governance mechanisms since it helps discipline managers to perform in the best interests of the owners (Bebchuk & Weisbach 2010; Dicks 2012; Henderson 2007).

In addition to the underlying theories of corporate governance outlined above, resource-dependence theory, institutional theory and stakeholder theory argue that, to be successful, a company needs to consider the environment in which it is operating (Clarke 2004; Freeman & Reed 1983; Jensen 2001). This is pertinent to GCG practice which recommends that a company adhere to regulations, global accounting practices, tax and fiscal policy, other business practice and regulations. In addition, risks and uncertainty should be accommodated into the company's financial management strategies since they influence the decision-making process (Bushman and Smith, 2001). Moreover, external governance mechanisms, such as an efficient market for corporate control, management labour and corporate information, will discipline the management, the agent of the company, by giving positive or negative feedback on corporate information (Clarke 2004). The market pays a higher premium to companies that implement GCG practice (Gompers et al. 2003).

Implementing all internal and external governance mechanisms enables a company to achieve the economic benefits of GCG practice, as stated by OECD (2004, p. 11):

> *Good corporate governance should provide proper incentives for the board and management to pursue objectives that are in the interests of the company and its shareholders and should facilitate effective monitoring. The presence of an effective corporate governance system, within an*

> *individual company and across an economy as a whole, helps to provide a degree of confidence that is necessary for the proper functioning of a market economy. As a result, the cost of capital is lower and firms are encouraged to use resources more efficiently, thereby underpinning growth.*

Furthermore, according to OECD (2004, p. 21) GCG practice minimises agency costs and brings benefit for shareholders since GCG: (1) protects and facilitates the rights of shareholders and the key ownership functions; (2) ensures the equitable treatment of shareholders, including minority and foreign shareholders; (3) recognises the right of stakeholders and interrelates the stakeholders in 'creating wealth, jobs, and the sustainability of financially sound enterprises'; and 4) promotes a high level of disclosure and transparency.

Based on the discussion above, this study constructs its proposition that *for achieving the economic benefit of GCG practice, optimal financial management strategies should reflect internal and external governance mechanisms*. As discussed above and in Chapter 2, the internal governance mechanisms that can minimise agency costs, reduce risks and motivate managers to perform in the best interests of shareholders, are, for example, internal control mechanisms, risk management practices, liquidity policy, leverage, executive compensation and investment policy. In addition to these internal mechanisms, external governance instruments such as accounting practices, industry practices, tax regulations, and so forth help to protect shareholder interest. Variables and proxies of internal and external governance mechanisms used in this study will be discussed further in Chapter 4.

3.4 Survey of methodology and mathematical model

3.4.1 Survey of methodology

Various research paradigms are available for researchers, namely: positivist and critical/interpretive approaches, quantitative and qualitative approaches, induction and deduction, and experimental and non-experimental approaches (Veal 2005). To test the postulate above, this book will be based on a positivist approach which views that the world is external and objective to the researcher and hence the book will also be quantitative and deductive (Veal 2005). Using a quantitative approach, the book involves collecting and analysing numerical data which are collected from secondary data. This book is also a deductive study which develops an integrated financial model based on prior logical reasoning as stated in postulates and propositions. Using a positive paradigm, the book is categorised as normative and predictive. As a normative study, the book offers a prescriptive financial model to optimise the benefits of GCG practices.

3.4.2 Survey of mathematical optimisation model

As a quantitative study, a mathematical model using the optimisation approach will be of benefit for developing a financial model. In the optimisation approach, a model is 'an abstraction or mathematical representation of a problem of interest and is an essential part of the process of solving that problem optimally' (Sarker & Newton 2008, p. 3). In the optimisation approach, a model will be developed to maximise or minimise a mathematical function of a problem that is represented by a number of variables which are shown in three essential elements of the optimisation problem, namely: decision variables, the objective function and constraints (Cornuejols & Tütüncü 2007).

An optimisation method is useful for decision-making analysis; it helps determine the realistic and practical outcomes of management decision-making and design processes (Sarker & Newton 2008). Its several stages and decision-making process are depicted in Figure 3.2. An optimisation model, which is one of the mathematical models available to an analyst, is categorised as a prescriptive model.

Optimisation problems may have one or multi-objective functions, or no objective function – termed feasibility problems. Based on the decision variables and depending on the nature of the problem, the optimisation problem may be integer or discrete (pure integer or binary integer) or a combination of them (Cornuejols & Tütüncü 2007; Sarker & Newton 2008, p. 5). An optimisation problem without restrictions on variables is called a continuous optimisation problem. Based on the constraint type, the optimisation problem could be constrained or unconstrained; problems that lack constraints are called unconstrained optimisation problems and vice versa. A constrained optimisation model means the left-hand side of the constraint function is separated from the right-hand side, and the value could be equal to (=), less than or equal to (≤), or greater than or equal to (≥) (Sarker & Newton 2008, p. 5). The classification of optimisation problems is depicted in Figure 3.3.

Based on types of mathematical functions, an optimisation model could involve linear or non-linear programming (NLP). As mentioned by Cornuejols & Tütüncü (2007, pp. 1–5), there are also other problems which include: '(1) a quadratic programming (QP) problem where its

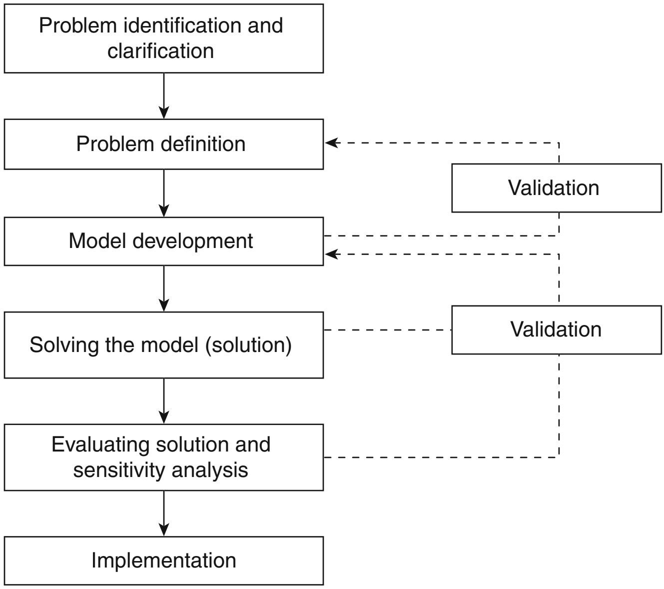


Figure 3.2 The decision-making process in optimisation approach
Source: Adopted from Sarker & Newton (2008, p. 19.)

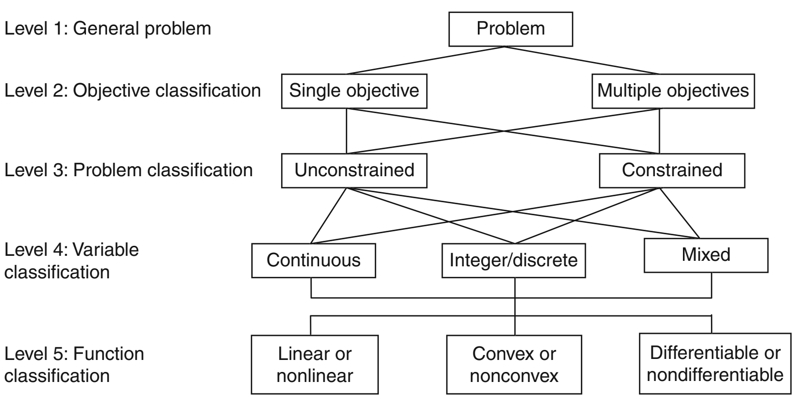


Figure 3.3 Classification of optimisation problems
Source: Adopted from Sarker & Newton (2008, p. 12).

objective function consists of quadratic functions; (2) a conic optimisation (CO) problem where the non-negativity constraints are replaced by general conic inclusion constraints; (3) an integer programming problem where some or all of the variables are required to take integer values; and (4) a dynamic(s) programming problem where the program changes over time, or divides the problem into "stages" in order to perform the optimisation recursively'.

With the exception of dynamic programming, all data related to parameters are known or certain. In particular, linear programming problems have the following characteristics (see Taylor 2010, pp. 55–56): first, the relationships exhibit proportionality which means 'the slope of the constraint or objective function line is constant'. Then, the terms in the objective function and constraints need to be additive. Next, the values of decision variables are 'continuous or divisible, as opposed to *integer* or *discrete*'. And, finally, 'all parameters are assumed to be constant and known with certainty'.

In the case that there is uncertainty data because the data of the parameters cannot be known exactly at the time of the model formulation or solution process (such as in the case of returns on investments or risks that will be known in the future), the optimisation model can be in the form of stochastic or robust optimisation problems (Cornuejols & Tütüncü 2007). In the stochastic problem, some data are random and the problem might be linear, integer or non-linear. Specifically, in a stochastic program with recourse, 'some of the decisions (recourse actions) can be taken after the outcomes of some (or all) random events have become known' (2008, p. 6). A robust optimisation program is preferred to achieve a good solution for all possible realisations of uncertain parameters. The model could be constraint/model robustness, which remains a feasible solution for all possible values of the uncertain inputs, or objective robustness, where the objective function has uncertain parameters. However, both constraints and objective robustness are 'concepts that arise in conservative decision-making and are not always appropriate for optimisation problems with data uncertainty' (Cornuejols & Tütüncü 2007, p. 8).

There are many factors affecting whether optimisation problems can be solved efficiently, including: (1) the number of decision variables; (2) total number of constraints; and (3) type of function of the problem (Cornuejols & Tütüncü 2007). It is also important that the model should follow some criteria, which are: simple, robust, adaptive, complete and user-friendly (Sarker & Newton 2008). Nevertheless, irregularities may occur in linear programming. Four special conditions that may be encountered in solving LP problems are: (1) redundancy, (2) infeasibility, (3) unboundedness and (4) alternate optimal solutions (Ragsdale 2012; Render et al. 2003; Taylor 2010).

Redundancy occurs due to a redundant constraint which contributes nothing to the feasible region. Therefore, this kind of constraint needs to be eliminated from the model. While a feasible solution in LP models means that the optimal solution is achieved because of all constraints being satisfied, an infeasible solution as depicted in Figure 3.4 can happen because of conflicts between constraints. The conflicting constraints cause the model to be unable to find a feasible solution. Finding out the reasons is difficult,[1] but some possible explanations are: (1) error in specifying some of the constraints in the model; (2) problems in the data; (3) a combination of some factors in the variables. The third irregularity is unboundedness, which is a condition where the objective function can increase indefinitely without reaching an optimal value – otherwise known as an infinite solution. Therefore, the model needs one or more constraints to create boundaries so that it can find a feasible solution. Finally, an alternate optimal solutions condition is a condition where multiple optimal solutions are available which provide greater flexibility for the user as a decision-maker to choose any feasible solution. The solutions are 'at the endpoints of the constraint line segment that the objective function parallels' (Taylor 2010, p. 53).

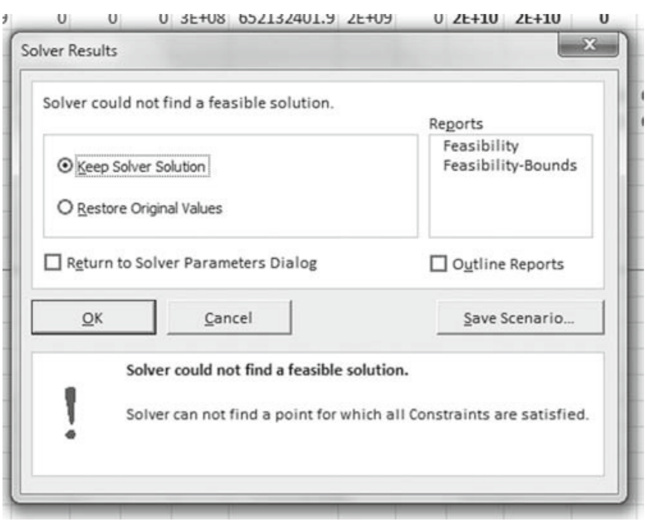


Figure 3.4 Example: Solver – infeasible solution

Having considered factors which influence the efficiency of optimisation problems and how they can be solved, Levy (2009) proposes four rules of thumb for modelling which can be viewed as ways to counter the irregularities of LP problems. These are: (1) 'keep it simple', meaning 'use linear functions whenever possible'; (2) 'keep it lean', meaning remove the pair of constraints whenever they can be replaced with other constraints without affecting the solutions to the model; (3) 'keep it compact', meaning 'consolidate constraints when possible'; and (4) 'keep it continuous', meaning 'use continuous variables if possible, and not variables constrained to have integer values or a finite number of values' (pp. 4–5).

3.4.2.1 Mathematical model of optimisation problem

In general, the mathematical model of an optimisation model is as follows (adopted from Ragsdale 2012). The objective may involve maximisation or minimisation problems. The optimisation problem subjects to some constraints.

$$\begin{aligned} &\text{Maximise (or Minimise)} f_0(x_1,\ x_2,\ldots,x_n) \\ &\qquad \text{Subject to } f_1(x_1,\ x_2,\ldots,x_n) \le b_1 \\ &\qquad\qquad\qquad f_2(x_1,\ x_2,\ldots,x_n) \le b_2 \\ &\qquad\qquad\qquad x_i \ge 0 \end{aligned} \tag{3.1}$$

The model above has variables: $x_1, x_2, \ldots, x_n$ and two constraints: f_1 and f_2, and with a non-negative constraint the solution will be limited to the positive solution area. The model is characterised as a constrained optimisation model since the left-hand side of the constraint function is separated from the right-hand side.

In the case of multiple objective problems such as goal and multiple objective programming, the objective function contains a set of goals (in the goal programming – GP) or more than one specific objective function (in multiple objective programming – MOP). This type of optimisation model would be more relevant in the real world since there are different groups of people who have different objectives or goals (Ragsdale 2012). The general models for GP and MOP are as follows:

Goal Programming (GP) Model:

$$\text{Minimise} \sum_i \frac{1}{t_i}(d_i^- + d_i^+)$$

$$\begin{aligned} &\text{Subject to } g_i(x) + d_i^- - d_i^+ = t_{b_i}, \quad i = 1,\ldots,m \\ &\qquad d_i^-, d_i^+ \geq 0 \text{ for all } i \\ &\qquad x_i \geq 0 \text{ for all } i \\ &\qquad x_i \text{ must be integers} \end{aligned} \tag{3.2}$$

Multiple Objective Programming (MOP) Model:

$$\begin{aligned} &\text{Minimise } f_0(x_1, x_2,\ldots,x_n) \\ &\text{Minimise } f_1(x_1, x_2,\ldots,x_n) \\ &\vdots \\ &\text{Maximise } f_3(x_1, x_2,\ldots,x_n) \\ &\text{Subject to } f_4(x_1, x_2,\ldots,x_n) \leq b_4 \\ &\qquad f_i(x_1, x_2,\ldots,x_n) \leq b_i \\ &\qquad f_j(x_1, x_2,\ldots,x_n) \leq b_j \\ &\qquad x_i \geq 0 \end{aligned} \tag{3.3}$$

To achieve the objective function, there are some constraints such as quantity of company's resources. The resources are used through some activities that contribute to the optimisation of the objective function. The allocation of the resources into some activities is reflected by the right-hand side of a constraint equation. These can be described, for example, by the optimisation model as follows:

$$\begin{aligned} &\text{Maximise } f(\bar{x}) = c_1x_1 + c_2x_2 + \ldots + c_nx_n \\ &\text{Subject to } g_1(\bar{x}) = a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n \leq gb_1 \\ &\qquad g_2(\bar{x}) = a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n \leq gb_2 \\ &\qquad h_1(\bar{x}) = a_{31}x_1 + a_{32}x_2 + \ldots + a_{3n}x_n = hb_1 \end{aligned} \tag{3.4}$$

The model above can be explained as follows: In the objective function, c_1 shows a return per unit of activity x_1, c_2 shows a return per unit of activity x_2 or in general c_n shows a return per unit of activity x_n. Then, in the constraints, for constraint $g_1(\bar{x})$, a_{11} is the resource required from gb_1 for unit of activity x_1, a_{21} is the resource required from gb_1 for unit of activity x_2, or in general a_{1n} is the resource required from gb_1 for unit of activity x_n. Similarly, for constraint $h_1(\bar{x})$, a_{31} is the resource required from hb_1 for unit of activity x_1, a_{31} is the resource required from hb_1 for unit of activity x_2, or, in general, a_{3n} is the resource required from hb_1 for unit of activity x_n.

Compared to the single objective problem, in the case of multiple criteria optimisation, the ideal way to find optimal solution will be to first assess the decision-maker's (manager's) utility function and then solve the mathematical model. However, because of the difficulty in finding a mathematical representation of the utility function of the decision-maker, the optimal solution of multiple criteria optimisation will be in the condition of 'space of trade-offs' among the multi-objectives of the model. Therefore, 'interactive procedures' or 'human intervention' will be the most effective way in searching trade-off space for a final solution. This final solution, because of the condition of 'space of trade-offs' would be 'any solution that satisfactorily terminates the decision-making process', no matter whether it is optimal or 'near-optimal' and this makes the multi-objective criteria different from other single criterion mathematical programming (Steuer 1989, p. 4).

In spite of the uniqueness of each type of mathematical modelling of optimisation, the formulation of all optimisation mathematical models requires these general assumptions (Sarker & Newton 2008, p. 7):

1) a common unit (such as dollars, kilograms or utility) of returns from different allocations of resources that can be measured and compared;
2) resources which will be used in the most economical manner;
3) certainty of all data for deterministic problem;
4) real or integer or a mix of both decision variables;
5) function type that is general and not restricted to any particular type.

3.5 Characteristics of an integrated financial optimisation model

GCG practices have many potential benefits not only for individual companies but also for the wider economy (Collier & Agyei-Ampomah 2007; Clarke 2004; OECD 2004). Two of them that are examined in this book are reducing risks and improving a company's firm value. The literature reveals that previous studies have overlooked an integrated relationship among corporate governance, corporate finance and accounting, especially in the application of the financial optimisation model as a tool for formulating sound financial management strategies that can achieve GCG practices, that is, reducing risks and improving firm value. For this purpose, a dynamic multi-period optimisation model based on managerial and financial accounting perspectives is believed to be the appropriate approach as a management tool to formulate sound financial management strategies, since it can represent all relevant factors as suggested by agency theory, managerial hegemony and external pressure theories that influence the company's corporate governance activities and how the objective of GCG practice can be optimised during a multi-period time. The development of the model is explained further below.

3.5.1 Attributes of the integrated financial model

The integrated financial model (based on computational optimisation in accounting) of this study is based on the existing financial models such as Carleton (1969, 1970), Carleton et al. (1973), Hamilton and Moses (1973), Ijiri et al. (1963) and illustration of a corporate model of Ho and Lee (2004). Based on the limitations of the current financial models that are highlighted in Chapter 2, the extensions for improving the current models will be on:

1) *Integrating contemporary issues: GCG practice and risk management*

The model integrates current issues on GCG practice and risk management such as liquidity risk, executive compensation, leverage and bankruptcy risk. External and market risks are captured by costs of capital of the model. The objective function will maximise the firm value, which is similar to the illustration of Ho and Lee (2004). Compared to other models that used a dividend approach (Carleton 1970), earnings per share (EPS) (Hamilton and Moses 1973), addition to retained earning (Ijiri et al. 1963) as the objective functions, this study used the free cash flows (FCF) approach to measure a firm's value since it is a more reliable approach for business valuation (Koller et al. 2010).

FCF valuation is more powerful than other valuations since it is the basis for calculating the intrinsic value of a company. It accommodates economic reality and all relevant information available in the market (Koller et al. 2010; Ratner 2009). It measures the real financial condition of a company as 'cash is king, not profit'. It summarises cash flows from three main activities: operating, financing and investing, and also considers the sustainability of the company by allocating investment in fixed capital and working capital (Weygandt et al. 2010). Therefore, FCF reflects the real cash flows available for shareholders, which could be distributed in terms of dividend (Pinto et al. 2010).

2) *Dynamic and integrated*

A dynamic multi-period optimisation approach is proposed by this study to reflect the dynamic economic conditions faced by a company.

A dynamic optimisation model has a characteristic that 'the program changes over time or divides the problem into "stages" in order to perform the optimisation recursively' (Cornuejols & Tütüncü 2007, pp. 1–5). This approach is useful to examine finance of a company as a dynamic process. It provides 'insight into optimum firm behaviour over time' (Elton and Gruber 1974, p. 155).

3) *Developed based on managerial and financial accounting perspectives*

The model is built based on managerial and financial accounting information. The objective and the constraints of the model are also based on managerial and financial accounting policies. The equations of the model follow general accepted accounting principles (GAAP), therefore the model shows accounting equations that reflect the interaction between income statement, balance sheet and cash flows statements. Financial statements will be the basis for developing the model. Because of using managerial and accounting information, the result of the model is relevant for management decision-making.

4) *A case-study approach*

Few of the current financial models give examples of their applications using a case study. This study uses a case study approach as it helps to illustrate how management can formulate sound financial management strategies. The implication of the results will be justified based on managerial and financial accounting practices and other underlying theories.

5) *Reliable model for management decision-making*

Compared to previous studies, this study performs verification and validity tests including sensitivity analysis to ensure the quality and plausibility of the model for management decision-making.

3.5.2 Financial statements as the basis for the model

The proposed model of this study is an integrated financial model using a dynamic multi-period optimisation approach which will be developed based mainly on financial statements, since the financial statements are snapshots of a company's business activities (Weygandt et al. 2010). Moreover, as the output from accounting practice, the financial statements play a governance role by recording all historical activities of a company, including the corporate governance practice and measuring them in financial units. Chapter 2 has described the function and importance of financial statements and how the company's activities, including corporate governance mechanisms, are reflected in those statements. This section discussed specifically the quality of financial statements as the foundation of the development of an integrated financial model.

3.5.2.1 Concepts, characteristics, elements and objectives of financial statements

To assess the quality of financial statements and the accounting information, it is important to understand the conceptual framework of financial statements. In accounting, the conceptual framework is defined as 'a body of interrelated objectives (which identifies the goals and purposes of financial reporting) and fundamentals (the underlying concepts that help achieve those objectives) that underlie the standard-setting process' (Plumlee 2010, p. 27). Qualitative characteristics of financial reporting that are depicted in a conceptual framework include understandability, relevance, reliability and comparability.

Based on International Accounting Standards Board (IASB) framework, the qualitative characteristics can be explained as follows.[2] First, understandability refers to the information provided by financial statements should be understood by users who have a reasonable knowledge of business and economic activities and accounting. Secondly, relevance refers to the ability of the information to influence users' economic decisions. Therefore it should be provided on a timely basis and considered material: the omission or the misstatement of the information could influence economic decision-making. To be relevant, information should meet two characteristics: predictive value and confirmative value. Thirdly, reliability refers to the condition that information must be free from material error, neutral (that is, free from bias), represent faithfulness and complete within the bounds of materiality and cost. It is also close to the prudence concept (or conservatism, based on US GAAP) so that the assets or income are not overstated while liabilities or expenses are not understated. Finally, comparability refers to the ability of the information to be compared through time and across entities, therefore consistent presentation is also important.

It can be concluded from the description above, the framework of financial statements is conceptualised based on the assumption of stewardship and information for decision-making (Wild et al. 2004). Based on the perspective that 'the manager is a steward entrusted with the responsibility of safeguarding assets, increasing the wealth of equity investors, and protecting creditors' (Wild et al. 2004, p. 74). The balance sheet and income statement, for example, are therefore used to evaluate the stewardship of management. In addition, as the objective of financial statements is to provide information on which to base decisions, these qualitative characteristics are important so that financial statements 'provide information about the financial position, performance, and changes in financial position of an entity that is useful to a wide range of users in making economic decisions' (IASB Framework discussed by Nandakumar 2010, Plumlee 2010, Rodgers 2007, van Greuning 2009). Since investors are the main users of financial statements, having those qualitites the information is presumed meet the investors' needs; the information is: (1) useful in investment and credit decisions; (2) useful in assessing future cash flows; and (3) about enterprise resources, claims to resources, and changes in them (Warfield et al. 2008, p. 46). While the qualitative characteristics are important to achieve the objectives of financial statements, they are implemented in elements of financial statements such as assets, liabilities, equity, revenues, expenses and so forth based on assumptions and principles, and also have constraints.

Based on IASB framework, there are two assumptions that underlie the preparation and presentation of financial statements, accrual basis and going concern. The transactions and other events are recognised when they occur, and recorded and reported in the periods to which they relate (matching). The financial statements are also prepared on the assumption that the entity will continue in operation (not intending to liquidate) for the foreseeable future. To enable users to asses a company's performance, the financial statements are reported periodically. They should also be based on an economic entity concept that 'economic activity can be identified with a particular unit of accountability' (Warfield et al. 2008, p. 36). In addition, specifically, the elements of financial statements should be recognised or incorporated in the statements if there is future economic benefit that will flow to or from the entity, and presented in monetary units so that the elements can be measured with reliability. The elements are also evaluated on a measurement basis or principals such as historical costs, current cost, realisable or settlement value, and present value. Finally, all the financial statements should be based on fair presentation.

Nevertheless, to apply all the qualitative characteristics of financial statements, constraints are faced by a company – for example, when information is prepared to meet the reliability characteristic, it takes time to ensure this quality, hence it will lose its relevance (not on a timely basis). Similarly, there is a trade-off between benefit and cost in preparing and reporting financial information. Also, some industry practices require financial statements to be prepared based on practical considerations which 'departs from basic theory' (Warfield et al. 2008, p. 44). Accordingly, a company should balance all the constraints when preparing and reporting financial statements. The summary of concepts, characteristics, elements and objectives of financial statements is depicted in Figure 3.5.

3.5.2.2 Analysing the quality of financial statements

The above section has described the qualitative characteristics of financial statements. Recent corporate failures, however, show that the objectives of financial statements have not been achieved

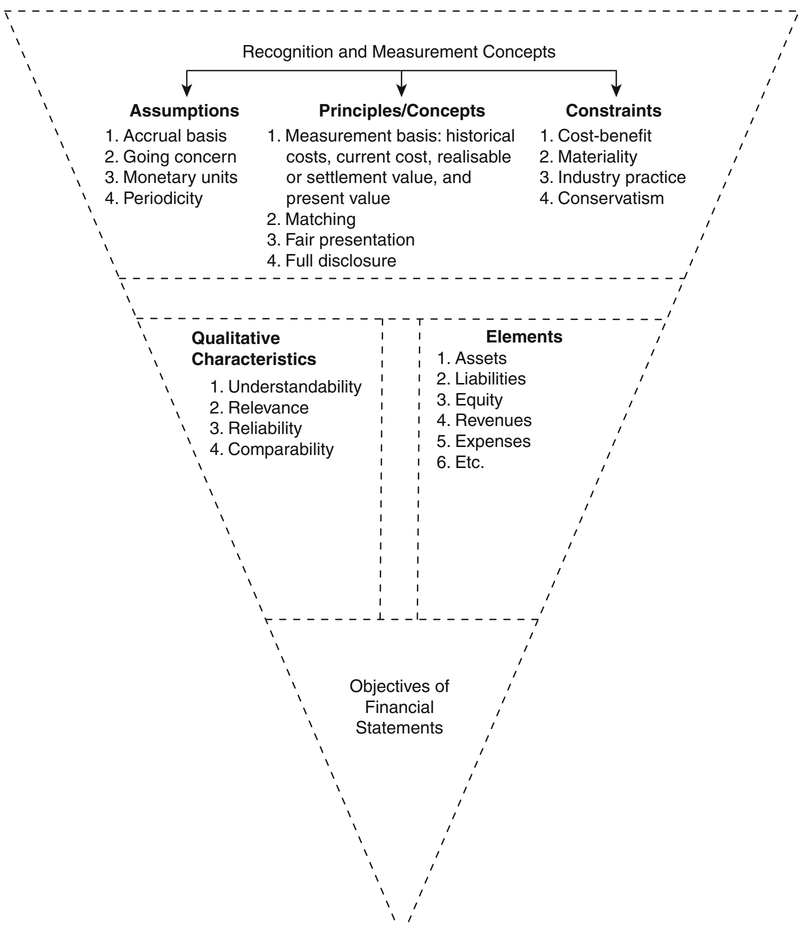


Figure 3.5 Conceptual framework of financial statements

Source: Adopted from Warfield et al. (2008) and IASCF (2010).

mostly due to the discretionary management practices and fraudulent account activities of managers. While the objective and conceptual framework of financial statements are built on the concept of stewardship, the external users' point of view shows financial statements are the product of management. Therefore, based on utility economic theory, which suggests that every person maximises his own benefit, as well as agency theory, which argues that management will maximise its own benefit (Jensen & Meckling 1976), external users cannot fully trust managers and they should remain sceptical when analysing the quality of financial statements. This section explains further some features of accounting systems that influence the quality of accounting, accounting distortions and earnings management, and process of accounting analysis.

Features of accounting system

The quality of the financial statements data, as explained by Palepu and Healy (2008), is influenced by the institutional features of an accounting system which include those: (1) of accrual accounting; (2) of accounting conventions and standards; (3) of manager's reporting strategy; and (4) of auditing. Similarly, Wild et al. (2004) stated that accounting standards may cause accounting distortions since: (1) they are the product of a political process which sometimes accommodates only some interests; (2) some accounting principles have some constraints (costs and benefits), for example LIFO versus FIFO, historical cost versus fair value and so forth; (3) conservatism could lead to biased financial statements.

Accrual accounting, compared to cash accounting, records economic events based on expected cash receipts and payments not necessarily on an actual basis. While the financial statements are prepared on a periodic basis, firms undertake economic transactions on a continual basis, hence 'the arbitrary closing accounting books at the end of a reporting period leads to a fundamental problem' (Palepu & Healy 2008, pp. 1–5).

Accrual accounting has also been frequently abused by management, who do creative accounting which then leads to corporate failures (Clarke et al. 2003). Based on accrual accounting, to expect future consequences of current events, financial statements are prepared based on accounting policies, methods and assumptions which are chosen based on the management's professional judgement which could be subjective. As mentioned previously, the conceptual framework of financial statements is developed based on the stewardship by which management can optimally use their accounting discretion to reflect inside information in reported financial statements.

Despite the fact of the potential value of this discretion accounting, as argued by agency theory, management may have an incentive to use the accounting policies, methods and assumptions to distort and manipulate the accounting information, and do creative accounting which then misleads external users. Even though the accounting conventions and standards attempt to minimise the potential distortions made by management by, for example, requiring high disclosure and developing accounting standards that give more security to the shareholders and investors, the accounting systems and accounting standards still give managers an opportunity for discretionary accounting. Rather than choose the accounting policies, methods and assumptions to improve the qualitative characteristics and meet the objectives mentioned in the conceptual framework of financial statements, management usually abuses them to adopt a reporting strategy that benefits the management position. Finally, independent auditors could give both positive and negative impacts to the quality of accounting information. Although an opinion of independent auditors provides reasonable assurance that information prepared by managers is free from material errors, it cannot provide a 100% guarantee that the information is reliable and free from fraudulent activities of management (except by means of a forensic audit). Therefore, audit per se cannot protect a company from failure.

Accounting distortions and earnings management as accounting risks

Accounting distortions can be defined as 'deviations of reported information in financial statements from the underlying business reality' (Wild et al. 2004, p. 91). These deviations, therefore, can be defined as accounting risks since they influence the quality of the accounting information as a resource for decision-making. They generally arise from the accrual accounting basis (including the standards, errors in estimation, constraints in measurements and concepts – for example, relevance versus reliability) or earnings management activity.

Earnings management, which is defined as the management activity to satisfy its selfish objectives intervention by deliberately determining the earnings and playing the accounting numbers, causes accounting discretions. These selfish objectives could be to increase contracting incentives (management's bonus and compensation), increase stock price and other specific incentives such as to gain some incentives from government. As an outcome of accrual accounting, explained by Wild et al. (2004), earnings management can take two forms: (1) changing accounting methods; and (2) changing accounting estimates and policies. These might be achieved through three strategies: (1) increase current period income; (2) reduce current period income; and (3) reduce earnings volatility by income smoothing. Specifically, areas that are potentially abused by managers for earnings management are 'revenue recognition, inventory valuation, estimates of provisions such as bad debt expenses and deferred taxes, and one-time charges such as restructuring and asset impairments' (p. 95). Having considered the vulnerability of accounting data to discretionary activities of management, an analysis of the financial statements is important.

Accounting analysis

To create more reliable financial statements which are free from accounting distortions, it is important for external users to analyse financial statements. Some types of analysis of financial statements include: business and strategy analysis, accounting analysis, financial analysis and prospective analysis. This book specifically focuses on accounting analysis only since the integrated financial model on which the book is developed is based mainly on accounting information available from financial statements.

The purpose of accounting analysis is to evaluate the quality of the financial statements, or 'the extent to which a company's accounting numbers reflect economic reality' (Giroux 2003; Palepu & Healy 2008; Wild et al. 2004, p. 90). The accounting analysis, in general, involves several interrelated processes and tasks of evaluating earnings quality and adjusting financial statements. The adjustment process of all distorted accrual accounting data uses information from cash flows and notes to the financial statements (Palepu & Healy 2008). The process includes identifying the accounting flexibility and evaluating the appropriateness of the company's accounting policies, methods and assumptions in order to assess the degree of accounting distortion.

The first process of accounting analysis is evaluating earnings or accounting quality. As explained previously, accrual accounting is one of the factors causing accounting distortion. The other factors that influence the accounting quality include management (in applying the accounting) and business risk. Management has a tendency to undertake discretionary activities while business risks force management to adopt some flexibility in accounting as explained below. The steps include: (1) identifying and assessing key accounting policies; (2) evaluating the extent of accounting flexibility; (3) determining the reporting strategy; and (4) identifying and assessing red flags (Wild et al. 2004, p. 97). These steps are explained further below.

The accounting quality can be assessed by identifying whether the key accounting policies adopted by the company are reasonable or aggressive and whether they are consistent with industry norms. Therefore, the impact of the key accounting policies on the quality of accounting figures can be identified. It is also important to evaluate the extent of accounting flexibility since every industry may have different accounting practices. An industry characterised by, for example, higher intangible assets (such as in the information technology industry), volatility in business operations (such as in the banking industry), higher production costs prior to production, or unusual revenue recognition methods (such as in agriculture or farm industry), generally has more flexible accounting practices which require special accounting estimates. In addition, determining the reporting strategy of a company is also essential; that is, whether the company adopts an aggressive reporting strategy, has a history of accounting problems, or how good is its auditing report and its financial disclosure. The worst case is for a company that already signals red flags, including poor performance, earnings much higher than its operating cash flows or taxable income, a qualified audit report and so on.

Having analysed the accounting quality, the next process of accounting analysis is adjusting or recasting financial statements, especially the balance sheet and income statement, into a standard format so that the accounting figures have comparability characteristic (Palepu & Healy 2008; Wild et al. 2004). Some adjustments on accounting figures are also needed to create unbiased and reliable accounting data since management tends to use aggressive accounting which causes overstated earnings. The example of these are adjustments on overstated/understated assets, understated liabilities, equity distortions, overstated revenues and understated expenses (Palepu & Healy 2008). Finally, the output of the two processes of accounting analysis will be the accounting figures which have qualitative characteristics as outlined in the conceptual framework of financial statements. The output of the accounting analysis will become an input for the development of an integrated financial model proposed by this book.

Compared to a private company, the users require more extensive accounting information of a public company, including both management and externals. In this case, the accounting or financial information would have higher importance since the stakeholders include the public. Most importantly, financial statements as one of the mediums of communication between managers and the outsiders are a product of management which could contain 'noises'.

Discretionary management activities, such as earnings management, will be a good example of how management attempts to 'legally' influence the earnings by skewing the accounting information to satisfy its selfish objectives. Typically there are three strategies of earnings management: increasing income, reducing current income (taking a 'big bath') and income smoothing (Wild et al. 2004). While one type of earnings management can be identified as having positive effects, the effects of opportunistic earnings management could be various and the negative impacts could be very perilous. An example of this is fraudulent financial statements. This misleading accounting information might deceive the public, causing flawed financial decisions; the effect can be even worse, spreading over the capital markets around the world. There are ample examples of bad accounting practice and its impact, such as Enron, Worldcom, Tyco, HIH and other collapsed companies (see further Clarke et al. 2003, Argenti 1976, and Culp and Niskanen 2003).

Compared to fraudulent financial statements, in the case of earnings management, management attempts to 'legally' influence the earnings by exploiting the 'weakness' of accrual accounting in order to make up the financial statements. Even though this activity is legal, Clarke et al. (2003) have pointed out that these earnings management activities, in abusing the weakness of accrual accounting, have caused corporate failures over decades. To manage earnings, management can subjectively choose any accounting methods (such as those related to depreciation of assets or inventory) or make subjective assumptions (such as the economic life of the assets).

From a corporate finance point of view, earnings management activity is a way for management to influence earnings by 'making up the numbers' in order, for example, to allocate future incomes so that the income in the financial statements looks smoother or does not fluctuate. More stable income means less risk, hence it will satisfy the stakeholders (such as debtholders/creditors, shareholders and other investors). Obviously earnings management is commonly found in a company that is trying to obtain finance whether by issuing debt or issuing new shares in the capital market (initial public offering or IPO) (Siew Hong et al. 1998).

Therefore, to protect investors from such mischievous activities by management, corporate governance plays an important role through the function of the board and the audit committee of the company (Xie et al. 2001). The board supervises the management to ensure it performs in the best interests of the shareholders. Corporate governance minimises agency costs by requiring accounting information and all material information that influence decision-making to be disclosed in a timely and accurate way (OECD 2004). In regard to the disclosures and transparency regulation, 'information should be prepared and disclosed in accordance with high quality standards of accounting and financial and non-financial disclosure' (OECD 2004, p. 24). In addition to this, since accounting information is produced by management, it also needs an independent examination by external auditors to ensure that the information has followed general accepted accounting standards and is free from material misstatement (Arens et al. 2008), thereby minimising information risks.

The literature has discussed the role of accounting in corporate governance and how it influences capital markets. Bushman and Smith (2001) argue that financial accounting information has an important role as an input to the governance mechanisms so that those mechanisms operate efficiently. Financial accounting transparency is also argued to be effective in reducing agency costs and conflicts of interest among managers, directors, shareholders and debtors (Armstrong et al. 2010). It is not only the level of disclosure; the timeliness of financial reporting also becomes an indicator of a company's good corporate governance practice (McGee & Yuan 2008). Nevertheless, the current study shows that the level of disclosure of accounting information is a double-edged sword effect: while it is argued that more disclosure is favourable to reduce a firm's agency problem, 'greater disclosure [also] tends to raise executive compensation and can create additional or exacerbate existing agency problems' (Hermalin & Weisbach 2012, p. 221). Accounting information and its practice, such as discretionary accruals accounting practice, is further used as a tool by strong–corporate governance companies to send a message to investors about bad news in a timely manner (García Lara et al. 2009).

To conclude, accounting information plays an important role in GCG practice. However, since it is produced by management, based on agency theory, it may contain accounting noise and therefore it is important to assess the quality of accounting information.

3.5.3 A description of the integrated financial optimisation model

As a mathematical model, an optimisation model has three major components: decision variables, an objective function and constraints. The decision variables are the unknowns of the model while an objective function is a function that needs to be optimised with constraints that limit the model (Sarker & Newton 2008). For the purpose of this book and in the context of GCG, the proposed integrated financial model is a dynamic multi-period linear program.

The model assumes that an explicit multiple time period of representation is important, therefore, following McCarl and Apland (1986) and McCarl and Spreen (1997, pp. 8–12), this book assumes the following factors as determinants of the dynamics background of the study: (1) the length of the total time and the starting date; (2) the length of the time intervals explicitly represented within the total time period; (3) initial and final inventory conditions; (4) activity life of an activity: when it starts and when it finishes; (5) the rate of time preference, for example a discount rate; and (6) whether the model includes uncertainty.

Based on this dynamic background, the dynamic linear programming can be divided into disequilibrium and equilibrium models. Then, based on the certainty of the life of the activity, the disequilibrium and equilibrium models fall into known life and unknown life (see McCarl and Spreen 1997 for the discussion). The matrix of the model is depicted in Figure 3.6 below.

The following model is categorised as a disequilibrium–unknown life model wherein the exact life of activities is to be endogenously determined in a multi-period context McCarl and Spreen (1997).

Objective functions:

$$\text{Max} \sum_{t} \sum_{j} \sum_{e \le \text{K}_j} (1+\text{r})^{-t} \text{C}_{je} \text{X}_{j,t,e} + (1+\text{r})^{-T} \sum_{j} \sum_{e < \text{K}_j} \text{F}_{je} \text{I}_{je}$$

$$\text{Subject to } \sum_{j} \sum_{e \le \text{K}_j} \text{A}_{ije}\ \text{X}_{j,t,e} \le \text{b}_{it} \text{ for all } i \text{ and } t$$

$$\text{X}_{j,0,e} = \text{X}^{*}_{j,0,e} \text{ for all } i \text{ and } e < \text{K}_j$$

Life of activity \ Period of model	Multi-period	Typical period
Known	Disequilibrium – known life	Equilibrium – known life
Unknown	Disequilibrium – unknown life	Equilibrium – unknown life

Figure 3.6 Matrix of dynamic linear programming

$$
\begin{aligned}
&-X_{j,T,e} + I_{je} = 0 \ \text{for all}\ i\ \text{and}\ e < K_j \\
&-X_{j,t-1,e-1} + X_{j,T,e} \qquad \le 0\ \text{for all}\ t, j\ \text{and}\ e \ge 0\ \text{and}\ e \le K_j \\
&X_{j,T,e}\ I_{je} \ge 0\ \text{for all}\ t, j, e
\end{aligned} \tag{3.5}
$$

where:

t = time index;
T = the length of the total planning horizon;
j = index for identifying alternative variables;
e = index identifying the elapsed age of variable;
K_j = the maximum age of a variable;
i = index identifying resources;
r = discount rate;
C_{je} = per unit profit from variable *j* when it is of age *e*;
$X_{j,t,e}$ = the number of units of alternative j on hand in period *t* which are of elapsed age *e*;
F_{je} = the terminal value of incomplete units of enterprise *j* which are of elapsed age *e*;
I_{je} = the number of units of enterprise *j* which are of elapsed age *e*;
A_{ije} = the resource *i* usage by one unit of the production represented of enterprise *j* when it is of elapsed age *e*;
b_{it} = the endowment of resource *i* in period *t*;
$X_{j,0,e}$ = the initial amount of enterprise *j* of elapsed age *e* before the model begins (in time period 0).

3.5.4 Specification of the elements of the model

3.5.4.1 Objective function

Previous models

The objective function of Carleton (1970) is maximising shareholder wealth. The dividend approach was used as a proxy to measure the objective function. The limitation of this model is its proxy because the dividend approach is applicable for a company that does not have any cash dividend policy. The objective function of Carleton's model (1970) is as follows:

$$
\text{MAX}\ \frac{Po}{No} = \sum_{t=1}^{T-1} \left[\frac{D_t}{No(t+k)} - \frac{\Delta E_t^n}{No(t+k)^t(1-C)} \right] + \frac{P_t - \Delta E_t^n}{N_t(1+k)^t} \tag{3.6}
$$

where:

s_0 = theoretical equity value in period zero;

D_t = total dividends paid by the firm in period *t*;
N_0 = number of common shares outstanding;
ΔE_t^n = net funds received from equity issued in period *t*;
D_t = aggregate market value of the firm's equity at the beginning of period *t* (t = 0,1,2,...,T);
C = an estimate of the proportion of equity lost to under-pricing and transaction costs; and
k = the appropriate discount rate.

Ijiri et al. (1963) used retained earnings as the objective function of their model. The limitation of using retained earnings is that it is based on an accrual accounting method, hence it contains accounting noise. The objective function of Ijiri et al.'s model (1963) is as follows.

$$\text{Max Net Addition to Retained Earnings} = X_{CE} + X_{RE} + X_{GE} - X_{ER} - X_{EP} - X_{ED} \quad (3.7)$$

where:

X_{CE} = amount of collect interest on securities;
X_{RE} = amount of gross profit on sales;
X_{EF} = amount of depreciation;
X_{ER} = amount of variable conversion costs;
X_{EP} = amount of manufacturing and operating costs;
X_{ED} = amount of accruals of income taxes and dividends.

The other model, that of Hamilton and Moses (1973), used earnings per share (EPS) as its objective function. EPS is a function of net income. The limitation of using EPS is that it is based on an accrual accounting method, hence it contains accounting noise. The objective function of Hamilton and Moses's model (1973) is as follows:

$$\max \text{EPS} = \sum_{t=1}^{t=T} E_t / s_0 \quad (3.8)$$

where:

EPS = total corporate earnings per share over the T periods;
s_0 = total outstanding stock in period t=0.

This study's model

In regard to GCG practices, this study will reflect GCG principles in the objective function of the model. OECD GCG principles state that in the long term GCG practices would benefit economic sustainability for the company as well as for the overall economy. This study defines this long-term benefit of GCG practice into more specific GCG objectives which are relevant to the responsibility of the management based on the theory of corporate finance: *maximising the shareholders wealth* by, for example, minimising risks and improving firm value.

By choosing this objective, this study will also reflect another objective of GCG practice: the resolution of conflict of interests, such as including the interests of debtholders. By having an objective function to maximise firm value, this model could also benefit the other stakeholders. If the company's performance is increased or positive, the company can pay its commitment to its management and employees as well as pay tax to the government. Therefore the objective function of the model will reflect interests of shareholders, debtholders and the other stakeholders. This model is then an integration of the value-based management (shareholder value maximisation) and stakeholder approaches (Meier et al. 2005).

Free cash flows (FCF) valuation is chosen to maximise the objective above. FCF offers better quality than other valuation methods since it minimises accounting noise, measures the real cash flows for owners, and captures the sustainability of the firm (Koller et al. 2010; Pinto et al. 2010; Weygandt et al. 2010). The detail objective function with FCF is explained in the next chapter.

3.5.4.2 Discount factor (cost of capital)

The model proposed in this book will consider the time value of money which is relevant to discount the future value to today's value. Therefore, the discounting factor has an important role in reaching the correct figures. Cost of capital is claimed to be the proper measure of the discount rate (Pratt & Grabowski 2010). By definition, a discount rate is 'a yield rate used to convert anticipated future economic income (payments or receipts) into present value (i.e. a cash value as of a specified valuation date)' (Pratt & Grabowski 2010, p. 11). A discount rate is also a rate used to calculate the *opportunity cost* of the investors because of investing their funds in that company so that they forgo the benefits that they could gain from alternative investments (Lee et al. 2009; Pratt & Grabowski 2010); it represents 'the total expected rate of return that the investor requires on the amount invested' (Pratt & Grabowski 2010, p. 11).

The literature discusses how to calculate cost of capital and among the methods weighted, average cost of capital – that is, debt and equity – (WACC) is most widely used in current practice (Pratt & Grabowski 2010; Rao & Stevens 2007). The WACC consists of costs of two components of capital structure: cost of debt and cost of equity. Cost of debt is calculated based on the effective rate that a company pays on its current debt. Because interest expense is a deductible expense, it is calculated net of tax. This deductible expense is called a tax-shielded portion and in extreme cases it may be affected by other items. For example, if a company experiences a net loss for the year, the tax shield will be decreased as the effective rate will be lowered (Allman 2010). The formula is as follows.

$$k_d = \text{Pre} - \text{tax Debt Interest Rate} \times (1 - \text{Tax Rate}) \tag{3.9}$$

where:

K_d = cost of debt.

While cost of debt is the return for the debtholders, cost of equity is the return for the equity holders. The calculation is based on the company's equity. The structure of a company's equity normally consists of common stocks and other equity such as preferred stocks. Some methods to calculate the cost of equity are, for example, risk premium, capital asset pricing model (CAPM) and discounted cash flows (DCF) using dividend growth model (Morin & Jarrell 2001). The risk-premium method assumes that the equity holders require higher returns than the free risk return investment, that is, bonds as the compensation for the additional risks. Similar to risk premium, CAPM defines more specifically the additional risks into market risk and company-specific risk. The company-specific risk is categorised as diversifiable risk and can be eliminated by diversification or portfolio investment strategy while the market risk is non-diversifiable risk and therefore the company would expect the latest risk (Morin & Jarrell 2001). The formula of CAPM is as follows (Morin & Jarrell 2001):

$$K_e = R_f + \beta(R_m - R_f) \tag{3.10}$$

where:

K_e = cost of equity;
R_f = risk-free rate;

$$\beta = \text{market risk} = \frac{\text{Covariance of the firm's returns with the market's return}}{\text{Variance of the market's return}};$$

R_m = market return;
$(R_m - R_f)$ = market risk premium.

For discounted cash flows (DCF), cost of capital is calculated based on dividend growth model; the formula is as follows (Morin & Jarrell 2001):

$$K_e = \frac{D_1}{P_0} + g \tag{3.11}$$

where:

K_e = cost of equity;
D_1 = expected dividend during the coming year;
P_0 = current stock price;
g = expected growth rate of future dividends.

After having defined cost of debt and cost of capital, the formula of WACC is as follows (adopted from Koller et al. 2010, p. 776) while the figure summarising the components of WACC is depicted in Figure 3.7.

$$WACC = \frac{D}{D+E}(K_d)(1 - T_m) + \frac{E}{D+E}(K_e) \tag{3.12}$$

where:

$WACC$ = weighted average cost of capital;
D = debt;
E = equity;
K_d = cost of debt;
K_e = cost of equity;
T_m = marginal tax.

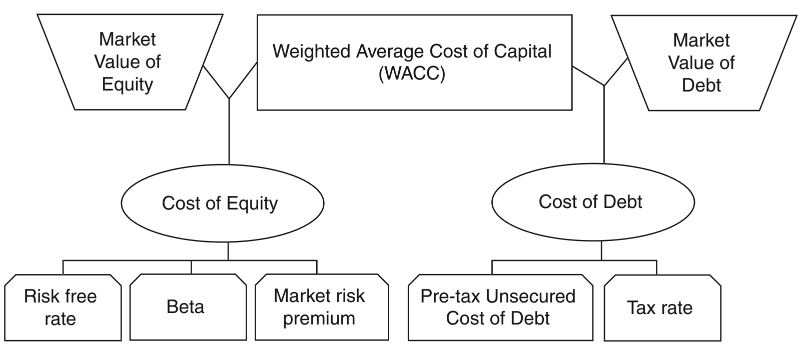


Figure 3.7 Components of WACC
Source: Adopted from Allman (2010, p. 200).

3.5.4.3 Constraints of the model

The constraints of the model will reflect internal and external governance mechanisms of the company which are derived from managerial and financial accounting practices. First, the constraints reflect specific internal governance mechanisms such as risk management policies, leverage, bankruptcy risk and executive compensation. Second, they reflect external factors such as the dynamics of the economy and regulations including capital market characteristics, industry practices, tax policy and accounting practices. Specifically, the constraints cover: (1) accounting and tax practice; (2) operating activities (related to the profitability of the company and liquidity management); (3) risk management, financial and investment practice (including leverage and bankruptcy risks); and (4) executive compensation (EC).

3.5.5 Expected results and their uses

As mentioned above, the integrated financial model of this study integrates all internal and external factors that influence and are relevant to the company's business, as suggested by agency theory, managerial hegemony theory and external pressure theories. The model accommodates internal and external governance mechanisms which discipline managers to perform in the best interest of shareholders. In addition, using a dynamic multi-period programming, the model captures the dynamic of economic conditions and the uncertainty of the future a company faces. As a result, the outcome of this study is useful for formulating sound financial strategies to achieve the benefits of GCG practices. The specific objectives are related to the fulfilment of the interests of shareholders and debtholders, and the sustainability of the company's operating activities.

The results will be used to formulate sound financial management strategies in the area of operating, investment and financing. The effectiveness of the strategies and the relevant GCG instruments can be assessed based on their impact on the firm value (the optimal objective function) – for example, how the leverage level influences the firm value, what liquidity management improves firm value, what investment strategies add value to the firm and so forth. These strategies are, in the end, important for achieving the economic benefits of GCG practices: reducing risks and improving firm value.

3.5.6 Verification and validation of the model

Once the model has been formulated and solved, it is important that it is verified and validated before analysing its output. Martínez (2009) defines model verification as a step to ensure that 'the model is computationally correct and does not contain errors of both omission and commission'. It ensures the internal consistency of the model; hence, as argued by Martínez (2009), the model calculates what it is supposed to do, so that the output reflects the behaviour of the real-world system being modelled. In addition to verification, the model needs to be validated. Compared to verification, validation ensures the external or representational correctness of the model (Martínez 2009). Martínez further argued that verification and validation of a linear programming model, whether for predictive or prescriptive purposes, 'can range from a simple inspection of the output to detailed comparisons of model results to the system's operational statistics' or, in other words, as argued by McCarl and Spreen (1997, 2011), the approaches 'vary widely' (p. 156).

Nevertheless, McCarl and Spreen (1997, 2011) mention two general approaches to validity which may be used, namely validation by construct and validation by results. They define validation by construct similarly to the verification's definition of Martínez (2009); it ensures that the model was built properly. On the other hand, validation by results ensures the external or representational correctness of the model (this definition is similar to Martínez 2009) by comparing the model outputs with the real-world observations. Following McCarl and Spreen (1997, 2011), below are processes of model verification or validation by construct which are most applicable for a predictive model but also useful for a prescriptive model:

1) Following the right procedure when developing the model.
   It means the procedure needs to be consistent with the industry, previous research and/or theory. In addition, the data need to be specified based on reasonable scientific estimation or accounting procedures.
2) Ensuring that the trial results indicate the model is behaving satisfactorily.
3) Ensuring that constraints were imposed which restrict the model to realistic solutions.
4) Ensuring that the data were set up in a manner so that the real-world outcome is replicated.

As argued by McCarl and Spreen, validation by construct has some limitations since the particular model is assumed, not tested. This can be overcome by validation by results since in this step the model is tested.

Validation by results is conducted by the following process (see McCarl and Spreen 1997, 2011 for further discussion):

1) Parameter outcome sets

   A numerical model that represents a real-world observation consists of an input parameter which describes the environment of the system and the output parameter which describes the corresponding behaviour of the system. Accordingly, a good model needs to have an outcome parameter rather than the input parameter so that the model reflects the behaviour of the observed object.

2) Validation experiments
   a) Feasibility experiment

      It examines the solution feasibility and has primal and dual forms. The primal feasibility experiment includes the addition of the constraints to the model to test internal model consistency – that is, checking faulty model equation specification. The dual feasibility experiment, the purpose of which is to test whether the solution is dual feasible and therefore primal optimal, involves testing to ascertain if shadow prices are feasible in the dual or Kuhn-Tucker conditions. Therefore, this validity experiment ensures that the model is working and feasible which means the model is free from problems such as (1) redundancy, (2) infeasibility, (3) unboundedness and (4) alternate optimal solutions, as mentioned previously in Section 3.4.2, and other problems which also potentially exist in linear programming as explained by Arsham (2011). The classification of linear programming solutions for the modelling validation process is depicted in Figure 3.8 below (see the details in Arsham 2011).

   b) Quantity experiment

      It examines the consistency between the optimal and observed levels of the production (Y) and input supply (Z). It involves constraining the outputs supplied or inputs demanded at their actual levels and removing f (X) or g (Z), then observing the shadow prices.

   c) Price experiment

      It is relevant in price-endogenous models or models with fixed demand requirements. The purpose is to examine how implicit fixed resource values are influenced in the experiment. It involves fixing the objective function coefficients at existing real-world prices, then observing quantities (the dual of the quantity experiment).

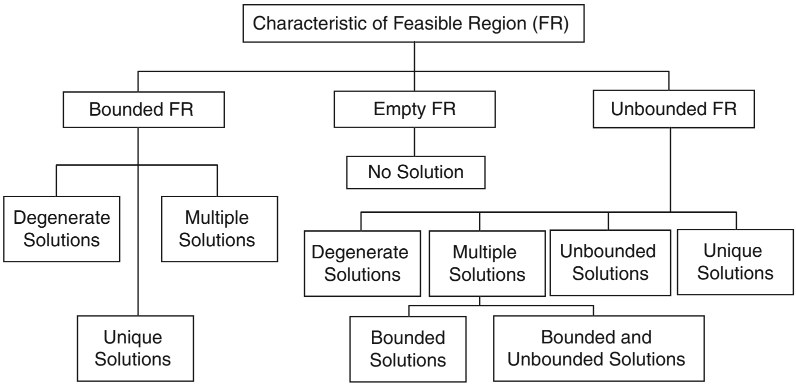


Figure 3.8 A classification of linear program's solutions for modelling validation process

Source: Adopted from Arsham (2011).

d) Prediction experiment

It is the most common validation by result test. The purpose is to examine whether the model linear programming output is close enough to the real-world outcomes. It involves fixing the problem at the real-world values and solving to get values of the variables.

e) Change experiment is a complement to the prediction experiment and has a static assumption. The purpose is to test the model's ability to predict change. It involves a comparison between the change in the model solution variables and the change observed in the real-world solution.

f) Tracking experiment

It is to test how well the model 'tracks' over time with respect to the corresponding observed adjustments in the system. It also involves a comparison between the change in the model solution variables and the change observed in the real-world solution.

Having discussed the validation process, the steps to conduct validation tests, as suggested by McCarl and Spreen (1997, 2011), are as follows:

1) Alter the model variables, equations and data to reflect the validation experiment;
2) solve the model(s);
3) evaluate the solution: does it contains linear programming problems such as infeasibility, unboundedness and so forth, or is it optimal?

If the model contains some problems, apply some remedies. If it is optimal, perform association tests to find out the degree of correspondence between the real world and the model solutions (except for the feasibility experiment). The test should be conducted upon both primal and dual variables;
4) if the model has a sufficient degree of association, then conduct a higher validation experiment, or determine the model's validity and proceed to use it;
5) if the model does not pass the validation tests, consider whether the data are consistent and correctly calculated, the model structure provides an adequate representation of the real-world system, and the objective function is correctly specified;
6) fix the model (procedures for recalculating model parameters will be problem-specific).

If the above steps do not lead to a valid model, one must decide whether to do demonstrations with an invalid model (assuming this is an approximately correct structure), abandon the project, or limit the scope of validation to a lesser set of variables (aiming at a less strict level of validation), subsequently qualifying model use.

3.6 Research data and computer program

The quantitative model of this study will be developed using a mathematical model of a dynamic optimisation approach. Therefore, as a mathematical model, the quality of the input is crucial; the legitimate concerns on the input raise questions for the model and the results will be untenable, and finally it will mislead decision-makers in formulating sound financial management strategies for achieving the benefits of GCG practices. Accordingly, the research data of this study will be based on archival data which are available in financial statements. Because the financial statements contain accounting noises affecting the quality of the available information, some adjustments or remedies using accounting analysis are very important so that the accounting data as the input of the model become qualified and reliable for the model, and the output will be tenable for the management decision-making process.

In addition to financial statements of publicly listed companies, for other variables such as interest rates, tax rates, discounting factors for unleveraged companies and other economic indicators, this study will take the data from institutions such as Datastream, stock exchange and tax office. A case study approach is applied to test the proposed financial optimisation model. A publicly listed company from a developing country, Indonesia, is selected. The justification of choosing the company from a developing country is discussed in Chapter 5.

Solver on Microsoft Excel

Available software that can be used for optimisation include MATLAB, GAMS and Solver. The model proposed by this study will be run using Solver software which is available in Microsoft Excel or a commercial Premium Solver Platform when necessary. As an optimisation model consists of an objective function and constraints, there will be a target cell, changing cells and constraints on the Solver. The Solver tool on Microsoft Excel is depicted in Figure 3.9.

In Microsoft Office 2010, Solver tool can be found on the upper left corner of the data tab. As shown by Figure 3.10 below, on the Solver parameters there are a target cell, changing cells and constraints. The objective or goal of the model needs to be located on the 'set target cell' box. The constraints of the model need to be located on the 'subject to constraints' box. The model can be a maximisation, a minimisation or value of a number. The 'changing cells' represents available resources that are required to optimise the objective having some constraints. Optimisation models could be linear or non-linear. The results of the model can be set to assumption: non-negative. This can be set by clicking the 'options' button. The option details are shown in Figure 3.11.

Figure 3.12 shows option section related to the type of the optimisation model. Having entered all numbers and variables of the model, the model can be solved by clicking the 'solve' button. When the model has a feasible solution, it will give reports: answers, sensitivity and results. The examples of the reports are depicted in Figures 3.13–3.15. For linear programming models, there are, however, conditions of optimality that cannot be met, hence Solver cannot find a feasible solution. In this case Solver will send the user a message.

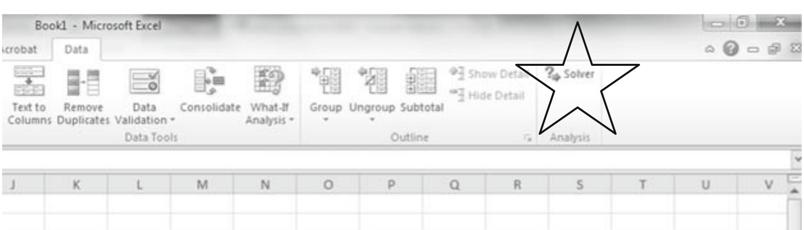


Figure 3.9 Solver tab in Microsoft Excel 2010

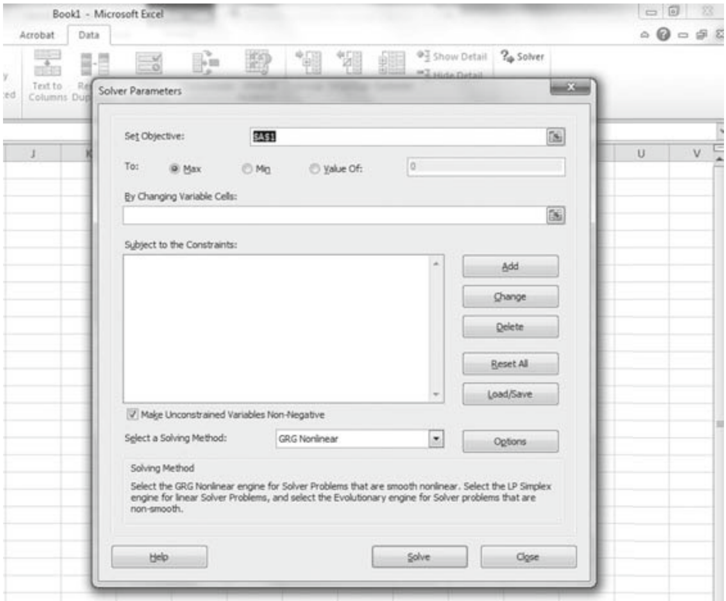


Figure 3.10 Solver parameters in Excel 2010

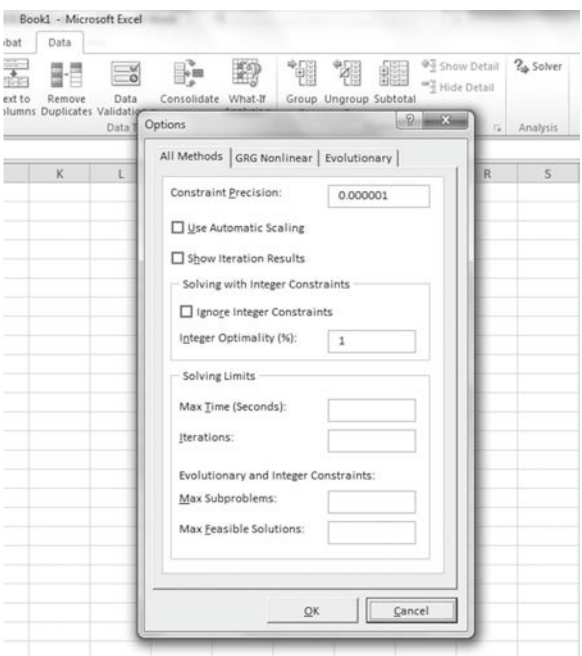


Figure 3.11 Solver options in Excel 2010

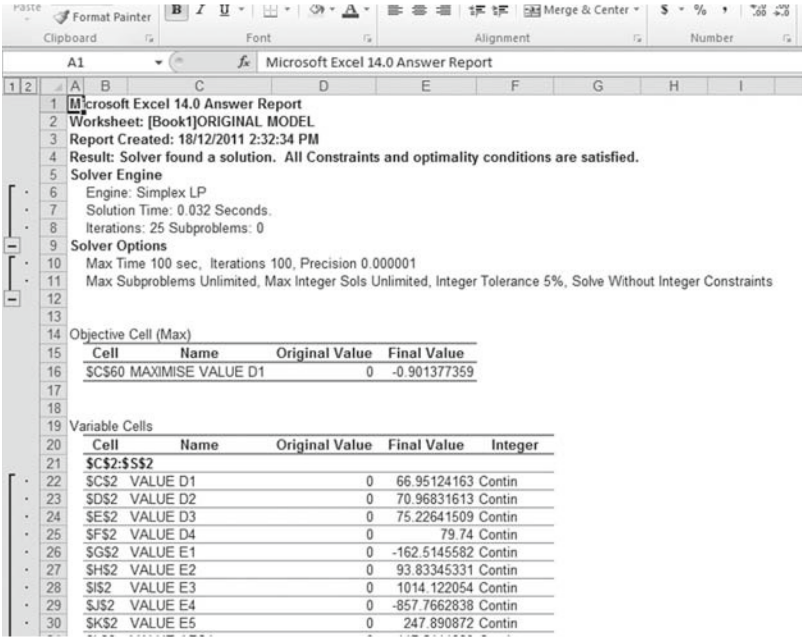


Figure 3.12 Example: answer report

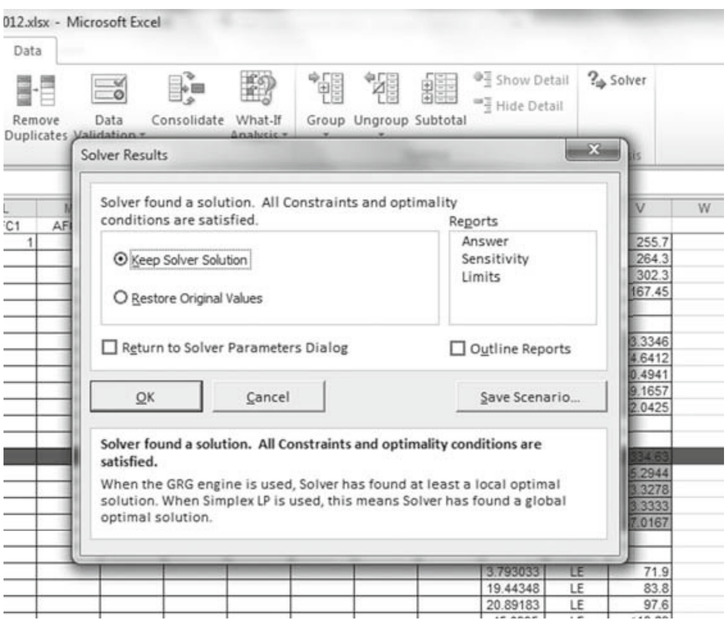
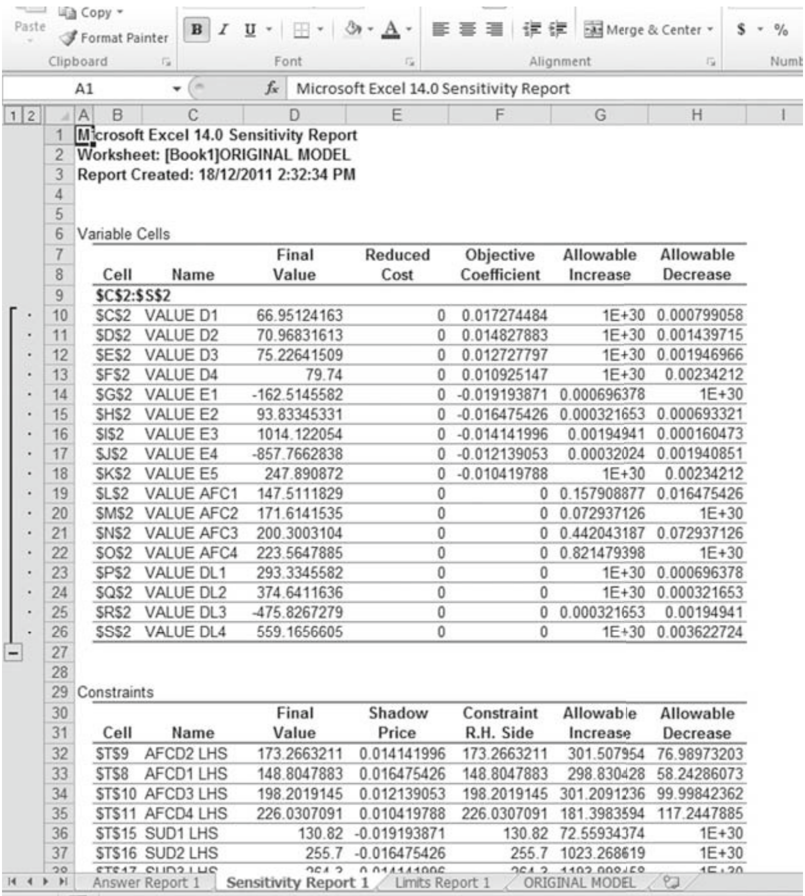


Figure 3.13 Solver results in Excel 2010



Microsoft Excel 14.0 Sensitivity Report
Worksheet: [Book1]ORIGINAL MODEL
Report Created: 18/12/2011 2:32:34 PM

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$2:$S$2						
$C$2	VALUE D1	66.95124163	0	0.017274484	1E+30	0.000799058
$D$2	VALUE D2	70.96831613	0	0.014827883	1E+30	0.001439715
$E$2	VALUE D3	75.22641509	0	0.012727797	1E+30	0.001946966
$F$2	VALUE D4	79.74	0	0.010925147	1E+30	0.00234212
$G$2	VALUE E1	-162.5145582	0	-0.019193871	0.000696378	1E+30
$H$2	VALUE E2	93.83345331	0	-0.016475426	0.000321653	0.000693321
$I$2	VALUE E3	1014.122054	0	-0.014141996	0.00194941	0.000160473
$J$2	VALUE E4	-857.7662838	0	-0.012139053	0.00032024	0.001940851
$K$2	VALUE E5	247.890872	0	-0.010419788	1E+30	0.00234212
$L$2	VALUE AFC1	147.5111829	0	0	0.157908877	0.016475426
$M$2	VALUE AFC2	171.6141535	0	0	0.072937126	1E+30
$N$2	VALUE AFC3	200.3003104	0	0	0.442043187	0.072937126
$O$2	VALUE AFC4	223.5647885	0	0	0.821479398	1E+30
$P$2	VALUE DL1	293.3345582	0	0	1E+30	0.000696378
$Q$2	VALUE DL2	374.6411636	0	0	1E+30	0.000321653
$R$2	VALUE DL3	-475.8267279	0	0	0.000321653	0.00194941
$S$2	VALUE DL4	559.1656605	0	0	1E+30	0.003622724

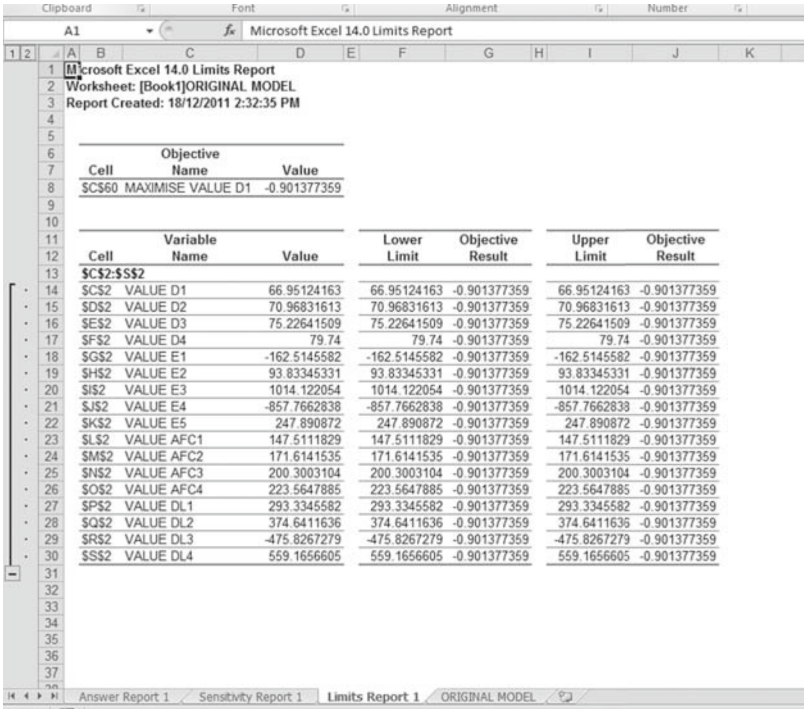
Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$T$9	AFCD2 LHS	173.2663211	0.014141996	173.2663211	301.507954	76.98973203
$T$8	AFCD1 LHS	148.8047883	0.016475426	148.8047883	298.830428	58.24286073
$T$10	AFCD3 LHS	198.2019145	0.012139053	198.2019145	301.2091236	99.99842362
$T$11	AFCD4 LHS	226.0307091	0.010419788	226.0307091	181.3983594	117.2447885
$T$15	SUD1 LHS	130.82	-0.019193871	130.82	72.55934374	1E+30
$T$16	SUD2 LHS	255.7	-0.016475426	255.7	1023.268619	1E+30

Figure 3.14 Example: sensitivity report

3.7 Conclusion

This chapter presented the conceptual framework of this study. Interrelationships among corporate governance, corporate finance and accounting become the basis of the conceptual framework. The framework was also developed under a postulate that many factors, both internally and externally, influence the business of a company. Therefore, to examine the proposition of this study, this chapter discussed available research methodology relevant for the study and presented some



Microsoft Excel 14.0 Limits Report
Worksheet: [Book1]ORIGINAL MODEL
Report Created: 18/12/2011 2:32:35 PM

Cell	Objective Name	Value
$C$60	MAXIMISE VALUE D1	-0.901377359

Cell	Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$C$2:$S$2						
$C$2	VALUE D1	66.95124163	66.95124163	-0.901377359	66.95124163	-0.901377359
$D$2	VALUE D2	70.96831613	70.96831613	-0.901377359	70.96831613	-0.901377359
$E$2	VALUE D3	75.22641509	75.22641509	-0.901377359	75.22641509	-0.901377359
$F$2	VALUE D4	79.74	79.74	-0.901377359	79.74	-0.901377359
$G$2	VALUE E1	-162.5145582	-162.5145582	-0.901377359	-162.5145582	-0.901377359
$H$2	VALUE E2	93.83345331	93.83345331	-0.901377359	93.83345331	-0.901377359
$I$2	VALUE E3	1014.122054	1014.122054	-0.901377359	1014.122054	-0.901377359
$J$2	VALUE E4	-857.7662838	-857.7662838	-0.901377359	-857.7662838	-0.901377359
$K$2	VALUE E5	247.890872	247.890872	-0.901377359	247.890872	-0.901377359
$L$2	VALUE AFC1	147.5111829	147.5111829	-0.901377359	147.5111829	-0.901377359
$M$2	VALUE AFC2	171.6141535	171.6141535	-0.901377359	171.6141535	-0.901377359
$N$2	VALUE AFC3	200.3003104	200.3003104	-0.901377359	200.3003104	-0.901377359
$O$2	VALUE AFC4	223.5647885	223.5647885	-0.901377359	223.5647885	-0.901377359
$P$2	VALUE DL1	293.3345582	293.3345582	-0.901377359	293.3345582	-0.901377359
$Q$2	VALUE DL2	374.6411636	374.6411636	-0.901377359	374.6411636	-0.901377359
$R$2	VALUE DL3	-475.8267279	-475.8267279	-0.901377359	-475.8267279	-0.901377359
$S$2	VALUE DL4	559.1656605	559.1656605	-0.901377359	559.1656605	-0.901377359

Figure 3.15 Example: limits report

mathematical models. Quantitative research using a dynamic optimisation model was argued to fit the objective of the study. Secondary data were chosen as the input of the model. Characteristics of the model that reflect an interrelationship among corporate governance, corporate finance and accounting were discussed. Attributes of the model that reflect this relationship and fill the literature gap were highlighted. How to use accounting data for decision-making and as an input for the model was discussed. An abstract form of an integrated financial model was introduced. The expected results of the model and their uses, as well as verification and validation of the model, conclude the chapter. The following chapter will develop the mathematical model and discuss further the abstract of the model.

4
An Integrated Financial Optimisation Model for Formulating Sound Financial Management Strategies

4.1 Introduction

The previous chapter which presented the conceptual framework and methodology of this book provides the basis for this chapter to develop an integrated financial model (computational optimisation in Accounting) for formulating optimal financial management strategies which can achieve the economic benefits of GCG practices. This chapter discusses the details of the proposed model.

The proposed model is the managerial and financial accounting application model of corporate governance (computational optimisation in Accounting) and is used as a tool for formulating sound financial management strategies. The model is developed based on the interrelationships among corporate governance, corporate finance and accounting. As a quantitative model, the model measures the monetary effects of GCG practices. In this case a discounted cash flows (DCF) valuation model is used and reflected in the objective function of the model. Some constraints of GCG practices such as regulatory environments and related risks are also carefully identified. Then a dynamic optimisation model in the form of a multi-period optimisation model is chosen to capture the fact that long-term corporate financial decisions need to take into account the dynamic business environment related to the company's operation. The multi-period model represents a real-world management process which usually takes in more than a one-year corporate period.

The objective and constraints of the model are derived from managerial and financial accounting practices (computational optimisation in Accounting). The equations of the model follow generally accepted accounting principles (GAAP), therefore the model shows accounting equations which reflect the interactions among income statement, balance sheet and cash flows statements. The interrelation of accounts of financial statements is shown in Section 4.2. The full version of the proposed model is then presented and explained in detail to show the quality of the model. The final part of this chapter concludes the discussion.

4.2 Income statement, balance sheet and cash flows statements: how they are related

How financial statements could reflect a company's activities and corporate governance practice was explained in Chapter 2 while the limitations of accounting measures were discussed in Chapter 3. In this part, the relationship among income statements, balance sheet and cash flows statement is depicted and explained as the basis for the numerical model of this study which will be discussed in the following section. The interrelationships among financial statements – income statement, balance sheet and cash flows statement – are as follows (the income statement is presented in single-step form while the balance sheet is presented in an account form).

An income statement reports a company's operational activities for a given period of time, whether a year or one operating business cycle. The net income of the operational activities goes to 'retained earnings' in the balance sheet. The retained earnings of the current year equal the ending retained earnings from the previous year plus net income minus dividend payment. Then the cash flows statement reflects all the company's activities: operating, investing and financing. The operating cash flows in general show the cash of income statement. Therefore it can be generated by adjusting the net income from non-cash activities. It can be produced also by analysing the changes in current assets and current liabilities in the current year's balance sheet compared to the previous year. The changes in current investment and PPE accounts compared to those of the previous year will be reflected in 'cash flows from/used by investing activities'. The gains/losses from selling these assets will be reflected in the section of income statement 'unusual gains/losses' (sometimes included in other revenues and gains or other expenses and losses), or 'gains/losses from discontinued operations or extraordinary items' (see the discussion further in Warfield et al. 2008). Then, the changes in current liabilities and stockholders' equity compared to the previous year will be reflected in 'cash flows from/used by financing activities'. Loss or gain from issuing long-term debt is also reflected in the section of incomes statement 'other revenue and gain or extraordinary items', while loss or gain from issuing equity will be reflected in 'additional paid in capital' in the balance sheet. Finally, the summation of cash flows from/used by operating, investing and financing activities equals the changes in cash that will be reflected in the 'cash' account in the current period balance sheet. The illustrations with numbers of income statement, cash flows statement and balance sheet are depicted in Tables 4.1–4.4.

Table 4.1 Example of an income statement

ABC Inc.
Income Statement
For the Year Ended 31 December 20xx

Symbol (Abbreviation)	*Name of Accounts:*			
$\overline{Sales}$	$\overline{Sales}$: *Net sales*		9,992.00	
COGS	Cost of good sold (COGS):		(4,966.00)	+
	Gross profit on sales		*5,026.00*	
Opex	Operating expenses:			
	Selling expense	(1,500.00)		
	Administrative expenses	(1,395.00)		
	Total operating expenses		(2,895.00)	+
	Income from operations		*2,131.00*	
	Other revenues and gain		36.00	
	Other expenses and losses		(3.00)	+
	Income before income taxes		*2,164.00*	
Tax	Income taxes		(757.40)	
	Income from continuing operations		1,406.60	
	Income from discontinued operations (net of tax)		0.65	+
	Income before extraordinary items		1,407.25	
	Extraordinary items (net of tax)		0.33	+
NI	*Net income*		*1,407.58*	

Table 4.2 Example of a cash flows statement (direct method)

	ABC Inc. **Statements of Cash Flows** **For the Year Ended 31 December 20xx**	
Symbol (Abbreviation)	*Name of Accounts*	
CFO	**Cash flows from/for Operating Activities**	
CiFO	Cash inflows from customers	10,760.00
CoFO sup	Cash outflows to suppliers	(6,000.00)
CoFO emp	Cash outflows to employees	(996.00)
CoFO opex	Cash outflows for operating expenses	(1,500.00)
CoFO intex	Cash outflows for interest expense	(0.00)
CoFO tax	Cash outflows for taxes	(600.00) +
	Net cash provided by operating activities	*1,664.00*
CFI	**Cash flows from/for Investing Activities**	
CiFI	Cash inflows from disinvestment activities	2.00
CoFI	Cash outflows for investment activities	(220.00) +
	Net cash used by investing activities	*(218.00)*
CFF	**Cash flows from/for Financing Activities**	
CiFF	Cash inflows from issuing bonds or new shares	5.00
CoFF	Cash outflows for bond redemptions or shares retired	(1,520.00) +
	Net cash used by financing activities	*(1,515.00)*
	Net increase (decrease) in cash (CFO+CFI+CFF)	69.00
	Cash beginning of the year	636.00 +
	Cash at the end of the year	705.00

Table 4.3 Example of a cash flows statement (indirect method)

	ABC Inc. **Statements of Cash Flows** **For the Year Ended 31 December 20xx**	
Symbol (Abbreviation)	*Name of Accounts*	
CFO	Cash flows from operating activities	
NI	Net income	
Adj	Adjustment to reconcile net income to net cash provided by operating activities depreciation and amortisation expenses Net cash provided by operating activities	1,407.58 256.42 + *1,664.00*
CFI	**Cash flows from/for Investing Activities**	
CiFI	Cash inflows from disinvestment activities	2.00
CoFI	Cash outflows for investment activities	(220.00) +
	Net cash used by investing activities	(218.00)
CFF	**Cash flows from/for Financing Activities**	
CiFF	Cash inflows from issuing bonds or new shares	5.00
CoFF	Cash outflows for bond redemptions or shares retired	(1,520.00) +
	Net cash used by financing activities	(1,515.00)
	Net increase (decrease) in cash (CFO+CFI+CFF)	69.00
	Cash at the beginning of the year	636.00 +
	Cash at the end of the year	705.00

Table 4.4 Example of a balance sheet

ABC Inc.
Balance Sheet
As of 31 December 20xx

Symbol (Abbreviation)	*Name of Accounts:*		
Assets	**ASSETS**		
CA	**Current Assets**		
Cash	Cash		705.00
AFT sec	Available-for-sale Securities		0
AR	Account Receivable	455.00	
Afda	Less: Allowance for Doubtful Accounts	(5.00)	450.00
NR	Notes Receivable		19.00
Inv	Inventories		766.00
Supplies	Supplies on Hand		0
Prep	Prepaid Expenses		82.25 +
LTI	*Total Current Assets*		*2,022.25*
Inv	**Long-term Investments**		
PPE	Investment		100.00
Build	**Property, Plant and Equipment**		
Land	Building	420.00	
Equip	Land/Improvements	110.00	
Acc. depr	Machinery/Equipment	1,305.00 +	
Goodwill	*Property, Plant and Equipment, Gross*	*1,835.00*	
AmortG	Accumulated Depreciation	(343.27)	1,491.73
	Goodwill, Gross	0	0
IA	Accumulated Goodwill Amortization		
AmortInt	Goodwill, Net		
	Intangibles, Gross 240.00 Accumulated		
NR-LT	Intangible Amortization	(68.00)+	
PensionA	Intangibles, Net		172.00
DTA	Notes Receivable, Long Term		33.00
LTA-Oth	Pension Benefits–Overfunded		29.00
TA	Deferred Income Tax–Long Term Asset		21.00
	Other Long Term Assets		60.00 +
	Total Assets		**3,928.98**

Symbol (Abbreviation)	*Name of Accounts:*		
	LIABILITIES AND STOCKHOLDERS' EQUITY LIABILITIES		
CL	Current Liabilities		
NP	Notes Payable	0	
AP	Accounts Payable	614.29	
TP	Income Taxes Payable	67.82	
Accr	Accrued Expenses	720.00	
OtherCL	Other Current Liabilities	99.00+	
LTD	Total Current Liabilities		1,501.11
BP	Long-term liabilities		
DTL	Bonds payable	100.00	
PensionL	Deferred Income Tax–Long Term Liability	0	
LTA-Oth	Pension Benefit–Underfunded	50.00	
S/E	Other Long-Term Liabilities	13.00 +	
P/S	Total Other Liabilities		
C/S	Total Liabilities		163.00 +
APIC	STOCKHOLDERS' EQUITY		1,664.11
R/E	Preferred stock	0	
	Common stock	176.00	
	Additional paid-in capital	50.23 +	
		226.23	
	Retained earnings (ending)	2,038.64 +	2,264.87 +
	Total stockholders' equity		
	Total Liabilities and Stockholders' Equity		3,928.98

The relationship among accounts in income statement, cash flows statement and balance sheet can also be summarised in mathematical equations. Accounts in the balance sheet have multi-period characteristics. They are accumulated from the previous year while accounts in income statements show the current year's activities. Some equations are shown below.

Table 4.5 Accounting equations

A. Equations of Accounts in Cash Flows Statements

1) Cash flows from operating activities

a. Cash receipts from sales of goods and services to customers

Cash inflows from customers ($CiFO_t$) equals current net sales $\left(\overline{Sales_t}\right)$ plus decrease in accounts receivable ($AR_t – AR_{t–1}$) or minus increase in accounts receivables.

$$CiFO_t = \left(\overline{Sales_t}\right) - (AR_t - AR_{t-1}) \tag{1}$$

b. Cash receipts from other revenues: interest revenues and dividend income

Cash inflows from other revenues ($CiFOother_t$) equals current other revenues (Rev_t) plus decrease in receivables of other revenues/incomes ($Rec_t - Rec_{t-1}$) or receivables of other revenues/incomes.

$$CiFOother_t = Rev_t - (Rec_t - Rec_{t-1}) \tag{2}$$

c. Cash payments to suppliers

Cash outflows to suppliers ($CoFO\ sup_t$) equals total cash payment to net purchases. Net purchases equals current costs of goods sold ($COGS_t$) plus increase in inventory ($Inv_t - Inv_{t-1}$) or minus decrease in inventory. Then the increase cash payments will decrease the ending accounts payable ($AP_{t-1} - AP_t$).

$$CoFO\ sup_t = COGS_t + (Inv_t - Inv_{t-1}) - (AP_t - AP_{t-1}) \tag{3}$$

d. Cash payments to employees and other operating expenses

Cash outflows to employees and other operating expenses ($CoFO$ opex, empl, $intex_t$) equals current operating expenses ($OExp_t$) plus increase in prepaid expenses ($Prep_t - Prep_{t-1}$) or minus decrease in prepaid expenses, plus decrease in accrued expenses payable ($Accr_t - Accr_{t-1}$) or minus increase in accrued expenses payable.

$$CoFO\ empl,\ opex,\ intex_t = Opex_t + (Prep_t - Prep_{t-1}) - (Accr_t - Accr_{t-1}) \tag{4}$$

e. Cash payments for tax expenses

Cash outflows for tax expenses ($CoFO\ tax_t$) equals current tax expenses (Tax_t) plus decrease in tax payable ($TP_t - TP_{t-1}$) or minus increase in tax payable.

$$CoFO\ tax_t = Tax_t - (TP_t - TP_{t-1}) \tag{5}$$

2) Cash flows from investing activities

Cash flows from investing activities (CFI_t) equals proceeds from disinvestment activities such as sales of fixed assets or property, plant and equipment (PPE) ($CiFI_t$) minus cash outflows for investments such as purchasing or maintaining fixed assets or property, plant, and equipment (PPE) ($COFI_t$).

$$CFI_t = CiFI_t - COFI_t \tag{6}$$

3) Cash flows from financing activities

Cash from financing activities (CFF_t) equals cash inflows from financing activities such as issuing stocks and debt instruments ($CiFF_t$) minus cash outflows for financing activities such as bond redemption, purchasing treasury stock, stock retired, or dividend payment ($CoFF_t$).

$$CFF_t = (CiFF_t) - (CoFF_t) \tag{7}$$

B. Equations of Accounts in Balance Sheet and Income Statement

1) Accounts receivable

From the equation (4.1), current accounts receivable (AR_t) equals previous accounts receivable (AR_{t-1}) plus current credit sales $\left(\overline{Sales_t}\right)$.

$$AR_t = AR_{t-1} + \left(\overline{Sales_t}\right) \tag{8}$$

2) Other receivables (interest receivables and dividend receivables)
From the equation (4.2), current other receivables (Rec_t) equals previous other receivable (Rec_{t-1}) plus current other revenues $(\overline{Rev_t})$.

$$Rec_t = Rec_{t-1} + (\overline{Rev_t}) \tag{9}$$

3) Inventories
Current ending inventories (Inv_t) equals previous inventories (Inv_{t-1}) plus net purchases during the year $\overline{Purchase_t}$ minus inventory sold during the year ($COGS_t$).

$$Inv_t = Inv_{t-1} + \overline{Purchase_t} - COGS_t \tag{10}$$

4.3 An integrated financial model using a dynamic multi-period optimisation approach

This study proposes an integrated quantitative financial model (computational optimisation in Accounting) as a tool of good financial management which will assist managers in formulating sound financial management strategies that can achieve the benefits of GCG practices. The model is a combination of a dynamic multi-period optimisation model and a constrained linear programming model. The objective function of the model is to optimise the benefits of the GCG practices of the company. To achieve its objective, some constraints are constructed to reflect both internal and external CG instruments. The details of the model are as follows.

4.3.1 Objective function

For the purpose of this book, the objective function of this financial model will be derived from GCG practices as well as managerial and financial accounting practices. The first three principles of OECD principles of Corporate Governance (OECD 2004) found to be relevant for this study are: (1) protecting and facilitating the rights of shareholders and the key ownership functions; (2) ensuring the equitable treatment of shareholders, including minority and foreign shareholders; (3) recognising the rights of stakeholders and interrelating the stakeholders in 'creating wealth, jobs, and the sustainability of financially sound enterprises'.

Following OECD principles, therefore, this book incorporates two main schools of thoughts related to corporate governance:the agency theory and stakeholder approach. Based on the agency theory, this book views that the ultimate objective of a company is to maximise shareholders' wealth (Titman et al. 2011). Shareholders, as one of the major stakeholders of a company, require returns of their investment in terms of instant cash distribution, that is, cash dividends or stock repurchases, and future value creation which creates high capital gain (Keown et al. 2006; Ogden et al. 2003). This study recognises shareholders as the most important stakeholders who need to be considered by management.

Next, GCG principles require a company to recognise the interests of other stakeholders. This is in line with stakeholder theory that a company needs to take other stakeholders' interests into account. Accordingly, this book argues that debtholders or creditors are the next most important stakeholders of a company because they provide another financing source for a company besides the shareholders. It is depicted in the balance sheet of a company that, in the financing column which is on the credit side, debt is another financing besides stocks (see Table 4.4). Debtholders can be important stakeholders of a company also because when a company becomes bankrupt, they need to be paid first before the shareholders. In addition, GCG principles require a company to conduct risk management – for example, by managing its leverage to prevent financial distress and minimise bankruptcy risk.

In addition to shareholders and debtholders, the other stakeholders, such as management, employees, suppliers, government and customers, need to be considered by the company. These other stakeholders have different interests but, above all, they have a similar interest which is the sustainability or going concern of the company. For example, if the company sustains its operating activities, it can pay tax to the government, settle its trade payable to suppliers, pay salary and employees' benefits, and provide after-sales service for its customers. In the end, there will be positive externalities that will benefit the whole economy.

Based on the discussion above, this book attempts to accommodate not only shareholders' interest but also other stakeholders' interests as recognised by GCG principles. This book found that the existing financial models, such as those of Carleton (1969, 1970), Carleton et al. (1973), Ho and Lee (2004) and other models as reviewed by Lee et al. (2009), are insufficient to accommodate this issue. This book views that maximising FCF is the most relevant objective for the designing of the financial optimisation model since it not only reflects the interests of shareholders but also accommodates interests of other major stakeholders. Specifically, free cash flows to equity (FCFE) as part of free cash flows (FCF) valuation is the most suitable proxy of shareholder value for the following reasons. First, in contrast to the dividend approach of Carleton (1969, 1970), FCFE can be applied to any company, including a non-dividend-paying company. Second, FCFE reflects the available cash flows for shareholders, after paying the debtholders (Pinto et al. 2010). Therefore, FCFE reflects the principles of GCG since it accommodates not only the interests of shareholders but also those of other stakeholders (Clarke 2004; OECD 2004).

To summarise, the objective function of this financial model is to maximise shareholder value. This objective is derived from the first three OECD GCG principles. The relationship between the underlying GCG principles and the objective function of the financial model developed in this book is depicted in Table 4.6 below. In this case, FCFE is argued as the best proxy of shareholder value and takes into account other stakeholders' interests. The justifications are discussed in the following paragraphs.

4.3.1.1 FCFE as the proxy of the objective function: the rationalisation

For the purpose of this book, an income business valuation approach using the discounted cash flows (DCF) method, namely FCFE, is chosen to measure the shareholder value. The considerations are: first, the valuation that is based on cash valuation follows the financial management principle that 'cash is king, not profit' (Petty et al. 2009, p. 11). Second, FCFE is based on cash-based accounting and hence it can minimise accounting risks and negative management discretion caused by accrual-based accounting. As suggested in Chapter 2, using cash flow valuation, the income approach is more suitable for calculating

Table 4.6 The underlying GCG principles and objective function of the model

GCG Principles	**Objective Function: Free Cash Flows Valuation**
1) GCG ensures the fulfilment of the return of shareholders	1) Reflected in free cash flows to equity (FCFE)
2) GCG ensures the fulfilment of the return of debtholders, including minimise the financial distress and bankruptcy risks	2) FCFE allocates return for debtholders
3) GCG concerns the fulfilment of other stakeholders: a) GCG ensures the profitability and sustainability of operating activities of the company b) GCG ensures a positive return on investments	3) Reflected in FCF: cash inflows from operating activities 4) FCF allocated amount for working capital investments and fixed asset investment for the future of the company

the intrinsic value of a company and assessing its financial health and profitability than the other two methods: asset approach and market approach. Third, discounted FCFE and the relevant discount rate reflect risks facing a company, therefore the results of the model can help managers with decision-making.

In comparison to other DCF methods, such as the dividend discount model (DDM), FCFE as part of FCF is preferable since it reflects the GCG principles. The basic calculation of FCFE from free cash flows (FCF) is depicted in Figure 4.1. FCFE is available FCF for shareholders after deducted all liabilities and future allocation which is important for the sustainability of the company. Whether the company can operate in the future is also the concern of the other stakeholders. Good qualities of FCFE as mentioned by Pinto et al. (2010, pp. 146–147) are as follows: first, FCFE, which is calculated from FCF, provides 'an economically sound basis for valuation'. It allocates value creation activities for the future by allocating cash for working capital and fixed assets reinvestments. Second, it is more reliable since it prevents double-count or cash flow omission which could occur in valuations using accrual-based accounting such as net income, EBIT and EBITDA. Third, it can be applied to any company, including a non-dividend-paying company or a company for which its actual dividend differs significantly from its capacity as projected previously. Fourth, it is preferred by analysts and investors since 'it aligns with profitability within a reasonable forecast period' and the investors still have 'a control perspective'. Finally, FCFE reflects the value of the company.

Therefore FCFE reflects the benefits of GCG practices. Specifically, FCFE is relevant to GCG Principle 1 which is concerned with the fulfilment of shareholders' rights. It promotes wealth creation for shareholders and the sustainability of the company through innovative and profitable investments. This is in line with GCG Principle 2 since it also accommodates interests of debtholders. Moreover, it is in parallel with GCG Principle 3 which is related to protect the interest of other stakeholders since this model measures the profitability and sustainability of the company's operating activities and its return on investments. In addition, this book also recognises the limitation of FCFE as it is calculated based on FCF which may lead to agency problem (Jensen 1986). However, this limitation will be overcome by other governance mechanisms such as debt monitoring (Bhattacharyya 2007; Jensen 1986).

Based on the discussion above, maximisation of FCFE is chosen as the objective of the model. Based on Figure 4.1 and Pinto (2010, p. 163),

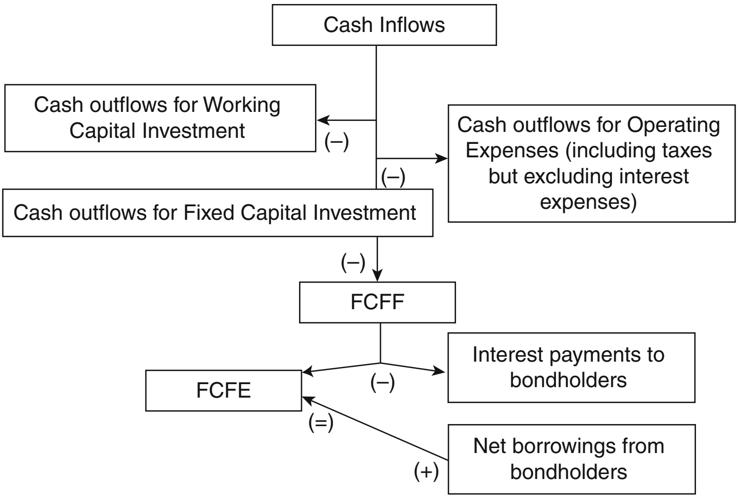


Figure 4.1 Cash flows, FCFF and FCFE

Source: Modified from Schweser (2008).

the objective function of the model and the mathematical equation of FCFE is as follows:

Maximise shareholder value = Maximise PV of FCFE

FCFE = FCFF – interest to bondholders + net financing

$$FCFE_t = FCEF_t - \overline{Int_t} + CFFd_t$$

where:

$FCFE_t$ = free cash flows to the equity in period *t*;
$FCFF_t$ = free cash flows to the firm in period *t*;
$\overline{Int_t}$ = net interest payment (net of tax) in period *t*;
$CFFd_t$ = net cash flows from debt financing activities in period *t*.

4.3.2 Constraints

A. Definitional and Accounting Equation Constraints

The following constraints are related to the variables shown in the objective function. The accounting equation constraints are related to equations of free cash flows to the firm (FCFF), free cash flows to the equity (FCFE), and mathematical accounting equations: the relationships between accounts in the financial statements.

1) Free cash flows to equity (FCFE)[1]

$$FCFE_t = FCFF_t - \overline{Int_t} + CFFd_t \quad (4.1)$$

2) Free cash flows to the firm (FCFF)

$$FCFF_t = CFO_t + \overline{Int_t} + CFI_t \quad (4.2)$$

where:

CFO_t = net cash flows from operating activities in period *t;*
$\overline{Int_t}$ = net interest payment (net of tax) in period *t;*
$CFFd_t$ = net cash flows from debt-financing activities in period *t;*
CFI_t = net cash flows from (for) investing activities (expected to be negative) in period *t.*

Based on Equations (4.1) and (4.2) and assume CFI_t is expected to be negative since outflows is more than the inflows, $FCFE_t$ will be:

$$FCFE_t = CFO_t - CFI_t + CFFd_t \quad (4.3)$$

While the net interest will be:

$$\overline{Int_t} = Int_t(1 - \tau) \quad (4.4)$$

where:

Int_t = interest payment in period *t;*
τ = corporate income tax rate.

In the Equation (4.2), interest expense (net of tax) is added back to CFO to make FCFF back to its definition: cash flows available for all capital providers, both bondholders and shareholders. The Equation (4.2) suggests that net cash flows from investing activities must be negative, meaning there is cash outflow for investing activities hence increasing in value-added investments (hence, cash outflows must be greater than cash inflows; see accounting policy section). This negative sign shows an allocation for capital expenditure (cash outflows used by investing activities).

3) Operating cash flows

$$CFO_t = CiFO_t - CoFO_t \quad (4.5)$$

where:

CFO_t = net cash flows from operating activities in period *t;*
$CiFO_t$ = cash inflows from operating activities in period *t*;
$CoFO_t$ = cash outflows used by operating activities in period *t*.

As depicted in Table 4.2 cash inflows from operating activities will be:

$$CiFO_t = CIS_t \tag{4.6}$$

$$CIS_t = Sales_t - (AR_t - AR_{(t-1)}) \tag{4.7}$$

where:

CIS_t = cash inflows from customers (from sales/services) in period *t;*
$Sales_t$ = net sales in period *t;*
AR_t = accounts receivable in period *t;*
AR_{t-1} = accounts receivable in period (*t*–1).

Cash outflows for operating activities will be:

$$CoFO_t = COS_t + COE_t + COInt_t + COT_t \tag{4.8}$$

where:

COS_t = cash outflows to suppliers in period *t;*
COE_t = cash outflows to employees and for operating expenses in period *t*;
$COInt_t$ = cash outflows for interest expense in period *t;*
COT_t = cash outflows for tax expense in period *t.*

Cash outflows for operating activities consist of:

$$COS_t = COGS_t + (Inv_t - Inv_{(t-1)}) - (AP_t - AP_{(t-1)}); \tag{4.9}$$

$$COE_t = OExp_t - Noncashexp_t + (Prep_t - Prep_{(t-1)}) - (Accr_t - Accr_{(t-1)}); \tag{4.10}$$

$$COT_t = Tax_t - (TP_t - TP_{(t-1)}); \tag{4.11}$$

$$COInt_t = Int_t - (IP_t - IP_{(t-1)}); \tag{4.12}$$

where:

$COGS_t$ = cost of good sold in period *t*;
Inv_t = inventories in period *t*;
Inv_{t-1} = inventories in period (*t*–1);
AP_t = accounts payable in period *t;*
AP_{t-1} = accounts payable in period (*t*–1);
$Opex_t$ = operating expenses in period *t*;

$Noncashexp_t$ = non-cash expenses i.e. depreciation and amortisation expenses in period *t*;

Prep_t = prepaid expenses in period *t;*
Prep_{t-1} = prepaid expenses in period *t–1;*
Accr_t = accrued expenses in period *t;*
Accr_{t-i} = accrued payable in period (*t*–1);
Tax_t = current income tax expense in period *t*;
TP_t = tax payable in period *t*;
TP_{t-1} = tax payable in period (*t*–1);
Int_t = interest expense in period *t*;
IP_t = interest payable in period *t*;
$\text{IP}_{(t-1)}$ = interest payable in period (*t*–1).

Inserting Equations (4.6)–(4.11) to Equation (4.5):

$$\text{CFO}_t = \text{CiFO}_t - \text{CoFO}_t$$

$$\begin{aligned}\text{CFO}_t = {} & \overline{\text{Sales}}_t - (\text{AR}_t - \text{AR}_{(t-1)}) - \text{COGS}_t - (\text{Inv}_t - \text{Inv}_{(t-1)}) \\ & + (\text{AP}_t - \text{AP}_{(t-1)}) - \text{Opex}_t + \text{Noncashexp}_t - (\text{Prep}_t - \text{Prep}_{(t-1)}) \\ & + (\text{Accr}_t - \text{Accr}_{(t-1)}) - \text{Tax}_t + (\text{TP}_t - \text{TP}_{(t-1)}) - \text{Int}_t + (\text{IP}_t - \text{IP}_{(t-1)})\end{aligned} \tag{4.13}$$

4) Investing cash flows

$$\text{CFI}_t = \text{CiFI}_t - \text{CoFI}_t \tag{4.14}$$

$$\text{CFI}_t = \text{CFI}_t\text{PPE} + \text{CFI}_t\text{IA} + \text{CFI}_t\text{LTI} + \text{CFI}_t\text{OInv} \tag{4.15}$$

$$\begin{aligned}\text{PPE}_t = {} & \text{PPE}_{t-1} + \text{CoFI}_t\text{PPE} - \text{CiFI}_t\text{PPE} + \text{NCinv}_t\text{in PPE} - \text{NCdisp}_t \\ & \text{of PPE} + \text{Lossdisp}_t\text{PPE} - \text{Gaindisp}_t\text{PPE} + \text{Accdepr}_t\text{PPEdisp}\end{aligned} \tag{4.16}$$

$$\begin{aligned}& \text{CiFI}_t\text{PPE} - \text{CoFI}_t\text{PPE} = \text{PPE}_{t-1} - \text{PPE}_t + \text{NCinv}_t\text{in PPE} - \\ & \text{Ncdisp}_t\text{in PPE} + \text{Lossdisp}_t\text{PPE} - \text{Gaindisp}_t\text{PPE} \\ & + \text{Accdepr}_t\text{PPEdisp}\end{aligned} \tag{4.17}$$

$$\begin{aligned}\text{IA}_t = {} & \text{IA}_{t-1} + \text{CoFI}_t\text{IA} - \text{CiFI}_t\text{IA} + \text{NCinv}_t\text{in IA} - \text{NCdisinv}_t\text{of} \\ & \text{IA} + \text{Lossdisinv}_t\text{IA} - \text{Gaindisinv}_t\text{IA} + \text{Accamrt}_t\text{IAdisinv}\end{aligned} \tag{4.18}$$

$$\begin{aligned}& \text{CiFI}_t\text{IA} - \text{CoFI}_t\text{lA} = \text{IA}_{t-1} - \text{IA}_t + \text{NCinv}_t\text{in IA} - \text{NCdisp}_t\text{ of IA} \\ & + \text{Lossdisp}_t\text{lA} - \text{Gaindisp}_t\text{IA} + \text{Accamrt}_t\text{IAdisp}\end{aligned} \tag{4.19}$$

$$\begin{aligned}\text{LTI}_t = {} & \text{LTI}_{t-1} - \text{CoFI}_t\text{LTI} - \text{CiFI}_t\text{LTI} + \text{NCinv}_t\text{inLTI} - \\ & \text{NCdisinv}_t\text{ofLTI} + \text{Lossdisinv}_t\text{LTI} - \text{Gaindisinv}_t\text{LTI} \\ & + \text{Accamrt}_t\text{LTIdisinv} + \text{Unamdisc}_t\text{LTI} - \text{Unampre}_t\text{LTI}\end{aligned} \tag{4.20}$$

$$\begin{aligned}& \text{CiFI}_t\text{LTI} - \text{CoFI}_t\text{LTI} = \text{LTI}_{t-1} - \text{LTI}_t + \text{NCinv}_t\text{inLTI} \\ & - \text{NCdisinv}_t\text{ofLTI} + \text{Lossdisinv}_t\text{LTI} - \text{Gaindisinv}_t\text{LT} \\ & + \text{Unamdisc}_t\text{LTI} - \text{unampre}_t\text{LTI}\end{aligned} \tag{4.21}$$

where:

CFI_t	=	net cash flows from investing activities in period *t*;
$CiFI_tPPE$	=	cash inflows from investing activities (disinvestments) of PPE in period *t*;
$CoFI_IPPE$	=	cash outflows used by investing activities (investments) in PPE in period *t*;
PPE_t	=	property, plant equipment in period *t*;
PPE_{t-1}	=	property, plant equipment in period *(t*–1);
$NCinv_t$in PPE	=	non-cash investment in PPE in period *t*;
$NCdisp_t$of PPE	=	non disposal of PPE in period *t;*
$Lossdisp_tPPE$	=	loss on disposal of PPE in period *t*;
$Gaindisp_tPPE$	=	gain on disposal of PPE in period *t*;
$Accdepr_tPPEdisp$	=	accumulated depreciation of PPE disposed in period *t*;
$CiFI_tIA$	=	cash inflows from investing activities (disinvestmeats) of IA in period *t*;
$CoFI_tIA$	=	cash outflows used by investing activities (investments) in IA in period *t*;
IA_t	=	intangible assets in period *t*;
IA_{t-1}	=	intangible assets in period (*t*–1);
$NCinv_t$in IA	=	non-cash investment in IA in period *t*;
$NCdisp_t$of IA	=	non-cash disposal of IA in period *t*;
$Lossdisp_tIA$	=	loss on disposal of IA in period *t*;
$Gaindisp_tIA$	=	gain on disposal of IA in period *t*;
$Accamrt_tIAdisp$	=	accumulated amortisation of IA disposed in period *t*;
$CiFI_tLTI$	=	cash inflows from investing activities (disinvestments) of LTI in period *t*;
$CoFI_tLTI$	=	cash outflows used by investing activities (investments) in LTI in period *t*;
LIT_t	=	long term investment in period *t*;
LTI_{t-1}	=	long term investment in period (*t*–1);
$NCinv_t$in LTI	=	non-cash investment in LTI in period *t*;
$NCdisinv_t$of LTI	=	non-cash disinvestment of LTI in period *t*;
$Lossdisinv_tLTI$	=	loss on disinvestment of LTI in period *t*;
$Gaindisinv_tLTI$	=	gain on disinvestment of LTI in period *t*;
$Unamdisc_tLTI$	=	unamortised discounts of LTI disposed in period *t*;
$Unampre_tLTI$	=	unamortised premium of LTI disposed in period *t*.

5) Debt and equity financing cash flows

$$CFF_t = CiFF_t - CoFF_t \quad (4.22)$$

$$CFFd_t = CiFFd_t - CoFFd_t \quad (4.23)$$

$$\begin{aligned} LTD_t &= LTD_{(t-1)} + CiFI_tLTD - CoFI_tLTD + NCLTDiss_t \\ &+ DiscLTD_t - PremLTD_t - NCLTDred_t - GainLTDred_t \\ &- LossLTDred_t - Unamdisc_tLTD + Unampre_tLTD \end{aligned} \quad (4.24)$$

$$\begin{aligned} CiFI_tLTD - CoFI_tLTD &= LTD_t - LTD_{(t-1)} - NCLTDiss_t - DiscLTD_t \\ &+ PremLTD_t + NCLTDred_t - GainLTDred_t + LossLTDred_t \\ &+ Unamdisc_tLTD - Unampre_tLTD \end{aligned} \quad (4.25)$$

$$\begin{aligned} C/S_t &= C/S_{(t-1)} + \Delta T/S + CiFI_tC/S - CoFI_tC/S + CiFI_tT/S - CoFI_tT/S \\ &+ NCC/Siss_t + (-)AddPIC_tC/S + (-)\ AddPIC_tT/S \end{aligned} \quad (4.26)$$

$$\begin{aligned} CiFI_tC/S - CoFI_tC/S &= C/S_t - C/S_{(t\text{-}1)} - \Delta T/S_{tt} - CiFI_tT/S + CoFI_tT/S \\ &- NCC/Siss_t + (-)AddPIC_tC/S + (-)\ AddPIC_tT/S \end{aligned} \quad (4.27)$$

where:

CFF_t	=	net cash flows from financing (debt and stock) activities in period *t*;
$CiFF_t$	=	cash inflows from financing (debt and stock) activities in period t;
$CoFF_t$	=	cash outflows used by financing (debt and stock) activities in period *t*;
$CFFd_t$	=	net cash flows from debt financing activities in period *t*;
$CiFFd_t$	=	cash inflows from debt financing activities in period *t*;
$CoFFd_t$	=	cash outflows used by debt financing activities in period *t*;
LTD_t	=	long-term debt in period *t*;
$LTD_{(t-1)}$	=	long-term debt in period (*t*–1);
$CiFI_tLTD_t$	=	cash inflows from LTD issuance in period *t*;
$CoFF\ LTD_t$	=	cash outflow for debt principals (including financial lease payment and preferred stock dividends) in period *t*;
$NCLTDiss_t$	=	non-cash long term debt issuance in period *t*;
$DiscLTD_t$	=	discounts of long-term debt in period *t*;
$PremLTD_t$	=	premiums of long-term debt in period *t*;

$NCLTDred_t$	=	non-cash long term debt redemption in period *t*;
$GainLTDred_t$	=	gain-extraordinary in long term debt redemption in period *t*;
$LossLTDred_t$	=	loss in long term debt redemption in period *t*;
$Unamdisc_tLTD$	=	unamortised discounts of LTD in LTD redemption in period *t*;
$Unampre_tLTD$	=	unamortised premium of LTD in LTD redemption in period *t*;
C/S_t	=	common stocks in period *t*;
$C/S_{(t-1)}$	=	common stocks in period (*t*–1);
$CiFI_tC/S$	=	cash inflows from issuing C/S in period *t*;
$CoFI_tC/S$	=	cash outflows for retiring C/S in period *t*;
$\Delta T/S_t$	=	changes in treasury stocks in period *t*;
$CiFI_tT/S$	=	cash inflows from issuing T/S in period *t*;
$CoFI_tT/S$	=	cash outflows for buying T/S in period *t*;
$NCC/Siss_t$	=	non-cash C/S issuance in period *t*;
$AddPIC_tC/S$	=	additional paid in capital from common stocks in period *t*;
$AddPIC_tT/S$	=	additional paid in capital from treasury stocks in period *t*.

B. Corporate Governance Policy: Accounting Policy Constraints

Good corporate governance practice suggests that first of all a company needs to comply with the business and regulatory environments (Farrar 2008). The following constraints are related to how a company complies with accounting practice – that is, generally accepted accounting principles (GAAP) or accounting standards – and how managers consider the difference between accounting practice and tax regulation (accounting-tax gap) in their decision-making.

1) Cash flows constraints

The position of a company's cash flows would be evaluated based on the company's business stage, that is, introductory, growth, maturity or decline (Warfield et al. 2008). Figure 4.2 below shows the relationship between cash flows and a company's business stage. With the exception of an introductory phase company, one of the indicators of a good or healthy company is positive cash flows from its core business, or operating activities. While expecting positive cash flows, GCG practice and financial management theory suggest that a company also needs to consider its sustainability and future value creation by making good investments; therefore it is expected that a company's cash outflows for

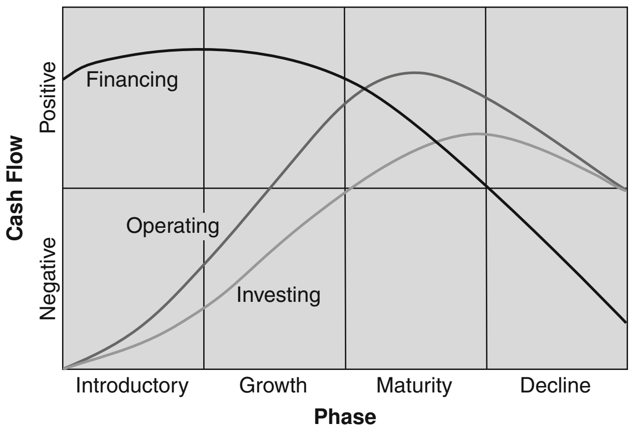


Figure 4.2 The relationship between cash flow and business stage
Source: Adopted from Warfield et al. (2008).

investment activities should be more than its divesting activities, for example, selling its long-term assets or long-term investments. As shown in Figure 4.2, it is expected that in its maturity stage a company will use its financing from internal funds, that is, from retained earnings which come from operating activities. This kind of company will also show declining financing cash flows since it will have more financing outflows in terms of dividend payments and repaying debt principals.

Following these arguments, positive operating cash flows mean that inflows are greater than outflows; negative investing cash flows reflects that a company allocates funds for investment activities, therefore it is expected that the company adopts good investment projects which ensure its sustainability and future value creation. Then it is expected that the total amount of investment will not be greater than the sources of funds: internal funds which come from operating activities and external funds which come from stock (assume no preferred stocks) or debt issuance.

$$\mathrm{CiFO}_t - \mathrm{CoFO}_t \geq 0 \tag{4.28}$$

$$\mathrm{CoFI}_t - \mathrm{CiFI}_t \geq 0 \tag{4.29}$$

$$(\mathrm{CiFO}_t - \mathrm{CoFO}_t) + (\mathrm{CiFF}_t - \mathrm{CoFF}_t) \geq \mathrm{CoFI}_t - \mathrm{CiFI}_t \tag{4.30}$$

2) *Accounting-tax difference (accounting for income tax): Effects of tax regulation*

Due to the permanent and temporary differences between accounting principles and tax codes, there are ‘current and future tax consequences of: (a) the future recovery (settlement) of carrying amount of assets (liabilities) that are recognised in an entity's statement of financial position; and (b) transactions and other events of the current period that are recognised in an entity's financial statements' (AASB 2010, p. 10). The temporary differences have deferred tax consequences which may increase or decrease tax expenses in the future but, in the end, the total effect of the difference between tax codes and accounting standards will be zero. In contrast, the permanent differences which are not recognised by tax regulation in calculating taxable income will never be resolved. The sources of permanent differences are non-taxable income and non-deductible expenses.

Non-taxable income is financial income which is based on tax regulation not subjected to tax or excluded from the calculation of annual taxable income or tax return. In the Indonesian case, an example of non-taxable income that is not subject to tax is income received by workers in remote areas, while income that needs to be excluded from the calculation of tax returns is income subject to final tax (Indonesia Taxation Office 2007, 2008). Therefore, when the company calculates annual taxable income at the end of the year, it must exclude the non-taxable income from pre-tax financial income.

Included in non-deductible expenses, based on ATO (2010), are: '(1) expenses used to get mutual receipts and (2) expenses classified under income tax law as non-deductible'. Therefore the company has to add them back to its pre-tax financial income to arrive at its annual taxable income. The example of non-deductible expenses (NDE) in the case of Indonesia is tax penalty, expenses that are not related to the activity generating the income, for example philanthropy expenses, and so forth (Indonesia Taxation Office 2007, 2008). Based on this discussion it is clear that the effect of permanent differences such as NDE need to be considered by the management since they cannot be recovered and hence could place the company into tax risk by paying higher taxes. Therefore management needs to control the positive effect of permanent difference: NDE by, for example, assessing the proportion of NDE to total expenses based on five-year historical figures. The related constraint is as follows:

$$\mathrm{Tax}_t = \mathrm{TP}_t + \mathrm{DTE}_t \tag{4.31}$$

$$\mathrm{TP}_t = \tau(\mathrm{EBT}_t + \mathrm{Td}_t + \mathrm{Pd}_t) \tag{4.32}$$

Inserting Equation (4.29) to Equation (4.28):

$$\mathrm{Tax}_t = \tau(\mathrm{EBT}_t + \mathrm{Td}_t + \mathrm{Pd}_t) + \mathrm{DTE}_t \tag{4.33}$$

$$Pd_t = Incf_t + NDE_t \tag{4.34}$$

$$NDE_t \le x\text{atd } Totex_t \tag{4.35}$$

$$Totex_t = COGS_t + Opex_t \tag{4.36}$$

$$x\text{atd} = \text{Avg} \sum_{t=1}^{5} \frac{NDE}{Totex} \tag{4.37}$$

where:

Tax_t	=	income tax expense in period *t*;
Td_t	=	income tax payable(current tax expense) in period *t*;
DTE_t	=	deferred tax expense in period *t*;
EBT_t	=	pre-tax financial income (earnings before tax) in period *t*;
Td_t	=	temporary difference in period *t*;
Pd_t	=	permanent difference in period *t*;
$Incf_t$	=	income subjected to final tax in period *t;*
NDE_t	=	non-deductible expenses in period *t*;
$x$atd	=	proportion of non-deductible expenses in period *t*;
$Totex_t$	=	total expenses in period *t*;
$COGS_t$	=	cost of good sold in period *t*;
$Opex_t$	=	operating expenses including adjustment from non-cash charges;
τ	=	corporate income tax rate.

C. Corporate Governance Policy: Risk Management, Financial and Investments Policy Constraints

The following constraints are related to a company's GCG practice. The company's policies related to the practice in the end support the objective of GCG: to increase the wealth of shareholders. This can be achieved through mixing some internal corporate governance instruments which include risk management, financial and investment policy constraints.

C.1. Liquidity Risks and Activity Ratio

1) Current ratio

Current ratio (CR) shows risk-management activity of the company. This policy is important since, first, it shows the ability of the company to minimise liquidity risks; it represents the company's ability to pay its current liabilities (risks in the short term). Second, this policy is also recognised as a short-term investment policy: investment in current assets; it is important since it shows the ability of the company to run the day-to-day operating activities. The ratio is expected to be higher than one or higher than (benchmarked to) the historical (five years) and industry data.

If CR is less than one, it means that the amount of current assets is less than the amount of current liabilities, hence it shows a red flag about the company's ability to pay its current liabilities. Similarly, if the current ratio is too different from the average of its industry, for example too high, shareholders and analysts need to be concerned about why the difference occurs; it is a red flag that the company has 'a lot of money tied up in non-productive assets, such as excess cash or marketable securities', or too many inventories which can be obsolete (Ehrhardt & Brigham 2011, p. 91). The ratio between current assets and current liabilities should be based on the assessment of historical data and/or the industry.

$$\frac{CA_t}{CL_t} \geq 1 \tag{4.38}$$

$$\frac{CA_t}{CL_t} \geq \frac{\overline{CA_t}}{\overline{CL_t}} \tag{4.39}$$

$$\frac{CA_t}{CL_t} \geq \text{Avg}\sum_{t=1}^{5}\frac{CA}{CL} \tag{4.40}$$

where:

CA_t = current assets in period t;
CL_t = current liabilities in period t.

2) Current cash debt coverage ratio

Similar to CR, current cash debt coverage ratio shows the liquidity of the company to pay its current liabilities but it is calculated based on the current cash from operating, not from the year-end balance of assets; 'it is often considered a better presentation of liquidity on the average day' (Warfield et al. 2008, p. 270). It is expected to be higher than one or higher than (benchmarked to) the historical (five years) or industry data.

$$\frac{CFO_t}{CL_t} \geq 1 \tag{4.41}$$

$$\frac{CFO_t}{CL_t} \geq \frac{\overline{CFO_t}}{\overline{CL_t}} \tag{4.42}$$

$$\frac{CFO_t}{CL_t} \geq \text{Avg}\sum_{t=1}^{5}\frac{CFO}{CL} \tag{4.43}$$

where:

CFO_t = current cash flows operating activities in period *t*;
CL_t = current liabilities in period *t*.

3) Liquidity of receivables

Risk related to accounts receivable is uncollectible accounts receivable which then affects the company's liquidity. Therefore, the faster the collecting time for the outstanding accounts receivable, the better it is for the company. Since accounts receivable come from credit sales activity, to control this risk management should make the accounts receivable turnover faster. Liquidity of receivables is measured by accounts receivable turn over (ARTO). It is one of the activity ratios of a company which measures how effectively the company manages its receivables. It is expected to be higher than one or higher than (benchmarked to) the historical or industry data. The formula is as follows (Ehrhardt & Brigham 2011; Warfield et al. 2008).

$$ARTO_t = \frac{Sales_t}{\overline{AR}_t} \tag{4.44}$$

$$ARTO_t \geq 1 \tag{4.45}$$

$$ARTO_t \geq \overline{ARTO}_t \tag{4.46}$$

$$ARTO_t \geq \text{Avg}\sum_{t=1}^{5} ARTO \tag{4.47}$$

where:

$ARTO_i$ = accounts receivable turnover in period *t*;
$\overline{ARTO}_i$ = accounts receivable turnover in period *t* based on industry or historical data;
$Sales_t$ = net sales in period *t*;
$\overline{AR}_t$ = net accounts receivable in period *t*.

4) Liquidity of inventory

Two types of risks related to the inventory are that too much inventory causes significant carrying costs, while low-level inventory leads to stock-outs, lost sales and unsatisfied customers (Weygandt et al. 2010). It is important for management to minimise this risk, for example by estimating how quickly the company can sell the inventory. A common measurement of the activity ratio that can be used by managers to manage these inventory risks is inventory turnover (ITO), or average days to sell inventory. It is expected to be higher than one or higher and benchmarked to the historical or industry data.

$$\mathrm{ITO_t} = \frac{\mathrm{COGS_t}}{\mathrm{Inv_t}} \tag{4.48}$$

$$\mathrm{ITO_t} \geq 1 \tag{4.49}$$

$$\mathrm{ITO_t} \geq \overline{\mathrm{ITO_t}} \tag{4.50}$$

$$\mathrm{ITO_t} \geq Avg\sum_{t=1}^{5}\mathrm{ITO} \tag{4.51}$$

where:

ITO_t = inventory turnover in period t;
$\overline{ITO_t}$ = inventory turnover in period t based on industry or historical data;
$\mathrm{COGS_t}$ = cost of good sold in period t;
$\mathrm{Inv_t}$ = inventory (average) in period t.

5) Assets turnover

This policy is also an activity ratio which measures the contribution of the overall investment activity of a company, incorporating short-term and long-term assets to the company's profitability (Brealey et al. 2011). Specifically, it measures how efficiently assets are used to generate sales. The formula (adopted from Ehrhardt & Brigham 2011) and the constraint are as follows: It is expected that the ratio is more than one, since a high ratio indicates that 'the firm is working close to its capacity' (Brealey et al. 2011, p. 841). It can be benchmarked with its historical figures or the industry.

$$\mathrm{ATO_t} = \frac{\mathrm{Sales_t}}{\mathrm{TA_t}} \tag{4.52}$$

$$\mathrm{ATO_t} \geq 1 \tag{4.53}$$

$$\mathrm{ATO_t} \geq \overline{\mathrm{ATO_t}} \tag{4.54}$$

$$\text{ATO}_\text{t} \geq \text{Avg}\sum_{t=1}^{5}\text{ATO} \tag{4.55}$$

where:

Sales_t = net sales in period *t*;
TA_t = total assets in period *t*;
ATO_t = assets turnover in period *t*;
$\overline{ATO_t}$ = assets turnover in period *t* based on industry or historical data.

C.2. Financial Distress and Bankruptcy Risk
1) Leverage policy

This policy is related to the risk management and finances of a company. As discussed in Chapter 2, debt is a double-edged sword in that at one level it gives a tax benefit but when it reaches another level it causes financial distress and bankruptcy risks. Financial distress costs are related to 'any loss of value that can be attributed to a firm's deteriorating financial strength', while bankruptcy costs are costs of financial distress plus additional costs such as 'legal, administrative and accounting costs associated with the bankruptcy process' (Brealey et al. 2011; Ogden et al. 2003, p. 161). Financial distress, bankruptcy and their costs are closely related to the debt amount or leverage of the company (Altman & Hotchkiss 2010). Therefore it is important for a company to have a policy which limits the amount of debt to minimise the financial distress and prevent the company from bankruptcy and solvency risks. To minimise bankruptcy and solvency risks or to maintain the ability of the company to fulfil its long-term debt (risks in the long term), total debt-to-assets ratio must be not more than total debt–assets ratio of the industry or the company's historical figures.

$$\text{Lev}_\text{t} = \frac{\text{TD}_\text{t}}{\text{TA}_\text{t}} \tag{4.56}$$

$$\text{Lev}_\text{t} \leq \overline{\text{Lev}}_\text{t} \tag{4.57}$$

$$\text{Lev}_\text{t} \leq \text{Avg}\sum_{t=1}^{5}\text{Lev} \tag{4.58}$$

where:

TD_t = total debt in period *t*;
TA_t = total assets in period *t*;
$\overline{Lev}_t$ = average long-term debt in period *t* based on industry or historical data.

2) Bankruptcy risk: Z-scores

Z-score is a score to predict financial distress (Altman 1968). Below are the formulas for public companies, private companies and emerging market companies respectively (Altman & Hotchkiss 2010).

$$Z_{pb} = 1.2\frac{\text{WC}}{\text{TA}} + 1.4\frac{\text{RE}}{\text{TA}} + 3.3\frac{\text{EBIT}}{\text{TA}} + 0.6\frac{\text{MV Eq}}{\text{TL}} + 1.0\frac{\text{Sales}}{\text{TA}} \tag{4.59}$$

$$\begin{aligned} Z_{pr} = {} & 0.717\frac{\text{WC}}{\text{TA}} + 0.847\frac{\text{RE}}{\text{TA}} + 3.107\frac{\text{EBIT}}{\text{TA}} \\ & + 0.420\frac{\text{MV Eq}}{\text{TL}} + 0.998\frac{\text{Sales}}{\text{TA}} \end{aligned} \tag{4.60}$$

$$\begin{aligned} Z_{\text{em}} = {} & 6.56\frac{\text{WC}}{\text{TA}} + 3.26\frac{\text{RE}}{\text{TA}} + 6.72\frac{\text{OpInc}}{\text{TA}} \\ & + 1.05\frac{\text{BV Eq}}{\text{TL}} + 3.25 \end{aligned} \tag{4.61}$$

where:

WC = working capital;
RE = retained earnings;
EBIT = earnings before interest and taxes;
MV Eq = market value of equity;
BV Eq = book value of equity;
Sales = sales;
TA = total assets;
TL = total liabilities;
OpInc = operating income.

The safety zone for a public company is when the Z-score is above 3.0 while those for which the Z-score is below 1.8 are very likely to fail (Warfield et al. 2008, p. 162). The safety zone for private companies is more than 2.90, while less than 1.23 falls within the distress zone and between 1.23 and 2.9 is the grey zone (Altman & Hotchkiss 2010,

p. 246). For emerging market companies, the safety zone is above 5.85 while the distress zone is under 4.15, and a score between 4.15 to 5.85 is recognised as the grey zone as follows in Figure 4.3 (Altman & Hotchkiss 2010, p. 268). Figure 4.3 illustrates the Z-score for a public company, a private company and an emerging market company.

For a company to survive, the policy should be:

$$Z \geq \text{safety point} \tag{4.62}$$

3) Debt-service coverage

As mentioned previously, corporate governance is related to managing conflicts of interest among different parties. In regard to creditors' interest, it is the responsibility of the company to fulfil its commitment by paying the interest fee and the principal. Debt-service coverage policy shows the cash-flow ability of a company to service not only the interest burden but also the full debt-service burden, thus the policy is related to minimising financial distress and bankruptcy risks (Brealey et al. 2011; Van Horne & Wachowicz 2005). Therefore, this policy is also the risk-management and financial policy of a company. For the purpose of this book, rather than using EBIT (earnings before interest

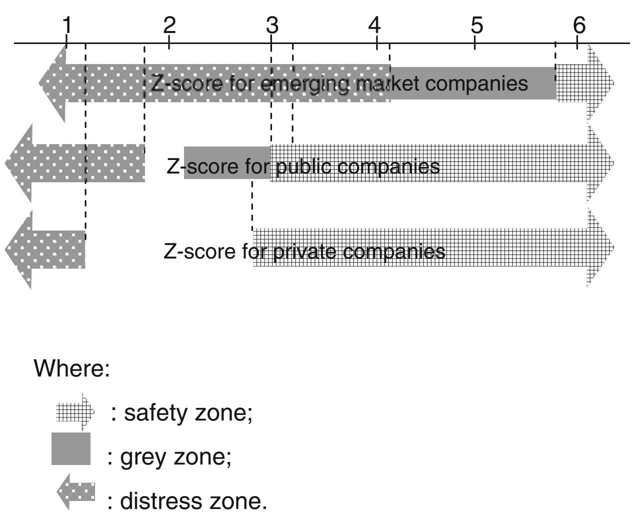


Figure 4.3 Z-score

and taxes), adjusted cash flows from operating activities (CFO) is used, which is CFO before interest and tax. The policy will be:

$$DsC_t = \frac{\overline{CFO_t}}{int_t + \frac{COD_t}{(1-\tau)}} \tag{4.63}$$

$$DsC_t \geq \overline{DsC} \tag{4.64}$$

$$\overline{CFO_t} = CFO_t + Tax_t - (TP_t - TP_{(t-1)}) + int_t - (IP_t - IP_{(t-1)}) \tag{4.65}$$

where:

DsC_t = debt-service coverage in period *t*;
$\overline{DsC_t}$ = debt-service coverage (average) in period *t* based on industry or the historical data;
$\overline{CFO_t}$ = adjusted cash flows from operating activities in period *t;*
COD_t = cash outflow for debt principals (including financial lease payment and preferred stock dividends) in period *t*;
τ = company's income tax rate;
Tax_t = current income tax expense in period *t*;
TP_t = tax payable in period *t*;
TP_{t-1} = tax payable in period (*t*–1);
Int_t = interest expense in period *t;*
IP_t = interest payable in period *t*;
$IP_{(t-1)}$ = interest payable in period (*t*–1).

C.3. Investment policy: risk related to the long-term investment activities

These policies are related to the investment activities of a company and how the company manages risk related to its long-term investment activities. In this book, the constraints related to the investment policy are specifically related to property, plant and equipment (PPE), and it is different from the investing activities that are usually referred to or discussed in capital budgeting literature. Because of the unavailability of data, this book does not discuss project appraisal but the amount of investment that is allocated to PPE and the available funds for general investment activities.

1) Capital expenditure

In contrast to working capital, capital expenditure or capital investment is categorised as a long-term investment; it is an investment on long-term assets such as PPE, intangible assets or long-term investments. The capital expenditure will be part of the strategic planning of a company and hence it should be based on capital requirements for production or expansion of the business as part of the business strategy. As discussed in Chapter 2, the investment categories of capital expenditure are equipment replacement, expansion to meet growth in existing products, expansion generated by new products and projects mandated by law (Peterson & Fabozzi 2002; Shapiro 2005). Growth of PPE and growth of sales for period *t* are as follows:

$$\Delta \mathrm{PPE}_t = \frac{\mathrm{PPE_t} - \mathrm{PPE_{(t-1)}}}{\mathrm{PPE_{(t-1)}}} \tag{4.66}$$

$$\Delta \mathrm{Sales_t} = \frac{\mathrm{Sales_t} - \mathrm{Sales_{(t-1)}}}{\mathrm{Sales_{(t-1)}}} \tag{4.67}$$

Every investment decision on capital expenditure needs to consider the capacity of the assets to meet the company's business growth. Therefore, the production capacity should match the company's sales. When the company's product demand increases, the company needs more capacity to meet the demand and therefore it needs more capital, for example machines or plant. Since specific data for analysing each capital expenditure are not available from financial statements, the constraint for capital expenditure for this study will be developed by benchmarking to the industry or company's historical figures: the percentage of fixed assets' growth to the sales growth. Average data of industry or company's historical figures for more than one year are needed since fixed assets have long-term economic value. The percentage of PPE's growth to sales' growth can be illustrated in the equation as follows:

$$\alpha_{PPE_t} = \frac{\Delta \mathrm{PPE_t}}{\Delta \mathrm{Sales_t}} \tag{4.68}$$

Average for five years historical data will be:

$$\bar{\alpha}_{PPE} = \sum_{t=0}^{T=5} \frac{\Delta \mathrm{PPE}}{\Delta \mathrm{Sales}} \tag{4.69}$$

Considering the equations above, the constraint for PPE will be:

$$\mathrm{PPE_t} \geq \mathrm{PPE_{(t-1)}} \tag{4.70}$$

$$\Delta PPE_t \leq \bar{\alpha}_{PPE}(\Delta Sales_t) \qquad (4.71)$$

Since the PPE's growth is a determinant of sales' growth, the additional constraint should be related to the sales' increase which is:

$$Sales_t \geq (1+\bar{\alpha}_s)Sales_{(t-1)} \qquad (4.72)$$

where:

ΔPPE_t = changes in PPE in period *t*;
PPE_t = amount of PPE in period *t*;
$PPE_{(t-1)}$ = amount of PPE in period (*t*–1);
$\Delta Sales_t$ = changes in net sales in period *t*;
$Sales_t$ = amount of sales in period *t*;
$Sales_{(t-1)}$ = net sales in period (*t*–1);
α_{PPEt} = percentage of PPE's growth to sales' growth in period *t*;
$\bar{\alpha}_{PPE}$ = percentage on average of PPE's growth to sales' growth in the last five years;
$\bar{\alpha}_s$ = sales' growth on average in the last five years.

2) Available funds for investments

The total amount of resources that a company can use for long-term investments will be from internal funds and external financing activities: issuing stocks and issuing long-debt instruments. Based on the pecking-order theory as discussed in Chapter 2, internal funds are preferable to external funds and, since internal funds are preferable, it can be assumed that there is no pay-out to the common stockholders because the funds will be reinvested in the company's business. If there are no free cash flows for equity, the maximum funds available for investments will be:

$$FCFE_t = CFO_t + CFFd_t + CFI_t \qquad (4.73)$$

$$CFO_t + CFFd_t + CFI_t \geq 0 \qquad (4.74)$$

$$-CFI_t \leq CFO_t + CFFd_t \qquad (4.75)$$

$$CoFI_t - CiFI_t \leq CFO_t + CFFd_t \qquad (4.76)$$

where:

$FCFF_t$ = free cash flows to the firm in period *t*;
CFO_t = net cash flows from (for) operating activities in period *t*;

CFI_t = net cash flows from (for) investing activities in period t;
$CFFd_t$ = net cash flows from (for) financing activities in period t;
$CiFI_t$ = cash inflows from investing activities in period t;
$CoFI_t$ = cash outflows used by investing activities in period t.

D. Other Corporate Governance Policy: Compensation for Executives

This constraint will be applicable following the condemnation of 'extraordinary' cash compensation paid to the executives of big companies whilst employees and other stakeholders face hard economic conditions. In fact, a coalition of leading financial regulators of the G-20 recommended that annual bonuses should be staggered so that executives are not rewarded for taking short-term risks (Winestock & Anderson 2009). While there are many types of management compensation, most of which are related to accounting earnings and stock prices, unfortunately there is no theoretical or empirical consensus on how these compensations affect the value of a company (Core et al. 2003). Therefore the best incentives as part of governance instruments need to be constructed so that they not only minimise agency costs by minimising the moral hazard of the managers but also encourage managers to use their best efforts to maximise the shareholders' wealth; hence the best incentives for managers should be based on these GCG criteria. Although the formulation of a remuneration system for management is complex (Eaton & Rosen 1983; Goobey 2005; Watson 1991), this book will give an example of a formula that links the remuneration with the company's process of achieving shareholders' wealth (FCFE). The formula proposed in this book is as follows:

$$TRex_t = \alpha FCFF_t \tag{4.77}$$

$$TRex_t = \alpha(CFO_t - CFI_t + CFF_t) \tag{4.78}$$

$$TRex_t = Rexm_t + Rexx_t \tag{4.79}$$

$$Rexm_t = \alpha m(CFO_t - CFI_t + CFF_t) \tag{4.80}$$

$$Rexx_t = \alpha x(CFO_t - CFI_t + CFF_t) \tag{4.81}$$

where:

$TRex_t$ = total remuneration expense in period t;
$Rexm_t$ = remuneration expense for employee in period t;
$Rexx_t$ = remuneration expense for executive in period t;
α_m = portion of remuneration expense for employee;
α_x = portion of remuneration expense for employee.

Table 4.7 Summary of how the model accommodates GCG principles

	GCG Principles	Variables	Proxy	
Objective function (see Table 4.6)	1) GCG ensures the fulfilment of the return of shareholders 2) GCG ensures the fulfilment of the return of debtholders, including minimising the financial distress and bankruptcy risks 3) GCG concerns the fulfilment of other stakeholders' interests: a) GCG ensures the profitability and sustainability of operating activities of the company b) GCG ensures a positive return on investments	Maximise shareholder value	$Max\ PV\ of \sum_{t=n}^{T=N} FCFE$	(1)
Constraints	**A. Corporate Governance Policy: Accounting Policy Constraints**			
	1) Cash flows constraints	Cash flows	$CiFO_t - CoFO_t \geq 0$	(2)
			$CoFI_t - CiFI_t \geq 0$	(3)
			$(CiFO_t - CoFO_t) + (CiFF_t - CoFF_t) \geq CoFI_t - CiFI_t$	(4)
	2) Accounting–tax difference (accounting for income tax): Effects of tax regulation	Allocation of non-deductible expenses (NDE)	$NDE_t \leq x_{atd}\, Totex_t$	(5)
			$Totex_t = COGS_t + Opex_t$	(6)
			$x_{adt} = Avg \sum_{t=1}^{5} \frac{Pd}{Totex}$	(7)

Constraints				
	B. Corporate Governance Policy: Risk Management, Financial and Investments Policy Constraints			
			$\frac{CA_t}{CL_t} \geq 1$	(8)
		Current ratio	$\frac{CA_t}{CL_t} \geq \frac{\overline{CA_t}}{\overline{CL_t}}$	(9)
			$\frac{CA_t}{CL_t} \geq Avg \sum_{t=1}^{5} \frac{CA}{CL}$	(10)
	1) Liquidity risk and activity ratio		$\frac{CFO_t}{CL_t} \geq 1$	(11)
		Current cash debt coverage ratio	$\frac{CFO_t}{CL_t} \geq \frac{\overline{CFO_t}}{\overline{CL_t}}$	(12)
			$\frac{CFO_t}{CL_t} \geq Avg \sum_{t=1}^{5} \frac{CFO}{CL}$	(13)
			$ARTO_t \geq 1$	(14)
		Liquidity of receivables	$ARTO_t \geq \overline{ARTO_t}$	(15)
			$ARTO_t \geq Avg \sum_{t=1}^{5} ARTO$	(16)

Continued

Table 4.7 Continued

	GCG Principles	Variables	Proxy	
Constraints	1) Liquidity risk and activity ratio	Liquidity of inventory	$ITO_t \geq 1$	(17)
			$ITO_t \geq \overline{ITO}_t$	(18)
			$ITO_t \geq Avg \sum_{t=1}^{5} ITO$	(19)
		Assets turnover	$ATO_t \geq 1$	(20)
			$ATO_t \geq \overline{ATO}_t$	(21)
			$ATO_t \geq Avg \sum_{t=1}^{5} ATO$	(22)
	2) Financial distress and bankruptcy risk	Leverage ratio	$Lev_t \leq \overline{Lev}_t$	(23)
			$Lev_t \leq Avg \sum_{t=1}^{5} Lev$	(24)
			$Lev_t \leq \overline{Lev}_t$	(25)
		Bankruptcy risk: Z-scores	$Z \geq 5.85$	(26)
		Debt-service coverage	$DsC_t \geq \overline{DsC}_t$	(27)
	3) Investment policy: risk related to the long-term investment activities	Capital expenditure	$PPE_t - PPE_{(t-1)} \geq 0$	(28)

			$\Delta PPE_t \leq \bar{\alpha}_{PPE}(\Delta Sales_t)$	(29)
			$Sales_t \geq (1+\bar{\alpha}_s)Sales_{(t\text{-}1)}$	(30)
		Available funds for investments	$CoFI_t - CiFI_t \leq CFO_t + CFF_t$	(31)
Constraints	**C. Other Corporate Governance Policy**			
			$TRex_t = \alpha\, FCFE_t$	(31)
			$TRex_t = \alpha\ (CFO_t - CFI_t + CFF_t)$	(33)
			$TRex_t = Rexm_t + Rexx_t$	(34)
	Compensation for executives	Allocation for executives' compensation	$Rexm_t = \alpha_m\ (CFO_t - CFI_t + CFF_t)$	(35)
			$Rexx_t = \alpha_x\ (CFO_t - CFI_t + CFF_t)$	(36)
			$Rexx_t \leq \alpha_x\ (CFO_t - CFI_t + CFF_t)$	(37)
			$lower\ bound \leq \alpha_x \leq upper\ bound$	(38)
	D. Definitional and Accounting Equation Constraints			
	1) Free cash flows to equity (FCFE)		$FCFE_t = FCFF_t - \overline{Int}_t + CFF_t$	(30)
	2) Free cash flows to the firm (FCFF)		$FCFF_t = CFO_t + \overline{Int}_t - CFI_t$	(40)
	3) Net interest payment		$\overline{Int}_t = Int_t(1-\tau)$	(41)
	4) Cash flows from/used by operating activities		$CFO_t = CiFO_t - CoFO_t$	(42)

Continued

Table 4.7 Continued

	GCG Principles	Variables	Proxy	
			$CFO_t = \overline{Sales_t} - (AR_t - AR_{(t-1)}) - COGS_t - (Inv_t - Inv_{(t-1)}) + (AP_t - AP_{(t-1)}) - Opex_t - (Prep_t - Prep_{(t-1)}) + (Accr_t - Accr_{(t-1)}) - Tax_t + (TP_t - TP_{(t-1)}) - Int_t + (IP_t - IP_{(t-1)}) + Noncashexp_t$	(43)
Constraints	5) Cash flows from/used by investing activities		$CFI_t = CFI_tPPE + CFI_tIA + CFI_tLTI + CFI_tOInv$	(44)
	6) Cash flows from/used by investing activities in Property, Plant and Equipment (PPE)		$CiFI_tPPE - CoFI_tPPE = PPE_{t-1} - PPE_t + NCinv_t in\ PPE - NCdisp_t in\ PPE + Lossdisp_tPPE - Gaindisp_tPPE + Accdepr_tPPEdisp$	(45)
	7) Cash flows from/used by investing activities in intangible assets (IA)		$CiFI_tIA - CoFI_tIA = IA_{t-1} - IA_t + NCinv_t in\ IA - NCdisp_t of\ IA + Lossdisp_tIA - Gaindisp_tIA + Accamrt_tIAdisp$	(46)
	8) Cash flows from/used by investing activities in long-term investment (LTI)		$CiFI_tLTI - CoFI_tLTI = LTI_{t-1} - LTI_t + NCinv_t in\ LTI - NCdisinv_t of\ LTI + Lossdisinv_tLTI - Gaindisinv_tLTI + Unamdisc_tLTI - Unampre_tLTI$	(47)
	9) Cash flows from/used by financing activities		$CFF_t = CiFF_t - CoFF_t$	(48)

Constraints	10) Cash flows from/used by financing activities: long-term debt (LTD)	$CiFI_t LTD - CoFI_t LTD = LTD_t - LTD_{(t-1)} - NCLTDiss_t - DiscLTD_t + PremLTD_t + NCLTDred_t - GainLTDred_t + LossLTDred_t + Unamdisc_t - Unampre_t$	(49)
	11) Cash flows from/used by financing activities: common stocks (C/S)	$CiFI_t C/S - CoFI_t C/S = C/S_t - C/S_{(t-1)} - \Delta T/S_{tt} - CiFI_t T/S + CoFI_t T/S - NCC/Siss_t + (-)AddPIC_t C/S + (-)AddPIC_t T/S$	(50)
	12) Accounting–tax difference	$Tax_t = \tau\ (EBT_t + Td_t + Pd_t) + DTE_t$	(51)
	13) Account receivable turnover	$ARTO_t = \frac{Sales_t}{\overline{AR_t}}$	(52)
	14) Inventory turnover	$ITO_t = \frac{COGS_t}{Inv_t}$	(53)
	15) Assets turnover	$ATO_t = \frac{Sales_t}{TA_t}$	(54)
	16) Leverage	$Lev_t = \frac{LTD_t}{LTA_t}$	(55)
	17) Z-score	$Z = 1.2\frac{WC}{TA} + 1.4\frac{RE}{TA} + 3.3\frac{EBIT}{TA} + 0.6\frac{MV\ Eq}{TL} + 0.999\frac{Sales}{TA}$	(56)

Continued

Table 4.7 Continued

GCG Principles	Variables	Proxy	
18) Debt-service coverage (DSC)		$DsC_t = \dfrac{\overline{CFO_t}}{i_t + \dfrac{COD_t}{(1-\tau)}}$	(57)
19) Adjusted cash flows from operating activities		$\overline{CFO_t} = CFO_t + Tax_t - (TP_t - TP_{(t-1)}) + int_t - (IP_t - IP_{(t-1)})$	(58)
20) Growth in property, plant and equipment (PPE)		$\varphi PPE_t = \dfrac{\Delta PPE_t}{PPE_{(t-1)}}$	(59)
21) Growth in sales		$\varphi Sales_t = \dfrac{\Delta Sales_t}{Sales_{(t-1)}}$	(60)

The constraints are:

$$\text{Rexx}_t \leq \alpha_x(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \tag{4.82}$$

$$\text{lower bound} \leq \alpha_x \leq \text{upper bound} \tag{4.83}$$

Lower bound and upper bound will be based on industrial practice (Eaton & Rosen 1983; Goobey 2005; Watson 1991).

4.4 Summary of the model

A summary of the model and how it relates to corporate governance practice is depicted in Table 4.7.

4.5 Conclusion

This chapter presented the details of the proposed model (computational optimisation in Accounting). It presented how normative GCG principles are measured to a quantitative model. Since the model is based on managerial and financial accounting perspectives, accounting information will be used as the input for the model. Therefore the quality of accounting information was discussed and accounting risks were highlighted. FCFE as calculated from FCF is used as a proxy of the objective function of the model – shareholder value. Constraints of the model were derived from GCG practices. Overall, the model reflected generally accepted accounting principles (GAAP). The excellence of the model was then justified to argue that the model revamps the existing optimisation financial models. Having developed the model, the next chapter is the application of the model in a case study.

4.6 Definition

FCFE_t	=	free cash flows to the equity in period *t;*
FCFF_t	=	free cash flows to the firm in period *t*;
CFO_t	=	net cash flows from (for) operating activities in period *t*;
CFI_t	=	net cash flows from (for) investing activities in period *t*;
CFF_t	=	net cash flows from (for) financing activities in period *t*;
$\overline{\text{CFO}_t}$	=	adjusted cash flows from operating activities in period *t*;
$\overline{\text{Inv}_t}$	=	net interest payment (net of tax) in period *t*;
Int_t	=	interest payment in period *t*;
τ	=	corporate income tax rate;
CA_t	=	current assets in period *t*;

CL_t = current liabilities in period *t*;
$\overline{AR_t}$ = net accounts receivable in period *t*;
ITO_t = inventory turnover in period *t*;
$\overline{ITO_t}$ = inventory turnover in period *t* based on industry or average of company's historical data;
Inv_t = inventory (average) in period *t*;
ATO_t = assets turnover in period *t*;
$\overline{ATO_t}$ = assets turnover in period *t* based on industry or average of company's historical data;
LTA_t = long term assets in period *t*;
TL = total liabilities;
WC = working capital;
RE = retained earnings;
EBIT = earnings before interest and taxes;
MV Eq = market value of equity;
TA_t = total assets in period *t*;
$ARTO_t$ = accounts receivable turnover in period *t*;
$\overline{ARTO_t}$ = accounts receivable turnover in period *t* based on industry or average of company's historical data;
PPE_t = property, plant equipment in period *t*;
PPE_{t-1} = property, plant equipment in period (*t*–1);
φPPE_t = PPE growth in period *t*;
$\overline{\varphi PPE}$ = PPE growth during period ($t_1 - t_5$) based on industry or average of company's historical data;
ΔPPE_t = changes in PPE in period *t*;
IA_t = intangible assets in period *t*;
IA_{t-1} = intangible assets in period (*t*–1);
TP_t = income tax payable (current tax expense) in period *t*;
TP_{t-1} = tax payable in period(*t*-1);
IP_t = interest payable in period *t*;
$IP_{(t-1)}$ = interest payable in period (*t*-1).
LTI_t = long-term investment in period *t*;
LTI_{t-1} = long-term investment in period (*t*–1);
LTD_t = long-term debt in period *t*;
$LTD_{(t-1)}$ = long-term debt in period (*t*-1);
$\overline{Lev_t}$ = average long-term debt in period *t* based on industry or historical data;
C/S_t = common stocks in period *t*;
$C/S_{(t-1)}$ = common stocks in period (*t*-1);
$\Delta T/S_t$ = changes in treasury stocks in period *t*;
Tax_t = income tax expense in period *t*;

Sales_t	=	net sales in period *t*;
Sales_{t-1}	=	net sales in period (*t*-1);
φSales_t	=	sales growth in period *t*;
$\overline{\varphi\text{Sales}_t}$	=	average sales growth during period (t_1-t_5) based on industry or the historical data;
ΔSales_t	=	changes in net sales in period *t*;
DTE_t	=	deferred tax expense in period *t*;
EBT_t	=	pretax financial income (earnings before tax) in period *t*;
Td_t	=	temporary difference in period *t*;
Pd_t	=	permanent difference in period *t*;
Totex_t	=	total expenses in period *t*;
COGS_t	=	cost of goods sold in period *t*;
Opex_t	=	operating expenses including adjustment from non-cash charges
CiFI_tPPE	=	cash inflows from investing activities (disinvestments) of PPE in period *t*,
CoFI_tPPE	=	cash outflows used by investing activities (investments) in PPE in period *t*;
CiFI_tIA	=	cash inflows from investing activities (disinvestments) of IA in period *t*;
CoFI_tIA	=	cash outflows used by investing activities (investments) in IA in period *t*;
CiFI_tLTI	=	cash inflows from investing activities (disinvestments) of LTI in period *t*;
CoFI_tLTI	=	cash outflows used by investing activities (investments) in LTI In period *t*;
CiFF_t	=	cash inflows from financing activities in period *t*;
CoFF_t	=	cash outflows used by financing activities in period *t*;
$\text{CiFI}_t\text{LTD}_t$	=	cash inflows from LTD issuance in period *t*;
CoFF LTD_t	=	cash outflow for debt principals (including financial lease payment and preferred stock dividends) in period *t*;
$\text{CiFF}_t\text{C/S}$	=	cash inflows from issuing C/S in period *t*;
$\text{CoFF}_t\text{C/S}$	=	cash outflows for retiring C/S in period *t*;
$\text{CiFF}_t\text{T/S}$	=	cash inflows from issuing T/S in period *t*;
$\text{CoFF}_t\text{T/S}$	=	cash outflows for buying T/S in period *t*;
NCinv_tin PPE	=	non-cash investment in PPE in period *t*;
$\text{NCdisp}_t$of PPE	=	non-cash disposal of PPE in period *t*;

$NCinv_t in\ IA$	=	non-cash investment in IA in period *t*;
$NCdisp_t of\ IA$	=	non-cash disposal of IA in period *t*;
$NCinv_t in\ LTI$	=	non-cash investment in LTI in period *t*;
$NCdisinv_t of\ LTI$	=	non-cash disinvestment of LTI in period *t*;
$NCLTDiss_t$	=	non-cash long-term debt issuance in period *t*;
$NCLTDred_t$	=	non-cash long-term debt redemption in period *t*;
$NCC/Siss_t$	=	non-cash C/S issuance in period *t*;
$Lossdisp_t PPE$	=	loss on disposal of PPE in period *t;*
$Gaindisp_t PPE$	=	gain on disposal of PPE in period *t;*
$Accdepr_t PPEdisp$	=	accumulated depreciation of PPE disposed in period;
$Lossdisp_t IA$	=	loss on disposal of IA in period *t*;
$Gaindisp_t IA$	=	gain on disposal of IA in period *t;*
$Accamrt_t IAdisp$	=	accumulated amortisation of IA disposed in period *t*;
$Lossdisinv_t LTI$	=	loss on disinvestment of LTI in period *t*;
$Gaindisinv_t LTI$	=	gain on disinvestment of LTI in period *t*;
$DiscLTD_t$	=	discount of LTD in period *t*;
$PremLTD_t$	=	premium of LTD in period *t*;
$GainLTDred_t$	=	gain-extraordinary in long-term debt redemption in period *t*;
$LossLTDred_t$	=	loss in long-term debt redemption in period *t*;
$Unamdisc_t LTI$	=	unamortised discounts of LTI disposed in period *t*;
$Unampre_t LTI$	=	unamortised premium of LTI disposed in period *t*;
$Unamdisc_t LTD$	=	unamortised discounts of LTD in LTD redemption in period *t*;
$Unampre_t LTD$	=	unamortised premium of LTD in LTD redemption in period *t*;
$AddPIC_t C/S$	=	additional paid in capital from common stocks in period *t*;
$AddPIC_t T/S$	=	additional paid in capital from treasury stocks in period *t*;
DsC_t	=	debt-service coverage in period *t*;
$\overline{DsC_t}$	=	debt-service coverage in period *t* based on industry or the historical data;
α	=	percentage basis for the management incentives;
$TRex_t$	=	total remuneration expense in period *t*;
$Rexm_t$	=	remuneration expense for employees in period *t;*
$Rexx_t$	=	remuneration expense for executives in period *t;*
α_m	=	portion of remuneration expense for employees;
α_x	=	portion of remuneration expense for executives.

5
The Context of the Case Study

5.1 Introduction

This chapter will provide a bridge between the previous chapter which presented the details of the integrated financial optimisation model with the following chapter which is a numerical model of this study. This chapter presents the sample of the study and the snapshot of the company's business activities including the country's characteristics related to corporate governance practices, capital market and regulatory environments. Before describing the sample further, the sampling method is explained. Understanding the characteristics of the sample will give a clue to the application of the model and what the analysis and implications in the following chapters are drawn upon.

5.2 Sampling method and sample of the study

For the purpose of this study and to simulate the model, a sample is chosen based on a purposive sampling where a company is selected in a deliberate and non-random fashion. The criteria of the sample are: first, that it is a listed company so that its financial data is publicly available. Next, a developing country is selected due to its dynamic economic conditions. Then, the impacts of how external and internal governance instruments discipline managers to achieve GCG practices are examined. For this purpose, an Indonesian listed company is selected as the sample for the case study.

5.3 Indonesia business and regulatory environments (external governance mechanisms)

Indonesia is a developing country in Southeast Asia. As a member of the G-20, it is the largest economy in its region with a population of approximately 240 million people. The large population can imply both potential human resources as well as a potential market. The abundance of natural resources of Indonesia also provides enormous potential for further economic development.

5.3.1 Capital market

The structure of Indonesia's capital market is depicted in Figure 5.1. The structure has been in place for the past ten years except for the Indonesia Capital Market Supervisory Agency, which since 30 December 2005 became the Indonesia Capital Market and Financial Institutions Supervisory Agency (Bapepam-LK 2010). This institution is soon to be merged into the Financial Services Authority or *Otoritas Jasa Keuangan* (OJK) (Maulana & Rahmat 2012). Bapepam-LK is supported by Self-Regulatory Organisations (SROs) which are the Indonesia Stock Exchange (IDX or PT Bursa Efek Indonesia – BEI), the Indonesia Central Securities Depository (PT Kustodian Sentral Efek Indonesia – KSEI) and the Indonesia Clearing and Guarantee Corporation (PT Kliring Penjaminan Efek Indonesia – KPEI).

The performance of the Indonesian capital market is shown in Figure 5.2 below. Based on the graph, the Indonesian capital market performance shows an increasing trend based on the composite index since the financial crisis in 2008. The Indonesian composite index is further argued to have had the highest increase in 2009 among some other countries as shown in Figure 5.3. Furthermore, as indicated by Figure 5.4, the capital market contributes about 20%–50% to economic development. During the period 2005–2009, most of the investors in stocks were foreign investors (about 70%), while most of the investors in bonds and government bonds were domestic (Bapepam-LK 2010).

In the Master Plan of the Indonesia Capital Market for 2010–2014, Bapepam-LK (2010) set five objectives for the next five years to strengthen the capital market and non-bank financial industry as follows: (1) easily accessible, efficient and competitive source of funds; (2) conducive and attractive investment climate as well as reliable risk management; (3) a stable, resilient and liquid industry; (4) a fair and transparent regulatory framework which guarantees legal certainty; (5) a credible, reliable international standard infrastructure.

With regard to the first objective, that of making the capital market and non-bank financial institutions (NBFI) easily accessible, efficient and competitive sources of funds, Bapepam-LK will release the constraints by first simplifying the requirements, processes and procedures for public offerings as well as disclosure obligations for issuers without reducing the quality of information. The methods will be, for example, e-registration for public offerings, and e-reporting. Second, the strategy will

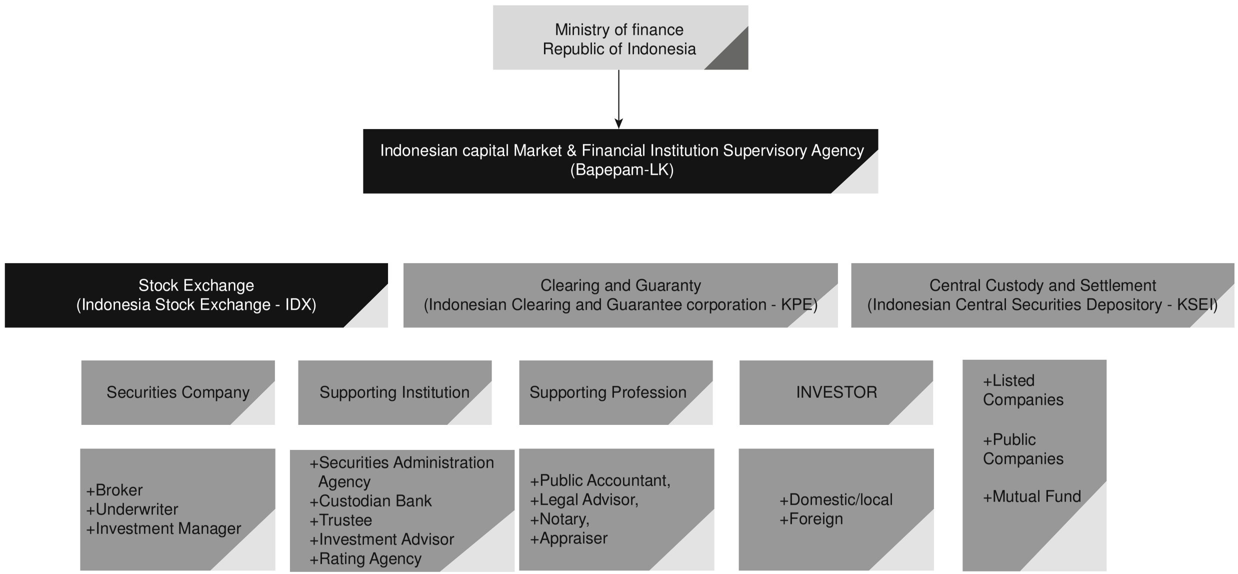


Figure 5.1 Indonesia capital market structure

Source: Adopted from IDX (2012).

be to increase public accessibility to finance and guarantee institutions. Therefore, those institutions are encouraged to expand their network to the countryside or rural areas, as well as to develop new products which meet the market demands. Then the professionals are challenged to improve their roles by repositioning their functions in the public offerings and corporate actions, and are also encouraged to have fair competition among them by disclosing their service fees.

Concerning the second objective, the Indonesian capital market now also expands its service by specifically developing a secondary market and supervisory mechanisms for not only commercial bonds but also sukuk (Islamic bonds). Some strategies to develop Indonesia's sharia capital market and sharia non-bank financial industry are, for example, developing a fundamental regulatory framework, developing and promoting the sharia products, and improving human resources. Then, programs for developing the bond and sukuk secondary markets are, for example, developing the repurchasing agreement market, increasing supervision of bonds and sukuk markets, improving the trading infrastructure, and setting benchmarks for evaluating the credible fair market price. Next, to make the Indonesian capital market a conducive and attractive climate for investment, the strategy will also be to improve the scheme to protect investors and customers by, for example, developing a system to monitor funds and securities of customers in securities companies and developing an insurance guarantee scheme.

To achieve its third objective, Bapepam-LK has set strategies as follows: (1) improving the quality of the market players; (2) encouraging

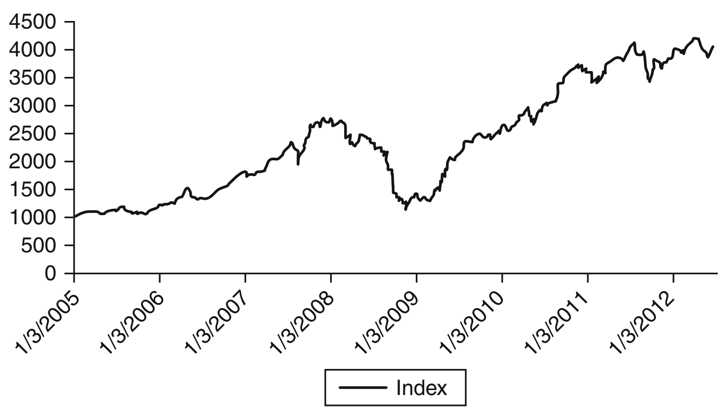


Figure 5.2 Development of composite stock index (IHSG) during 2005–2012
Source: Graph created by author based on Yahoo Finance data.

GCG practice; (3) improving risk-management industry capability; (4) improving the supervision capacity of industry players; and (5) improving the domestic investor base and long-term funds. Specifically with respect to the second strategy, the programs launched include: (1) developing GCG guidelines including for the sharia industry and securities companies; (2) improving the GCG regulations, specifically for securities companies and pension-fund institutions, according to international standards; and (3) enhancing the quality of GCG implementation. Based on this information, it can be concluded that the steps taken to improve and maintain GCG practice have remained in place, except that the guidelines have now been extended to the other industries, including the securities companies and sharia business.

Furthermore, improving risk-management industry capability is achieved through the following programs: (1) enhancing the

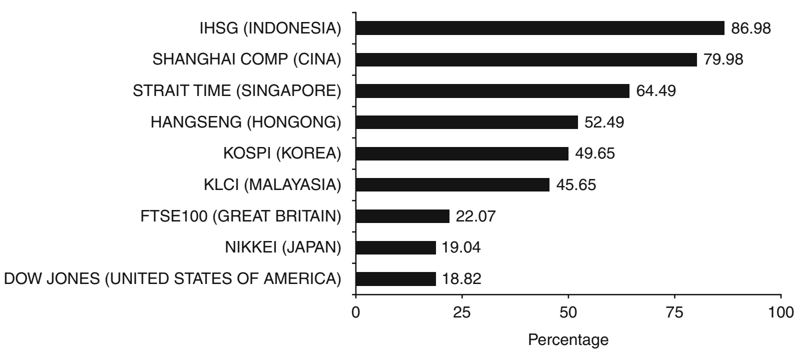


Figure 5.3 Development of stock price index in some of the world stock exchanges in 2009

Source: Bapepam-LK (2010, p. 39).

Indicators	2005	2006	2007	2008	2009
Composite Index (IHSG)	1,162.62	1,805.52	2,745.83	1,355.41	2,534.36
Capitalization of Stock Market (trillion Rp)	801.25	1,249.07	1,988.33	1,076.49	2,019.38
% of GDP	28.77	37.42	50.24	21.73	35.97
Daily average of transaction value (billion Rp)	1670.80	1,841.80	4,268.90	4,435.50	4.046.51
Daily average of transaction volume (millions of shares)	1,653.78	1,805.52	4,225.78	3,282.40	6,093.97
Frequency of daily average transaction (thousands)	16.51	19.90	48.22	55.90	87.12

Figure 5.4 The main indicators of the Indonesia Stock Exchange, 2005–2009

Source: Bapepam-LK (2010, p. 40).

risk-management implementation quality of security companies by separating funds and securities, implementing a risk-control system, improving the role of the compliance unit; (2) enhancing clearing and settlement guarantees risk management for market transactions through continuing the transaction validation system development and performing continuous transaction settlements; (3) preparing a Business Continuity Plan (BCP) especially for 'fragile industries' hit by the financial crisis, such as the capital market itself, the insurance industry and regulators; (4) implementing and developing a Crisis Management Protocol (CMP) which will be integrated into the Risk Based Supervision (RBS) and Early Warning System (EWS).

To achieve the fourth objective, the strategies are: (1) improving the quality of legal enforcement; (2) harmonising regulation among the industries and meeting international standards; (3) drafting regulations based on the needs and development stage of the industry; and (4) improving the quality and transparency of financial information of players in the capital market and NBFI industries. In improving legal enforcement quality, Bapepam-LK has now extended the methods by, for example, providing additional authority to obtain important information, improving criminal provisions and formulating firmer sanctions which have a deterrent effect, encouraging an effective coordination among legal enforcers domestically and overseas, and also developing the capital market intelligence capability to prevent and anticipate early cases of violation and crime in the capital market. By these means the harmonisation of the regulation will be of benefit to all stakeholders since it increases the global competitiveness of the market. The draft regulations now also involve the participation of all stakeholders, and the research-based policy is now preferred. Regarding strategies for improving the quality of financial information of the capital market players, the programs will be: (1) supporting the convergence of accounting standards to international standards; (2) improving or issuing accounting regulations according to the statement of financial accounting standard or international standard; (3) developing accounting standards for the capital market and NBFI industry players, including the sharia industry.

Finally, to achieve objective five, Bapepam-LK has set some strategies to develop an integrated-securities trading system and a reliable information system. To integrate the system, programs include maximising the capacity of the stock exchange trading system, enhancing the capacity of the clearing and guarantee institutions system and central securities depository system, and integrating the systems of the three institutions: stock exchange, clearing and guarantee, and central securities depository with the participants. The programs to improve reliability of the information system include optimising the utilisation of information and communication technology such as for e-government, e-registration, e-licensing and e-reporting, developing a data centre, improving communication information technology governance, and also preparing the Bapepam-LK Continuity Plan.

To conclude, during the last ten years the Indonesian stock exchange has shown favourable results which have positive implications for the development of the country. Bapapem-LK with its master plan shows its commitment to continue improving the performance of Indonesia's capital market.

5.3.2 Good corporate governance

GCG practice has been endorsed by the country following the 1998 financial crisis. Initially, the practice was voluntary but since 2004 it has become compulsory for publicly listed companies. The specific body that drafts the code for best practice was initially the National Committee on Corporate Governance (NCCG), but it was replaced in 2004 by the National Committee on Governance (NCG), whose function is now to draft codes and other tasks to improve not only corporate governance practice but also public-sector governance practice.

The Indonesia Good Corporate Governance Codes follow the framework of the Organisation for Economic Co-operation and Development (OECD). Under the 2006 Code of Good Governance (CGG), which is the amendment of the 2001 Code of Governance Practice, every company must disclose material information in a timely, accurate, understandable and objective manner. This includes annual reports, financial statements and other corporate announcements/news. The codes explain further the function of each corporate structure related to corporate governance practice and how the interests of stockholders are protected.

To pursue its commitment, Indonesia embeds GCG practice into its new company law: Company Law No. 40/2007, which is imposed on limited companies. The law details the definition, the role and the responsibilities of the governance structure of companies and includes the General Meeting of Shareholders (GMS), the Board of Directors (BoD) and the Board of Commissioners (BoC). The law also explains the relationships between each of the structures. Apart from the discussion of board governance, the law also stipulates that companies have social and environmental responsibilities and it requires companies to commit to sustainable economic development.

5.3.3 Tax act[1]

The Indonesia taxation office is the Directorate General of Taxation (DGT) and is under the supervision of the Ministry of Finance. Similar to many countries, taxation in Indonesia is determined based on residency and source of income. Indonesian tax residents are taxed on their worldwide income while non-residents are taxed based on their income derived from an Indonesian source. Tax returns are filed by taxpayers based on a self-assessment system. Taxes imposed on individuals and corporations are income tax, and also value-added tax (VAT) and luxury goods sales tax (LGST) which are subject to certain criteria.

Income tax is paid monthly by the 15th of the following month and is filed monthly by the 20th of the following month. Then, every year a corporation must file its total annual income by the end of the fourth month after the tax year ends. Similarly, individual taxpayers must also file their annual income but the deadline is the end of the third month after the tax year ends. All withholding taxes are to be paid by the 10th of the following month and filed by the 20th of the following month. All taxpayers are also obliged to maintain administrative books and records in Rupiah and Indonesian language and keep them in Indonesia for ten years.

Since 2010, Indonesia has lessened its income tax regulation so that it is more favourable for investors. For example, the flat rate of corporate income tax since 2010 is 25%. However, public companies that satisfy certain conditions, including a minimum listing requirement of 40% of their total paid-up shares traded on a stock exchange in Indonesia, are entitled to a tax cut of 5% off the standard rate; hence, the effective rate will be 20%. Then, small enterprises with an annual turnover of not more than Rp50 billion are entitled to a 50% discount off the standard tax rate which is imposed proportionally on taxable income of the part of gross revenue up to Rp4.8 billion.

Income tax is calculated based on the income tax rate times the taxable income. Taxable income is calculated on all incomes which are recognised as tax objects reduced by deductible expenses. Therefore, the non-deductible expenses (NDE) need to be added back to the taxable income. This NDE can be temporarily different or permanently different. Taxation Law also describes specific types of depreciation methods; hence, taxpayers need to do a tax reconciliation to calculate the taxable income from their accounting-based income.

Overall, the Indonesian taxation system is categorised to be moderate and favourable for business and economic growth.

5.3.4 Accounting standards[2]

The accounting board of Indonesia is the Indonesian Institute of Accountants or Ikatan Akuntan Indonesia (IAI). It is a member of the International Federation of Accountants (IFAC). Initially, the Indonesian Accounting Standards or the Indonesian Generally Accepted Accounting Practice was codified in 1973, in the period when the Indonesian capital market was activated. The Standards were revised first in 1984 and then in 1994 with major amendments. The 1994 version was harmonised to international accounting standards and finally in 2012 it was fully convergent with International Financial Reporting Standards (IFRS). Similarly, the Auditing Standards have followed the International Standards on Auditing (ISAs).

Following the business practice in Indonesia, such as the booming sharia industry and its products, the Indonesian Accounting Board has released a series of accounting standards which relate to sharia products such as Ijarah, Murabahah, Zakah, Islamic Insurance Contract and Hawalah. This brings a total of 59 chapters of accounting standards and four interpretations of the accounting standards which are released in Indonesia.

5.4 Profile of the company

Unilever Indonesia Tbk (UNVR) was selected for this study. The company was incorporated in 1933. It is an Indonesia-based company which is the producer, marketer and distributor of consumer goods, including soaps, detergents, margarine, dairy-based products, ice cream, cosmetic products, tea-based beverages and fruit juice. It has been listed on the Indonesia Stock Exchange since 11 January 1982 under the consumer goods industry sector and cosmetics and household subsector.

5.4.1 Corporate governance and risk-management practice[3]

As a publicly listed company, UNVR does have GCG practice pursuant to Company Law No. 40/ 2007 and the decree of Director of Jakarta Stock Exchange (JSX).[4] The company's GCG objective is 'strongly committed to upholding the highest standards of corporate governance throughout the Company's operations' (Unilever 2012). The company claims to have the highest standard of corporate governance throughout its operations. It further mentions that the principles of GCG reflect the company's values, Code of Business Principles (CoBP), business processes, controls and standard operating procedures. The company also commits to taking continuous action to ensure that the principles are internalised and practised by every member of the company. Therefore the company argues that their GCG implementation is more than simply compliance with legal requirements.

UNVR further argues that they have strong board governance which consists of Annual General Meeting of Shareholders (AGMS), the Board of Commissioners (BoC) and the Board of Directors (BoD). It also argues that it maintains a good relationship with its shareholders and other stakeholders. Similarly, the management carries out their roles properly in managing assets and risks in support of the development of the business, compliance, developing the human resources, safety and environmental management practices, and developing the corporate culture.

UNVR advises that its AGMS is convened within six months after the end of each fiscal year. As the company's highest governance body, the power of the AGMS is: (1) having the authority to appoint and terminate the commissioners and directors; (2) making decisions on other critical matters pertaining to: (a) the company's business and operations including the amount of the directors' and commissioners' remuneration; (b) the payment of dividends and distribution of profits; (c) the approval of the annual report; (d) the appointment of the independent auditor; (e) amendments to the articles of association; and (f) the delegation of authority to the boards to follow up matters discussed and agreed to at the AGMS.

In a two-tier governance system such as Indonesia's, UNVR states that its BoC function is to supervise the BoD as the management of the company. In this company, members of the BoC are nominated by the Nomination Committee which is appointed by the AGMS. Currently, the company's BoC consists of five members, of whom 80% are independent. The company reports that the BoC holds its meeting every quarter.

The company states that its BoD as the management of the company is responsible for setting the strategic direction and managing the assets of the company, hence it reports to the BoC. Currently, the BoD of the company consists of ten directors. They hold their meetings at least every month and all the discussions are noted under minutes of meeting. The company reports that, similar to the BoC, the BoD is nominated by the Nomination Committee.

The company also reports that its audit committee works under the audit committee charter. This committee is appointed by the BoC and therefore its position is for supporting the supervision function of the BoC by reviewing and providing assurance on the integrity of the financial statements. Therefore, the audit committee also needs to provide assurance on the company's risk management and internal control, compliance with legal and regulatory requirements, the external auditor's performance (including its qualifications and independence) and the implementation of the internal audit function. The audit committee bridges the communication between the external and internal auditors of the company. The company reports that its audit committee holds its meeting at least four times a year. In compliance with GCG best practice, the company reports that currently the audit committee consists of three members and is led by an independent commissioner.

Another important position related to governance structure that is also reported by the company is that of corporate secretary, who is the principal liaison between the company and its stakeholders, including shareholders, the capital market authorities, investors, analysts and the public. Its duty is to ensure transparency in the company's disclosures and communications, both internal and external.

To support its governance structure, the company explains its approach to ethical business practice which is codified in its Code of Business Principles (CoBP). It includes how the company obeys the law, deals with its employees, its shareholders and its business partners. Furthermore, in its CoBP the company explains how it engages with the community, involves itself in public activities, cares for the environment, maintains its innovation and deals with the competition. The company also mentions that it is committed to its business integrity and aims to minimise conflicts of interest. It further explains the compliance, monitoring and reporting related to the company's ethics which include the whistle-blower mechanism.

Finally, the company also reports its excellent internal control which complies with the Sarbanes Oxley Act (SOX) section 404, and its internal audit unit which incorporates the risk-management system including financial risk management, operation risk management, market risk, and how to deal with other risks such as those related to customers and litigation.

5.4.2 Financial data and regulatory environments of the company

A summary of financial data of the company is attached in Appendix 1. The regulatory requirements of the company to comply with the Indonesia regulations and industry practices are detailed in Chapter 6. Figure 5.5 illustrates how regulatory environments influence the company's internal corporate governance mechanisms.

5.5 Summary

This chapter has specifically discussed the business and regulatory framework that related to the model development. The reason to choose Indonesia is that as a developing country it reflects to some extent the risks and dynamics of business environments which are faced by most companies. The next chapter will finalise the optimisation model by putting all variables in place and operationalising the model based on the Indonesian context.

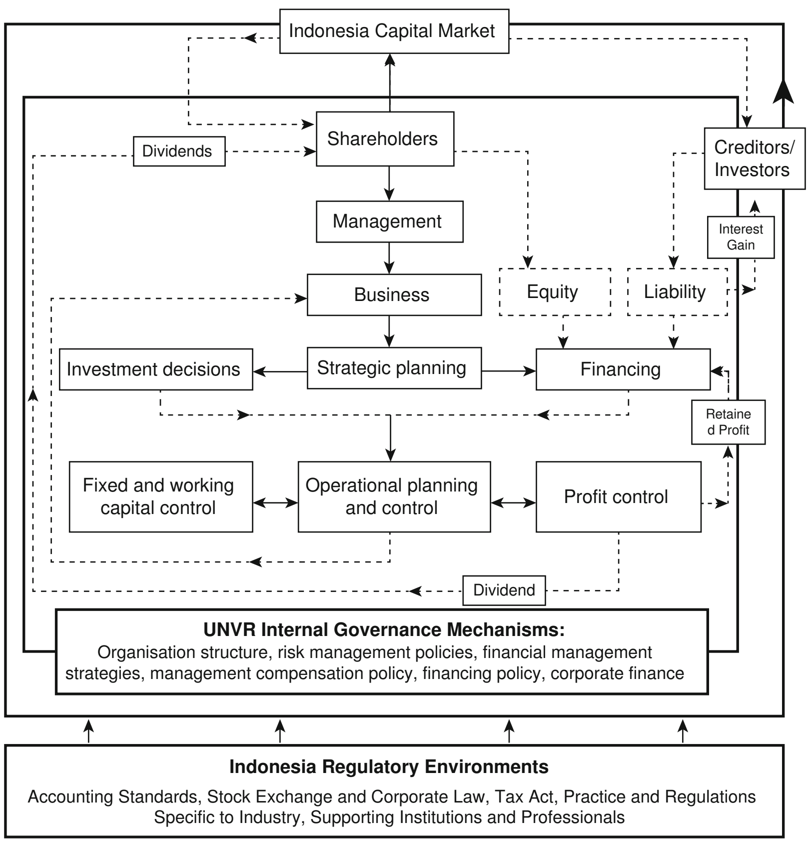


Figure 5.5 UNVR and its regulatory environments

6
The Numerical Model, Results and Analysis

6.1 Introduction

This chapter presents a numerical model and results of the study. Section 6.2 shows the numerical model of this study which is based on the integrated financial optimisation model developed in Chapter 4 and applied in a case study as described in Chapter 5. Section 6.3 describes the characteristics of the simulation software, while Section 6.4 presents the output of the model. In this section, the model is validated and verified to ensure its quality and plausibility for decision-making. Section 6.5 then discusses the sensitivity analysis of the model. Section 6.6 compares the optimal value created under the proposed sound financial management strategies with the book value which was achieved under the current strategies executed by the management (as shown in the financial statements). Finally, the chapter concludes with a discussion of the model's plausibility and its applicability for generalisation. The results of the model presented in this chapter will be discussed further in Chapter 7.

6.2 Application of the integrated financial optimisation model

Using data of the company that were presented in Chapter 5 and Appendix 1, the integrated financial optimisation model proposed in Chapter 4 is constructed as follows. The model, which uses free cash flow (FCF) valuation, is based on a discounted cash flows (DCF) model and therefore, initially, the cost of capital is calculated. The model is constructed based on the last eight years' financial data of the company (2004–2011).

6.2.1 Objective function

Using the DCF approach, the model is designed based on present value (PV) of its objective function: free cash flows to equity (FCFE). The model of FCFE calculates the 2004–2011 value of FCFE using a discount factor to arrive at the present value for 2004 (beginning of 2004 or ending of 2003). In this book two types of cost of capital as the discount rate are used: (1) a discount rate based on CAPM calculation; and (2) a discount rate that is equal to the interest rate. Data for calculating discount rate and FCFE are drawn from secondary data – annual reports, stock exchange website, Datastream and Yahoo Finance. The total PV of the eight-year FCFE then is compared with the real data available in the market for the same period, the end of year 2003 or beginning of 2004. The timeline for calculation of PV is as follows:

Formula of objective function:

$$\begin{aligned}\text{Max PV of FCFE} = {} & \frac{1}{(1+r)^t}\sum_{t=1}^{T=8}\left[\text{CFO}_t - \text{CFI}_t + \text{CFF}_t\right] \\ & + \frac{FCFE_8(1+g)/(r-g)}{(1+r)^8}\end{aligned} \tag{6.1}$$

6.2.1.1 Cost of capital

The relevant literature related to the cost of capital and how to calculate it is discussed in Chapter 3. As mentioned previously, a WACC approach is the common method used to calculate the cost of capital for the required rate of return for investors, or as a discounting factor. The formula of WACC discussed in Chapter 3 is as follows:

$$WACC = \frac{D}{D+E}(K_d)(1-T_m) + \frac{E}{D+E}(K_e)$$

where:

$WACC$ = weighted average cost of capital;
D = debt;

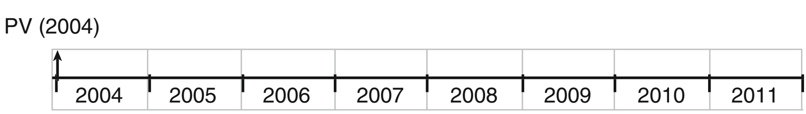


Figure 6.1 Timeline of present value

E = equity;
K_d = cost of debt;
K_e = cost of equity;
T_m = marginal tax.

However, since the company's capital does not contain long-term debt financing, the cost of debt as part of WACC is not relevant and therefore the cost of capital is calculated based on the cost of equity. Below are the calculations of cost of debt and cost of equity.

1) Cost of debt

Using the formula discussed in Chapter 3:

$$K_d = \text{Pre} - \text{tax Debt Interest Rate} \times (1 - \text{Tax Rate})$$

where:

K_d = cost of debt.

As shown in the financial statements, the company does not have long-term interest-bearing notes during the last seven years (see balance sheet); the available debts are to the related parties (no interest rate) and therefore, as seen in the relevant income statements, the company does not have any interest expenses from these debts. The 2010 and 2009 income statements show interest expenses but they are from the current liabilities (see further in the notes to the financial statements for the relevant years). Hence it is concluded that the company's capital relies mostly on equity and internal funding.

2) Cost of equity

Based on the CAPM approach, the cost of equity is calculated using the formula as discussed in Chapter 3 which is as follows:

$$k_e = R_f + \beta(R_m - R_f)$$

where:
K_e = cost of equity;
R_f = risk free rate;

$$\beta = \text{market risk} = \frac{\left(\begin{array}{c}\text{Covariance of the firm's returns with}\\ \text{the market's return}\end{array}\right)}{(\text{Variance of the market's return})};$$

R_m = market return;
$(R_m – R_f)$ = market-risk premium.

The risk-free rate (R_f) is the average of the Indonesian government bond rate for every relevant year, while market return is calculated based on the IDX composite index.[1] Market return and β estimation are calculated based on daily returns of three-year historical data (Porras 2010 ; Pratt & Grabowski 2010). The data for the calculation of cost of capital are sourced from secondary data such as the stock market website, Datastream, Yahoo Finance, the Central Bank of Indonesia website and annual reports. Market risk (β), which is non-diversifiable risk or systematic risk, is calculated using the formula mentioned above in risk β's definition. Linear regression using SPSS was used to find the β (see Appendix 2 for the results). The calculation of the cost of capital is shown in Table 6.1.

3) Interest rate

In addition to WACC and CAPM, in a capital budgeting practice the other alternative rate of return also used for the model is interest rate. For the purpose of this book, the amount of the interest rate is depicted in Table 6.1 in the R_f column.

Table 6.1 Calculation of the cost of capital using CAPM

Period	R_f^*	β#	R_m	$R_m – R_f$	K_e
1(2004)	7.40%	55.89%	19.24%	11.84%	16.7317%
2(2005)	9.06%	60.47%	33.55%	24.49%	26.3059%
3(2006)	11.83%	68.94%	35.45%	23.61%	32.0775%
4(2007)	8.60%	68.90%	33.99%	25.39%	29.1008%
5(2008)	8.67%	77.48%	35.83%	27.16%	33.3223%
6(2009)	7.15%	64.20%	9.24%	2.10%	12.4196%
7(2010)	6.50%	55.41%	15.71%	9.21%	14.1867%
8(2011)	6.58%	53.02%	14.12%	7.54%	13.1401%

*Data of R_f is from the Central Bank of Indonesia (Bank Indonesia 2012) and Statistics of Indonesia (BPS 2012); because of the availability of the data, interest rate is used to represent R_f.
See Appendix 2 for the calculation.

6.2.1.2 Objective function

In the initial model, this book uses interest rate as the discount factor for the model. The cost of capital that is calculated based on the CAPM will be used in the sensitivity analysis.

Inserting the interest rate as the cost of capital or the discount factor in the model, the objective function is as follows:

$$\begin{aligned}
\text{Max PV of } \sum_{t=1}^{T=8} \text{FCFE} = {} & \frac{1}{(1+0.073994)^1}\left[\text{CFO}_1 - \text{CFI}_1 + \text{CFF}_1\right] \\
& + \frac{1}{(1+0.090581)^2}\left[\text{CFO}_2 - \text{CFI}_2 + \text{CFF}_2\right] \\
& + \frac{1}{(1+0.118333)^3}\left[\text{CFO}_3 - \text{CFI}_3 + \text{CFF}_3\right] \\
& + \frac{1}{(1+0.086042)^4}\left[\text{CFO}_4 - \text{CFI}_4 + \text{CFF}_4\right] \\
& + \frac{1}{(1+0.086667)^5}\left[\text{CFO}_5 - \text{CFI}_5 + \text{CFF}_5\right] \\
& + \frac{1}{(1+0.071458)^6}\left[\text{CFO}_6 - \text{CFI}_6 + \text{CFF}_6\right] \\
& + \frac{1}{(1+0.065)^7}\left[\text{CFO}_7 - \text{CFI}_7 + \text{CFF}_7\right] \\
& + \frac{1}{(1+0.065833)^8}\left[\text{CFO}_8 - \text{CFI}_8 + \text{CFF}_8\right] \\
& + \frac{FCFE_8(1+g)/(r-g)}{(1+0.065833)^8}
\end{aligned} \tag{6.2}$$

where:

PV = present value;
FCFE = free cash flows to equity;
r = cost of capital (in this case is k_e);
CFO_t = cash flows from operating activities in period t;

CFI_t = cash flows from (used by) investing activities in period *t*;
CFF_t = cash flows from financing activities in period *t*;
g = growth rate.[2]

6.2.2 Constraints

A. Definitional and accounting equation constraints
   a) Free cash flows to equity

Recalling Equation (4.3) in Chapter 4:

$$FCFE_t = CFO_t - CFI_t + CFFd_t$$

Bringing some variables as parameters to the left-hand side (LHS) and based on financial data of the company available in Appendix 1, the definitional constraints of FCFE for each of eight periods are as follows.

$$CFO_1 + CFI_1 + CFFd_1 = 1172.85 \quad (6.3)$$

$$CFO_2 + CFI_2 + CFFd_2 = 1452.87 \quad (6.4)$$

$$CFO_3 + CFI_3 + CFFd_3 = 1836.68 \quad (6.5)$$

$$CFO_4 + CFI_4 + CFFd_4 = 1058.50 \quad (6.6)$$

$$CFO_5 + CFI_5 + CFFd_5 = 2276.67 \quad (6.7)$$

$$CFO_6 + CFI_6 + CFFd_6 = 2580.66 \quad (6.8)$$

$$CFO_7 + CFI_7 + CFFd_7 = 2499.17 \quad (6.9)$$

$$CFO_8 + CFI_8 + CFFd_8 = 4537.90 \quad (6.10)$$

where:

$FCFE_t$ = free cash flows to equity in period *t;*
CFO_t = net cash flows from operating activities in period *t;*
$CFFd_t$ = net cash flows from debt-financing activities in period *t;*
CFI_t = net cash flows from (used by) investing activities (expected to be negative) in period *t.*

b) *Cash flows from operating activities*

Recalling Equation (4.5) in Chapter 4:

$$\text{CFO}_t = \text{CiFO}_t - \text{CoFO}_t$$

Then, from formula of CFO shown in Equation (4.13), bring some variables as parameters to the left-hand side (LHS):

$$\begin{aligned}\text{CFO}_t + \text{AR}_t + \text{COGS}_t + \text{Inv}_t - \text{AP}_t = {} & \overline{\text{Sales}}_t + \text{AR}_{(t-1)} \\ & + \text{Inv}_{(t-1)} - \text{AP}_{(t-1)} - \text{Opex}_t + \text{Noncashexp}_t \\ & - (\text{Prep}_t - \text{Prep}_{(t-1)}) + (\text{Accr}_t - \text{Accr}_{(t-1)}) \\ & - \text{Tax}_t + (\text{TP}_t - \text{TP}_{(t-1)}) - \text{Int}_t + (\text{IP}_t - \text{IP}_{(t-1)})\end{aligned} \quad (6.11)$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.11) for each of eight periods is as follows below. To accommodate the dynamic of the model, variables of AR, Inv, and AP from the (*t*–1) period are brought into the LHS of the model or in the model equations.

$$\text{CFO}_1 + \text{AR}_1 + \text{COGS}_1 + \text{Inv}_1 - \text{AP}_1 = 6473.89 \quad (6.12)$$

$$\text{CFO}_2 + \text{AR}_2 - \text{AR}_1 + \text{COGS}_2 + \text{Inv}_2 - \text{Inv}_1 - \text{AP}_2 + \text{AP}_1 = 6598.35 \quad (6.13)$$

$$\text{CFO}_3 + \text{AR}_3 - \text{AR}_2 + \text{COGS}_3 + \text{Inv}_3 - \text{Inv}_2 - \text{AP}_3 + \text{AP}_2 = 7984.77 \quad (6.14)$$

$$\text{CFO}_4 + \text{AR}_4 - \text{AR}_3 + \text{COGS}_4 + \text{Inv}_4 - \text{Inv}_3 - \text{AP}_4 + \text{AP}_3 = 8509.41 \quad (6.15)$$

$$\text{CFO}_5 + \text{AR}_5 - \text{AR}_4 + \text{COGS}_5 + \text{Inv}_5 - \text{Inv}_4 - \text{AP}_5 + \text{AP}_4 = 11149.55 \quad (6.16)$$

$$\text{CFO}_6 + \text{AR}_6 - \text{AR}_5 + \text{COGS}_6 + \text{Inv}_6 - \text{Inv}_5 - \text{AP}_6 + \text{AP}_5 = 12506.09 \quad (6.17)$$

$$\text{CFO}_7 + \text{AR}_7 - \text{AR}_6 + \text{COGS}_7 + \text{Inv}_7 - \text{Inv}_6 - \text{AP}_7 + \text{AP}_6 = 13258.20 \quad (6.18)$$

$$\text{CFO}_8 + \text{AR}_8 - \text{AR}_7 + \text{COGS}_8 + \text{Inv}_8 - \text{Inv}_7 - \text{AP}_8 + \text{AP}_7 = 17057.32 \quad (6.19)$$

where:

CFO_t = net cash flows from operating activities in period *t*;
COGS_t = cost of good sold in period *t*;

Inv_t = inventories in period *t*;
Inv_{t-1} = inventories in period (*t*–1);
AP_t = accounts payable in period *t*;
AP_{t-1} = accounts payable in period *t;*
Opex_t = operating expenses in period *t;*
Noncashexp_t = non-cash expenses, that is, depreciation and amortisation expenses in period *t;*
Prep_t = prepaid expenses in period *t*;
Prep_{t-1} = prepaid expenses in period (*t*–1);
Accr_t = accrued expenses in period *t;*
Accr_{t-1} = accrued payable in period (*t*–1);
Tax_t = current income tax expense in period *t*;
TP_t = tax payable in period *t*;
TP_{t-1} = tax payable in period (*t*–1);
Int_t = interest expense in period *t*;
IP_t = interest payable in period *t*;
IP_{t-1} = interest payable in period (*t*–1).

c) *Cash flows from (used by) investing activities*

Similar to CFO, some variables of CFI shown in Equations (4.14)–(4.21) are brought to the left-hand side (LHS) and, assuming that the company does invest in working capital and their fixed capital which means the cash outflow is bigger than the cash inflow and hence the amount is negative, the equation will be:

$$\begin{aligned}&\text{CFI}_t + \text{PPE}_t + \text{IA}_t + \text{LTI}_t = \text{PPE}_{t-1} + \text{IA}_{t-1} + \text{LTI}_{t-1} + \text{NCinv}_t \text{ in}\\ &\text{PPE} + \text{NCinv}_t \text{ in IA} + \text{NCinv}_t \text{ in LTI} - \text{NCdisp}_\text{t} \text{ in PPE} -\\ &\text{NCdisp}_t \text{ of IA} - \text{NCdisinv}_t \text{ of LTI} + \text{Lossdisp}_t \text{ PPE} -\\ &\text{Gaindisp}_t \text{ PPE} + \text{Lossdisinv}_t \text{ LTI} - \text{Gaindisinv}_t \text{ LTI} +\\ &\text{Lossdisp}_t \text{ IA} - \text{Gaindisp}_t \text{ IA} + \text{Accdepr}_t \text{ PPEdisp} +\\ &\text{Accamrt}_t \text{ IAdisp} + \text{Unamdisc}_t \text{ LTI} - \text{Unampre}_t \text{ LTI}\end{aligned} \tag{6.20}$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.20) for each of eight periods is as follows:

$$\text{CFI}_1 + \text{PPE}_1 + \text{IA}_1 + \text{LTI}_1 = 1105.38 \tag{6.21}$$

$$\text{CFI}_2 + \text{PPE}_2 + \text{IA}_2 + \text{LTI}_2 = 1282.79 \tag{6.22}$$

$$CFI_3 + PPE_3 + IA_3 + LTI_3 = 1386.54 \tag{6.23}$$

$$CFI_4 + PPE_4 + IA_4 + LTI_4 = 1008.29 \tag{6.24}$$

$$CFI_5 + PPE_5 + IA_5 + LTI_5 = 2050.76 \tag{6.25}$$

$$CFI_6 + PPE_6 + IA_6 + LTI_6 = 2335.87 \tag{6.26}$$

$$CFI_7 + PPE_7 + IA_7 + LTI_7 = 2838.75 \tag{6.27}$$

$$CFI_8 + PPE_8 + IA_8 + LTI_8 = 3881.17 \tag{6.28}$$

where:

CFI_t = net cash flows from investing activities in period *t*;
PPE_t = property, plant equipment in period *t*;
PPE_{t-1} = property, plant equipment in period (*t*–1);
$NCinv_t$in PPE = non-cash investment in PPE in period *t*;
$NCdisp_t$of PPE = non-cash disinvestment of PPE in period *t*;
$Lossdisp_t$PPE = loss on disinvestment of PPE in period *t;*
$Gaindisp_t$PPE = gain on disinvestment of PPE in period *t;*
$Accdepr_t$PPEdisp = accumulated depreciation of PPE disposed in period *t*;
IA_t = intangible assets in period *t*;
IA_{t-1} = intangible assets in period (*t*–1);
$NCinv_t$ in IA = non-cash investment in IA in period *t*;
$NCdisp_t$ in IA = non-cash disposal of IA in period *t*;
$Lossdisp_t$ IA = loss on disposal of IA in period *t*;
$Gaindisp_t$ IA = Gain on disposal of IA in period *t*;
$Accamrt_t$ IAdisp = accumulated amortisation of IA disposed in period *t*;
LTI_t = long-term investment in period *t;*
LTI_{t-1} = long-term investment in period(*t*–1);
$NCinv_t$ in LTI = non-cash investment in LTI in period *t*;
$NCdisp_t$ of LTI = non-cash disinvestment of LTI in period *t*;
$Lossdisinv_t$ LTI = Loss on disinvestment of LTI in period *t*;
$Gaindisinv_t$ LTI = gain on disinvestment of LTI in period *t*;
$Unamdisc_t$ LTI = unamortised discounts of LTI disposed in period *t*;
$Unampre_t$ LTI = unamortised premium of LTI disposed in period *t*.

d) *Cash flows from (used by) debt-financing activities*

Also, from formula of CFFd shown in Equations (4.23–4.25), bring some variables as parameters to the left-hand side (LHS); the equation will be:

$$\begin{aligned} CFFd_t - LTD_t = &- LTD_{(t-1)} - NCLTDiss_t - DiscLTD_t \\ &+ PremLTD_t + NCLTDred_t - GainLTDred_t \\ &+ LossLTDred_t + Unamdisc_tLTD - Unampre_tLTD \end{aligned} \tag{6.29}$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.29) for each of eight periods is as follows:

$$CFFd_1 - LTD_1 = 0 \tag{6.30}$$

$$CFFd_2 - LTD_2 = 0 \tag{6.31}$$

$$CFFd_3 - LTD_3 = 0 \tag{6.32}$$

$$CFFd_4 - LTD_4 = 0 \tag{6.33}$$

$$CFFd_5 - LTD_5 = 0 \tag{6.34}$$

$$CFFd_6 - LTD_6 = 0 \tag{6.35}$$

$$CFFd_7 - LTD_7 = 0 \tag{6.36}$$

$$CFFd_8 - LTD_8 = 0 \tag{6.37}$$

where:

$CFFd_t$ = net cash flows from debt-financing activities in period *t*;
LTD_t = in period *t;*
$LTD_{(t-1)}$ = in period *t;*
$NCLTDiss_t$ = non-cash long-term debt issuance in period *t;*
$DiscLTD_t$ = in period *t*;
$PremLTD_t$ = in period *t*;
$NCLTDred_t$ = non-cash long-term debt redemption in period *t;*
$GainLTDred_t$ = gain-extraordinary in long-term debt redemption in period *t*;
$LossLTDred_t$ = loss in long-term debt redemption in period *t*;

$\text{Unamdisc}_t\text{LTD}$ = unamortised discounts of LTD in LTD redemption in period *t*;
$\text{Unampre}_t\text{LTD}$ = unamortised premium of LTD in LTD redemption in period *t*.

B. Accounting policy constraints

a) *Accounting–tax difference (accounting for income tax): Effects of tax regulation*

Recalling Equations (4.34)–(4.37) in Chapter 4:

$$\text{NDE}_t \le x_{atd}\,\text{Totex}_t$$

$$\text{Totex}_t = \text{COGS}_t + \text{Opex}_t$$

$$x_{atd} = \text{Avg}\sum_{t=1}^{5}\frac{\text{NDE}}{\text{Totex}}$$

Bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\text{NDE}_t - x_{atd}\,\text{COGS}_t \le x_{atd}\,\text{Opex}_t \tag{6.38}$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.38), the NDE_t, for each of eight periods is as follows:

$$\text{NDE}_1 - 0.008905393\,\text{COGS}_1 \le 100.31 \tag{6.39}$$

$$\text{NDE}_2 - 0.007044321\,\text{COGS}_2 \le 91.77 \tag{6.40}$$

$$\text{NDE}_3 - 0.007069428\,\text{COGS}_3 \le 103.24 \tag{6.41}$$

$$\text{NDE}_4 - 0.009164743\,\text{COGS}_4 \le 146.77 \tag{6.42}$$

$$\text{NDE}_5 - 0.006990533\,\text{COGS}_5 \le 140.46 \tag{6.43}$$

$$\text{NDE}_6 - 0.00448583\,\text{COGS}_6 \le 104.20 \tag{6.44}$$

$$\text{NDE}_7 - 0.006686268\,\text{COGS}_7 \le 164.70 \tag{6.45}$$

$$NDE_8 - 0.004982067 COGS_8 \leq 146.85 \quad (6.46)$$

where:

NDE_t = non-deductible expenses in period *t*;
x_{atd} = proportion of non-deductible expenses in period *t*;
$Totex_t$ = total expenses in period *t;*
$COGS_t$ = cost of good sold in period *t;*
$Opex_t$ = operating expenses including adjustment from non-cash charge in period *t.*

C. Corporate governance policy: risk management, financial and investment policy constraints

a) *Liquidity risks and activity ratio*
   1) *Current ratio*

Recalling Equations (4.38)–(4.40) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\frac{CA_t}{CL_t} \geq x_{cr} \quad (6.47)$$

$$CA_t \geq x_{cr} CL_t \quad (6.48)$$

$$AR_t + Inv_t + (CA_t - AR_t - Inv_t) \geq x_{cr} \ (AP_t + (CL_t - AP_t)) \quad (6.49)$$

$$AR_t + Inv_t - x_{cr} (AP_t) \geq x_{cr} (CL_t - AP_t) - (CA_t - AR_t - Inv_t) \quad (6.50)$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.50) for each of eight periods is as follows:

$$AR_1 + Inv_1 - 1.6182302 (AP_1) \geq 507.03 \quad (6.51)$$

$$AR_2 + Inv_2 - 1.352235953 (AP_2) \geq 392.57 \quad (6.52)$$

$$AR_3 + Inv_3 - 1.265912044 (AP_3) \geq 527.75 \quad (6.53)$$

$$AR_4 + Inv_4 - 1.109771396 (AP_4) \geq 631.81 \quad (6.54)$$

$$AR_5 + Inv_5 - 1.003941625(AP_5) \geq 1139.44 \tag{6.55}$$

$$AR_6 + Inv_6 - 1.777025526\,(AP_6) \geq 57.36 \tag{6.56}$$

$$AR_7 + Inv_7 - 0.851278918\,(AP_7) \geq 1592.62 \tag{6.57}$$

$$AR_8 + Inv_8 - 0.686717808\,(AP_8) \geq 2217.25 \tag{6.58}$$

where:

CA_t = current assets in period t;
CL_t = current liabilities in period t;
x_{cr} = coefficient of current ratio based on historical data or industry;
AR_t = accounts receivable in period t;
Inv_t = inventories in period t;
AP_t = accounts payable in period t.

2) *Current cash debt coverage ratio*

Recalling Equations (4.41)–(4.43) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\frac{CFO_t}{(AP_t + (CL_t - AP_t))} \geq x_{cdcr} \tag{6.59}$$

$$CFO_t - x_{cdcr}(AP_1) \geq x_{cdcr}(CL_t - AP_t) \tag{6.60}$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.60) for each of eight periods is as follows:

$$CFO_1 - 1.149367465(AP_1) \geq 977.75 \tag{6.61}$$

$$CFO_2 - 1.109391702\,(AP_2) \geq 984.25 \tag{6.62}$$

$$CFO_3 - 1.057039998(AP_3) \geq 1432.61 \tag{6.63}$$

$$CFO_4 - 0.926645136(AP_4) \geq 1449.25 \tag{6.64}$$

$$CFO_5 - 0.901224511(AP_5) \geq 1797.44 \tag{6.65}$$

$$CFO_6 - 1.619961307(AP_6) \geq 964.67 \tag{6.66}$$

$$CFO_7 - 0.821993713(AP_7) \geq 2123.49 \tag{6.67}$$

$$CFO_8 - 0.843585868(AP_8) \geq 3408.37 \tag{6.68}$$

where:

CFO_t = current cash flows from operating activities in period t;
CL_t = current liabilities in period t;
X_{cdcr} = coefficient of current cash debt coverage ratio based on historical data or industry;
AP_t = accounts payable in period t.

3) *Liquidity ratio: receivables*

Recalling Equations (4.44)–(4.47) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\frac{Sales_t}{\overline{AR}_t} \geq x_{lr} \tag{6.69}$$

$$x_{lr}(\overline{AR}_t) \leq Sales_t \tag{6.70}$$

where:

$Sales_t$ = net sales in period t;
AR_t = net accounts receivable in period t;
X_{lr} = coefficient of liquidity (receivables) ratio based on historical data or industry.

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.70) for each of eight periods is as follows:

$$18.14943228 \ AR_1 \leq 8984.82 \tag{6.71}$$

$$21.85759723 \ AR_2 \leq 9992.14 \tag{6.72}$$

$$17.35321422\ AR_3 \leq 11335.24 \tag{6.73}$$

$$17.10608447\ AR_4 \leq 12544.90 \tag{6.74}$$

$$16.33212419\ AR_5 \leq 15609.84 \tag{6.75}$$

$$14.50557865\ AR_6 \leq 18246.87 \tag{6.76}$$

$$12.56125147\ AR_7 \leq 19690.24 \tag{6.77}$$

$$11.30456634\ AR_8 \leq 23469.22 \tag{6.78}$$

4) *Liquidity of inventory*

Recalling Equations (4.48)–(4.51) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\frac{COGS_t}{Inv_t} \geq x_{li} \tag{6.79}$$

$$COGS_t - x_{li}\ (Inv_t) \geq 0 \tag{6.80}$$

where:

$COGS_t$ = cost of good sold in period *t;*
Inv_t = inventory (average) in period *t*;
X_{li} = coefficient of liquidity (inventory) ratio based on historical data or industry.

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.80) for each of eight periods is as follows:

$$COGS_1 - 6.862516817\ Inv_1 \geq 0 \tag{6.81}$$

$$COGS_2 - 6.613350285\ Inv_2 \geq 0 \tag{6.82}$$

$$COGS_3 - 7.472429847\ Inv_3 \geq 0 \tag{6.83}$$

$$COGS_4 - 7.28566597\ Inv_4 \geq 0 \tag{6.84}$$

$$\text{COGS}_5 - 6.185823631\ \text{Inv}_5 \geq 0 \tag{6.85}$$

$$\text{COGS}_6 - 6.866142402\ \text{Inv}_6 \geq 0 \tag{6.86}$$

$$\text{COGS}_7 - 6.025992656\ \text{Inv}_7 \geq 0 \tag{6.87}$$

$$\text{COGS}_8 - 6.3231863495\text{Inv}_8 \geq 0 \tag{6.88}$$

5) *Assets turnover*

Recalling Equations (4.52)–(4.55) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\frac{\text{Sales}_t}{\text{TA}_t} \geq x_{at} \tag{6.89}$$

$$\text{Sales}_t \geq x_{at}\ \text{TA}_t \tag{6.90}$$

$$x_{at}\ \text{TA}_t \leq \text{Sales}_t \tag{6.91}$$

$$x_{at}(\text{AR}_t) + x_{at}(\text{Inv}_t) + x_{at}(PPE_t) + x_{at}(\text{TA}_t - \text{AR}_\text{t} - \text{Inv}_t - \text{PPE}_t) \leq \text{Sales}_t \tag{6.92}$$

$$x_{at}(\text{AR}_t) + x_{at}(\text{Inv}_t) + x_{at}(\text{PPE}_t) \leq \text{Sales}_t - x(\text{TA}_t - \text{AR}_t - \text{Inv}_t - \text{PPE}_t) \tag{6.93}$$

where:

Sales_t = net sales in period *t;*
TA_t = total assets in period *t*;
x_{at} = coefficient of assets turnover ratio based on historical data or industry;
AR_t = accounts receivable in period *t*;
Inv_t = inventories in period *t*;
PPE_t = property, plant and equipment in period *t*.

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.93) for each of eight periods is as follows:

$$2.452384182\ (\text{AR}_1 + \text{Inv}_1 + \text{PPE}_1) \leq 6062.968104 \tag{6.94}$$

$$2.600526344\ (\text{AR}_2 + \text{Inv}_2 + \text{PPE}_2) \leq 7070.537271 \tag{6.95}$$

$$2.450333117\ (\text{AR}_3 + \text{Inv}_3 + \text{PPE}_3) \leq 7697.15301 \tag{6.96}$$

$$2.352136890\ (\mathrm{AR}_4 + \mathrm{Inv}_4 + \mathrm{PPE}_4) \leq 8916.085362 \tag{6.97}$$

$$2.399764725\ (\mathrm{AR}_5 + \mathrm{Inv}_5 + \mathrm{PPE}_5) \leq 11519.61221 \tag{6.98}$$

$$2.437795107\ (\mathrm{AR}_6 + \mathrm{Inv}_6 + \mathrm{PPE}_6) \leq 13734.2256 \tag{6.99}$$

$$2.262917609\ (\mathrm{AR}_7 + \mathrm{Inv}_7 + \mathrm{PPE}_7) \leq 16497.52023 \tag{6.100}$$

$$2.238935265\ (\mathrm{AR}_8 + \mathrm{Inv}_8 + \mathrm{PPE}_8) \leq 20605.40262 \tag{6.101}$$

b) *Financial Distress and Bankruptcy Risk*

1) *Leverage policy*

Recalling Equations (4.56)–(4.58) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\frac{\mathrm{TD_t}}{\mathrm{TA_t}} \leq x_{lev} \tag{6.102}$$

$$TD_t \leq x_{lev} TA_t \tag{6.103}$$

$$\begin{aligned} &\mathrm{AP}_t + \mathrm{LTD}_t + (\mathrm{TD}_t - \mathrm{AP}_t - \mathrm{LTD}_t) \\ &\qquad \leq x_{lev}(\mathrm{AR}_t + \mathrm{Inv}_t + \mathrm{PPE}_t + (\mathrm{TA}_t - \mathrm{AR}_t - \mathrm{Inv}_t - \mathrm{PPE}_t)) \end{aligned} \tag{6.104}$$

$$\begin{aligned} &\mathrm{AP}_t + \mathrm{LTD}_t - x_{lev}(\mathrm{AR}_t) - x_{lev}(\mathrm{Inv}_t) - x_{lev}(\mathrm{PPE}_t) \\ &\qquad \leq x_{lev}(\mathrm{TA}_t - \mathrm{AR}_t - \mathrm{Inv}_t - \mathrm{PPE}_t) - (\mathrm{TD}_t - \mathrm{AP}_t - \mathrm{LTD}_t) \end{aligned} \tag{6.105}$$

where:

TD_t = total debt in period t;
TA_t = total assets in period t;
x_{lev} = coefficient of leverage ratio based on historical data or industry;
AP_t = accounts payable in period t;
LTD_t = long-term debts in period t;
AR_t = accounts receivable in period t;
Inv_t = inventory in period t;
PPE_t = property, plant and equipment in period t.

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.105) for each of eight periods is as follows:

$$-AP_1 - LTD_1 + 0.373125977\,(AR_1 + Inv_1 + PPE_1) \geq 541.2840247 \quad (6.106)$$

$$-AP_2 - LTD_2 + 0.434323933\,(AR_2 + Inv_2 + PPE_2) \geq 566.5916964 \quad (6.107)$$

$$-AP_3 - LTD_3 + 0.487996757\,(AR_3 + Inv_3 + PPE_3) \geq 830.7845983 \quad (6.108)$$

$$-AP_4 - LTD_4 + 0.49523044\,(AR_4 + Inv_4 + PPE_4) \geq 1013.087353 \quad (6.109)$$

$$-AP_5 - LTD_5 + 0.523376199\,(AR_5 + Inv_5 + PPE_5) \geq 1415.694476 \quad (6.110)$$

$$-AP_6 - LTD_6 + 0.505300742\,(AR_6 + Inv_6 + PPE_6) \geq 1417.108701 \quad (6.\ 111)$$

$$-AP_7 - LTD_7 + 0.535076751\,(AR_7 + Inv_7 + PPE_7) \geq 2081.317703 \quad (6.\ 112)$$

$$-AP_8 - LTD_8 + 0.648843022\,(AR_8 + Inv_8 + PPE_8) \geq 3537.181837 \quad (6.113)$$

2) *Bankruptcy risk: Z-scores*

Recalling Equations (4.59)–(4.62) in Chapter 4, and for this study case is the emerging market company, therefore the relevant formula is:

$$Z_{em} = 6.56\frac{WC}{TA} + 3.26\frac{RE}{TA} + 6.72\frac{OpInc}{TA} + 1.05\frac{BV\ Eq}{TL} + 3.25$$

Having the safety zone more than 5.85 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$6.56\frac{WC}{TA} + 3.26\frac{RE}{TA} + 6.72\frac{OpInc}{TA} + 1.05\frac{BV\,Eq}{TL} + 3.25 \geq 5.85 \quad (6.114)$$

$$\frac{6.56WC + 3.26RE + 6.72OpInc}{TA} + \frac{1.05BV\,Eq}{TL} \geq 5.85 - 3.25 \quad (6.115)$$

$$\frac{6.56WC + 3.26RE + 6.72OpInc}{TA} \geq 2.60 - \frac{1.05BV\,Eq}{TL} \quad (6.116)$$

$$\frac{6.56\ (\mathrm{CA}-\mathrm{CL})+3.26\mathrm{RE}+6.72\ (\mathrm{Sales}-\mathrm{COGS}-\mathrm{Opex})}{\mathrm{TA}} \geq 2.60-\frac{1.05\mathrm{BV\,Eq}}{\mathrm{TL}} \tag{6.117}$$

$$\frac{6.56\ ((\mathrm{AR}+\mathrm{Inv}+(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})-(\mathrm{AP}+(\mathrm{CL}-\mathrm{AP}))}{\mathrm{TA}}+\frac{3.26\mathrm{RE}}{\mathrm{TA}} + \frac{6.72\ (\mathrm{Sales}-\mathrm{COGS}-\mathrm{Opex})}{\mathrm{TA}} \geq 2.60-\frac{1.05\,\mathrm{BV\,Eq}}{\mathrm{TL}} \tag{6.118}$$

$$\frac{6.56\ ((\mathrm{AR}+\mathrm{Inv}+(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})-(\mathrm{AP}+(\mathrm{CL}-\mathrm{AP}))}{\mathrm{TA}}+\frac{3.26\mathrm{RE}}{\mathrm{TA}} + \frac{6.72(\mathrm{Sales}-\mathrm{COGS}-\mathrm{Opex})}{\mathrm{TA}} \geq 2.60-\frac{1.05(\mathrm{BV\,Eq})}{\mathrm{TL}} \tag{6.119}$$

$$6.56((\mathrm{AR}+\mathrm{Inv}+(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})-(\mathrm{AP}+(\mathrm{CL}-\mathrm{AP}))+3.26\mathrm{RE} +6.72(\mathrm{Sales}-\mathrm{COGS}-\mathrm{Opex}) \geq 2.60(\mathrm{TA})-\frac{1.05(\mathrm{BV\,Eq})(\mathrm{TA})}{\mathrm{TL}} \tag{6.120}$$

$$\begin{aligned}&6.56((\mathrm{AR}+\mathrm{Inv}+(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})-(\mathrm{AP}\\ &\quad+(\mathrm{CL}-\mathrm{AP}))+3.26\mathrm{RE}+6.72(\mathrm{Sales}-\mathrm{COGS}-\mathrm{Opex})\\ &\quad\geq 2.60(\mathrm{CA}+\mathrm{CL}+(\mathrm{TA}-\mathrm{CA}-\mathrm{CL}))-\frac{1.05(\mathrm{BV\,Eq})(\mathrm{TA})}{\mathrm{TL}}\end{aligned} \tag{6.121}$$

$$\begin{aligned}&6.56\ ((\mathrm{AR}+\mathrm{Inv}+(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})-(\mathrm{AP}\\ &\quad+(\mathrm{CL}-\mathrm{AP}))+3.26\mathrm{RE}+6.72(\mathrm{Sales}-\mathrm{COGS}-\mathrm{Opex})\\ &\quad\geq 2.60((\mathrm{AR}+\mathrm{Inv}+(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})+(\mathrm{AP}+(\mathrm{CL}-\mathrm{AP})\\ &\quad+(\mathrm{TA}-\mathrm{CA}-\mathrm{CL}))-\frac{1.05(\mathrm{BV\,Eq})(\mathrm{TA})}{\mathrm{TL}}\end{aligned} \tag{6.122}$$

$$\begin{aligned}&6.56\mathrm{AR}+6.56\mathrm{Inv}-6.56\mathrm{AP}-6.72\,\mathrm{COGS}\\ &\quad-2.60\mathrm{AR}-2.60\mathrm{Inv}-2.60\mathrm{AP}\geq 2.60((\mathrm{CA}-\mathrm{AR}\\ &\quad-\mathrm{Inv})+(\mathrm{CL}-\mathrm{AP})+(\mathrm{TA}-\mathrm{CA}-\mathrm{CL}))\\ &\quad-\frac{1.05(\mathrm{BV\,Eq})(\mathrm{TA})}{\mathrm{TL}}-6.56(\mathrm{CA}-\mathrm{AR}-\mathrm{Inv})\\ &\quad+6.56\,(\mathrm{CL}-\mathrm{AP})-3.26\mathrm{RE}+6.72\ (\mathrm{Sales}-\mathrm{Opex})\end{aligned} \tag{6.123}$$

$$\begin{aligned}
&3.96\text{AR} + 3.96\text{Inv} - 9.16\text{AP} - 6.72\,\text{COGS} \\
&\quad \geq 2.60((\text{CA} - \text{AR} - \text{Inv}) + (\text{CL} - \text{AP}) \\
&\quad + (\text{TA} - \text{CA} - \text{CL})) - \frac{1.05(\text{BV Eq})(\text{TA})}{\text{TL}} \\
&\quad - 6.56(\text{CA} - \text{AR} - \text{Inv}) + 6.56\,(\text{CL} - \text{AP}) \\
&\quad - 3.26\text{RE} + 6.72\,(\text{Sales} - \text{Opex})
\end{aligned} \tag{6.124}$$

where:

WC = working capital;
RE = retained earnings;
BV Eq = book value of equity;
OpInc = operating income;
TA = total assets;
TL = total liabilities;
CA = current assets;
AR = accounts receivable;
Inv = inventories;
CL = current liabilities;
AP = accounts payable.

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.124) for each of eight periods is as follows:

$$-3.96\text{AR}_1 - 3.96\text{Inv}_1 + 9.16\text{AP}_1 + 6.72\,\text{COGS}_1 \leq 28040.14 \tag{6.125}$$

$$-3.96\text{AR}_2 - 3.96\text{Inv}_2 + 9.16\text{AP}_2 + 6.72\,\text{COGS}_2 \leq 34828.83 \tag{6.126}$$

$$-3.96\text{AR}_3 - 3.96\text{Inv}_3 + 9.16\text{AP}_3 + 6.72\,\text{COGS}_3 \leq 39155.71 \tag{6.127}$$

$$-3.96\text{AR}_4 - 3.96\text{Inv}_4 + 9.16\text{AP}_4 + 6.72\,\text{COGS}_4 \leq 43597.06 \tag{6.128}$$

$$-3.96\text{AR}_5 - 3.96\text{Inv}_5 + 9.16\text{AP}_5 + 6.72\,\text{COGS}_5 \leq 54575.06 \tag{6.129}$$

$$-3.96\text{AR}_6 - 3.96\text{Inv}_6 + 9.16\text{AP}_6 + 6.72\,\text{COGS}_6 \leq 64637.96 \tag{6.130}$$

$$-3.96\text{AR}_7 - 3.96\text{Inv}_7 + 9.16\text{AP}_7 + 6.72\,\text{COGS}_7 \leq 67967.79 \tag{6.131}$$

$$-3.96\text{AR}_8 - 3.96\text{Inv}_8 + 9.16\text{AP}_8 + 6.72\,\text{COGS}_8 \leq 83927.81 \tag{6.132}$$

3) *Debt-service coverage*

Recalling Equations (4.63)–(4.65) in Chapter 4 and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\overline{\mathrm{CFO}_t} \geq x_{dsc}\,\mathrm{int}_t + x_{dsc}\left(\frac{\mathrm{COD}_t}{(1-\tau)}\right) \tag{6.133}$$

Recall Equation (4.64):

$$\overline{\mathrm{CFO}_t} = \mathrm{CFO}_t + \mathrm{Tax}_t - (\mathrm{TP}_t - \mathrm{TP}_{(t-1)}) + \mathrm{int}_t - (\mathrm{IP}_t - \mathrm{IP}_{(t-1)})$$

Therefore:

$$\mathrm{CFO}_t - x_{dsc}\left(\frac{\mathrm{COD}_t}{(1-\tau)}\right) \geq (1-x)\mathrm{int}_t - \mathrm{Tax}_t + (\mathrm{TP}_t - \mathrm{TP}_{(t-1)}) + (\mathrm{IP}_t - \mathrm{IP}_{(t-1)}) \tag{6.134}$$

while

$$x_{dsc} = \mathrm{DsC}_t = \frac{\overline{\mathrm{CFO}_t}}{\mathrm{int}_t + \dfrac{\mathrm{COD}_t}{(1-\tau)}}$$

where:

τ = company's income tax rate;
Tax_t = current income tax expense in period *t*;
TP_t = tax payable in period *t*;
TP_{t-1} = tax payable in period *(t–1)*;
int_t = interest expense in period *t*;
IP_t = interest payable in period *t*;
$\mathrm{IP}_{(t-1)}$ = interest payable in period *(t–1)*.

Inserting the right-hand side (RHS) financial data available in Appendix 1, and τ = 35%, the Equation (6.134) for each of eight periods is presented below. Because the company does not rely on long-term debt financing, there is no interest expense or cash outflows for debt principal, hence the denominator of x_{dsc} is zero. In this case, this constraint is not applicable for the sample of this study.

$$\mathrm{CFO}_1 - 1.54x\mathrm{COD}_1 \geq \mathrm{N/A} \tag{6.135}$$

$$\mathrm{CFO}_2 - 1.54x\mathrm{COD}_3 \geq \mathrm{N/A} \tag{6.136}$$

$$\mathrm{CFO}_3 - 1.54x\mathrm{COD}_3 \geq \mathrm{N/A} \tag{6.137}$$

$$\mathrm{CFO}_4 - 1.54x\mathrm{COD}_4 \geq \mathrm{N/A} \tag{6.138}$$

$$\mathrm{CFO}_5 - 1.54x\mathrm{COD}_5 \geq \mathrm{N/A} \tag{6.139}$$

$$\mathrm{CFO}_6 - 1.54x\mathrm{COD}_3 \geq \mathrm{N/A} \tag{6.140}$$

$$\mathrm{CFO}_7 - 1.54x\mathrm{COD}_3 \geq \mathrm{N/A} \tag{6.141}$$

$$\mathrm{CFO}_8 - 1.54x\mathrm{COD}_8 \geq \mathrm{N/A} \tag{6.142}$$

4) *Investment policy*

Capital expenditure

Recalling Equations (4.66)–(4.71) in Chapter 4:

$$\Delta \text{PPE}_t = \frac{\text{PPE}_t - \text{PPE}_{(t-1)}}{\text{PPE}_{(t-1)}}$$

$$\Delta \text{Sales}_t = \frac{\text{Sales}_t - \text{Sales}_{(t-1)}}{\text{Sales}_{(t-1)}}$$

$$\alpha_{PPEt} = \frac{\Delta \text{PPE}_t}{\Delta \text{Sales}_t}$$

$$\bar{\alpha}_{\text{PPE}} = \sum_{t=0}^{T=5} \frac{\Delta \text{PPE}}{\Delta \text{Sales}}$$

$$\Delta \text{PPE}_t \leq \bar{\alpha}_{PPE}(\Delta \text{Sales}_t)$$

where:

ΔPPE_t = changes in period t;
PPE_t = amount of PPE in period t;
$\text{PPE}_{(t-1)}$ = amount of PPE in period (t–1);
ΔSales_t = changes in net sales in period t;
Sales_t = amount of Sales in period t;
$\text{Sales}_{(t-1)}$ = net sales in period (t–1);
α_{PPEt} = percentage of PPE's growth to sales' growth in period t;
$\bar{\alpha}_{PPE}$ = percentage on average of PPE's growth to sales' growth in the last five years;
$\bar{\alpha}_s$ = sales' growth on average in the last five years.

Bringing PPE_t as parameters to the left-hand side (LHS), the equation will be:

$$\frac{\text{PPE}_t - \text{PPE}_{(t-1)}}{\text{PPE}_{(t-1)}} \leq \bar{\alpha}_{PPE}\,(\Delta \text{Sales}_t) \tag{6.143}$$

$$\text{PPE}_t - \text{PPE}_{(t-1)} \leq \bar{\alpha}_{PPE}(\Delta \text{Sales}_t)(\text{PPE}_{(t-1)}) \qquad \text{(6.1434}$$

$$\frac{\text{PPE}_t}{(1+\bar{\alpha}_{PPE}(\Delta \text{Sales}_t)} \leq (\text{PPE}_{(t-1)}) \tag{6.145}$$

Since the industry data are inaccessible, the five-year average industry data are replaced by a five-year historical company data. Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.145) for each of eight periods is as follows:

Lower bounds

$$PPE_1 \geq 876.48 \tag{6.146}$$

$$PPE_2 \geq 1348.40 \tag{6.147}$$

$$PPE_3 \geq 1495.66 \tag{6.148}$$

$$PPE_4 \geq 1724.66 \tag{6.149}$$

$$PPE_5 \geq 2199.81 \tag{6.150}$$

$$PPE_6 \geq 2559.88 \tag{6.151}$$

$$PPE_7 \geq 3035.92 \tag{6.152}$$

$$PPE_8 \geq 4148.78 \tag{6.153}$$

Upper bounds

$$0.8687PPE_1 \leq 1171.39 \tag{6.154}$$

$$0.8725PPE_2 \leq 1304.97 \tag{6.155}$$

$$0.8591PPE_3 \leq 1481.69 \tag{6.156}$$

$$0.8572PPE_4 \leq 1885.65 \tag{6.157}$$

$$0.7685PPE_5 \leq 1967.34 \tag{6.158}$$

$$0.8577PPE_6 \leq 2603.98 \tag{6.159}$$

$$0.9037PPE_7 \leq 3749.32 \tag{6.160}$$

$$0.8065PPE_8 \leq 4285.89 \tag{6.161}$$

Available funds for investments

Recall Equations (4.74) and (4.75):

$$-\text{CFI}_t \leq \text{CFO}_t + \text{CFF}_t$$
$$\text{CoFI}_t - \text{CiFI}_t \leq \text{CFO}_t + \text{CFF}_t$$

From Equation (6.11):

$$\begin{aligned}\text{CFO}_t = & -\text{AR}_t - \text{COGS}_t - \text{Inv}_t + \text{AP}_t + \overline{\text{Sales}}_t + \text{AR}_{(t-1)} + \text{Inv}_{(t-1)}) \\ & - \text{AP}_{(t-1)} - \text{Opex}_t - (\text{Prep}_t - \text{Prep}_{(t-1)}) + (\text{Accr}_t - \text{Accr}_{(t-1)}) \\ & - \text{Tax}_t + (\text{TP}_t - \text{TP}_{(t-1)}) - \text{Int}_t + (\text{IP}_t - \text{IP}_{(t-1)}) + \text{Noncashexp}_t\end{aligned}$$

where:

CFO_t = net cash flows from operating activities in period
COGS_t = cost of good sold in period *t*;
Inv_t = inventories is period *t*;
Inv_{t-1} = inventories in period (*t*–1);
AP_t = accounts payable in period *t;*
AP_{t-1} = accounts payable in period (*t*–1);
Opex_t = operating expenses in period *t*
Noncashexp_t = non-cash expenses, that is, depreciation and amortisation expenses in period *t;*
Prep_t = prepaid expenses in period *t;*
Prep_{t-1} = prepaid expenses in period (*t*–1);
Accr_t = accrued expenses in period *t*;
Accr_{t-1} = accrued payable in period (*t*–1);
Tax_t = current income tax expense in period *t*;
TP_t = tax payable in period *t;*
TP_{t-1} = tax payable in period (*t*–1);
Int_t = interest expense in period *t*;
IP_t = interest payable in period *t*;
$\text{IP}_{(t-1)}$ = interest payable in period (*t*–1).
Int_t = interest expense in period *t*;
IP_t = interest payable in period *t*;
$\text{IP}_{(t-1)}$ = interest payable in period (*t*–1).

And from Equation (6.29):

$$\begin{aligned}\mathrm{CFFd}_t &= \mathrm{LTD}_t - \mathrm{LTD}_{(t-1)} - \mathrm{NCLTDiss}_t - \mathrm{DiscLTD}_t \\ &\quad + \mathrm{PremLTD}_t + \mathrm{NCLTDred}_t - \mathrm{GainLTDred}_t \\ &\quad + \mathrm{LossLTDred}_t + \mathrm{Unamdisc}_t\mathrm{LTD} - \mathrm{Unampre}_t\mathrm{LTD}\end{aligned}$$

where:

CFFd_t = net cash flows from debt-financing activities in period *t*;
LTD_t = long-term debt in period *t*;
$\mathrm{LTD}_{(t\text{-}1)}$ = long-term debt in period (*t*–1);
$\mathrm{NCLTDiss}_t$ = non-cash long-term debt issuance in period *t*;
$\mathrm{DiscLTD}_t$ = discounts of long-term debt in period *t*;
$\mathrm{PremLTD}_t$ = premiums of long-term debt in period *t*;
$\mathrm{NCLTDred}_t$ = non-cash long-term debt redemption in period *t*;
$\mathrm{GainLTDred}_t$ = gain-extraordinary in long-term debt redemption in period *t*;
$\mathrm{LossLTDred}_\mathrm{t}$ = loss in long-term debt redemption in period *t*;
$\mathrm{Unamdisc}_\mathrm{t}\mathrm{LTD}$ = unamortised discounts of LTD in LTD redemption in period *t*;
$\mathrm{Unampre}_\mathrm{t}\mathrm{LTD}$ = unamortised premium of LTD in LTD redemption in period *t*.

Inserting Equations (6.11) and (6.29) and bringing some variables as parameters to the left-hand side (LHS), the equation will be:

$$\begin{aligned}&-\mathrm{CFI}_t + \mathrm{AR}_t + \mathrm{COGS}_t + \mathrm{Inv}_t - \mathrm{AP}_t - \mathrm{LTD}_t \le \overline{\mathrm{Sales}}_\mathrm{t} + \mathrm{AR}_{(t-1)} + \mathrm{Inv}_{(t-1)} \\ &- \mathrm{AP}_{(t-1)} - \mathrm{Opex}_t - (\mathrm{Prep}_t - \mathrm{Prep}_{(t-1)}) + (\mathrm{Accr}_t - \mathrm{Accr}_{(t-1)}) \\ &\quad - \mathrm{Tax}_t + (\mathrm{TP}_t - \mathrm{TP}_{(t-1)}) - \mathrm{Int}_t + (\mathrm{IP}_t - \mathrm{IP}_{(t-1)}) + \mathrm{Noncashexp}_t \\ &- \mathrm{LTD}_{(t-1)} - \mathrm{NCLTDiss}_t - \mathrm{DiscLTD}_t + \mathrm{PremLTD}_t + \mathrm{NCLTDred}_t \\ &- \mathrm{GainLTDred}_\mathrm{t} + \mathrm{LossLTDred}_\mathrm{t} + \mathrm{Unamdisc}_\mathrm{t}\mathrm{LTD} - \mathrm{Unampre}_\mathrm{t}\mathrm{LTD}\end{aligned} \tag{6.162}$$

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (6.162) for each of eight periods is as follows:

$$-\mathrm{CFI}_1 + \mathrm{AR}_1 + \mathrm{COGS}_1 + \mathrm{Inv}_1 - \mathrm{AP}_1 - \mathrm{LTD}_1 \le 3815.66 \tag{6.163}$$

$$-\mathrm{CFI}_2 + \mathrm{AR}_2 + \mathrm{COGS}_2 + \mathrm{Inv}_2 - \mathrm{AP}_2 - \mathrm{LTD}_2 \le 4670.29 \tag{6.164}$$

$$-\mathrm{CFI}_3 + \mathrm{AR}_3 + \mathrm{COGS}_3 + \mathrm{Inv}_3 - \mathrm{AP}_3 - \mathrm{LTD}_3 \le 5328.10 \tag{6.165}$$

$$-\mathrm{CFI}_4 + \mathrm{AR}_4 + \mathrm{COGS}_4 + \mathrm{Inv}_4 - \mathrm{AP}_4 - \mathrm{LTD}_4 \leq 6712.03 \tag{6.166}$$

$$-\mathrm{CFI}_5 + \mathrm{AR}_5 + \mathrm{COGS}_5 + \mathrm{Inv}_5 - \mathrm{AP}_5 - \mathrm{LTD}_5 \leq 7312.03 \tag{6.167}$$

$$-\mathrm{CFI}_6 + \mathrm{AR}_6 + \mathrm{COGS}_6 + \mathrm{Inv}_6 - \mathrm{AP}_6 - \mathrm{LTD}_6 \leq 8732.66 \tag{6.168}$$

$$-\mathrm{CFI}_7 + \mathrm{AR}_7 + \mathrm{COGS}_7 + \mathrm{Inv}_7 - \mathrm{AP}_7 - \mathrm{LTD}_7 \leq 9473.29 \tag{6.169}$$

$$-\mathrm{CFI}_8 + \mathrm{AR}_8 + \mathrm{COGS}_8 + \mathrm{Inv}_8 - \mathrm{AP}_8 - \mathrm{LTD}_8 \leq 11441.30 \tag{6.170}$$

D. Other corporate governance policy: compensation for executives

It was discussed in Chapter 4 that calculation for executive compensation is complex. For the purpose of this book, benchmarking to the current practice of some companies' executive compensation is used. Based on the current practice, the executive compensation is calculated based on 0.05% of company's performance such as net income, revenue, and so forth. In this case study, the performance is measured on the proxy of company's objective (FCFE).
Recalling Equations (4.77)–(4.81) in Chapter 4:

$$\mathrm{TRe}x_t = \alpha\,\mathrm{FCFE}_t$$

$$\mathrm{TRe}x_t = \alpha\ (\mathrm{CFO}_t - \mathrm{CFI}_t + \mathrm{CFF}_t)$$

$$\mathrm{TRex}_t = \mathrm{Rexm}_t + \mathrm{Rexx}_t$$

$$\mathrm{Rexm}_t = \alpha_{\mathrm{m}}\ (\mathrm{CFO}_t - \mathrm{CFI}_t + \mathrm{CFF}_t)$$

where:

TRex_t = total remuneration expenses in period t;
Rexm_t = remuneration expenses for employees in period t;
Rexx_t = remuneration expenses for executives in period t;
α_m = portion of remuneration expense for employees;
α_{x} = portion of remuneration expense for executives.

Inserting the right-hand side (RHS) financial data available in Appendix 1, the Equation (4.81) for each of eight periods is as follows:

Lower bounds

$$\mathrm{Rexx}_1 - 0.05895\%\ (\mathrm{CFO}_t - \mathrm{CFI}_t + \mathrm{CFF}_t) \geq 0 \tag{6.171}$$

$$\text{Rexx}_2 - 0.05548\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.172}$$

$$\text{Rexx}_3 - 0.05315\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.173}$$

$$\text{Rexx}_4 - 0.06022\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.174}$$

$$\text{Rexx}_5 - 0.05658\% \ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.175}$$

$$\text{Rexx}_6 - 0.05211\% \ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.176}$$

$$\text{Rexx}_7 - 0.05193\% \ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.177}$$

$$\text{Rexx}_8 - 0.04820\% \ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{6.178}$$

Upper bounds

$$0.14738\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_1 \geq 0 \tag{6.179}$$

$$0.13870\% \ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_2 \geq 0 \tag{6.180}$$

$$0.13289\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_3 \geq 0 \tag{6.181}$$

$$0.15054\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_4 \geq 0 \tag{6.182}$$

$$0.14146\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_5 \geq 0 \tag{6.183}$$

$$0.13029\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_6 \geq 0 \tag{6.184}$$

$$0.12983\% \ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_7 \geq 0 \tag{6.185}$$

$$0.12049\%(\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_8 \geq 0 \tag{6.186}$$

6.2.3 Summary of the model

A. Objective function

$$\begin{aligned} \text{Max PV of} \sum_{t=1}^{T=8} \text{FCFE} = {} & \frac{1}{(1+0.073994)^1}\left[\text{CFO}_1 - \text{CFI}_1 + \text{CFF}_1\right] \\ & + \frac{1}{(1+0.090581)^2}\left[\text{CFO}_2 - \text{CFI}_2 + \text{CFF}_2\right] \\ & + \frac{1}{(1+0.118333)^3}\left[\text{CFO}_3 - \text{CFI}_3 + \text{CFF}_3\right] \end{aligned}$$

$$
\begin{aligned}
&+\frac{1}{(1+0.086042)^4}\left[\mathrm{CFO}_4-\mathrm{CFI}_4+\mathrm{CFF}_4\right]\\
&+\frac{1}{(1+0.086667)^5}\left[\mathrm{CFO}_5-\mathrm{CFI}_5+\mathrm{CFF}_5\right]\\
&+\frac{1}{(1+0.071458)^6}\left[\mathrm{CFO}_6-\mathrm{CFI}_6+\mathrm{CFF}_6\right]\\
&+\frac{1}{(1+0.065)^7}\left[\mathrm{CFO}_7-\mathrm{CFI}_7+\mathrm{CFF}_7\right]\\
&+\frac{1}{(1+0.065833)^8}\left[\mathrm{CFO}_8-\mathrm{CFI}_8+\mathrm{CFF}_8\right]\\
&+\frac{\mathrm{FCFE}_8(1+g)/(\mathrm{r}-g)}{(1+0.065833)^8}
\end{aligned}
\tag{1}
$$

B. Constraints

1. Definitional and accounting equation constraints

   1) *Free cash flows to equity*

$$\mathrm{CFO}_1 + \mathrm{CFI}_1 + \mathrm{CFFd}_1 = 1172.85 \tag{2}$$

$$\mathrm{CFO}_2 + \mathrm{CFI}_2 + \mathrm{CFFd}_1 = 1457.87 \tag{3}$$

$$\mathrm{CFO}_3 + \mathrm{CFI}_3 + \mathrm{CFFd}_1 = 1836.68 \tag{4}$$

$$\mathrm{CFO}_4 + \mathrm{CFI}_4 + \mathrm{CFFd}_1 = 1058.50 \tag{5}$$

$$\mathrm{CFO}_5 + \mathrm{CFI}_5 + \mathrm{CFFd}_1 = 2276.67 \tag{6}$$

$$\mathrm{CFO}_6 + \mathrm{CFI}_6 + \mathrm{CFFd}_6 = 2580.66 \tag{7}$$

$$\mathrm{CFO}_7 + \mathrm{CFI}_7 + \mathrm{CFFd}_7 = 2499.17 \tag{8}$$

$$\mathrm{CFO}_8 + \mathrm{CFI}_8 + \mathrm{CFFd}_8 = 4537.90 \tag{9}$$

2) *Cash flows from operating activities*

$$\mathrm{CFO}_1 + \mathrm{AR}_1 + \mathrm{COGS}_1 + \mathrm{Inv}_1 - \mathrm{AP}_1 = 6473.89 \tag{10}$$

$$\mathrm{CFO}_2 + \mathrm{AR}_2 - \mathrm{AR}_1 + \mathrm{COGS}_2 + \mathrm{Inv}_2 - \mathrm{Inv}_1 - \mathrm{AP}_2 + \mathrm{AP}_1 = 6598.35 \tag{11}$$

$$\mathrm{CFO}_3 + \mathrm{AR}_3 - \mathrm{AR}_2 + \mathrm{COGS}_3 + \mathrm{Inv}_3 - \mathrm{Inv}_2 - \mathrm{AP}_3 + \mathrm{AP}_2 = 7984.77 \tag{12}$$

$$CFO_4 + AR_4 - AR_3 + COGS_4 + Inv_4 - Inv_3 - AP_4 + AP_3 = 8509.41 \tag{13}$$

$$CFO_5 + AR_5 - AR_4 + COGS_5 + Inv_5 - Inv_4 - AP_5 + AP_4 = 11149.55 \tag{14}$$

$$CFO_6 + AR_6 - AR_5 + COGS_6 + Inv_6 - Inv_5 - AP_6 + AP_5 = 12506.09 \tag{15}$$

$$CFO_7 + AR_7 - AR_6 + COGS_7 + Inv_7 - Inv_6 - AP_7 + AP_6 = 13258.20 \tag{16}$$

$$CFO_8 + AR_8 - AR_7 + COGS_8 + Inv_8 - Inv_7 - AP_8 + AP_7 = 17057.32 \tag{17}$$

3) *Cash flows from (used by) investing activities*

$$CFI_1 + PPE_1 + IA_1 + LTI_1 = 1105.38 \tag{18}$$

$$CFI_2 + PPE_2 + IA_2 + LTI_2 = 1282.79 \tag{19}$$

$$CFI_3 + PPE_3 + IA_3 + LTI_3 = 1386.54 \tag{20}$$

$$CFI_4 + PPE_4 + IA_4 + LTI_4 = 1008.29 \tag{21}$$

$$CFI_5 + PPE_5 + IA_5 + LTI_5 = 2050.76 \tag{22}$$

$$CFI_6 + PPE_6 + IA_6 + LTI_6 = 2335.87 \tag{23}$$

$$CFI_7 + PPE_7 + IA_7 + LTI_7 = 2838.75 \tag{24}$$

$$CFI_8 + PPE_8 + IA_8 + LTI_8 = 3881.17 \tag{25}$$

4) *Cash flows from (used by) debt-financing activities*

$$CFFd_1 - LTD_1 = 0 \tag{26}$$

$$CFFd_2 - LTD_2 = 0 \tag{27}$$

$$CFFd_3 - LTD_3 = 0 \tag{28}$$

$$CFFd_4 - LTD_4 = 0 \tag{29}$$

$$CFFd_5 - LTD_5 = 0 \tag{30}$$

$$CFFd_6 - LTD_6 = 0 \quad \text{31)}$$

$$CFFd_7 - LTD_7 = 0 \quad (32)$$

$$CFFd_8 - LTD_8 = 0 \quad (33)$$

2. Accounting policy constraints
   a) *Accounting–tax difference (accounting for income tax): Effects of tax regulation*

$$NDE_1 - 0.008905393\ COGS_1 \leq 100.31 \quad (34)$$

$$NDE_2 - 0.007044321 COGS_2 \leq 91.77 \quad (35)$$

$$NDE_3 - 0.007069428 COGS_3 \leq 103.24 \quad (36)$$

$$NDE_4 - 0.009164743 COGS_4 \leq 146.77 \quad (37)$$

$$NDE_5 - 0.006990533 COGS_5 \leq 140.46 \quad (38)$$

$$NDE_6 - 0.00448583 COGS_6 \leq 104.20 \quad (39)$$

$$NDE_7 - 0.006686268 COGS_7 \leq 164.70 \quad (40)$$

$$NDE_8 - 0.004982067 COGS_8 \leq 146.85 \quad (41)$$

3. Corporate governance policy: risk management, financial and investment policy constraints

a) *Liquidity risks and activity ratio*
   1) *Current ratio*

$$AR_1 + Inv_1 - 1.6182302\ (AP_1\ ) \geq 507.03 \quad (42)$$

$$AR_2 + Inv_2 - 1.352235953\ (AP_2) \geq 392.57 \quad (43)$$

$$AR_3 + Inv_3 - 1.265912044\ (AP_3) \geq 527.75 \quad (44)$$

$$AR_4 + Inv_4 - 1.109771396\ \left(AP_4\right) \geq 631.81 \quad (45)$$

$$AR_5 + Inv_5 - 1.003941625\ (AP_5) \geq 1139.44 \quad (46)$$

$$AR_6 + Inv_6 - 1.777025526\ (AP_6) \geq 57.36 \quad (47)$$

$$AR_7 + Inv_7 - 0.851278918\ (AP_7) \geq 1592.62 \quad (48)$$

$$AR_8 + Inv_8 - 0.686717808\ (AP_8) \geq 2217.25 \quad (49)$$

2) *Current cash debt coverage ratio*

$$CFO_1 - 1.149367465(AP_1) \geq 977.75 \quad (50)$$

$$CFO_2 - 1.109391702\ (AP_2) \geq 984.25 \quad (51)$$

$$CFO_3 - 1.057039998(AP_3) \geq 1432.61 \quad (52)$$

$$CFO_4 - 0.926645136(AP_4) \geq 1449.25 \quad (53)$$

$$CFO_5 - 0.901224511(AP_5) \geq 1797.44 \quad (54)$$

$$CFO_6 - 1.619961307(AP_6) \geq 964.67 \quad (55)$$

$$CFO_7 - 0.821993713(AP_7) \geq 2123.49 \quad (56)$$

$$CFO_8 - 0.843585868(AP_8) \geq 3408.37 \quad (57)$$

3) *Liquidity ratio: receivables*

$$18.14943228\ AR_1 \leq 8984.82 \quad (58)$$

$$21.85759723\ AR_2 \leq 9992.14 \quad (59)$$

$$17.35321422\ AR_3 \leq 11335.24 \quad (60)$$

$$17.10608447\ AR_4 \leq 12544.90 \quad (61)$$

$$16.33212419\ AR_5 \leq 15609.84 \quad (62)$$

$$14.50557865\ AR_6 \leq 18246.87 \tag{63}$$

$$12.56125147\ AR_7 \leq 19690.24 \tag{64}$$

$$11.30456634 AR_8 \leq 23469.22 \tag{65}$$

4) *Liquidity of inventory*

$$COGS_1 - 6.862516817\ Inv_1 \geq 0 \tag{66}$$

$$COGS_2 - 6.613350285\ Inv_2 \geq 0 \tag{67}$$

$$COGS_3 - 7.472429847\ Inv_3 \geq 0 \tag{68}$$

$$COGS_4 - 7.28566597\ Inv_4 \geq 0 \tag{69}$$

$$COGS_5 - 6.185823631\ Inv_5 \geq 0 \tag{70}$$

$$COGS_6 - 6.866142402\ Inv_6 \geq 0 \tag{71}$$

$$COGS_7 - 6.025992656\ Inv_7 \geq 0 \tag{72}$$

$$COGS_8 - 6.3231863495 Inv_8 \geq 0 \tag{73}$$

5) *Assets turnover*

$$2.452384182\ (AR_1 + Inv_1 + PPE_1) \leq 6062.968104 \tag{74}$$

$$2.600526344\ (AR_2 + Inv_2 + PPE_2) \leq 7070.537271 \tag{75}$$

$$2.450333117(AR_3 + Inv_3 + PPE_3) \leq 7697.15301 \tag{76}$$

$$2.352136890(AR_4 + Inv_4 + PPE_4) \leq 8916.085362 \tag{77}$$

$$2.399764725(AR_5 + Inv_5 + PPE_5) \leq 11519.61221 \tag{78}$$

$$2.437795107(AR_6 + Inv_6 + PPE_6) \leq 13734.2256 \tag{79}$$

$$2.262917609(AR_7 + Inv_7 + PPE_7) \le 16497.52023 \tag{80}$$

$$2.238935265\,(AR_8 + Inv_8 + PPE_8) \le 20605.40262 \tag{81}$$

b) *Financial distress and bankruptcy risk*

1) *Leverage policy*

$$-AP_1 - LTD_1 + 0.373125977(AR_1 + Inv_1 + PPE_1) \ge 541.2840247 \tag{82}$$

$$-AP_2 - LTD_2 + 0.434323933\,(AR_2 + Inv_2 + PPE_2) \ge 566.5916964 \tag{83}$$

$$-AP_3 - LTD_3 + 0.487996757\,(AR_3 + Inv_3 + PPE_3) \ge 830.7845983 \tag{84}$$

$$-AP_4 - LTD_4 + 0.49523044\,(AR_4 + Inv_4 + PPE_4) \ge 1013.087353 \tag{85}$$

$$-\,AP_5 - LTD_5 + 0.523376199\,(AR_5 + Inv_5 + PPE_5) \ge 1415.694476 \tag{86}$$

$$-AP_6 - LTD_6 + 0.505300742(AR_6 + Inv_6 + PPE_6) \ge 1417.108701 \tag{87}$$

$$-AP_7 - LTD_7 + 0.535076751\,(AR_7 + Inv_7 + PPE_7) \ge 2081.317703 \tag{88}$$

$$-AP_8 - LTD_8 + 0.648843022(AR_8 + Inv_8 + PPE_8) \ge 3537.181837 \tag{89}$$

2) *Bankruptcy risk: Z-scores*

$$-3.96AR_1 - 3.96Inv_1 + 9.16AP_1 + 6.72\,COGS_1 \le 28040.14 \tag{90}$$

$$-3.96AR_2 - 3.96Inv_2 + 9.16AP_2 + 6.72\,COGS_2 \le 34828.83 \tag{91}$$

$$-3.96AR_3 - 3.96Inv_3 + 9.16AP_3 + 6.72\,COGS_3 \le 39155.71 \tag{92}$$

$$-3.96AR_4 - 3.96Inv_4 + 9.16AP_4 + 6.72\,COGS_4 \le 43597.06 \tag{93}$$

$$-3.96AR_5 - 3.96Inv_5 + 9.16AP_5 + 6.72\,COGS_5 \le 54575.06 \tag{94}$$

$$-3.96AR_6 - 3.96Inv_6 + 9.16AP_6 + 6.72\,COGS_6 \le 64637.96 \tag{95}$$

$$-3.96AR_7 - 3.96Inv_7 + 9.16AP_7 + 6.72\,COGS_7 \le 67967.79 \tag{96}$$

$$-3.96AR_8 - 3.96Inv_8 + 9.16AP_8 + 6.72COGS_8 \le 83927.81 \quad (97)$$

3) *Debt-service coverage*

$$CFO_1 - 1.54 \times COD_1 \ge N/A \quad (98)$$

$$CFO_2 - 1.54 \times COD_2 \ge N/A \quad (99)$$

$$CFO_3 - 1.54 \times COD_3 \ge N/A \quad (100)$$

$$CFO_4 - 1.54 \times COD_4 \ge N/A \quad (101)$$

$$CFO_5 - 1.54 \times COD_5 \ge N/A \quad (102)$$

$$CFO_6 - 1.54 \times COD_6 \ge N/A \quad (103)$$

$$CFO_7 - 1.54 \times COD_7 \ge N/A \quad (104)$$

$$CFO_8 - 1.54 \times COD_8 \ge N/A \quad (105)$$

4) *Investment policy*

(a) Capital expenditure

Lower bounds

$$PPE_1 \ge 876.48 \quad (106)$$

$$PPE_2 \ge 1348.40 \quad (107)$$

$$PPE_3 \ge 1495.66 \quad (108)$$

$$PPE_4 \ge 1724.66 \quad (109)$$

$$PPE_5 \ge 2199.81 \quad (110)$$

$$PPE_6 \ge 2559.88 \quad (111)$$

$$PPE_7 \ge 3035.92 \quad (112)$$

$$PPE_8 \ge 4148.78 \quad (113)$$

Upper bounds

$$0.8687\text{PPE}_1 \leq 1171.39 \tag{114}$$

$$0.8725\text{PPE}_2 \leq 1304.97 \tag{115}$$

$$0.8591\text{PPE}_3 \leq 1481.69 \tag{116}$$

$$0.8572\,\text{PPE}_4 \leq 1885.65 \tag{117}$$

$$0.7685\text{PPE}_5 \leq 1967.34 \tag{118}$$

$$0.8577\text{PPE}_6 \leq 2603.98 \tag{119}$$

$$0.9037\text{PPE}_7 \leq 3749.32 \tag{120}$$

$$0.8065\text{PPE}_8 \leq 4285.89 \tag{121}$$

(b) Available funds for investments

$$-\text{CFI}_1 + \text{AR}_1 + \text{COGS}_1 + \text{Inv}_1 - \text{AP}_1 - \text{LTD}_1 \leq 3815.66 \tag{122}$$

$$-\text{CFI}_2 + \text{AR}_2 + \text{COGS}_2 + \text{Inv}_2 - \text{AP}_2 - \text{LTD}_2 \leq 4670.29 \tag{123}$$

$$-\text{CFI}_3 + \text{AR}_3 + \text{COGS}_3 + \text{Inv}_3 - \text{AP}_3 - \text{LTD}_3 \leq 5328.10 \tag{124}$$

$$-\text{CFI}_4 + \text{AR}_4 + \text{COGS}_4 + \text{Inv}_4 - \text{AP}_4 - \text{LTD}_4 \leq 6712.03 \tag{125}$$

$$-\text{CFI}_5 + \text{AR}_5 + \text{COGS}_5 + \text{Inv}_5 - \text{AP}_5 - \text{LTD}_5 \leq 7312.03 \tag{126}$$

$$-\text{CFI}_6 + \text{AR}_6 + \text{COGS}_6 + \text{Inv}_6 - \text{AP}_6 - \text{LTD}_6 \leq 8732.66 \tag{127}$$

$$-\text{CFI}_7 + \text{AR}_7 + \text{COGS}_7 + \text{Inv}_7 - \text{AP}_7 - \text{LTD}_7 \leq 9473.29 \tag{128}$$

$$-\text{CFI}_8 + \text{AR}_8 + \text{COGS}_8 + \text{Inv}_8 - \text{AP}_8 - \text{LTD}_8 \leq 11441.30 \tag{129}$$

4. Other Corporate Governance Policy: Compensation for Executives

Lower bounds

$$\text{Rexx}_1 - 0.05895\%\ (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{130}$$

$$\text{Rexx}_2 - 0.05548\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{131}$$

$$\text{Rexx}_3 - 0.05315\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{132}$$

$$\text{Rexx}_4 - 0.06022\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{133}$$

$$\text{Rexx}_5 - 0.05658\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{134}$$

$$\text{Rexx}_6 - 0.05211\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{135}$$

$$\text{Rexx}_7 - 0.05193\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{136}$$

$$\text{Rexx}_8 - 0.04820\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) \geq 0 \tag{137}$$

Upper bounds

$$0.14738\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_1 \geq 0 \tag{138}$$

$$0.13870\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_2 \geq 0 \tag{139}$$

$$0.13289\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_3 \geq 0 \tag{140}$$

$$0.15054\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_4 \geq 0 \tag{141}$$

$$0.14146\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_5 \geq 0 \tag{142}$$

$$0.13029\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_6 \geq 0 \tag{143}$$

$$0.12983\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_7 \geq 0 \tag{144}$$

$$0.12049\% (\text{CFO}_t - \text{CFI}_t + \text{CFF}_t) - \text{Rexx}_8 \geq 0 \tag{145}$$

5. Others

All constraints are non-negative or $x \geq 0$. (146)

where:

PV = present value;

FCFE = free cash flows to equity;
r = cost of capital (in this case is K_e);
CFO_t = cash flows from operating activities in period t;
CFI_t = cash flows from (used by) investing activities in period t;
CFF_t = cash flows from financing activities in period t;
g = growth rate;
$COGS_t$ = cost of good sold in period t;
Inv_t = inventories in period t;
Inv_{t-1} = inventories in period $(t-1)$;
AP_t = accounts payable in period t;
Ap_{t-1} = accounts payable in period $(t-1)$;
$Opex_t$ = operating expenses in period t;
$Noncashexp_t$ = non-cash expenses, that is, depreciation and amortisation expenses in period t;
$Prep_t$ = prepaid expenses in period t;
$Prep_{t-1}$ = prepaid expenses in period $(t\text{-}1)$;
$Accr_{t;}$ = accrued expenses in period t;
$Accr_{t-1}$ = accrued payable in period $(t-1)$;
Tax_t = current income *t*ax expense in period t;
TP_t = tax payable in period t;
Tp_{t-1} = tax payable in period $(t-1)$;
Int_t = interest expense in period t;
IP_t = interest payable in period t;
$IP_{(t-1)}$ = interest payable in period $(t-1)$;
PPE_t = property, plant equipment in period t;
PPE_{t-1} = property, plant equipment in period $(t-1)$;
$NCinv_t$ in PPE = non-cash investment in PPE in period t;
$NCdisp_t$ of PPE = non-cash disposal of PPE in period t;
$Lossdisp_t$ PPE = loss on disposal of PPE in period t;
$Gaindisp_t$ PPE = gain on disposal of PPE in period t;
$Accdepr_t$ PPEdisp = accumulated depreciation of PPE disposed in period ;
IA_t = intangible assets in period t;
IA_{t-1} = intangible assets in period $(t-1)$;
$NCinv_t$ in IA = non-cash investment in IA in period t;
$NCdisp_t$ of IA = non-cash disposal of IA in period t;
LossdisdIA = loss on disposal of IA in period t;
$Gaindisp_t$IA = gain on disposal of IA in period t;
$Accamrt_t$IAdisp = accumulated amortisation of IA disposed in period t;
LTI_t = long-term investment in period t;

LTI_{t-1} = long-term investment in period (t–1);
$NCinv_t$in LTI = non-cash investment in LTI in period t;
$NCdisinv_t$ of LTI = non-cash disinvestment of LTI in period t;
$Lossdisinv_t$ LTI = loss on disinvestment of LTI in period t;
$Gaindisinv_t$ LTI = gain on disinvestment of LTI in period t;
$Unamdisc_t$ LTI = unamortised discounts of LTI disposed in period t;
$Unampre_t$ LTI = unamortised premium of LTI disposed in period t;
LTD_t = long-term debt in period t;
$NCLTDiss_t$ = non-cash long-term debt issuance in period t;
$DiscLTD_t$ = discounts of long-term debt in period t;
$PremLTD_t$ = premiums of long-term debt in period t;
$NCLTDred_t$ = non-cash long-term debt redemption in period t;
$GainLTDred_t$ = gain-extraordinary in long-term debt redemption in period t;
$LossLTDred_t$ = loss in long-term debt redemption in period t;
$Unamdisc_t$ LTD = unamortised discounts of LTD in LTD redemption in period t;
$Unampre_t$ LTD = unamortised premium of LTD in LTD redemption in period t;
NDE_t = non-deductible expenses in period t;
x_{atd} = proportion of non-deductible expenses in period t;
$Totex_t$ = total expenses in period t;
$COGS_t$ = cost of good sold in period t;
$Opex_t$ = operating expenses including adjustment from non-cash charge in period t;
CA_t = current assets in period t;
CL_t = current liabilities in period t;
x_{cr} = coefficient of current ratio based on historical data or industry;
AR_t = accounts receivable in period t;
Inv_t = inventories in period t;
x_{cdcr} = coefficient of current cash debt coverage ratio based on historical data or industry;
AR_t =net accounts receivable in period t;
x_{lr} = coefficient of liquidity (receivables) ratio based on historical data or industry;
x_{li} = coefficient of liquidity (inventory) ratio based on historical data or industry;
$\underline{x_{at}}$ = coefficient of assets turnover ratio based on historical data or industry;
x_{lev} = coefficient of leverage ratio based on historical data or industry;

WC = working capital;
RE = retained earnings;
BV Eq = book value of equity;
OpInc = operating income;
TA = total assets;
TL = total liabilities;
CA = current assets;
AR = accounts receivable;
Inv = inventories;
CL = current liabilities;
AP = accounts payable;
DsC_t = debt-service coverage in period t;
$\overline{DsC_t}$ = debt-service coverage (average) in period t based on industry or the historical data;
CFO_t = adjusted cash flows from operating activities in period t;
COD_t = cash outflow for debt principals (including financial lease payment and preferred stock dividends) in period t;
τ = company's income tax rate;
α_{PPEt} = percentage of PPE's growth to sales' growth in period t;
$\bar{\alpha}_{PPE}$ = percentage on average of PPE's growth to sales' growth in the last five years;
$\bar{\alpha}_s$ = sales' growth on average in the last five years;
$TRex_t$ = total remuneration expense in period t;
$Rexm_t$ = remuneration expenses for employees in period t;
$Rexx_t$ = remuneration expenses for executives in period t;
α_m = portion of remuneration expenses for employees;
α_x = portion of remuneration expenses for executives.

6.3 Solver as a tool for analysis

The integrated model proposed by this book is an optimisation model which could initially be solved using the Solver tool available in Microsoft Excel. However, the model consists of a large amount of data that have too many variables and constraints to be handled by Solver. An alert to this problem sent by Excel when the model was run using Excel Solver is shown in Figure 6.2. Therefore, to solve the problem, this book used a free trial version of Premium Solver which is a product of Frontline Solver. As a commercial product, Premium Solver offers many benefits such as unlimited size models, which can 'handle problems with up to 8,000 decision variables (40 times larger than the Excel Solver)' (FrontlineSolvers 2012).

6.3.1 How Solver analyses the model

In Microsoft Excel Solver, the problem is solved using iterative numerical methods. These methods are based on a pure 'trial and error' approach which involves 'plugging in' trial values for the adjustable cells and observing the results calculated by the constraint cells and the optimum cell. Each trial is called an 'iteration'. As a trial and error approach, it would take an extremely long time (especially for problems involving many adjustable cells and constraints) since Microsoft Excel Solver performs extensive analyses of the observed outputs and their rates of change as the inputs are varied, to guide the selection of new trial values (Microsoft 2012). The Solver tool available in Excel is depicted in Figure 6.2. To solve the model, the user needs to 'select a Solving Method' which depends on the type of the model, that is, whether it is linear or non-linear. The solving methods available in Microsoft Excel Solver are GRG Non Linear, LP Simplex and Evolutionary. The GRG Non Linear method is for smooth non-linear models, LP Simplex is for linear programming, while Evolutionary is for non-smooth models. In this Solver Parameter section, the user also can choose whether the constraints are negative or non-negative.

Compared to Excel Solver, Premium Solver Platform offers a more advanced analysis since the platform can perform very fast iteration. It needs only a few minutes to run the model and report the results. The platform can also identify whether the model is a linear programming model or a non-linear model; therefore, if a researcher is not sure of the type of model being used, Premium Solver can run this analysis. It can also guide users in the choice of analysis method and a specific Solver engine suitable for the model being employed. For the model used in this book, the Gurobi engine is automatically selected since the model consists of huge amounts of data with more than 200 variable cells. Figures 6.3 to 6.7 show further features of the Premium Solver.

6.4 Model results and interpretation: optimal FCFE under the proposed sound financial management strategies of the present study

6.4.1 Results of initial model

Appendix 3 depicts output of the integrated financial optimisation model which uses interest rate as the discount factor. The reports consist of a structure report, an answer report, a sensitivity report and a limits report. Based on the structure report, the model consists of 97 variables,

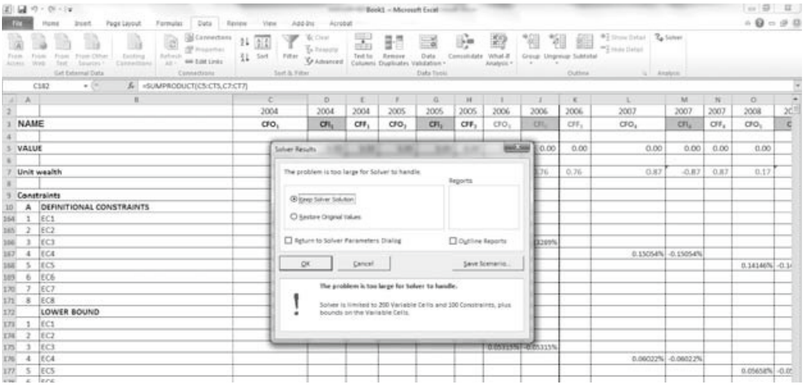


Figure 6.2 Solver analysis in Excel 2010

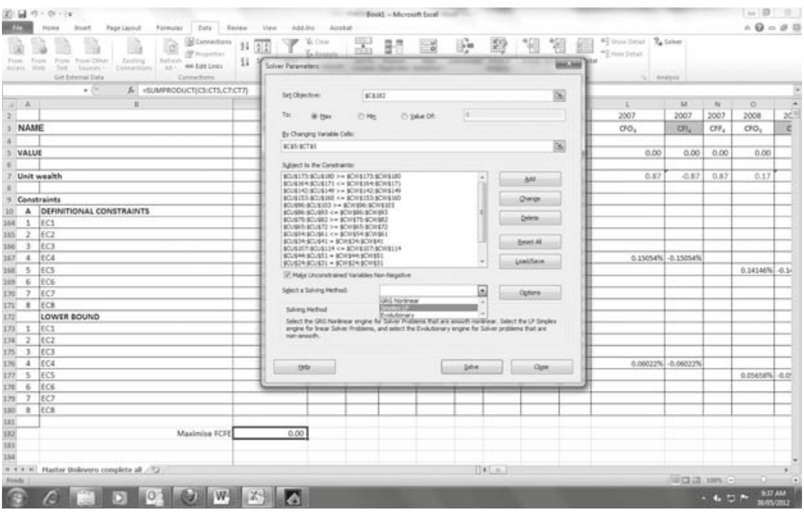


Figure 6.3 Premium Solver Platform task pane

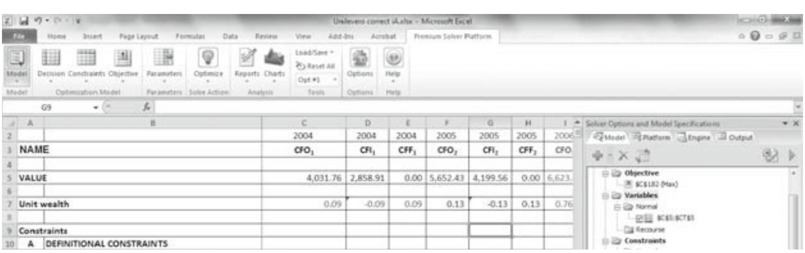


Figure 6.4 Model section of Premium Solver

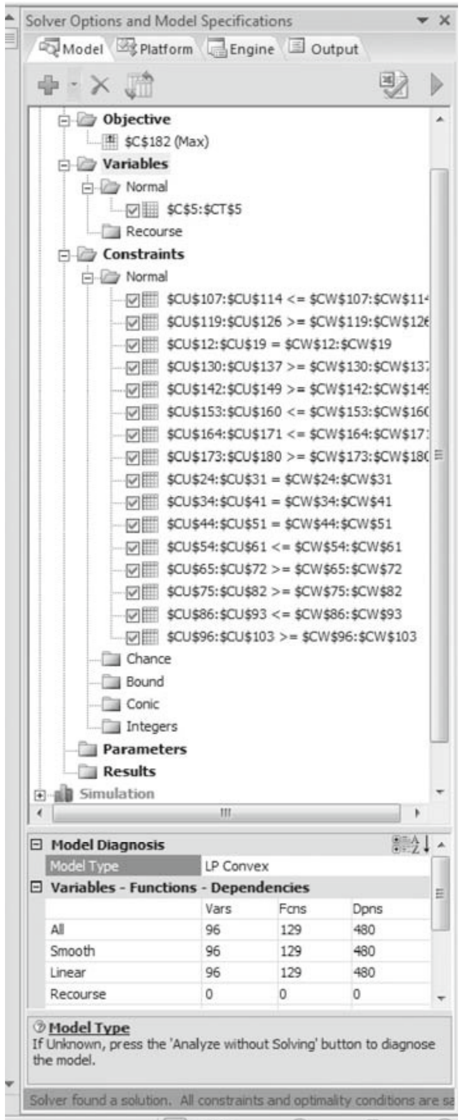


Figure 6.5 Platform section of Premium Solver

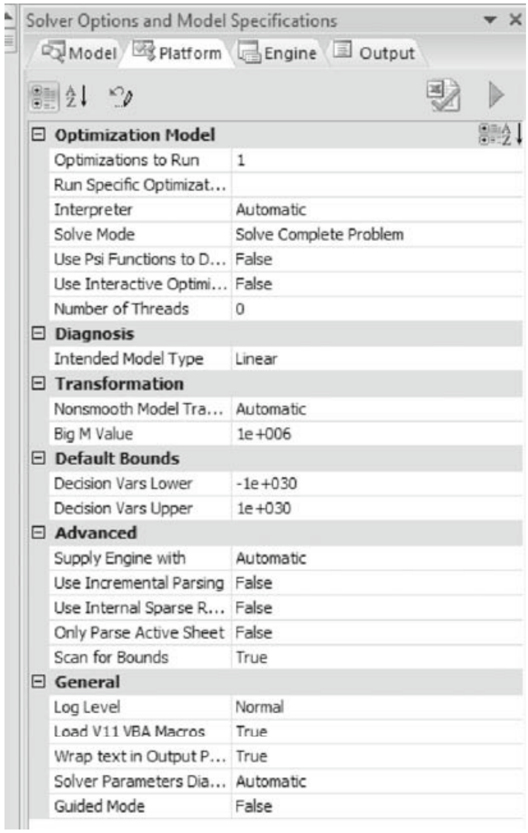


Figure 6.6 Solver engines of Premium Solver

177 functions and 661 dependants. The optimal value of FCFE achieved is 67214.38184.

Nevertheless, before interpreting these results further, the sensitivity report shows that the initial model has some problems. First, based on the sensitivity report, one or more objective function coefficients have zero value within range of the allowable decrease and allowable increase. This suggests that the model has a problem – which could be due to alternate optimal solutions (Arsham 2011; Ragsdale 2012). Second, many of the values of RHS constraints have zero amounts, which is a warning about the model's degeneracy (Arsham 2011; Ragsdale 2012).

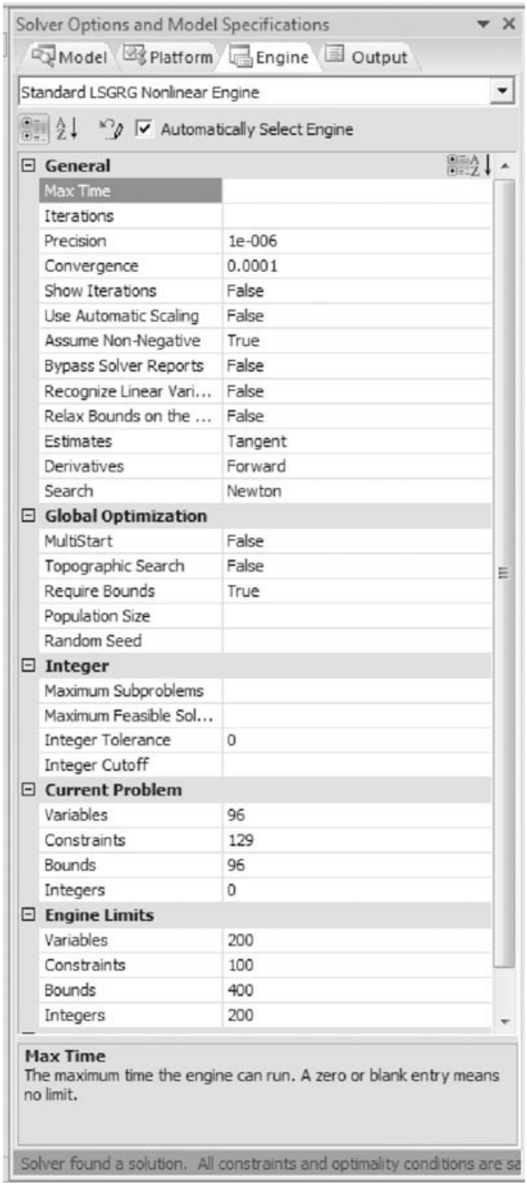


Figure 6.7 Output Section of Premium Solver

The alternate optimal solutions problem and degeneracy suggest caution in interpreting the sensitivity report.

6.4.2 Verification and validation processes

This book follows the verification and validation processes which were discussed in Chapter 3. Model verification is a process to ensure that 'the model is computationally correct and does not contain errors of both omission and commission' (Martínez 2009). Verification ensures the internal consistency of the model while validation ensures its external or representational correctness (Martínez 2009); hence, these processes ensure the plausibility of the results for decision-making.

The approaches for verification and validation of a linear programming model as argued by Martínez (2009) and McCarl and Spreen (1997, 2011) are various. Two general approaches of validity are used in this study – namely, validation by construct and validation by results. Steps taken in this study for checking the model's construct validity or model verification are as follows:

1) Following the right procedure when developing the model.
   This model was constructed by following the right procedure since it followed previous studies such as Carleton (1970) and other optimisation models discussed in textbooks such as Lee et al. (2009), Taha (2011), Ragsdale (2012) and Anderson et al. (2012).

2) Ensuring that the trial results indicate the model is working.
   Initially, the model experienced some problems, such as infeasibility or unboundedness. The model was then remedied and trialed many times until it provided a satisfactory output.

3) Ensuring that constraints were imposed which restrict the model to realistic solutions.
   The objective function and the constraints were developed from managerial and financial accounting perspectives and based on financial, accounting and corporate governance theories/practices. Therefore, both objective function and constraints were relevant for management decision-making and formulating financial management strategies.

4) Ensuring that the data were set up in a manner so that it can be replicated in practice.

Data were specified based on managerial and financial accounting perspectives, and collected from financial statements and other secondary data sources such as Indonesia Central Bank and Datastream. Therefore the outcome of the model should be informative for practitioners.

Following the steps outlined above, this book argues that the model was built properly because the quality of internal consistency was examined in the early stage of its development.

The next step, which is validation by results, also followed McCarl and Spreen (1997, 2011). The procedures taken were as follows:

1) Parameter outcome sets

   The model was constructed with outcome parameters so that it reflects the behaviour of the observed object. In regard to this, cost of capital in the model reflected the corresponding to behaviour of the economic system; the discount factor reflected market risks and other external regulatory environments where the company operates.

2) Validation experiments: feasibility experiment

   As mentioned above, initially the model experienced problems such as infeasibility and unboundedness. At this stage, the sensitivity results also indicated that the model contains some problems such as alternate optimal solutions and degeneracy.

While argued by McCarl and Spreen (1997, 2011) that 'model validation is fundamentally subjective' so that modellers can 'choose the validity tests, the criteria for passing those tests, what model outputs to validate, what setting to test in, what data to use, etc.', this book follows Arsham (2011) and Ragsdale (2012) for the remedies by executing the following steps:

a) Fixing the constraints of the model. Each constraint was checked as to whether it contributes to the optimal solution. Having examined the models, there were repetitive constraints. Therefore the model was revised by first deleting some constraints, which were: (1) lower bound of accounting–tax difference (ATD) constraints; (2) current cash debt coverage ratio (CCDC) constraints since they are already covered by current ratio constraints; (3) asset turnover (ATO) constraints; (4) lower bounds of PPE constraints; and (5) upper bounds of executive compensation (EC) constraints.

b) Modifying one of the constraints to improve 'construct/internal validity'. CFO constraints were added to some variables, namely non-deductible expenses (NDE) constraints and remuneration expenses (Rexx and Rexm). NDE constraints represent accounting–tax difference policy while Rexx and Rexm constraints represent executive compensation policy. The new CFO constraints are depicted in Equations (6.187)–(6.194) below.

$$CFO_1 + AR_1 + COGS_1 + Inv_1 - AP_1 + NDE_1 + Rexx_1 + Rexm_1 = 6473.89 \tag{6.187}$$

$$CFO_2 + AR_2 - AR_1 + COGS_2 + Inv_2 - AP_2 - Inv_1 + AP_1 + NDE_2 + Rexx_2 + Rexm_2 = 6981.75 \tag{6.188}$$

$$CFO_3 + AR_3 - AR_2 + COGS_3 + Inv_3 - AP_3 - Inv_2 + AP_2 + NDE_3 + Rexx_3 + Rexm_3 = 8450.42 \tag{6.189}$$

$$CFO_4 + AR_4 - AR_3 + COGS_4 + Inv_4 - AP_4 - Inv_3 + AP3 + NDE4 + Rexx4 + Rexm4 = 9062.07 \tag{6.190}$$

$$CFO_5 + AR_5 - AR_4 + COGS_5 + Inv_5 - AP_5 - Inv_4 + AP_4 + NDE_5 + Rexx_5 + Rexm_5 = 11753.30 \tag{6.191}$$

$$CFO_6 + AR_6 - AR_5 + COGS_6 + Inv_6 - AP_6 - Inv_5 + AP_5 + NDE_6 + Rexx_6 + Rexm_6 = 13066.76 \tag{6.192}$$

$$CFO_7 + AR_7 - AR_6 + COGS_7 + Inv_7 - AP_7 - Inv_6 + AP_6 + NDE_7 + Rexx_7 + Rexm_7 = 13911.13 \tag{6.193}$$

$$CFO_8 + AR_8 - AR_7 + COGS_8 + Inv_8 - AP_8 - Inv_7 + AP_7 + NDE_8 + Rexx_8 + Rexm_8 = 17718.44 \tag{6.194}$$

Having some remedies as mentioned above, the sensitivity report of the model, however, suggests that the model still contains an alternate optimal solutions problem since one or more objective function coefficients have zero value in the allowable decrease and allowable increase. Therefore, the second remedy, in the form of deleting an FCFE definitional constraint, was adopted.

c) The second remedy is deleting an FCFE definitional constraint since these constraints are repetitive with other definitional constraints, namely the CFO, CFI, and CFFd constraints.

6.4.3 Results of the final validated model

6.4.3.1 Structure and answer reports

This book will interpret the output based on the separation of the model without perpetuity case and with perpetuity case, since fundamentally the perpetuity model is based on the FCFE in period 8 but discounted with the perpetuity discount factor. Another reason for conducting interpretation and analysis based on the separation of the model is that, based on the validation of results, this book found that the invalid value of the combination model, that is, reduce cost of CFF6, had zero value (see sensitivity report in Appendix 4). As a variable whose final value is zero, CFF6 has to have a non-zero reduced cost value (Ragsdale 2012).

Appendix 5 shows the output of the model without the perpetuity while Appendix 6 depicts the perpetuity of the model. The structure report on the main model depicted in Appendix 5 shows that the model consists of 104 variables, 129 functions and 557 dependants, while the perpetuity model as shown in Appendix 6 consists of 13 variables, 17 functions, and 67 dependants. The optimal value created by the main model is 119515.6528 and the optimal value of perpetuity is 145738.3839. Therefore, the total optimal value created is 265254.0367.

Appendix 5 also shows details of the financial resources provided and used to achieve the optimal value. First, cash inflows from operating activities (CFO) from period 1 to period 8 are various but mostly increase every year; the amount that needs to be provided from CFO is between 5658.19 and 15853.01. The amount of cash outflows for investment activities is zero to a maximum of 239.50 and the amount of cash inflows from debt financing (CFF) also varies from zero to a maximum of 376.44.

To achieve the optimal value, the answer report shows allocations of assets, liabilities and expenses. Amount of accounts receivable (AR) is gradually increased following the increased operating activities. The range of AR is from 457.15 to 2076.08. The amount of inventory (INV) also varies from 28.37 to 194.80. Then, the amount of property, plant and equipment (PPE) ranges from 1105.38 to 3881.17. Amount of accounts payable is shown to be low, from zero to a maximum of 413.17. Similarly, the amount of long-term debt (LTD) is zero to maximum 376.44. The output shows that the company does not have any long-term investments (LTI) for any period. Regarding the expenses, cost of goods sold (COGS) achieves a maximum 1231.75. On the other hand, non-deductible expenses (NDE) are minimal, from 0.87 to 7.94. Finally, executive remuneration (REXX) varies from 3.37 to 7.82.

As shown also in the constraints sections in Appendix 5, some resources are binding while some are not. The binding financial resources of the company show that all available amounts of these financial resources will be used optimally with a zero balance (no slack/no unused capacity) if the financial strategies based on this report are implemented. The positive level of slack informs as to the amount of resources that will be left over. Out of 16 sets of constraints, 8 constraints are binding: (a) operating cash flows (CFO) constraints; (b) investment cash flows (CFI) constraints; (c) debt financing cash flows (CFFd) constraints; (d) executive compensations (EC) policy constraints; (e) lower bounds of accounting–tax difference (ATD); (f) upper bounds of accounts receivable turnover ratio (ARTO) policy constraints; (g) inventory turnover (ITO) constraints; and (h) leverage policy constraints. Also, most of the current ratio (CR) policy constraints (except periods 4 and 6) are binding. Then lower bounds of bankruptcy Z-score constraints are also binding except in period 5. On the other hand, the non-binding constraints are: (a) both lower and upper bounds constraints of available funds for investments (FUNDS) policy; (b) upper bounds of accounting–tax difference (ATD) policy constraints; (c) lower bounds of ARTO policy constraints; (d) upper bounds of bankruptcy score (Z) policy constraints; (e) upper bounds of accounting–tax difference (ATD) policy constraints; (f) property, plant and equipment (PPE) constraints; (g) upper bounds of Z-score constraints; and (h) lower bounds of accounts receivable turnover ratio (ARTO) policy constraints.

6.5 Sensitivity analyses

Sensitivity analysis provides information as to 'how sensitive the optimal solution is to changes in various coefficients in the model' (Ragsdale 2012, p. 144). It is used to investigate risks and uncertainty in an environment or a system. In the present study, sensitivity analysis is important since it identifies the uncertain key variables or parameters of the dynamic of economic environment where the case study was applied. Sensitivity analysis undertaken by this study furthermore shows the sensitivity of the optimal solution if coefficients of the following changes: (1) the objective function coefficients; (2) the currently zero variables (non-basic variables) become non-zero ones (basic variables); and (3) the right-hand side of a constraint.

Solver output provides a sensitivity analysis based on changes in the objective function coefficients or decision variable cells and changes in the right-hand side values of the constraints. In the section of decision variable cells, the two columns of allowable increase and allowable decrease show the maximum amount of the original objective function coefficients that can increase or decrease without changing the optimal solution, assuming ceteris paribus or all other coefficients remain constant (Ragsdale 2012). In addition to sensitivity reports on Solver output, a second sensitivity analysis was conducted in this book. That is, the sensitivity of the model was examined by changing the discount factor of the model from interest rate to CAPM rate. The results of sensitivity analyses are discussed in the following sections.

6.5.1 Sensitivity analyses based on solver output

The sensitivity analysis of the main model of this study is based on the simplex method. The two main parts of the sensitivity reports discussed below are based on changes in the objective function coefficients or decision-variable cells, and changes in the right-hand side (RHS) values of the constraints.

6.5.1.1 Sensitivity analysis: changes in the objective function coefficients

The section of decision-variable cells shows that, first, among the objective function variables, CFO2 coefficient has the smallest allowable decrease, which is 0.08391, while CFI coefficients for all periods except period 4, and CFFd periods 4 and 6 have the largest allowable decrease, which is infinity. The largest allowable increase belongs to CFO5 with a value of 8.7130, while the smallest allowable increase is in CFO3 with a value of 0.1871.

The sensitivity of the optimal solution can be interpreted as that as long as the value of a coefficient moves within the allowable increase and allowable decrease, the optimal solution will remain. Accordingly, ceteris paribus, the optimal solution will be unchanged as long as the value of the CFO2 coefficient increases to a maximum of 0.2581, or decreases to minimum of 0.08391, or the coefficient value is within 0.93126 to 1.44746. Also, ceteris paribus, the coefficient of CFFd4 can increase to a maximum of 1.4171 or decrease by infinity without changing the optimal solution. The coefficient of CFO5, ceteris paribus, can increase to as much as 8.71301 or decrease to as little as 0.68795 without changing the optimal solution. Similarly, ceteris paribus, the optimal solution will be unchanged if the coefficient CFO3 increases to a maximum of 0.2081 or decreases to as little as 0.1871.

Regarding the objective function coefficients with zero values in their final values, which are called the non-basic variables, that is, CFI of all periods (except period 4), CFFd4 and CFFd6, the increase or decrease in their coefficients will not change the optimal value. The reduced costs suggest further that coefficients of these variables need to change, that is, increase (in the case of the maximisation problem) to make these variables useful and contribute to the optimal value creation. The CFI of all periods (except period 4) can contribute to the increase of FCFE if the coefficient increases respectively by 0.67, 0.67, 0.72, 0.72, 0.50, 0.72, and 0.58. Then, CFF4 and CFF6 can contribute to the increase of FCFE if the coefficient increases respectively by 1.42 and 0.48.

6.5.1.2 Sensitivity analysis: changes of RHS value of the constraints

The second part of the sensitivity report explains the sensitivity of the model if the RHS constraints change. The non-binding variable will have a zero shadow price since its RHS is not constraining the optimal solution. Therefore, only binding variables have shadow prices. First, for CFO, the maximum shadow price of these constraints is in period 8, which is 1.66. This suggests that the premium price (cost) to generate additional cash inflows from operating activities that the company should pay for period 8 is 1.66. This shadow price will remain unchanged if the RHS value of CFO8 decreases by 1000 or less than its allowable decrease (15860.65). This also means that 1000 decrease in the CFO8 RHS constraint will make a 1660 (equals to 1000 times 1.66) decrease in FCFE, assuming all other coefficients remain constant. Second, for CFI, the maximum price (cost) for additional cash outflows for investment activities in period 4 that the company should pay is 1.39. The shadow price remains if the constraint increases by, for example, only 100 (less than its allowable increase: 239.4997) to become 1248.7937. This suggests further that a 100 increase in CFI4 RHS constraint will increase FCFE as much as 139 (equals to 100 times 1.39), assuming ceteris paribus. Next, for CFFd4, the company should only be willing to pay 3.81 for additional cash inflows from debt activities from period 4. The shadow price remains if this RHS constraint increases by 100 (less than its allowable increase: 340.6738) to become 100. The increase in CFFd7's RHS value by 100, however, will decrease FCFE as much as 281 (equal to 100 times –2.81), assuming all other coefficients remain constant.

Related to the other accounting policy, current ratio (CR) constraints, the maximum of their shadow prices' constraints is 8.64 (CR5) which suggests that the maximum price (cost) for additional increases in CR5 that the company should pay is 8.64. The shadow price remains unchanged if the constraint increases by only 100 (less than its allowable increase: 984.5862) to become 1239.4383. Assuming ceteris paribus, a 100 increase in the CR5 constraint, however, will decrease FCFE by 864 (equals to 100 times –8.64). Next, the shadow price of ARTO5, which is the highest among other ARTO constraints, suggests that the maximum price (cost) for an additional increase in ARTO5 that the company should pay is 0.58. The shadow price remains unchanged if the constraint increases or decreases within its allowable increase and allowable decrease. If its RHS value decreases by 100 (less than its allowable decrease: 15609.836), the shadow price remains unchanged but, assuming all other coefficients remain constant, the decrease causes FCFE to lower as much as 58 (equals to 100 times –0.58.). Then, the shadow price of ITO5: –1.52 suggests the maximum price which the company should pay for an additional increase in ITO5. If the value of the constraint increases to 1000, the FCFE will decrease by 1520, assuming all other coefficients remain constant. The highest shadow price of LEV, which is –11.74 in period 4, suggests that the maximum price that the company is willing to pay for an additional increase in LEV (in period 4) is 2.81. The shadow price remains as long as the increase or the decrease in the LEV4 constraint is within its allowable increase and allowable decrease. Hence, if the constraint increases to 1113.0874 (increases by 100), the shadow price remains unchanged but will make FCFE decrease by 281, assuming ceteris paribus. The shadow price of the lower bound of Z6/Z7/Z8 constraint, –0.22, suggests that the maximum price which the company is willing to pay for an additional increase in Z6/Z7/Z8 is 0.22. If the constraint of Z6/Z7/Z8 increases by 100, which is less than its allowable increase, the FCFE will decrease by 22. Next, the shadow price of EC8 which is –1.66 suggests that the company is willing to pay for an additional increase in EC8 as much as 1.66. If the constraint decreases by 10, the shadow price will change, but if it only decreases by 2 (less than its allowable decrease: 7.8260), the shadow price remains and increases FCFE by 3.32, assuming all other coefficients remain constant. Finally, the shadow price of the lower bounds of ATD8, which is –1.66, also suggests that the company is willing to pay for an additional increase in ATD8 as much as 1.66. If the constraint decreases by 10, the shadow price will change, but if it only decreases by 2 (less than its allowable decrease: 6.1366), the shadow price remains and can increase FCFE by 3.22 by assuming ceteris paribus.

6.5.1.3 Limits report

The limits report shows that the upper limit of each variable is the same as its lower limit. Since the relationship of the LHS and the RHS values of relevant constraint equations are equal (not more than or less than), the limits report suggests that the model is too sensitive to change since the current solution is already optimal. The limit reports for variable CFO1, for example, suggests that the variable cannot increase or decrease from that number, which is the same as its current value of 5658.19. Assuming all other variables are constant, the value of CFO1 that the company can achieve is 5658.19 and the objective result will be 119515.65.

6.5.2 Sensitivity analysis: changing the discount factor

6.5.2.1 CAPM rate as the discount factor of the objective function

In addition to the sensitivity reports on the output of the model, this book applied another sensitivity analysis by running the model in a different scenario of the cost of capital which is calculated based on CAPM approach as shown in the beginning of this chapter (Table 6.1). Inserting as the cost of capital or discounting factor in the model, the objective function is as follows:

$$\begin{aligned}\text{Max PV of}\sum_{t=1}^{T=8}\text{FCFE} = {} & \frac{1}{(1+0.167317)^1}\left[\text{CFO}_1 - \text{CFI}_1 + \text{CFF}_1\right] \\ & + \frac{1}{(1+0.263059)^2}\left[\text{CFO}_2 - \text{CFI}_2 + \text{CFF}_2\right] \\ & + \frac{1}{(1+0.320775)^3}\left[\text{CFO}_3 - \text{CFI}_3 + \text{CFF}_3\right] \\ & + \frac{1}{(1+0.291008)^4}\left[\text{CFO}_4 - \text{CFI}_4 + \text{CFF}_4\right] \\ & + \frac{1}{(1+0.333223)^5}\left[\text{CFO}_5 - \text{CFI}_5 + \text{CFF}_5\right] \\ & + \frac{1}{(1+0.124196)^6}\left[\text{CFO}_6 - \text{CFI}_6 + \text{CFF}_6\right] \\ & + \frac{1}{(1+0.141867)^7}\left[\text{CFO}_7 - \text{CFI}_7 + \text{CFF}_7\right] \\ & + \frac{1}{(1+0.131401)^8}\left[\text{CFO}_8 - \text{CFI}_8 + \text{CFF}_8\right] \\ & + \frac{\text{FCFE}_8 / 0.131401}{(1+0.131401)^8}\end{aligned} \tag{6.195}$$

where:

PV = present value;

FCFE = free cash flows to equity;
r = cost of capital (in this case is K_e);
CFO_t = cash flows from operating activities in period t;
CFI_t = cash flows from (used by) investing activities in period t;
CFF_t = cash flows from financing activities in period t;
g = growth rate.

6.5.2.2 Results of the model using CAPM rate as the discount factor

Structure and answer reports The output of the sensitivity analysis that used a different figure of the cost of capital is presented in appendices 7 and 8. The optimal value is achieved while all constraints and optimality conditions are satisfied. Similar to the interpretation of output of the validated model above, this section will also present the output of the sensitivity model based on the main model with the CAPM rate as the discount rate.

The optimal value of the main model is 205357.3424 and the optimal value of the FCFE perpetuity is 45290.3173; hence, the total optimal value of FCFE achieved is 250647.6597. To achieve the optimal value, the decision variable values required by the company, in general, are similar to the validated main model above but with slightly different values. To achieve the optimal FCFE value, the company needs to generate cash from operating activities (CFO) and get cash inflows from debt financing (CFF). The output also recommends a minimum or zero cash outflow for investment.

The output of this model showed that the company needs to maintain the composition of current assets similar to the recommendation of the output of the main validated model discussed in the previous section. For some variables, there is a slight difference only for periods 1 and 2. The amounts of the accounts receivable (AR), for example, for periods 1 to 8 under the sensitivity analysis report of the model using CAPM rate, should be similar to the amounts that are suggested by the main validated model. Similarly, the composition of inventory for periods 1 to 8 is similar to the main validated model except for periods 1 and 2, which are slightly higher at 46.50 and 44.72 respectively. Accounts payable also show similar amounts except for AP1 and AP2 which are zero. Then, amounts of PPE and LTI are also very similar to the amounts suggested by the main validated model. Next, the amount of LTD is also similar except for periods 1 and 2 which are higher, that is, 73.23 and 208.53 respectively. The maximum amounts of COGS are also similar to the output of the main validated model except for periods 1 and 2, which are slightly higher at 319.13 and 295.74 respectively. Non-deductible expenses (NDE) and remuneration for executives (REXX) are also similar to the output of the main validated model except for periods 1 and 2. The maximum of NDE1 and NDE2 are 2.84 and 2.08 respectively, while REXX1 and REXX2 are 3.35 and 3.84 respectively.

Sensitivity analysis based on Solver output: changes in the objective function coefficients The section of decision variable cells depicted by sensitivity reports of the CAPM rate model, in general, shows similar results to the main validated model (interest rate model), except for the smallest allowable increase which, under the CAPM rate, the coefficient of CFO1 has the smallest allowable increase with a value of 0.0099. The other results are similar; for example, the biggest allowable decrease, which is infinity, belongs to CFI coefficients for all periods except period 4 and CFFd periods 4 and 6. On the other hand, the smallest allowable decrease belongs to the CFO2 coefficient. The biggest allowable increase belongs to CFO5 with a value of 16.2113.

Regarding the objective function coefficients with zero values in their final values, called the non-basic variables, the variables shown in the sensitivity reports of the CAPM rate model are the same as the main validated interest rate model, which are CFI of all periods (except period 4), CFF4 and CFFd6. The CFI reduced costs for periods 1 to 8 (except period 4) respectively are 0.73, 0.90, 1.18, 2.01, 0.93, 1.18, and 1.94, while the reduced costs of CFFd4 and CFFd6 respectively are 2.83 and 0.14.

Sensitivity analysis based on Solver output: changes of RHS value of the constraints The second part of the sensitivity report of the CAPM rate model which explains the sensitivity of the model if the RHS constraints change, in general also shows similar results to the interest rate model except in some constraints. First, for CFO where the maximum shadow price of these constraints is in period 5 (compared to the interest-rate model, it was on CFO8), which is 4.21. This suggests that the premium price (cost) to generate additional cash inflows from operating activities that the company should pay for period 5 is 4.21. This shadow price will remain unchanged if the RHS value of CFO5 decreases by 1000 or less than its allowable decrease (10267.56). This also means that 1000 decrease in the CFO5 RHS constraint will cause a 4210 (equals to 1000 times 4.21) decrease in FCFE, assuming all other coefficients remain constant.

The second different result is in the shadow price of EC. Under the CAPM rate model, EC5 has the highest shadow price, while under the interest-rate model EC8 had the highest price. The shadow price of –4.21 suggests that the company is willing to pay for an additional increase in EC5 as much as 4.21. If the constraint decreases by 10, the shadow price will change but if it only decreases by 5 (less than its allowable decrease: 5.9536), the shadow price remains and causes FCFE to increase by 21.05 assuming all other coefficients remain constant.

Third, the shadow price of the lower bounds of the Z4 and Z7 constraints is the highest, with a value of 0.36, suggesting that the maximum price the company is willing to pay for an additional increase in Z4/Z7 is 0.36. Ceteris paribus, if the constraint of Z4 decreases by 1000, which is less than its allowable decrease (2904.102), the FCFE will increase by 360. Or, ceteris paribus, if the constraint of Z7 decreases by 1000, which is less than its allowable decrease (5291.203), the FCFE will increase by 360.

Fourth, the shadow price of lower bounds of ATD5, which is 4.21, is the highest under the CAPM rate model. This suggests that the company is willing to pay for an additional increase in ATD5 as much as 4.21. If the constraint decreases by 10, the shadow price will change, but if it only decreases by 5 (less than its allowable decrease: 7.9420), the shadow price remains and can increase FCFE by 21.05 by assuming ceteris paribus.

The remaining binding constraints of the CAPM rate model have the same results as the interest-rate main model. The highest shadow price values for each relevant constraint are: CFI4 (for CFI constraints), CFFd4 (for CFFd constraints), CR5 (for CR constraints), ARTO5 (for ARTO constraints), ITO5 (for ITO constraints) and LEV4 (for LEV constraints).

Limits report Appendix 7 also shows that the LHS and the RHS values of relevant constraint equations are equal (not more than or less than equal). Similar to the interest-rate main model, the limits report on the CAPM rate model suggests that the model is too sensitive to change since the current solution is already optimal. The limit reports for variable CFO1, for example, suggests that the variable cannot increase or decrease from that number, which is the same as its current value of 5607.02. Assuming all other variables are constant, the value of CFO1 that the company needs to generate is 5607.02, and the objective result will be 205357.34.

6.6 Book value of FCFE (calculated based on data of financial statements)

The previous chapters explained the objective of this study which is to formulate sound financial management strategies for achieving the benefits of GCG practices. This can be achieved by using an integrated financial model which is developed from managerial and financial accounting perspectives. As a comparison, below is the book value of FCFE under the current financial management strategies executed by the management as shown in the financial statements.
Recalling Equation (6.1):

$$\text{Max PV of FCFE} = \frac{1}{(1+r)^t}\sum_{t=1}^{T=8}\left[\text{CFO}_t - \text{CFI}_t + \text{CFF}_t\right] + \frac{\text{FCFE}_8(1+g)/(r-g)}{(1+r)^8}$$

where:
PV = present value;
FCFE = free cash flows to equity;
r = cost of capital;
CFO_t = cash flows from operating activities in period t;
CFI_t = cash flows used by investing activities in period t;
CFF_t = cash flows from financing activities in period t.

The amounts of CFO, CFI and CFFd based on financial data in Appendix 1 are shown in Table 6.2. The table also shows the calculation of present value (PV) of FCFE using the discounting factor calculated previously in Table 6.1. Based on data in the financial statements (book value), the total PV of FCFE using interest rate and CAPM rate as the discount factor is 33566.953 and 11578.9933 respectively. On the other hand, the FCFE achieved under the proposed sound financial management strategies (based on the output of the integrated financial optimisation model of the present study) is substantially higher. Based on the output of the present model, the optimal FCFE achieved under the proposed sound financial management strategies is 253201.98 (using an interest rate as a discount rate) or 250647.6597 (using the CAPM rate as a discount rate).

6.7 Plausibility of the model and results

The optimisation models presented in this chapter were examined rigorously through some verification and validation procedures as

Table 6.2 Book value of FCFE based on data of financial statements

	CFO	CFI	CFFd	r (interest rate	PV of FCFE (Using r)	Ke (CAPM Rate)	PV of FCFE (Using Ke)
2004	1415.87	–243.02	0	7.399%	1092.0457	16.732%	1004.7403
2005	1665.74	–212.87	0	9.058%	1221.54446	26.306%	910.70633
2006	2174.81	–338.13	0	11.793%	1314.57786	32.052%	797.63076
2007	2250.01	–1191.5	0	8.604%	760.859918	29.101%	381.04306
2008	2785.79	–509.11	0	8.667%	1502.51177	33.322%	540.48779
2009	3280.71	–700.05	0	7.146%	1705.61255	12.420%	1278.437
2010	3619.19	–1310	0	6.500%	1485.9646	14.187%	912.3174
2011	5461.88	–1433.1	0	6.583%	2419.1094	13.140%	1500.5046
Perpetuity of FV of FCFE	36746.152 (Perpetuity based on interest rate)			6.583%	22064.7271		
	11419.306 (Perpetuity based on CAPM rate)					13.140%	4253.126
			Total PV of FCFE		**33566.953**		**11578.9933**

explained in Section 6.4.2. Remedies for linear programming problems were executed so that the model generated a unique solution and the results were valid. Therefore, the reports on the model – namely answer report, sensitivity report and limits report – can be referred to as guidance for decision-making.

Sensitivity analyses which were presented in the previous sections also help to improve the reliability of the model; the results can be used for decision-making when formulating sound financial management strategies for achieving the benefits of GCG. The sensitivity analyses were executed by using both a simplex method approach which is provided by the output of Solver, and a different cost of capital approach (using the CAPM rate). The simplex method approach is argued to have more benefits than other optimisation techniques since it provides dual prices (reduced cost or opportunity costs and shadow price), thus giving information about the impact of changing RHS constraints and/or objective function coefficients on the optimal solution/value (Ragsdale 2012). However, changing the discount rate of the model also provides information about the impact of higher/lower market risks (as reflected by the discount factor) on optimal value. All these approaches ultimately ensure the validity and reliability of the model and plausibility of the study results.

6.8 Generalisation of the model

The optimisation model in this book was developed based on a general approach. The equations reflected generally accepted accounting principles (GAAP) and showed the relationship between the accounts in the company's financial statements. Therefore, this model can be applied to other companies in Indonesia or in other countries.

6.9 Summary

This chapter presented the output of the integrated financial optimisation model which was solved using Premium Solver. The initial model that used interest rate as the discount factor was examined and tested using the model. This initial model was built and its internal correctness was examined through validation and verification processes. The output of these initial results was then checked for validity. Remedies to the model were performed to improve its validity and reliability. After two stages of remedy, the output of the final model was valid for interpretation. This section also presented sensitivity analyses which were performed by analysing the sensitivity reports of the simplex model and by changing the cost of capital of the model. The later type of sensitivity analysis generated another output which can then be used to improve the validity and the reliability of the model for decision-making. The plausibility of the model and the results and the applicability of the results were also justified in this section. The output of these models will be discussed further in the following chapter so that the implications of the model for GCG practice can be drawn upon.

Notes

1. The IDX composite index is also called ISHG: 'Index Harga Saham Gabungan'.
2. Based on five-year calculation of dividend, g = 25.0216%. Because g is greater than r, the figure cannot be used in the model (Ehrhardt & Brigham 2011, p. 267). Therefore, for the perpetuity of the future cash flows, simple discount rate is used and the perpetuity of the future FCFE equals to
$$\frac{FCFE_8 / 0.065833}{(1+0.065833)^8}$$

7
Implications of The Results for Sound Financial Management Strategies, Corporate Governance, and Managerial and Financial Accounting Perspectives

7 Introduction

The literature review in Chapter 2 revealed that the interrelationships among corporate governance, corporate finance and accounting practices, especially in an optimisation framework, have been overlooked by previous studies. Therefore, Chapter 3 discussed these interrelationships further, while Chapter 4 specified the relationships in a financial optimisation model.

This chapter extends the discussion of the research findings presented in the previous chapter in terms of how sound financial management strategies could help to achieve GCG practices. Sound financial management strategies developed from the results of the model are presented in Section 7.2. Section 7.2.1 explains further what sound financial management strategies are and how these strategies help to achieve the benefits of GCG practices by reducing risks and improving firm value. Section 7.2.2 presents three output channels from which sound financial strategies increase free cash flows to equity (FCFE) as a proxy of firm value. The channels are operating (represented by cash flows from operating activities – CFO), investing (represented by cash flows from investing activities – CFI) and debt financing (represented by cash flows from debt financing activities – CFFd). Section 7.2.3 discusses the effects of the time value of money and external risks on the optimal FCFE value achieved by the strategies. The final optimal value, discounted of FCFE, is presented in Section 7.2.4. Implications of the results of this study for GCG practices, and managerial and financial accounting practices, are discussed in Section 7.3, followed by theoretical and methodological implications in Section 7.3. Finally, Section 7.5 summarises this chapter.

7.2 Optimal financial management strategies achieving good corporate governance practices

The literature review study revealed that sound financial management strategies are essential for achieving GCG practices since these strategies minimise risks and improve the performance of a company (Collier & Agyei-Ampomah 2007). These two economic benefits of GCG practices mainly help to protect the interests of shareholders of a company, though they may also benefit other stakeholders (OECD 2004). In this study the interests of shareholders are represented by FCFE which shows the available cash return for shareholders that can be distributed in terms of cash dividends and/or stock repurchases.

The results of this study show that the proposed financial management strategies formulated by integrated financial management strategies are optimal for achieving GCG practices since they minimise risks and improve the performance of a company. The following sections explain further what sound financial management strategies are and how these strategies reduce risks and therefore improve FCFE.

7.2.1 Sound financial management strategies[1]

Initially in Chapter 4 this study identified the risks faced by a company and how the risks could affect the optimal FCFE value. These risks were then incorporated into the constraints of the model (see Chapter 4 for the construction and Chapter 6 for the numerical model). The objective of sound financial management strategies proposed by this study is, therefore, to minimise these risks so that optimal FCFE can be achieved. Sound financial management strategies proposed by this study are aimed largely at minimising risks so that they are in effect risk management activities. These strategies are derived from corporate governance instruments and analysed through three main output channels of a company's activities: operating, investing and debt financing. The discussion of the sound financial strategies and their impacts on optimal value of FCFE are below.

7.2.1.1 Strategy related to non-deductible expenses (accounting and operating policy)

Chapter 2 discussed how external governance instruments discipline companies by requiring them to comply with both tax regulation and accounting standards. While complying with these two regulations, however, companies identify that there are some differences between tax regulation and accounting standards which are called book-tax differences or accounting-tax gaps. These differences furthermore affect a company's financial position and, as required by accounting standards, these effects need to be recognised on net income as well as on assets/liabilities (AASB 2010). Therefore, users of accounting information or financial statements can assess how material this information is for decision-making.

While the differences can be temporary or permanent, temporary differences are recognised by a company on deferred tax assets (DTA) and/or deferred tax liabilities (DTL), as well as deferred tax expenses. The effects of these temporary differences are recoverable in the long term so that their total effect is zero. Permanent tax differences, however, will not be recovered in the future so that their amount will cause non-taxable income and non-deductible expenses (NDE). In the case of NDE, the permanent difference will be viewed as a risk which may decrease the company's cash flows. It causes positive adjustments to the taxable income which means the taxable income is higher, thereby increasing income tax expense and decreasing net income.

Related to NDE, the results of the model suggest strategies that can minimise the risks and therefore optimise firm value. The strategies can help discipline managers by requiring them to keep non-deductible expenses minimal, ranging from 0.87 to 7.94, for the periods analysed. Specifically, if NDE8 were more than 7.94 it would have decreased the optimal value, and vice versa. The right-hand side (RHS) of accounting-tax difference (ATD) constraints constructed by this study also reflects the amount that ensures an allowable level of NDE (calculated as a percentage of total expenses). Therefore, decreasing the RHS of ATD would increase the optimal FCFE value, so that a decrease of ATD8 by 2 would increase FCFE by 3.22 assuming ceteris paribus.

By having accounting-tax gap constraints in the model, this study recognises the effect of tax regulation and its exposure on firm value. The objective of the relevant strategy is, therefore, to minimise risks due to the difference between accounting standards and tax regulation which may decrease the company's CFO. Accordingly, the financial management strategy as part of the internal governance mechanism constructed in this study is through the operating activity channel – that is, by minimising NDE. These constraints can discipline managers so that the company can minimise risks and optimise the FCFE, hence achieving GCG practices.

7.2.1.2 Risk-management policy related to liquidity of the company (operating policy)

The liquidity of a company shows the ability of a company to pay off its short-term liabilities. Risk due to inability of a company to fulfil its short-term commitment is called liquidity risk. As part of an internal governance mechanism, one of the risk-management policies that can minimise liquidity risk is good current ratio (CR). This book applied this internal governance instrument by constructing liquidity constraints in the model (see Chapter 4 and Section 6.2.2 for the discussion).

The RHS of CR constraints constructed in this study shows the maximum amount of the denominator of CR policy, which is equal to the maximum amount of short-term liabilities. Therefore, increasing the RHS of CR would increase short-term liabilities and decrease the optimal FCFE value. For example, a 100 increase in CR5 constraint would decrease FCFE by 864 (equals to 100 times -8.64), assuming ceteris paribus. This suggests that the CR policy constructed by this study disciplines managers by requiring them to limit liability since an increase in the RHS of CR constraints would only decrease the CR and hence decrease the company's liquidity.

The results of the model furthermore indicate that the maximum amount of accounts payable (AP) that a company can have during the periods range from zero to maximum 413.17. Having these APs, while types of sales are commonly credit sales, CR requires the company to maintain its accounts receivable (AR) at a higher level than its short-term liabilities (that is, AP). The amounts of ARs should range between 457.15 and 2076.08.

Having CR constraints in the model, this study recognises risks related to liquidity of a company. Accordingly, the objective of a relevant good risk management strategy is to minimise this liquidity risk. An internal governance instrument, that is, CR policy, which is constructed as the constraints of the model, disciplines managers through their operating activities.

The instrument requires managers to achieve a good balance of accounts receivable and accounts payable so that the company has appropriate liquidity, minimises liquidity risks and hence improves the optimal FCFE value.

7.2.1.3 Risk-management policy related to financial activity of the company (operating policy)

Activity ratio measures the ability of a company to convert its current assets into cash as quickly as possible. As part of an internal governance instrument, relevant risk management policies constructed in this study reflect the activity of a company. The strategies are to maintain good accounts receivable turnover ratio (ARTO) as well as good inventory turnover ratio (ITO). Similar to the CR policy, this book applied these financial management strategies by constructing ARTO and ITO constraints in the model (see Chapter 4 and Section 6.2.2 for the discussion).

The RHS of ARTO constraints constructed by this study reflects the numerator of ARTO, which is the average of sales. On the other hand, its left-hand side (LHS) shows the amount of AR. The sensitivity results of this study suggest that, while considering the constraints of AR discussed in Section 7.2.1.2 (CR section), a decrease in the RHS of ARTO would decrease average sales and hence decrease optimal FCFE value. For example, a 100 decrease in ARTO5 constraints would decrease FCFE by as much as 58, assuming ceteris paribus. This suggests that the ARTO policy constructed by this study disciplines managers by requiring them to increase their companies' sales level as well as maintain a certain level of AR, which supports both a company's liquidity (a good liquidity ratio prefers high AR, assuming ceteris paribus) and activity ratio (a good ARTO ratio prefers low AR, assuming ceteris paribus).

In addition to ARTO policy, to discipline managers the RHS of ITO constraints constructed by this study reflect the balance amount that ensures a good level of ITO ratio and requires that the amount of costs of goods sold (COGS) is higher than inventory. The sensitivity results of this study suggest that an increase in the RHS of ITO would make the amount of inventory higher than COGS, hence it would decrease the ITO ratio and decrease the optimal FCFE value. For example, a 1000 increase in ITO5 would decrease FCFE by 1520, assuming all other coefficients remain constant. Having constructed good levels of ITO ratio, the results of the model furthermore indicate that, during the relevant period, the company's COGS should be at a maximum of 1231.75 while the amount of inventory (INV) should be in the range 28.37 to 194.80.

Overall, this study recognised risks related to how quickly a company can convert its liquid assets to cash. The faster a company changes its other liquid assets into cash, the higher its liquidity to pay off its current liabilities. In this case the objective of the sound risk-management strategies is to minimise the liquidity risks related to activity ratios. Internal governance instruments, that is, ARTO and ITO policies which are constructed as the constraints of the model, discipline managers through their operating activities. The constraints require the managers to have certain amounts of accounts receivable, sales, COGS and inventory so that the company would have good levels of ARTO and ITO, thereby minimising the risks exposure to liquidity, and optimising FCFE value.

7.2.1.4 Risk-management policy related to financial distress and bankruptcy risk (financial policy)

Despite the book value of financial statements that shows no long-term debt owed by the company as well as no cash flows from debt financing, the output of the model suggests a certain safety level of debt which could increase FCFE. While debt financing offers some benefits, such as substituting weak internal governance and minimising agency costs due to the substantial value of FCF, it also contains risks. This section explains how the company can minimise these risks while maintaining the benefits of debt. By applying additional internal governance instruments, this book shows how the risks of debt financing can be reduced. The relevant constraints are financial distress (measured by leverage policy) and bankruptcy risks (measured by Z-score policy).

Leverage constraints discipline managers by requiring them to limit the amount of debt, thereby minimising financial distress and preventing the company from bankruptcy and solvency risks. The results of this study suggest that the amount of long-term debt (LTD) should not be more than 376.44. The RHS of leverage constraints constructed by this study shows the balance amount which ensures a safety level of debt. The RHS of leverage also requires that total debt should be lower than total assets. The sensitivity results of this study suggest that an increase in the RHS of leverage would make the amount of total debt higher than total assets, and hence it would increase the leverage ratio and decrease the optimal FCFE value. Specifically, an increase of the LEV4 constraint to 1113.0874 (increased by 100) would decrease FCFE by 281, assuming ceteris paribus.

In addition to leverage policy, Z-score constraints discipline managers by requiring them to maintain the financial position of a company within a safe bankruptcy zone. The right-hand side of Z-score shows the balance amount of the safety zone, which in the case of Indonesia (as an emerging market), the Z-score should be more than 5.85. The constraints of Z-score were constructed by showing that an increase in the RHS of Z-score constraints would cause the strength of the company's financial position to decrease under the safety zone. The composition of assets AR, inventories, AP and COGS proposed by this model, as also discussed in the previous sections, was already optimal and their compositions placed the financial position of the company above the bankruptcy safety zone. Specifically, the sensitivity reports of this study show that a 100 decrease in the constraint of Z6/Z7/Z8 would improve the optimal FCFE value by 22 which help to strengthen the company's financial position so that bankruptcy risk can be minimised.

Having included constraints related to leverage and bankruptcy risks, this study has attempted to minimise the company's risks related to debt financing as well as ensuring an effective debt-controlling mechanism in minimising agency costs. The leverage policy is an internal governance instrument which disciplines managers through their financing activities; it requires managers to limit amounts of debt so that the company does not face financial distress. Similarly, Z-score constraints discipline managers through their financing activities; they require the managers to maintain a composition of assets so that the company does not face bankruptcy risks.

7.2.1.5 Risk-management policy related to investment activities of the company (investing policy)

Despite the importance of investment activities in creating the future value of a company, they contain risks which may decrease firm value. Exposure to risks from these activities include opportunity loss due to low investment return, 'sunk costs' due to unrecoverable investment amounts and opportunity costs of not fulfilling market demand due to low capacity of the production assets. This section discusses the results of this study which are specifically related to considerable amounts of PPE investments (capital expenditure) and the investment exposure on firm value. This book, however, does not cover capital budgeting as a tool for selecting investments.

To minimise risk related to considerable amount of PPE investments, this study constructed risk-management policies, namely PPE constraints and the availability of funds for investments (FUNDS) constraints in the model. As part of internal governance mechanisms, these risk-management policies discipline managers by requiring them to set minimum and maximum amount of PPE investments having maximum funds that can be collected by a company, or called upon as available funds for investments (FUNDS).

The results of this study suggest that, having maximum funds that can be collected for investments (FUNDS), the company should maintain a level of PPE ranging from 1105.38 to 3881.17. The non-binding constraints of PPE indicate that there were PPE left over in the optimisation process. This suggests further that the amount of cash flows available for investments (CFI) achieved by this model – which was only 239.50 – is not enough for the company to attain the level of PPE investments as formulated in the model. This is supported by the non-binding available funds for investments (FUNDS) variable which showed that FUNDS resources were also left over in the optimal value creation. This suggests that there were still available funds which could be collected by the company and used for financing investments. This may also suggest further formulation of the FUNDS constraints in this study as to how to increase available funds for investments.

Overall this study provided information for formulating relevant risk management strategies specifically for the amount of PPE investments which can lead to GCG practices. The objective of the relevant strategy is to minimise risk related to PPE investments. PPE constraints and FUNDS constraints act as internal governance mechanisms which can discipline managers in minimising the risks of PPE investments. The constraints require management to set proper levels of PPE investments which can reduce risks and improve FCFE value.

7.2.1.6 Compensation for executives policy (other operating policy)

Chapter 2 discussed that compensation for executives, as argued by optimal contracting theory, can be an internal governance mechanism to make managers perform in the best interest of owners (Bebchuk & Weisbach 2010; Dicks 2012; Henderson 2007). However, compensation of management also contains risk in that, as argued by managerial power theory, managers are often overpaid and inefficiently paid (Henderson 2007).

Therefore an internal governance policy constructed in this study reflected by executive compensation constraints shows a sensible amount of management compensation which minimises its exposure on firm value while maintaining its effectiveness in motivating managers to perform in the best interests of shareholders. The results of this study suggest the company set executive remuneration (REXX) between 3.37 and 7.82. In addition, the RHS of executive compensation (EC) constructed in this study reflects a balance of proper amounts of executive compensation. The sensitivity results of this study suggest that the proposed executive compensation is already at its maximum level since any incremental increase would decrease firm value – a decrease of EC8 by 2 would increase FCFE by as much as 3.32, assuming all other coefficients remain constant.

Therefore this study has provided information about how the constraints of the model can minimise risks related to exaggerated amounts of executive compensation. The sound financial management strategy of this book formulates a proper amount of executive compensation so that risk exposure from that compensation can be minimised. Overall, the amount of the compensation motivates management to perform effectively in the best interests of shareholders and therefore increases FCFE value.

7.2.2 Cost of capital

The cost of capital for this study was used as the discount rate for calculating discounted FCFE. It reflects economic risk, market risk and external business risks faced by a company. The cost of capital consists of two components: risk-free rate and risk premium. It shows the opportunity costs of funds or a compensation for the time value of money. The opportunity cost is recognised as a required rate of return: 'a return or compensation which investors require for investing their limited funds in one project rather than in another project with equivalent risks' (Lee et al. 2009, p. 418). Specifically, this opportunity cost is represented by the risk-free rate component. Risk premium, on the other hand, represents a compensation for three risks faced by a company and its shareholders: business risks, financial risks and inflation risks (Lee et al. 2009).

The cost of capital used in this study reflects the degree of risks in the country where the model of this study was applied. Compared to a developed country's discount rate, the discount rate where the model was applied, as depicted in Table 6.1, on average is above 15%. This rate shows further the uncertainty and high-risk levels in Indonesia and, therefore, indicates weak external governance of the country (due to a weak legal system). Weak external governance mechanisms, however, can be overcome by other governance instruments such as debt monitoring, executive compensation and risk-management practices as discussed above, as well as a high level of transparency and strong board governance function in terms of independence, size, financial literacy, diversity and so forth (Brown et al. 2011).

In addition, the cost of capital reflects the concept of the time value of money: 'a dollar received today is worth more than a dollar received in the future' (Petty et al. 2009, p. 10). This concept is very important when comparing the FCFE value with other values – that is, the market value of a company's stock from which the intrinsic value can then be assessed. The optimal values of the model achieved by sound financial management strategies are presented as present values or discounted values of FCFE. These optimal values, which reflect shareholder value, and their intrinsic values, are discussed below. Initially, cash flows generated from (used by) each output channel – operating (CFO), investing (CFI) and debt financing (CFFd) – are presented.

7.2.3 Cash flows from (used by) operating, investing and debt-financing activities

Free cash flows to equity (FCFE) which was used as a proxy of firm value or shareholder value was discussed in Chapter 4. It shows the available cash which can be distributed to shareholders in terms of cash dividend or stock repurchases. FCFE is a function of cash flows from three main business activities of a company: operating, investing and debt financing. CFO, CFI and CFFd show respectively cash inflows or outflows generated from financial management strategies in the operating, investing and debt-financing areas.

The results of the model which were presented in Chapter 6 indicate that, CFO during the relevant periods ranged from 5,658.19 to 15,853.01. As depicted in Table 7.1, compared to the book value of cash flows shown in the financial statements (reflecting the current management strategies of the company), the amounts of CFO achieved under the proposed optimal financial management strategies were three to four times higher. This reflects further that the proposed financial management strategies (which were discussed above in Section 7.2.1), formulated through the integrated financial optimisation model, can minimise risks related to the company's operating activities and hence enable the company to generate higher cash flows. High CFO indicates further that the company is good or healthy (Warfield et al. 2008).

For cash flows used by investment activities (CFI), the results of the model show that the maximum of cash outflows that should be used for investment activities, proposed by sound financial management strategies, was 239.50. Compared to the book value of cash flows shown in the financial statements (reflecting the company's current management strategies), the amounts of CFI achieved under the proposed optimal financial management strategies were significantly lower. The company's annual reports showed that its investment activities during 2004–2011 were related to the acquisition of other companies, purchasing fixed assets and purchasing intangible assets. Despite the theory on the relationship between cash flows and business stage that suggests that a mature company makes investments for which the amount of CFI should be less than the cash flows generated by operating activities (Warfield et al. 2008), the output of the model indicates that the company's previous level of investments was too high. The results of CFI can be interpreted such that, in the future, the company needs to evaluate its investment activities by assessing the proper amount of investment funds as well as evaluating whether the investment activities are adding firm value.

For cash flows from debt-financing activities (CFFd), the results of the model show that the maximum amount for debt leverage is 376.44. Related to this CFFd, the sensitivity reports suggest that this amount would be optimal since an increase in the right-hand side of the CFFd constraint would increase the level of CFFd or long-term debt, and hence it would decrease the optimal FCFE value. A 100 increase in CFFd7's right-hand side value would decrease FCFE by as much as 281 (equal to 100 times -2.81), assuming all other coefficients remain constant.

Compared to cash flows shown in the financial statements (reflecting the company's current management strategies) that showed zero debt

Table 7.1 Comparison between book value of cash flows shown in financial statements and proposed amount of cash flows based on output of the model

Cash Flows	**Based on F/S**	**PV Model (using interest rate discount factor)**	**PV Model (using CAPM rate discount factor)**
CFO1	1415.869	5,658.19	5,607.02
CFI1	–243.019	0.00	0.00
CFFd1	0	52.90	73.23
CFO2	1665.735	6,886.07	6,719.76
CFI2	–212.869	0.00	0.00
CFFd2	0	132.48	208.53
CFO3	2174.808	8,066.16	8,151.03
CFI3	–338.127	0.00	0.00
CFFd3	0	56.02	56.02
CFO4	2250.013	8,345.49	8,345.49
CFI4	–1191.52	–239.50	–239.50
CFFd4	0	0.00	0.00
CFO5	2785.785	10,261.75	10,261.75
CFI5	–509.114	0.00	0.00
CFFd5	0	253.98	253.98
CFO6	3280.71	13,130.56	13,130.56
CFI6	–700.047	0.00	0.00
CFFd6	0	0.00	0.00
CFO7	3619.189	12,373.82	12,373.82
CFI7	–1310.02	0.00	0.00
CFFd7	190	218.25	218.25
CFO8	5461.876	15,853.01	15,853.01
CFI8	–1433.14	0.00	0.00
CFFd8	509.16	376.44	376.44

Source: This table represents a comparison between the actual book value of cash flows shown in the financial statements and the figure of cash flows based on the output of the model (calculated using both interest rate and CAPM rate), from period 1 to period 8. The cash flows from three main activities of a company: operating (CFO), investing (CFI) and debt financing (CFFd) reflect free cash flows to equity (FCFE).

financing, the results for the amounts of CFFd suggest a certain amount of debt financing. Based on corporate finance theory (capital structure), debt financing offers tax-benefit advantages but it also contains risk in that too much debt causes financial distress and increases bankruptcy risks. Based on GCG practices, debt also offers advantages since it can act as a governance mechanism (i.e., debt monitoring) which disciplines managers, especially in the case of a country with a weak legal framework. Second, in the case of substantial free cash flows, debt monitoring reduces agency costs by requiring management to invest the substantial free cash flows in valuable activities or investments which may increase the company's future value (Jensen & Meckling 1976; Jagannathan & Srinivasan 1999). In this case, while the objective function of this study uses FCF valuation, debt financing is necessary since it will minimise the agency costs which may be incurred due to the substantial FCFE achieved by the model. Furthermore, the debt financing proposed based on the output of the model improves FCFE since, as discussed in Section 7.2.1, sound risk-management policies developed by this model are effective in achieving GCG practices by minimising the risks related to debt financing.

7.2.4 Optimal firm value

All financial management strategies discussed above are found to be optimal for GCG practices since they minimise risks and increase FCFE value. The present value (PV) of FCFE measures firm value and reflects shareholder value. According to this model, the PV of FCFE was 253201.976 (using interest discount rate). This amount is much higher compared to the present value of the book value of FCFE, created under the current company's management strategies, which was only 33566.95 (calculated based on figures in financial statements and depicted in Table 6.2). The sensitivity analysis showed that the results were robust even when the model was simulated using CAPM cost of capital, in that the firm value achieved was 250647.66 while the firm value under the current management strategies calculated using CAPM rate was only 11578.99.

Moreover, the intrinsic values of the company, which were calculated based on the present values of optimal FCFE were higher than the market value of the company's stock in the relevant period. Having outstanding common stock of 7,630 million, the intrinsic value of the company's stock was Rp33,185 (using the interest discount rate FCFE value) and Rp32,850 per share (using the CAPM discount rate FCFE value), while the market value of the company's common stock in that period was Rp2,792.29 per share. Comparing the intrinsic values with the market value, the company's stock was undervalued since its selling price was significantly lower than its predictive intrinsic value. These intrinsic values suggest further that sound financial management strategies create value in the future and hence bring benefit to shareholders.

Having achieved optimal firm values and high intrinsic values, this study shows that financial management strategies that accommodate external regulatory environments as well as internal governance mechanisms are effective achieving GCG practices. The strategies reduce risks and improve FCFE. Sound financial management strategies applied in this model are, for example, risk-management activities, leverage and executive compensation, and were formulated comprehensively using the integrated financial optimisation model which was developed from managerial and financial accounting perspectives. Overall, these financial management strategies add value for shareholders. Furthermore, the results of this study answer the research question of this study: '*What sound financial management strategies achieve GCG practices and how do they do so.'* The results answer the proposition of this study: *'for achieving the economic benefit of GCG practice, optimal financial management strategies should reflect internal and external governance mechanisms'*. Therefore, this modelling exercise shows that it is possible to achieve the economic benefits of GCG practices through optimal financial management strategies since they reduce risks and increase firm value.

7.3 Implications of the study for managerial and financial accounting perspectives

7.3.1 Managerial accounting perspectives for improving GCG practices

GCG practices are perceived to provide economic benefits for an individual company and the national economy (OECD 2004). Despite the fact that GCG practice is now largely compulsory for listed companies around the world, previously few companies viewed GCG practice as a good risk and only regarded it as a cost rather than as an investment (Dallas 2004; Fabozzi & Modigliani 2009). GCG practices were even more challenged as some companies that claimed to have GCG practices collapsed (Love 1991; Sarre 2003). Complying with GCG best practices in form would not help a company to achieve the potential benefits offered by GCG practices nor protect it from corporate failure. Good financial management strategies will help to achieve the benefits of GCG practices.

This book fills the gap in the corporate governance study by building a practical decision-making model for formulating sound financial strategies that can achieve the benefits of GCG practices. This study contributes to theories and practical managerial and financial accounting by providing valuable insights into how to link sound financial management strategies with GCG practices. Moreover, the study helps us to understand how to integrate internal and external governance mechanisms into sound financial management strategies. These strategies measure broad concepts of GCG practices and normative GCG principles into specific quantitative monetary units so that the effectiveness of GCG practices can be assessed. For example, in Chapter 4, this study defined GCG principles which concern shareholders' rights into a more specific measurement: an increased shareholder value. Free cash flows (FCF), chosen as the proxy of shareholder value, would also provide an assessment of the sustainability of a company in the future. A high FCF also shows a company's sustainable performance, which means the company is able to fulfil GCG principles related to stakeholders' interests since high FCF means that the company can pay tax to the government, settle its trade payable to suppliers, pay salaries and employees' benefits to the management and employees, and have funds to potentially cover the cost of its after-sales service.

This study gives a further insight into risk-management practices that can help to achieve the benefits of GCG practices. For example, this study provides an extended understanding of how three of the four drivers suggested by Léautier (2007) need to be integrated for determining a firm's risk-management strategy. This book covers risk management strategies in operating, investing and financing areas but does not cover risk management practices for value creation from the investors' perspectives. The integrated financial optimisation model specific for GCG practices provides a framework of risk analysis. In addition, the numerical model illustrates the risks of external regulatory environments and risks exposure of other internal governance mechanisms. Through the integration of the value-based management and stakeholder approaches, this study shows how good risk-management strategies can help management mitigate these risks. By examining risk-management policies related to the financial liquidity and financial activity of a company as well as PPE investments, this study extends previous studies such as those of Carleton (1970), which focused mainly on long-term debt financing. Specifically, the results of this study show that financial accounting ratios, such as current ratio (CR), accounts receivable turnover ratio (ARTO) and inventory turnover ratio (ITO), are effective internal governance instruments which can measure a company's liquidity risks.

In addition to risk-management practices in operating and investing activities, this study provides an understanding of risk-management practices in financing activities and executive compensation. The literature on corporate governance reveals that leverage has the effect of a double-edged sword; while debt monitoring reduces agency costs, debt contains financial distress risks (Ghosh 2007; Heinrich 2002; Jensen 1986; Sarkar & Sarkar 2008; Verwijmeren & Derwall 2010). This study illustrates how to minimise the bankruptcy risks which are related to debt financing. The results of this study provide strong evidence that debt can serve as a good internal governance mechanism in the case of substantial free cash flows, as achieved in this study (Jensen 1986), while risks related to debt can be properly managed. Similarly, the current study provides a valuable insight into the application of executive compensation policy. Similar to debt, compensation for executives as a governance instrument offers both advantages and disadvantages. The exercise demonstrated by this study provides an understanding of how to set a sensible amount of executive compensation.

To conclude, this study has implications for practical GCG as well as managerial and financial accounting by providing an understanding of how GCG practices can be quantified from managerial and financial accounting perspectives. Quantification of the broad concepts of GCG practices and normative GCG principles enables management to assess the effectiveness of GCG practices. Moreover, sound financial management strategies applied in the operating, investing and financing areas are effective internal governance mechanisms which discipline managers since they measure and control risks so that the benefits of GCG practices can be achieved through reducing risk and stimulating performance.

7.3.2 Financial accounting perspectives for improving GCG practices

This study provides an understanding of how external regulatory environments influence a company's business activities and GCG practice. It shows that while a strong external regulatory environment disciplines managers, complying with the regulations may incur costs especially if the regulations are not in line with one another.

This study shows how two inharmonious regulations – accounting standards and tax policy – impact on a company's GCG practice. It also provides an insight into the application of risk-management activities that can minimise costs of the incongruity of accounting standards with other regulations, known as permanent book-tax differences. The study shows that by giving constraints to non-deductible expenses (NDE), firm value can be increased. In spite of this sound risk-management practice, which can minimise the costs due to the incongruity of accounting standards with other regulations, GCG practices can be further improved by, for example, making accounting standards align with other regulations, hence the costs incurred due to inharmonious regulations can be prevented. Therefore, this study provides an implication for accounting standard–setters in regard to lobbying other regulators or making accounting standards harmonise with other regulations.

GCG practices can also be improved further by, for example, developing appropriate accounting standards that are supportive of GCG practices. Despite the fact that the accrual accounting concept provides some advantages for recognising income and expenses, this concept has frequently been abused by management (such as through creative accounting) which then leads to corporate failures (Clarke et al. 2003). This study provides an understanding of how the cash accounting concept can be more reliable for measuring GCG practices rather than the concept of accrual accounting. The discounted FCFE, which is based on the cash accounting concept, shows the present value of a company's future expected after tax cash flows. Therefore, it measures the economic value of a company and reflects investors' required returns on securities of comparable risks (Chew 2003b). The study furthermore gives an insight into the preferable discounted FCFE as a proxy of shareholder value since it reflects available cash for shareholders and an intrinsic value of a company's stock. Having argued that FCF is an important health indicator for a company, the study has an implication for accounting standard–setters or capital market authorities to improve financial reporting and disclosures by requiring a company to disclose not only accrual-based accounting measurements such as net income (NI) and return on equity (ROE) but also the positions of cash flows such as FCF and other financial indicators related to cash flows – that is, FCF per share.

To conclude, this study has implications for implementing GCG practices as well as for managerial and financial accounting by providing a valuable insight into a company's compliance with regulatory environments. Using an integrated financial optimisation model, a company can quantify and minimise the costs incurred due to its compliance activity. The study also provides an understanding of the importance of a FCF valuation for measuring the benefits of GCG practices as well as for a financial health indicator other than accrual-based accounting measurements such as net income. This provides further implications for accounting standard–setters and regulators to improve current GCG practices by requiring a company to disclose its FCF position and other financial indicators related to cash flows.

7.4 Theoretical and methodological implications of the study

7.4.1 Theoretical implications

The main aim of this study was to formulate sound financial management strategies in order to achieve the benefits of GCG practices. To achieve this objective, this study has exploited theories and literature on corporate governance, corporate finance and accounting. The following paragraphs summarise the most important theoretical contributions that this study has made to corporate governance research.

This study contributes to corporate governance literature by developing an integrated framework based on managerial and financial accounting perspectives for achieving the benefits of GCG practices, such as reducing risks and stimulating performance (Collier & Agyei-Ampomah 2007). The framework is depicted in Figure 7.1. In line with GCG principles, this study defined performance as shareholder value. Developed on the basis of the interrelationship among corporate governance, corporate finance and accounting, the integrated framework provides an understanding of how to formulate sound financial management strategies and analyse the impacts of these strategies on shareholder value.

In particular, this study provides an extended understanding of the governance role of accounting as discussed by Brown et al. (2011). As discussed in Chapter 2, accounting is an important governance instrument since, as a language of business, it measures the company's business activities in monetary terms. As an information system, the governance role of accounting is to identify and record the economic events of an entity, and then disseminate the record of the entity's financial activities to interested parties (Weygandt et al. 2010).

Similarly, this study provides an understanding of the concepts of accounting and corporate finance, and how they relate to GCG practices. Despite the fact that the accrual-accounting concept provides some advantages for recognising income and expenses, it may also contain accounting 'noise' as management could employ earnings management and manipulate the accounting figures. A free cash flows (FCF) valuation was chosen since it is based on the cash accounting concept that management has more limitations on employing earnings management compared to accrual accounting. Using free cash flows to equity (FCFE) as a measurement for shareholders' rights, this study highlights the importance of corporate finance concepts that the ultimate objective of a company is maximising shareholder value, and 'cash – not profits – is

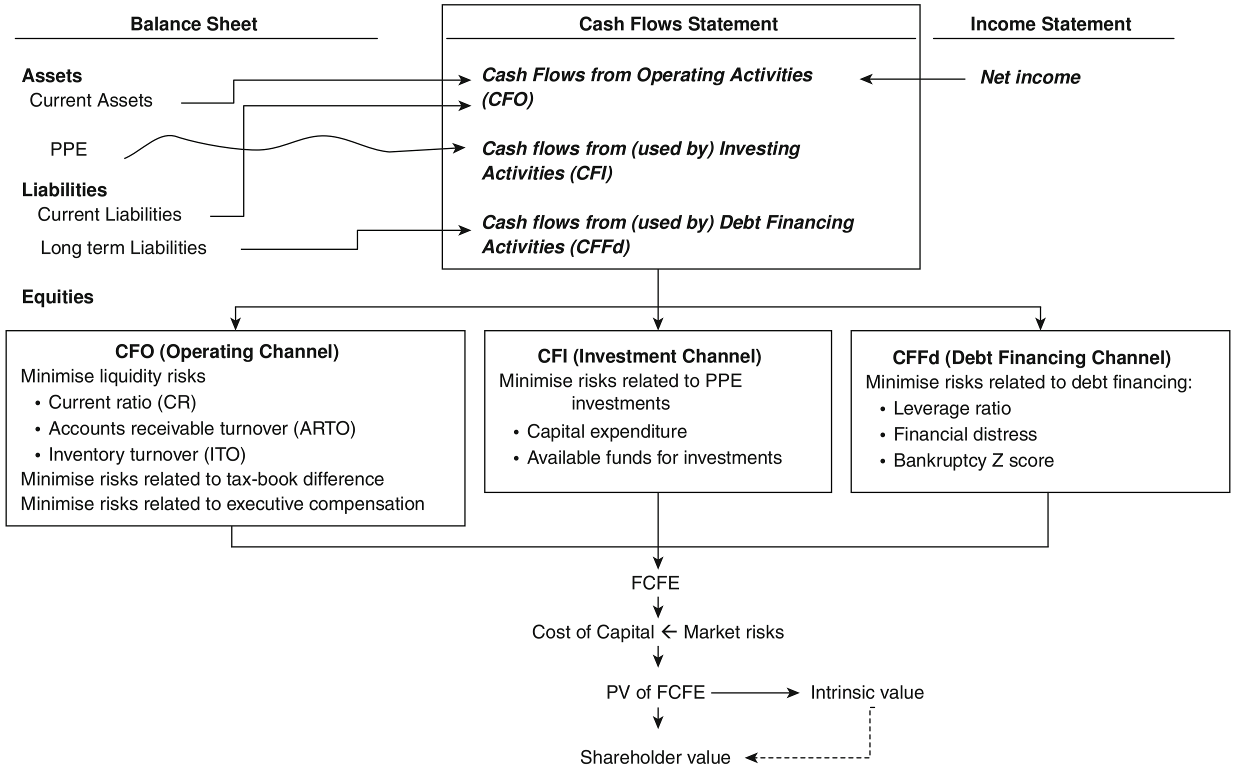


Figure 7.1 An Integrated Framework for Achieving GCG Practices Based on Managerial and Financial Accounting Perspectives

king'. The discounted FCFE moreover provides more understanding on the principle 'the time value of money'. Discounted FCFE as the proxy of shareholder value moreover reflects cash available for shareholders. Based on the discounted FCFE, an intrinsic value of the company's stock can also be assessed. The results of this study show that the discounted FCFE was optimal and therefore optimal shareholders' value was achieved as a result of employing sound financial management strategies.

Using discounted FCFE, this study provides an extended understanding of the importance of the correct cost of capital for a business valuation. The cost of capital reflects opportunity costs and the economic and market risks faced by the company. The cost of capital used in this study was calculated based on both risk-free interest rate and CAPM methods. The high cost of capital reflected the degree of risk in Indonesia where the model of this study was applied.

Finally, this study provides a framework for integrating risk measures and analysis with GCG practices. As shown by this study, good risk management can reduce the negative impacts of the double-edged sword of governance instruments such as leverage and executive compensation. Therefore, this study supports the argument of Jensen (1986) that debt monitoring can reduce agency costs which may be incurred due to substantial free cash flows. The results of this study also support the optimal contracting theory that management compensation can serve as an efficient bargaining tool to make managers perform in the best interests of owners (Bebchuk & Weisbach 2010; Dicks 2012; Henderson 2007). Moreover, good risk-management activities should consider the influence of external regulatory environments such tax policy and accounting practices on a company's value. The effect of book-tax difference on a company's financial position, as required by accounting standards, needs to be recognised. While non-deductible expenses (NDE) may decrease a company's cash flows, this study provides a valuable insight for minimising this risk. Overall, the results of the study show that good risk-management practices are effective in minimising risks of financial liquidity, PPE investments, debt financing, executive compensation and tax-book differences.

7.4.2 Methodological implications

Despite the considerable number of empirical studies that are focused on corporate governance, this study provides a new insight into the application of the optimisation approach. Previous corporate governance studies that have used an optimisation approach are, for example, Nwogugu (2006) which included risk and corporate governance issues, but the study focused more on modelling bankruptcy decision-making and legal reasoning. Bonazzi and Islam (2007) also used an optimisation approach to discuss one aspect of governance instruments (board governance) in their model. Bonazzi and Islam (2007), however, did not cover other governance mechanisms which relate to financial management strategies.

This study furthermore provides an understanding for integrating the accounting concept in the linear optimisation model (computational optimisation in Accounting) as previously done by Demski (1967, 2008), which highlighted an accounting system structured on a linear programming model, as well as Ho and Lee (2004) with their 'corporate model'. This study includes the accounting concepts in the objective and constraints of the model. The equations of the model reflect the relationship among balance sheet, income statement and cash flows statement. The objective function of this study, using FCF, is, however, substantially original in the literature. Previous optimisation models such as that of Carleton (1970) were built using the dividend approach, while Hamilton and Moses (1973) measured the company's performance based on earnings per share (EPS). Reflecting shareholder value, the FCF approach is more suitable for corporate governance study.

7.5 Summary

This chapter presented the implications of the study. The discussion explained further what sound financial management strategies act as effective governance mechanisms and how they control risks and improve firm value. It also showed that the optimal FCFE was achieved and that sound financial management strategies can help to achieve the benefits of GCG practices, that is, reducing risks and stimulating the company's performance. This chapter also discussed the implications of the study from managerial and financial accounting perspectives with regard to sound financial management strategies and good risk-management practices. It also highlighted the importance of keeping accounting standards in line with other regulations, and the importance of using cash accounting concept to measure GCG practices and using FCF as a financial health indicator. The study also contributes to further development of corporate governance theory by developing an integrated framework which shows the interrelationships among corporate governance, corporate finance and accounting, and using an optimisation approach to measure GCG practices (computational optimisation in Accounting).

8 Conclusion and Recommendations for Future Research

8.1 Introduction

This final chapter provides a summary of the research developed by the study. Initially, this chapter discusses briefly the background and literature that motivated this study. Next, how to achieve its main objective: developing sound financial management strategies through a financial optimisation model is reviewed. Section 8.4 presents how this book achieves its specific aims which are: (1) determining the GCG practices, business risks and regulatory environments that should be incorporated into the financial management strategies of a company; (2) quantifying the policy and mechanisms of GCG practices and identifying the right proxy for them; (3) designing an integrated multi-period financial optimisation model based on managerial and financial accounting perspectives; and (4) using a FCF approach, which is believed to be the best approach, to quantify the economic benefits of GCG practice.

The last specific aim of this research, implementing the model for formulating sound financial management strategies that reflect good risk-management activities and GCG practices is summarised in Section 8.5. In this section, the major findings from the simulation of the model are briefly presented, followed by a discussion of the findings in the context of how sound financial management strategies can help to achieve the benefits of GCG practice, that is, minimising risks and improving firm value. This chapter also discusses the contribution of this book, its limitations, and directions for future research.

8.2 Sound financial management strategies for achieving good corporate governance practices

The initial chapter of this study provided an overview of the phenomena of corporate failures and the global financial crisis. To strengthen the economy, GCG practices need to be implemented. Most countries have now made GCG practices mandatory for public or listed companies. Nevertheless, only making GCG mandatory is not enough, as some companies who only used a tick-box approach to GCG practices collapsed. The investigation of corporate failures found that, apart from the unethical behaviour of managers, lack of sound financial management practice is the main cause of failure (HIH Royal Commission 2003; Watts 2002). Companies need to employ sound financial management practices to survive and achieve the economic benefits of GCG practices.

8.3 Critical review of the literature

8.3.1 Interrelationships among corporate governance, corporate finance and accounting

The literature review shows that corporate governance, corporate finance and accounting practices are interrelated; they serve as controlling mechanisms which can discipline managers to perform in the best interests of shareholders to create firm value (Brown et al. 2011). Therefore it is necessary that sound financial management strategies are developed on the basis of the interrelationships among corporate governance, corporate finance and accounting. Corporate governance practice depicts the relationship among management, shareholders and stakeholders. Corporate finance provides specific financial management strategies which help management to achieve the benefits of GCG practices, that is, reducing risks and improving the performance of a company. Examples of governance instruments include leverage, executive compensation and risk-management practices.

Accounting practices help a company to identify and record the economic events of the company and disseminate the record of the company's financial activities to interested parties (Weygandt et al. 2010). Financial statements as a product of accounting are a snapshot of a company's business activities during one operating period. This information is useful for both management and external users in making effective business decisions to allocate scarce resources. The externals send negative or positive feedback through the movement of a company's stock market price; this information is then valuable to management in evaluating their decisions and formulating future strategies.

8.3.2 An optimisation model

An optimisation approach is a useful tool for decision-making since it assists management to make the best possible economic decisions in regard to allocation of resources. In business applications, the objective function will be the maximisation of revenue/profit or minimisation of costs, while the constraints will be, for example, the availability of resources such as people, materials and time. The results of the model suggest the available decisions for management to consider, given limited resources.

The literature review indicated that there is no comprehensive study that researches the interrelationships between the underlying theories and GCG practices for formulating sound financial management strategies in an optimisation framework using a case study method. Moreover, the existing models have the following limitations: (1) they were not developed in the context of the current GCG practice; (2) most of the existing models only reflected short-term goals of the company and did not consider maximising shareholders' wealth; (3) their measurements were mostly based on accrual accounting, which contains accounting noise; and (4) they did not incorporate managerial and financial accounting practices. Due to these limitations, the existing models were found not to be sufficient to model GCG practices and risks faced by a company in the formulation of sound financial management strategies.

8.4 Developing an integrated financial optimisation model based on managerial and financial accounting perspectives for formulating sound financial management strategies

8.4.1 Conceptual framework and research methodology

This study is positivist. Hence, to examine its research problems, this book used a quantitative methodology and a deductive approach. The framework of this book was developed based on a postulate that the success of a company is influenced by both internal and external factors. Based on the literature review, this study formulated its main research question: *What financial management strategies help to achieve the economic benefits of GCG practices?* Therefore, it is the purpose of this study to formulate sound financial management strategies based on managerial and financial accounting perspectives, and measure the effectiveness of these strategies on improving corporate governance practices.

The conceptual framework of this study showed that to formulate good financial management strategies to promote GCG practices, initially GCG practices and its principles were modelled and formulated based on financial management practices and from financial accounting perspectives. Variables commonly used in financial management practices were chosen to represent GCG practices. The variables reflected both internal company management activities and external business environments. These variables were then formulated in the proposed model, called an integrated financial optimisation model. The equations of the model followed generally accepted accounting principles (GAAP). Therefore the model showed accounting equations reflecting the interaction among income statements, balance sheets and cash flows statements. The model was justified based on accounting and financial management practices.

8.4.2 An integrated optimisation problem and approach

An integrated financial optimisation model was built to formulate sound financial management strategies that can help managers to achieve the benefits of GCG practices. A multi-period optimisation model that 'involve(s) decisions that have a ripple effect on future decisions' was used to solve long-term corporate financial problems (Ragsdale 2012, p. 95). The multi-period model represents a real-world management process which usually takes in more than a one-year corporate period. Specifically, the objective of the model is to maximise FCFE, a proxy of shareholder value, subject to constraints which were derived from GCG practices and financial management practices.

The integrated optimisation model that can accommodate the issues of this book can be generally expressed as follows (adopted from Cornuejols and Tütüncü 2007, p. 3):

$$\begin{aligned} &\mathrm{Max}_{x} c^{Tx} \\ &\text{Subject to } Ax=b \\ &x \geq 0 \end{aligned} \tag{8.1}$$

where:

$A \in IR^{m*n}$ is given;
$b \in IR^{m}$ is given;
$c \in IR^{n}$ is given;
$x \in IR^{n}$ is the variable vector to be determined.

8.5 An integrated financial optimisation model and results

8.5.1 An integrated financial optimisation model for formulating sound financial management strategies and for achieving GCG practices

The model is an eight-year multi-period model. FCFE was used as the objective function. FCFE reflects GCG practices since it accommodates one of the parties of a company recognised by GCG principles: its shareholders. FCFE shows available cash for shareholders and thus reflects shareholder value. Initially, the model had 16 types of constraints within the following categories: (1) definitional and accounting equation constraints; (2) corporate governance policy: accounting policy constraints; (3) corporate governance policy: risk-management, financial and investment policy constraints; (4) other corporate governance policy: executive compensation constraints.

Specifically, the accounting policy constraints included accounting-tax difference (accounting for income tax) constraints. Risk-management, financial and investment policy constraints included: (1) liquidity risks and activity ratio constraints, as well as (2) financial distress and bankruptcy risk constraints. Regarding the former pair of risks, these include (i) current ratio; (ii) current cash debt coverage ratio; (iii) liquidity ratio: receivables; (iv) liquidity of inventory; and (v) assets turnover. The latter pair include (i) leverage policy; (ii) bankruptcy risk: Z-scores; (iii) debt-service coverage; and (iv) investment policy (capital expenditure and available funds for investments). The model also covered executive compensation policy constraints.

The model has been verified and validated using methods suggested by the literature and is thus free from linear programming problems such as alternate optimal solutions and degeneracy. Hence the output is reliable for decision-making purposes. The main results are explained below.

8.5.2 Optimal firm value

The integrated model enables management to generate better financial management strategies. Applying sound financial strategies, the model output shows that the company can achieve maximum FCFE as much as 253201.976 (in thousand million rupiahs; using interest rate cost of capital) or 250647.66 (in thousand million rupiahs; using CAPM rate cost of capital). Compared to market value, the intrinsic value of the company's stock is undervalued. This suggests that this company will create potential value in the future. To achieve this optimal FCFE, the following sound financial management strategies need to be implemented.

8.5.3 Sound financial management strategies as complement to internal corporate governance instruments

First, the financial management strategies need to incorporate instruments of corporate governance such as leverage, executive compensation and risk-management practices. Second, the financial management strategies need to be measured by good proxy so that their effectiveness can be monitored and evaluated. The company needs to choose the best proxy to measure shareholder value and consider constraints that affect shareholder value creation. An FCF valuation is argued to be more powerful than traditional accounting measurements since it measures the economic value of the company and is relevant to GCG practices. External regulatory constraints such as capital market characteristics, tax policy, accounting practices and industry practices need to be formulated in the model so that their monetary effects on firm value can be measured and monitored.

Third, sound financial management strategies need to cover all main business areas of a company – operating, investing and financing. The examples of how to apply the model are as follows:

1) In operating activities

The purpose of corporate policies in operating activities is to minimise risk which may decrease cash inflows from operating activities. The first strategy is to limit NDE. Secondly, risk-management policies need to be applied to minimise liquidity risks so that the company can pay its short-term liabilities and finance its daily operating activities. Thirdly, risk related to excessive executive compensation can be minimised by having maximum constraints, while also linking remuneration to the GCG practices.

2) In investment area: long-term asset management strategy

Good corporate governance policies related to investing help to minimise risk that may become 'sunk costs', but without missing good investment opportunities. Risk-management strategies can be applied to minimise risks related to investment in PPE. PPE as shown in a company's balance sheet is the biggest internal investment (compared to other assets) made by a company. Therefore, this investment needs to be based on very careful analysis. Increases in PPE investments should be justified by increases in sales and the production capacity of the company.

3) In financing area: source of financing

While the company's current financing is drawn purely from internal sources, a certain amount of debt or so-called optimal debt financing can improve corporate value. As the theory suggests, optimal debt leverage improves the financial position of the company (Heinrich

2002; Jensen 1986; Petty et al. 2009; Sarkar & Sarkar 2008). Leverage can serve as an internal governance mechanism to discipline managers to perform in the best interests of shareholders (Milton & Raviv 1990).

8.6 Contributions of the study

The practical contributions of this study for GCG practices as well as managerial and financial accounting practices are:

1) a practical decision-making model for formulating sound financial strategies based on managerial and financial accounting perspectives that can achieve economic benefits of GCG practices. The model quantifies broad concepts of GCG practices and normative GCG principles into monetary units so that GCG practices can be monitored and evaluated;
2) valuable insights into the implementation of GCG practices in three main value creation channels: operating, investing and financing;
3) a further insight into risk-management practices;
4) an understanding of how a company should comply with its external regulatory environment.

The practical contributions of this study for accounting standard setters and other regulators are:

1) to make accounting standards in line with other regulations;
2) to improve financial statement reporting and disclosures by highlighting the importance of free cash flows (FCF) as one of the financial health indicators of a company.

This book contributes to the academic literature by providing:

1) an integrated framework for achieving the benefits of GCG practices. The framework, through an integration of the value-based management and stakeholder approaches, integrates risk-management measures and analysis with GCG practices;
2) an understanding of concepts of accounting and corporate finance, and how they relate to GCG practices;
3) an extended understanding of the importance of correct cost for a business valuation so that the valuation accommodates economic risk and market risk faced by the company.

The methodological implications of this study are:

1) a new insight into the application of the optimisation approach as a methodology for corporate governance study;
2) an understanding for integrating the accounting concept in the linear optimisation model;
3) using FCF as a measurement of firm value, which is substantially original in the literature.

8.7 Limitations of the studies and recommendations for future research

The proposed model is an extension of existing financial management models, such as that of Carleton (1970), and the corporate model of Ho and Lee (2004). Financial optimisation models have demonstrated their capacity for guiding management in decision-making. However, the integrated financial optimisation model proposed by this book would be more useful if future research can extend in the areas of, for example, projection or prediction of future value of the company. The intrinsic value of the company, calculated based on the expected value of its future cash flows, can be compared with the company's fundamental value or current market price. In this way, whether the company's stock is under- or over-valued can be assessed.

Other potential areas in which the model can be extended include capturing the uncertainty of the future, for which a stochastic model is preferred. In addition, the objective function could be altered to other types of function such as a multi-linear optimisation model or goal programming. Constraints can also be modified by accommodating the investors' perspective of Léautier (2007), derivatives and other complex risk-management activities. The model could also be extended by including other governance instruments such as board governance. This includes the quality of board of directors (BoD), size of the BoD, composition of independent directors, audit committee (AC), and so on. Costs related to board governance could also be accommodated (for example, total expenses related to board governance). Then, to make it more powerful, the model could be extended by applying it to more samples or observations, such as a larger number of companies, length of horizons, or by conducting comparative analysis between companies in the same country or different countries.

Future research can be also extended by studying the company's improvement in its financial position and its ability to combat the financial crisis. If it is feasible, the findings of this study will be informed to the case study company and a pilot study participatory research may be conducted to find out the impact of the findings of the study on the company's performance.

Finally, while FCF is effective for measuring firm value, the existence of the agency problem related to FCF needs to be examined further since, as argued by Jensen (1986), high FCF may lead to moral hazards of the management such as choosing investments with low return or investing in inefficient organisation activities. This book does not measure whether the FCFE achieved by the model is substantially high. In fact, the output of this model supports debt monitoring. Debt monitoring, as argued by the literature, is an effective governance instrument, more effective than the payout policy, which mitigates the agency problem (Jensen 1986). Hence, the limitation of the potential effect of FCF can be overcome by debt monitoring.

8.8 Summary

This study has demonstrated the association between normative or prescriptive GCG practices and their potential financial benefits. By constructing and applying an integrated financial model using an optimisation approach based on managerial and financial accounting perspectives, this book has shown what sound financial strategies help to achieve GCG practices, and reduce risks and improve company performance. The model, as a new management apparatus, aids the formulation of sound financial management strategies so that it helps management to achieve GCG practice. By applying sound financial management strategies developed using an integrated reliable management optimisation approach, management can not only achieve the benefits of GCG, but can also strengthen the company's financial position to ensure its ability to survive financial crises.

Appendix 1

Financial Data of the Company

PT UNILEVER INDONESIA Tbk AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
AS AT DECEMBER 31, 2004 AND 2003

Rupiah millions

	Notes	2004	2003
CURRENT ASSETS			
Cash and cash equivalents	4	784,455	1,136,579
Trade debtors			
(Net of allowance for doubtful accounts of Rp 6,118 in 2004 and Rp 2,856 in 2003)			
- Third parties	2g, 5	453,869	423,701
- Related parties	2d, 5	41,178	41,271
Other debtors	2f, 6	28,228	20,499
Inventories	2h, 7	628,826	517,459
(Net of provision for obsolete and unused/slow moving stocks of Rp 23,247 in 2004 and Rp 24,878 in 2003)			
Prepaid taxes	2n, 14c	6,765	11,323
Prepaid expenses	2l, 9	50,125	45,118
Total Current Assets		1,993,446	2,195,950
NON-CURRENT ASSETS			
Amounts due from related parties	2d, 8c	15,408	29,087
Deferred tax asset, net	2n, 14b	52,226	40,399
Fixed assets	2i, 10a	1,348,402	876,480
(Net of accumulated depreciation of Rp 295,231 in 2004 and Rp 285,301 in 2003)			
Intangible assets	2j, 11	175,675	188,434
(Net of accumulated amortisation of Rp 51,911 in 2004 and Rp 39,152 in 2003)			
Other assets	2l, 12	39,571	35,360
Prepaid pension expense	2o, 17	38,981	50,566
Total Non-current Assets		1,670,263	1,220,326
TOTAL ASSETS		3,663,709	3,416,276

PT UNILEVER INDONESIA Tbk AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

AS AT DECEMBER 31, 2004 AND 2003

Rupiah millions, except par value per share

	Notes	2004	2003
CURRENT LIABILITIES			
Trade creditors			
- Third parties	13	311,346	316,893
- Related parties	2d, 13	69,840	15,472
Taxes payable	2n, 14d	197,076	122,784
Accrued expenses	15	335,398	379,838
Other liabilities	16	318,208	396,216
Total Current Liabilities		1,231,868	1,231,203
NON-CURRENT LIABILITIES			
Amounts due to related parties	2d, 8d	64,408	32,850
Employee benefit obligations	2o, 17	52,466	47,814
Total Non-current Liabilities		116,874	80,664
MINORITY INTERESTS	18a	18,283	8,750
EQUITY			
Share capital (Authorised, issued and fully paid-up: 7,630,000,000 common shares at par value of Rp 10 per share for 2004 and 2003)	19	76,300	76,300
Capital paid in excess of par value	20	15,227	15,227
Fixed assets revaluation reserve	2i, 10b	287,593	154
Balance arising from restructuring transactions between entities under common control	3, 21	80,773	-
Appropriated retained earnings	23	15,848	15,260
Unappropriated retained earnings		1,820,943	1,988,718
Total Equity		2,296,684	2,095,659
TOTAL LIABILITIES AND EQUITY		3,663,709	3,416,276

PT UNILEVER INDONESIA Tbk AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF INCOME
FOR THE YEARS ENDED DECEMBER 31, 2004 AND 2003

Rupiah millions except basic earnings per share

	Notes	2004	2003
NET SALES	2m, 24	8,984,822	8,123,625
COST OF GOODS SOLD	2m, 25	(4,315,329)	(3,906,550)
GROSS PROFIT		4,669,493	4,217,075
OPERATING EXPENSES		(2,630,295)	(2,440,049)
Marketing and selling expenses	2m, 26a	(2,134,577)	(1,939,995)
General and administration expenses	2m, 26b	(495,718)	(500,054)
OPERATING INCOME		2,039,198	1,777,026
OTHER INCOME/(EXPENSES)		69,215	42,740
Loss on disposals of fixed assets	2i, 10d	(3,748)	(28,283)
Gain/(loss) on foreign exchange, net	2e	36,841	(913)
Interest income		36,122	72,234
Others		-	(298)
PROFIT BEFORE INCOME TAX		2,108,413	1,819,766
Income tax expense	2n, 14a	(641,285)	(534,007)
INCOME BEFORE MINORITY INTERESTS		1,467,128	1,285,759
MINORITY INTERESTS IN NET LOSS OF SUBSIDIARIES		1,317	10,952
Net loss of subsidiaries	18b	1,123	11,146
Reversal/(excess) of the difference of the subsidiary's accumulated losses over minority shareholder's paid up capital	18a	194	(194)
NET INCOME		1,468,445	1,296,711
BASIC EARNINGS PER SHARE	2q, 28	192	170

CONSOLIDATED STATEMENTS OF INCOME

FOR THE YEARS ENDED DECEMBER 31, 2004 AND 2003

Rupiah millions except basic earnings per share

	Notes	2004	2003
NET SALES	2m, 24	8,984,822	8,123,625
COST OF GOODS SOLD	2m, 25	(4,315,329)	(3,906,550)
GROSS PROFIT		4,669,493	4,217,075
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PT UNILEVER INDONESIA Tbk AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

AS AT DECEMBER 31, 2005 AND 2004

(Expressed in million Rupiah)

	Notes	2005	2004*)
CURRENT ASSETS			
Cash and cash equivalents	2d, 5	705,369	784,455
Trade debtors (Net of allowance for doubtful accounts of Rp 4,998 in 2005 and Rp 6,118 in 2004)			
- Third parties	2g, 6	415,466	453,869
- Related parties	2c, 6	41,681	41,178
Other debtors	2f, 7	19,515	28,228
Inventories (Net of provision for obsolete and unused/slow moving stocks of Rp 22,468 in 2005 and Rp 23,247 in 2004)	2h, 8	766,081	628,826
Prepaid taxes	2o, 15c	37,122	6,765
Prepaid expenses	2m, 10	45,128	39,448
Total Current Assets		2,030,362	1,982,769
NON-CURRENT ASSETS			
Amounts due from related parties	2c, 9c	32,479	15,844
Deferred tax assets, net	2o, 15b	21,305	68,613
Fixed assets (Net of accumulated depreciation of Rp 343,270 in 2005 and Rp 295,231 in 2004)	2i, 11a	1,495,659	1,348,402
Intangible assets (Net of accumulated amortisation of Rp 67,852 in 2005 and Rp 51,911 in 2004)	2k, 12	172,556	179,782
Other assets	2m, 13	60,827	39,571
Prepaid pension expense	2p, 18	29,163	12,117
Total Non-current Assets		1,811,989	1,664,329
TOTAL ASSETS		3,842,351	3,647,098

**) Restated, refer to Note 3*

CONSOLIDATED BALANCE SHEETS

AS AT DECEMBER 31, 2005 AND 2004

(Expressed in million Rupiah, except par value per share)

	Notes	2005	2004*)
CURRENT LIABILITIES			
Trade creditors			
- Third parties	14	573,278	311,346
- Related parties	2c, 14	41,008	69,840
Taxes payable	2o, 15d	67,815	197,076
Accrued expenses	16	719,917	551,848
Other liabilities	2f, 17	99,467	101,758
Total Current Liabilities		1,501,485	1,231,868
NON-CURRENT LIABILITIES			
Amounts due to related parties	2c, 9d	73,248	58,274
Employee benefit obligations	2p, 18	83,658	80,226
Total Non-current Liabilities		156,906	138,500
MINORITY INTERESTS	19	10,434	18,283
EQUITY			
Share capital (Authorised, issued and fully paid-up: 7,630,000,000 common shares at par value of Rp 10 per share for 2005 and 2004)	2r, 20	76,300	76,300
Capital paid in excess of par value	2r, 21	15,227	15,227
Fixed assets revaluation reserve	2i, 11b	287,593	287,593
Balance arising from restructuring transactions between entities under common control	2c, 4, 22	80,773	80,773
Appropriated retained earnings	24	16,442	15,848
Unappropriated retained earnings		1,697,191	1,782,706
Total Equity		2,173,526	2,258,447
TOTAL LIABILITIES AND EQUITY		3,842,351	3,647,098

CONSOLIDATED STATEMENTS OF INCOME
FOR THE YEARS ENDED DECEMBER 31, 2005 AND 2004

(Expressed in million Rupiah, except basic earnings per share)

	Notes	2005	2004*)
NET SALES	2n, 25	9,992,135	8,984,822
COST OF GOODS SOLD	2n, 26	(5,066,362)	(4,316,027)
GROSS PROFIT		4,925,773	4,668,795
OPERATING EXPENSES		(2,895,371)	(2,633,045)
Marketing and selling expenses	2n, 27a	(2,304,121)	(2,115,464)
General and administration expenses	2n, 27b	(591,250)	(517,581)
OPERATING INCOME		2,030,402	2,035,750
OTHER INCOME/(EXPENSES)		34,005	66,573
Loss on disposals of fixed assets	2i, 11d	(3,055)	(3,748)
Gain on foreign exchange, net	2e	8,360	34,199
Interest income		28,700	36,122
PROFIT BEFORE INCOME TAX		2,064,407	2,102,323
Income tax expense	2o, 15a	(624,421)	(639,458)
INCOME BEFORE MINORITY INTERESTS		1,439,986	1,462,865
MINORITY INTERESTS IN NET LOSS OF SUBSIDIARIES		499	1,317
Net loss of subsidiaries	19b	499	1,123
Reversal of the difference of the subsidiary's accumulated losses over minority shareholder's paid up capital	19a	-	194
NET INCOME		1,440,485	1,464,182
BASIC EARNINGS PER SHARE	2t, 29	189	192

CONSOLIDATED STATEMENTS OF CASH FLOWS
DECEMBER 31, 2005 AND 2004

(Expressed in million Rupiah)

	Notes	2005	2004
Cash flows from operating activities			
Receipts from customers		10,762,655	9,601,641
Payments to suppliers		(7,582,266)	(6,854,538)
Payments of directors and employees remuneration		(429,609)	(460,534)
Payments of employee benefits	18	(53,431)	(42,312)
Payments of service fees		(316,899)	(271,723)
Cash from operations		2,380,450	1,972,534
Receipts of interest income		28,191	36,122
Payments of loans to employees		(5,785)	(3,287)
Payments of corporate income tax		(737,121)	(589,500)
Net cash flows provided from operating activities		1,665,735	1,415,869
Cash flows from investing activities			
Payments for the acquisition of fixed assets	11a	(214,746)	(250,792)
Proceeds from the sale of fixed assets	11d	1,877	7,773
Net cash flows used in investing activities		(212,869)	(243,019)
Cash flows from financing activities			
Dividends paid	23	(1,529,850)	(1,527,400)
Capital contribution by minority shareholders		-	12,250
Net cash flows used in financing activities		(1,529,850)	(1,515,150)
Net decrease in cash and cash equivalents		(76,984)	(342,300)
Effect of exchange rate changes on cash and cash equivalents		(2,102)	(9,824)
Cash and cash equivalents at the beginning of the year		784,455	1,136,579
Cash and cash equivalents at the end of the year	2d, 5	705,369	784,455
Non-cash transaction			
Acquisition of fixed assets through payables (recorded in "Accrued expenses")		5,039	-

CONSOLIDATED BALANCE SHEETS

AS AT DECEMBER 31, 2006 AND 2005

(Expressed in million Rupiah)

	Notes	2006	2005
CURRENT ASSETS			
Cash and cash equivalents	2d, 3	1,014,379	705,369
Trade debtors (Net of allowance for doubtful accounts of Rp 1,350 in 2006 and Rp 4,998 in 2005)			
- Third parties	2g, 4	615,939	415,466
- Related parties	2c, 4	37,268	41,681
Other debtors	5	32,363	19,515
Inventories (Net of provision for obsolete and unused/slow moving stocks of Rp 31,662 in 2006 and Rp 22,468 in 2005)	2h, 6	763,398	766,081
Prepaid taxes	2o, 13c	89,859	37,122
Prepaid expenses	2m, 8	51,346	45,128
Total Current Assets		2,604,552	2,030,362
NON-CURRENT ASSETS			
Amounts due from related parties	2c, 7c	13,270	32,479
Deferred tax assets, net	2o, 13b	25,217	21,305
Fixed assets (Net of accumulated depreciation of Rp 383,390 in 2006 and Rp 343,270 in 2005)	2i, 9a	1,724,663	1,495,659
Intangible assets (Net of accumulated amortisation of Rp 81,341 in 2006 and Rp 67,852 in 2005)	2k, 10	159,067	172,556
Other assets	2m, 11	64,088	60,827
Prepaid pension expense	2p, 16	35,143	29,163
Total Non-current Assets		2,021,448	1,811,989
TOTAL ASSETS		4,626,000	3,842,351

CONSOLIDATED BALANCE SHEETS

AS AT DECEMBER 31, 2006 AND 2005

(Expressed in million Rupiah, except par value per share)

	Notes	2006	2005
CURRENT LIABILITIES			
Trade creditors			
- Third parties	12	611,986	561,180
- Related parties	2c, 12	90,158	53,106
Taxes payable	2o, 13d	304,013	67,815
Accrued expenses	14	886,436	719,917
Other liabilities	2f, 15	164,858	99,467
Total Current Liabilities		2,057,451	1,501,485
NON-CURRENT LIABILITIES			
Amounts due to related parties	2c, 7d	86,304	73,248
Employee benefits obligations	2p, 16	105,626	83,658
Total Non-current Liabilities		191,930	156,906
MINORITY INTERESTS	17a	8,092	10,434
EQUITY			
Share capital (Authorised, issued and fully paid-up: 7,630,000,000 common shares at par value of Rp 10 per share for 2006 and 2005)	2r, 18	76,300	76,300
Capital paid in excess of par value	2r, 19	15,227	15,227
Fixed assets revaluation reserve	2i, 9b	287,593	287,593
Balance arising from restructuring transactions between entities under common control	2c, 20	80,773	80,773
Appropriated retained earnings	22	15,848	16,442
Unappropriated retained earnings		1,892,786	1,697,191
Total Equity		2,368,527	2,173,526
TOTAL LIABILITIES AND EQUITY		4,626,000	3,842,351

CONSOLIDATED STATEMENTS OF INCOME
FOR THE YEARS ENDED DECEMBER 31, 2006 AND 2005

(Expressed in million Rupiah, except basic earnings per share)

	Notes	2006	2005
NET SALES	2n, 23	11,335,241	9,992,135
COST OF GOODS SOLD	2n, 24	(5,704,438)	(5,066,362)
GROSS PROFIT		5,630,803	4,925,773
OPERATING EXPENSES		(3,195,433)	(2,895,371)
Marketing and selling expenses	2n, 25a	(2,559,943)	(2,304,121)
General and administration expenses	2n, 25b	(635,490)	(591,250)
OPERATING INCOME		2,435,370	2,030,402
OTHER INCOME/(EXPENSES)		29,422	34,005
Loss on disposals of fixed assets	2i, 9e	(6,160)	(3,055)
(Loss)/gain on foreign exchange, net	2e	(3,956)	8,360
Interest income		39,538	28,700
PROFIT BEFORE INCOME TAX		2,464,792	2,064,407
Income tax expense	2o, 13a	(743,754)	(624,421)
INCOME BEFORE MINORITY INTERESTS		1,721,038	1,439,986
MINORITY INTERESTS IN NET LOSS OF SUBSIDIARIES	17b	557	499
NET INCOME		1,721,595	1,440,485
BASIC EARNINGS PER SHARE	2l, 27	226	189

CONSOLIDATED STATEMENTS OF CASH FLOWS

DECEMBER 31, 2006 AND 2005

(Expressed in million Rupiah)

	Notes	2006	2005
Cash flows from operating activities			
Receipts from customers		11,952,998	10,762,655
Payments to suppliers		(8,291,436)	(7,583,843)
Payments of directors and employees remuneration		(530,567)	(429,609)
Payments of employee benefits	16	(55,659)	(53,431)
Payments of service fees		(343,913)	(316,899)
Cash from operations		2,731,423	2,378,873
Receipts of interest income		38,755	28,191
Loans to employees		(4,461)	(5,785)
Payments of corporate income tax		(590,909)	(737,121)
Net cash flows provided from operating activities		2,174,808	1,664,158
Cash flows from investing activities			
Acquisitions of fixed assets	9a	(341,111)	(214,746)
Proceeds from the sale of fixed assets	9d	2,984	1,877
Net cash flows used in investing activities		(338,127)	(212,869)
Cash flows from financing activities			
Dividends paid to the shareholders	21	(1,522,296)	(1,524,423)
Dividends paid to minority interests	21	(560)	(3,850)
Net cash flows used in financing activities		(1,522,856)	(1,528,273)
Net increase/(decrease) in cash and cash equivalents		313,825	(76,984)
Effect of exchange rate changes on cash and cash equivalents		(4,815)	(2,102)
Cash and cash equivalents at the beginning of the year		705,369	784,455
Cash and cash equivalents at the end of the year	2d, 3	1,014,379	705,369
Non-cash transaction			
Acquisition of fixed assets through payables (recorded in "Accrued expenses")		13.744	5,039

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	2008	Catatan/ *Notes*	2007	
ASET				ASSETS
Aset Lancar				*Current Assets*
Kas dan setara kas	722,347	2d, 4	437,224	*Cash and cash equivalents*
Kas yang dibatasi penggunaannya	-	4	447,686	*Restricted cash*
Piutang usaha (Setelah dikurangi penyisihan piutang tidak tertagih sebesar Rp 1.150 pada tahun 2008 dan Rp 2.742 pada tahun 2007)				*Trade debtors (Net of allowance for doubtful accounts of Rp 1,150 in 2008 and Rp 2,742 in 2007)*
- Pihak ketiga	840,530	2g, 5	665,952	*Third parties -*
- Pihak hubungan istimewa	115,245	2c, 5	67,407	*Related parties -*
Piutang lain-lain	38,148	2f, 6	37,815	*Other debtors*
Persediaan (Setelah dikurangi penyisihan persediaan usang dan persediaan tidak terpakai/tidak laris sebesar Rp 27.703 pada tahun 2008 dan Rp 29.620 pada tahun 2007)	1,284,659	2h, 7	857,463	*Inventories (Net of provision for obsolete and unused/slow moving stocks of Rp 27,703 in 2008 and Rp 29,620 in 2007)*
Pajak dibayar di muka	31,113	2q, 16c	117,628	*Prepaid taxes*
Biaya dibayar di muka	71,253	2o, 10	63,492	*Prepaid expenses*
Jumlah Aset Lancar	3,103,295		2,694,667	*Total Current Assets*
Aset Tidak Lancar				*Non-Current Assets*
Piutang lain-lain pada pihak yang mempunyai hubungan istimewa	2,674	2c, 9c	3,925	*Amounts due from related parties*
Aset pajak tangguhan, bersih	25,283	2q, 16b	37,521	*Deferred tax assets, net*
Aset tetap (Setelah dikurangi akumulasi penyusutan sebesar Rp 559.947 pada tahun 2008 dan Rp 471.307 pada tahun 2007)	2,559,875	2i, 2j, 11a	2,199,810	*Fixed assets (Net of accumulated depreciation of Rp 559,947 in 2008 and Rp 471,307 in 2007)*
Goodwill (Setelah dikurangi akumulasi amortisasi sebesar Rp 9.137 pada tahun 2008 dan Rp 2.691 pada tahun 2007)	74,817	2l, 12	81,263	*Goodwill (Net of accumulated amortisation of Rp 9,137 in 2008 and Rp 2,691 in 2007)*
Aset tidak berwujud (Setelah dikurangi akumulasi amortisasi sebesar Rp 148.134 pada tahun 2008 dan Rp 95.525 pada tahun 2007)	665,737	2m, 13	217,124	*Intangible assets (Net of accumulated amortisation of Rp 148,134 in 2008 and Rp 95,525 in 2007)*
Biaya pensiun dibayar di muka	14,459	2r, 19	34,407	*Prepaid pension expense*
Aset lain-lain	58,596	2o, 14	64,689	*Other assets*
Jumlah Aset Tidak Lancar	3,401,441		2,638,739	*Total Non-Current Assets*
JUMLAH ASET	6,504,736		5,333,406	*TOTAL ASSETS*

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	2008	Catatan/ *Notes*	2007	
KEWAJIBAN				*LIABILITIES*
Kewajiban Lancar				*Current Liabilities*
Hutang usaha				*Trade creditors*
- Pihak ketiga	1,028,699	15	811,581	*Third parties -*
- Pihak hubungan istimewa	67,974	2c, 15	52,568	*Related parties -*
Hutang pajak	320,447	2q, 16d	163,921	*Taxes payables*
Biaya yang masih harus dibayar	1,336,761	17	1,228,763	*Accrued expenses*
Hutang lain-lain	337,230	2f, 18	171,295	*Other liabilities*
Jumlah Kewajiban Lancar	3,091,111		2,428,128	*Total Current Liabilities*
Kewajiban Tidak Lancar				*Non-Current Liabilities*
Hutang lain-lain pada pihak yang mempunyai hubungan istimewa	162,462	2c, 9d	87,247	*Amounts due to related parties*
Kewajiban imbalan kerja	144,342	2r, 19	123,912	*Employee benefits obligations*
Jumlah Kewajiban Tidak Lancar	306,804		211,159	*Total Non-Current Liabilities*
Jumlah Kewajiban	3,397,915		2,639,287	*Total Liabilities*
HAK MINORITAS	6,509	20a	1,978	*MINORITY INTERESTS*
EKUITAS				*EQUITY*
Modal saham (Modal dasar, seluruhnya ditempatkan dan disetor penuh: 7.630.000.000 lembar saham biasa dengan nilai nominal Rp 10 (nilai penuh) per lembar saham untuk tahun 2008 dan 2007)	76,300	2t, 21	76,300	*Share capital (Authorised, issued and fully paid-up: 7,630,000,000 common shares at a par value of Rp 10 (full amount) per share for 2008 and 2007)*
Agio saham	15,227	2t, 22	15,227	*Capital paid in excess of par value*
Surplus revaluasi aset tetap	-	3	287,593	*Fixed assets revaluation reserve*
Selisih nilai transaksi restrukturisasi entitas sepengendali	80,773	2c, 23	80,773	*Balance arising from restructuring transactions between entities under common control*
Saldo laba yang dicadangkan	15,260	25	15,260	*Appropriated retained earnings*
Saldo laba yang belum dicadangkan	2,912,752		2,216,988	*Unappropriated retained earnings*
Jumlah Ekuitas	3,100,312		2,692,141	*Total Equity*
JUMLAH KEWAJIBAN DAN EKUITAS	6,504,736		5,333,406	*TOTAL LIABILITIES AND EQUITY*

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	2008	Catatan/ *Notes*	2007	
PENJUALAN BERSIH	15,577,811	2p, 26	12,544,901	*NET SALES*
HARGA POKOK PENJUALAN	(7,946,674)	2p, 27	(6,247,189)	*COST OF GOODS SOLD*
LABA KOTOR	7,631,137		6,297,712	*GROSS PROFIT*
BEBAN USAHA	(4,200,039)		(3,520,352)	*OPERATING EXPENSES*
Beban pemasaran dan penjualan	(3,277,894)	2p, 28a	(2,790,002)	*Marketing and selling expenses*
Beban umum dan administrasi	(922,145)	2p, 28b	(730,350)	*General and administration expenses*
LABA USAHA	3,431,098		2,777,360	*OPERATING INCOME*
PENGHASILAN/(BEBAN) LAIN-LAIN	17,307		44,081	*OTHER INCOME/(EXPENSES)*
Keuntungan pelepasan aset tetap	6,446	2i, 11e	1,120	*Gain on disposals of fixed assets*
(Kerugian)/keuntungan selisih kurs, bersih	(59,956)	2e	8,446	*(Loss)/gain on foreign exchange, net*
Pendapatan bunga	38,792		41,291	*Interest income*
Pendapatan/(beban) lain-lain	32,025	16e	(6,776)	*Other income/(expenses)*
LABA SEBELUM PAJAK PENGHASILAN	3,448,405		2,821,441	*PROFIT BEFORE INCOME TAX*
Beban pajak penghasilan	(1,036,643)	2q, 16a	(859,294)	*Income tax expense*
LABA SEBELUM HAK MINORITAS	2,411,762		1,962,147	*INCOME BEFORE MINORITY INTERESTS*
HAK MINORITAS ATAS BAGIAN (LABA)/RUGI BERSIH ANAK PERUSAHAAN	(4,531)	20b	2,505	*MINORITY INTERESTS IN NET (GAIN)/LOSS OF SUBSIDIARIES*
LABA BERSIH	2,407,231		1,964,652	*NET INCOME*
LABA BERSIH PER SAHAM DASAR (dinyatakan dalam nilai penuh Rupiah per saham)	315	2v, 30	257	*BASIC EARNINGS PER SHARE (expressed in Rupiah, full amount per share)*

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	2008	Catatan/ *Notes*	2007	
Arus kas dari aktivitas operasi				*Cash flows from operating activities*
Penerimaan dari pelanggan	16,840,154		13,669,364	*Receipts from customers*
Pembayaran kepada pemasok	(12,060,186)		(9,366,540)	*Payments to suppliers*
Pembayaran kepada direksi dan karyawan	(695,929)		(563,450)	*Payments of directors' and employees' remuneration*
Pembayaran imbalan kerja	(33,669)	19	(55,320)	*Payments of employee benefits*
Pembayaran untuk biaya jasa dan royalti	(483,778)		(434,341)	*Payments of service fees and royalty*
Kas yang dihasilkan dari operasi	3,566,592		3,249,713	*Cash generated from operations*
Penerimaan dari pendapatan bunga	38,789		42,560	*Receipts of interest income*
Pelunasan/(pemberian) pinjaman karyawan, bersih	7,222		(3,755)	*Repayment/(disbursement) of employee loan, net*
Pembayaran atas kurang bayar pajak	-		(174,342)	*Payments of tax underpayment*
Penerimaan pengembalian pajak	120,887	16e	5,061	*Receipt of tax refund*
Pembayaran pajak penghasilan badan	(947,705)		(869,224)	*Payments of corporate income tax*
Arus kas bersih yang diperoleh dari aktivitas operasi	2,785,785		2,250,013	*Net cash flows provided from operating activities*
Arus kas dari aktivitas investasi				*Cash flows from investing activities*
Pembelian aset tetap	(506,243)	11a	(614,134)	*Acquisition of fixed assets*
Pembelian saham minoritas PT Anugrah Lever	-		(87,563)	*Purchase of minority shares of PT Anugrah Lever*
Hasil penjualan aset tetap	12,924	11d	5,241	*Proceeds from the sale of fixed assets*
Pembelian aset tidak berwujud	(463,481)	13	(47,374)	*Acquisition of intangible assets*
Penarikan atas/(penempatan pada) kas yang dibatasi penggunaannya	447,686	4	(447,686)	*Withdrawal of/(placement in) restricted cash*
Arus kas bersih yang digunakan untuk aktivitas investasi	(509,114)		(1,191,516)	*Net cash flows used in investing activities*
Arus kas dari aktivitas pendanaan				*Cash flows from financing activities*
Pembayaran dividen kepada pemegang saham	(1,994,516)	24	(1,636,560)	*Dividends paid to the shareholders*
Pembayaran dividen kepada hak minoritas	-		(1,225)	*Dividends paid to minority interests*
Arus kas bersih yang digunakan untuk aktivitas pendanaan	(1,994,516)		(1,637,785)	*Net cash flows used in financing activities*
Kenaikan/(penurunan) bersih kas dan setara kas	282,155		(579,288)	*Net Increase/(decrease) in cash and cash equivalents*
Dampak perubahan kurs terhadap kas dan setara kas	2,968		2,133	*Effect of exchange rate changes on cash and cash equivalents*
Kas dan setara kas pada awal tahun	437,224		1,014,379	*Cash and cash equivalents at the beginning of the year*
Kas dan setara kas pada akhir tahun	722,347	2a, 2d, 4	437,224	*Cash and cash equivalents at the end of the year*

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	2008	Catatan/ *Notes*	2007	
Transaksi non-kas				*Non-cash transactions*
Perolehan aset tetap melalui hutang (dicatat dalam akun "Hutang lain-lain")	2,246		4,564	*Acquisition of fixed assets through payables (recorded in "Other liabilities")*
Perolehan aset tidak berwujud melalui hutang (dicatat dalam akun "Biaya yang masih harus dibayar")	62,608	17	24,867	*Acquisition of intangible assets through payables (recorded in "Accrued expenses")*

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	2009	Catatan/ *Notes*	2008	
ASET				*ASSETS*
Aset Lancar				*Current Assets*
Kas dan setara kas	858,322	2d, 3	722,347	*Cash and cash equivalents*
Piutang usaha (Setelah dikurangi penyisihan piutang tidak tertagih sebesar Rp 1.895 pada tahun 2009 dan Rp 1.150 pada tahun 2008)				*Trade debtors (Net of allowance for doubtful accounts of Rp 1,895 in 2009 and Rp 1,150 in 2008)*
- Pihak ketiga	1,133,460	2g, 4	840,530	*Third parties -*
- Pihak hubungan istimewa	124,461	2c, 4	115,245	*Related parties -*
Uang muka dan piutang lain-lain	87,334	5	38,148	*Advances and other debtors*
Persediaan (Setelah dikurangi penyisihan persediaan usang dan persediaan tidak terpakai/tidak laris sebesar Rp 25.668 pada tahun 2009 dan Rp 27.703 pada tahun 2008)	1,340,036	2h, 6	1,284,659	*Inventories (Net of provision for obsolete and unused/slow moving inventories of Rp 25,668 in 2009 and Rp 27,703 in 2008)*
Pajak dibayar di muka	13,399	2q, 15c	31,113	*Prepaid taxes*
Beban dibayar di muka	41,781	2o, 9	71,253	*Prepaid expenses*
Jumlah Aset Lancar	3,598,793		3,103,295	*Total Current Assets*
Aset Tidak Lancar				*Non-Current Assets*
Piutang lain-lain pada pihak yang mempunyai hubungan istimewa	2,918	2c, 8c	2,674	*Amounts due from related parties*
Aset pajak tangguhan	-	2q, 15b	25,283	*Deferred tax assets*
Aset tetap (Setelah dikurangi akumulasi penyusutan sebesar Rp 752.024 pada tahun 2009 dan Rp 599.405 pada tahun 2008)	3,035,915	2i, 2j, 10a	2,559,875	*Fixed assets (Net of accumulated depreciation of Rp 752,024 in 2009 and Rp 599,405 in 2008)*
Goodwill (Setelah dikurangi akumulasi amortisasi sebesar Rp 15.583 pada tahun 2009 dan Rp 9.137 pada tahun 2008)	68,371	2l, 11	74,817	*Goodwill (Net of accumulated amortisation of Rp 15,583 in 2009 and Rp 9,137 in 2008)*
Aset tidak berwujud (Setelah dikurangi akumulasi amortisasi sebesar Rp 240.085 pada tahun 2009 dan Rp 148.134 pada tahun 2008)	672,550	2m, 12	665,737	*Intangible assets (Net of accumulated amortisation of Rp 240,085 in 2009 and Rp 148,134 in 2008)*
Beban pensiun dibayar di muka	51,385	2r, 18	14,459	*Prepaid pension expense*
Aset lain-lain	55,058	2o, 13	58,596	*Other assets*
Jumlah Aset Tidak Lancar	3,886,197		3,401,441	*Total Non-Current Assets*
JUMLAH ASET	7,484,990		6,504,736	*TOTAL ASSETS*

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	2009	Catatan/ *Notes*	2008	
KEWAJIBAN				*LIABILITIES*
Kewajiban Lancar				*Current Liabilities*
Hutang usaha				*Trade creditors*
- Pihak ketiga	1,358,070	14	1,028,699	*Third parties -*
- Pihak hubungan istimewa	71,621	2c, 14	67,974	*Related parties -*
Hutang pajak	317,931	2q, 15d	320,447	*Taxes payable*
Beban yang masih harus dibayar	1,481,827	16	1,336,761	*Accrued expenses*
Hutang lain-lain	225,420	2f, 17	337,230	*Other liabilities*
Jumlah Kewajiban Lancar	3,454,869		3,091,111	*Total Current Liabilities*
Kewajiban Tidak Lancar				*Non-Current Liabilities*
Hutang lain-lain pada pihak yang mempunyai hubungan istimewa	134,319	2c, 8d	162,462	*Amounts due to related parties*
Kewajiban pajak tangguhan	27,252	2q, 15b	-	*Deferred tax liabilities*
Kewajiban imbalan kerja	159,975	2r, 18	144,342	*Employee benefits obligations*
Jumlah Kewajiban Tidak Lancar	321,546		306,804	*Total Non-Current Liabilities*
Jumlah Kewajiban	3,776,415		3,397,915	*Total Liabilities*
HAK MINORITAS	5,756	19a	6,509	*MINORITY INTERESTS*
EKUITAS				*EQUITY*
Modal saham (Modal dasar, seluruhnya ditempatkan dan disetor penuh: 7.630.000.000 lembar saham biasa dengan nilai nominal Rp 10 (nilai penuh) per lembar saham untuk tahun 2009 dan 2008)	76,300	2t, 20	76,300	*Share capital (Authorised, issued and fully paid - up: 7,630,000,000 common shares at a par value of Rp 10 (full amount) per share for 2009 and 2008)*
Agio saham	15,227	2t, 21	15,227	*Capital paid in excess of par value*
Selisih nilai transaksi restrukturisasi entitas sepengendali	80,773	2c, 22	80,773	*Balance arising from restructuring transactions between entities under common control*
Saldo laba yang dicadangkan	15,260	24	15,260	*Appropriated retained earnings*
Saldo laba yang belum dicadangkan	3,515,259		2,912,752	*Unappropriated retained earnings*
Jumlah Ekuitas	3,702,819		3,100,312	*Total Equity*
JUMLAH KEWAJIBAN DAN EKUITAS	7,484,990		6,504,736	*TOTAL LIABILITIES AND EQUITY*

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	2009	Catatan/ *Notes*	2008	
PENJUALAN BERSIH	18,246,872	2p, 25	15,577,811	*NET SALES*
HARGA POKOK PENJUALAN	(9,200,878)	2p, 26	(7,946,674)	*COST OF GOODS SOLD*
LABA KOTOR	9,045,994		7,631,137	*GROSS PROFIT*
BEBAN USAHA	(4,831,103)		(4,200,039)	*OPERATING EXPENSES*
Beban pemasaran dan penjualan	(3,735,597)	2p, 27a	(3,277,894)	*Marketing and selling expenses*
Beban umum dan administrasi	(1,095,506)	2p, 27b	(922,145)	*General and administration expenses*
LABA USAHA	4,214,891		3,431,098	*OPERATING INCOME*
PENGHASILAN/(BEBAN) LAIN-LAIN	33,699		17,307	*OTHER INCOME/(EXPENSES)*
Keuntungan pelepasan aset tetap	444	2i, 10d	6,446	*Gain on disposals of fixed assets*
Keuntungan/(kerugian) selisih kurs, bersih	2,413	2e	(59,956)	*Gain/(loss) on foreign exchange, net*
Penghasilan bunga	30,842		38,792	*Interest income*
Penghasilan lain-lain	-	15e	32,025	*Other income*
LABA SEBELUM PAJAK PENGHASILAN	4,248,590		3,448,405	*PROFIT BEFORE INCOME TAX*
Beban pajak penghasilan	(1,205,236)	2q, 15a	(1,036,643)	*Income tax expense*
LABA SEBELUM HAK MINORITAS	3,043,354		2,411,762	*INCOME BEFORE MINORITY INTERESTS*
HAK MINORITAS ATAS BAGIAN RUGI/(LABA) BERSIH ANAK PERUSAHAAN	753	19b	(4,531)	*MINORITY INTERESTS IN NET LOSS/(INCOME) OF SUBSIDIARY*
LABA BERSIH	3,044,107		2,407,231	*NET INCOME*
LABA BERSIH PER SAHAM DASAR (dinyatakan dalam nilai penuh Rupiah per saham)	399	2v, 29	315	*BASIC EARNINGS PER SHARE (expressed in Rupiah full amount per share)*

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	2009	Catatan/ *Notes*	2008	
Arus kas dari aktivitas operasi				*Cash flows from operating activities*
Penerimaan dari pelanggan	19,704,297		16,840,154	*Receipts from customers*
Pembayaran kepada pemasok	(13,849,849)		(12,060,186)	*Payments to suppliers*
Pembayaran remunerasi direksi dan karyawan	(718,456)		(695,929)	*Payments of directors' and employees' remuneration*
Pembayaran imbalan kerja	(72,923)	18	(33,669)	*Payments of employee benefits*
Pembayaran untuk beban jasa dan royalti	(587,192)		(483,778)	*Payments of service fees and Royalty*
Kas yang dihasilkan dari operasi	4,475,877		3,566,592	*Cash generated from operations*
Penerimaan dari pendapatan bunga	31,620		38,789	*Receipts of interest income*
Pelunasan pinjaman karyawan	5,660		7,222	*Repayment of employee loan*
Penerimaan pengembalian pajak	-	15	120,887	*Receipt of tax refund*
Pembayaran atas kurang bayar pajak	(4,554)		-	*Payment of tax underpayment*
Pembayaran pajak penghasilan badan	(1,227,893)		(947,705)	*Payments of corporate income tax*
Arus kas bersih yang diperoleh dari aktivitas operasi	3,280,710		2,785,785	*Net cash flows provided from operating activities*
Arus kas dari aktivitas investasi				*Cash flows from investing activities*
Pembelian aset tetap	(563,129)	10a	(506,243)	*Acquisition of fixed assets*
Pembelian aset tidak berwujud	(140,994)		(463,481)	*Acquisition of intangible assets*
Hasil penjualan aset tetap	4,076	10d	12,924	*Proceeds from the sale of fixed Assets*
Penarikan atas kas yg dibatasi penggunaannya	-		447,686	*Withdrawal of restricted cash*
Arus kas bersih yang digunakan untuk aktivitas investasi	(700,047)		(509,114)	*Net cash flows used in investing activities*
Arus kas dari aktivitas pendanaan				*Cash flows from financing activities*
Pembayaran dividen kepada pemegang saham	(2,436,028)	23	(1,994,516)	*Dividends paid to the shareholders*
Arus kas bersih yang digunakan untuk aktivitas pendanaan	(2,436,028)		(1,994,516)	*Net cash flows used in financing activities*
Kenaikan bersih kas dan setara kas	144,635		282,155	*Net Increase in cash and cash equivalents*
Dampak perubahan kurs terhadap kas dan setara kas	(8,660)		2,968	*Effect of exchange rate changes on cash and cash equivalents*
Kas dan setara kas pada awal tahun	722,347		437,224	*Cash and cash equivalents at the beginning of the year*
Kas dan setara kas pada akhir tahun	858,322	2a, 2d, 3	722,347	*Cash and cash equivalents at the end of the year*

	2009	Catatan/ *Notes*	2008	
Transaksi non-kas				*Non-cash transactions*
Perolehan aset tetap melalui hutang (dicatat dalam akun "Hutang lain-lain")	82,058		2,246	*Acquisition of fixed assets through payables (recorded in "Other liabilities")*
Perolehan aset tidak berwujud melalui hutang (dicatat dalam akun "Beban yang masih harus dibayar")	20,378	16	62,608	*Acquisition of intangible assets through payables (recorded in "Accrued expenses")*

Neraca Konsolidasian
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Consolidated Balance Sheets
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(Expressed in millions of Rupiah, unless otherwise stated)

	2010	Catatan/ *Notes*	2009	
ASET				***ASSETS***
Aset Lancar				***Current Assets***
Kas dan setara kas	317,759	2d, 3	858,322	*Cash and cash equivalents*
Piutang usaha (Setelah dikurangi penyisihan piutang tidak tertagih sebesar Rp 3.981 pada tahun 2010 dan Rp 1.895 pada tahun 2009)				*Trade debtors (Net of allowance for doubtful accounts of Rp 3,981 in 2010 and Rp 1,895 in 2009)*
- Pihak ketiga	1,445,450	2g, 4	1,133,460	*Third parties -*
- Pihak hubungan istimewa	122,088	2c, 4	124,461	*Related parties -*
Uang muka dan piutang lain-lain				*Advances and other debtors*
- Pihak ketiga	182,773	5	87,334	*Third parties -*
- Pihak hubungan istimewa	2,322	2c, 8c	2,918	*Related parties -*
Persediaan (Setelah dikurangi penyisihan persediaan usang dan persediaan tidak terpakai/tidak laris sebesar Rp 63.306 pada tahun 2010 dan Rp 25.668 pada tahun 2009)	1,574,060	2h, 6	1,340,036	*Inventories (Net of provision for obsolete and unused/slow moving inventories of Rp 63,306 in 2010 and Rp 25,668 in 2009)*
Pajak dibayar di muka	51,533	2s, 16c	13,399	*Prepaid taxes*
Beban dibayar di muka	52,145	2o, 9	41,781	*Prepaid expenses*
Jumlah Aset Lancar	3,748,130		3,601,711	***Total Current Assets***
Aset Tidak Lancar				***Non-Current Assets***
Aset tetap (Setelah dikurangi akumulasi penyusutan sebesar Rp 913.074 pada tahun 2010 dan Rp 752.024 pada tahun 2009)	4,148,778	2i, 2j, 10a	3,035,915	*Fixed assets (Net of accumulated depreciation of Rp 913,074 in 2010 and Rp 752,024 in 2009)*
Goodwill (Setelah dikurangi akumulasi amortisasi sebesar Rp 22.029 pada tahun 2010 dan Rp 15.583 pada tahun 2009)	61,925	2l, 11	68,371	*Goodwill (Net of accumulated amortisation of Rp 22,029 in 2010 and Rp 15,583 in 2009)*
Aset tidak berwujud (Setelah dikurangi akumulasi amortisasi sebesar Rp 353.522 pada tahun 2010 dan Rp 240.085 pada tahun 2009)	646,356	2m, 12	672,550	*Intangible assets (Net of accumulated amortisation of Rp 353,522 in 2010 and Rp 240,085 in 2009)*
Beban pensiun dibayar di muka	45,696	2t, 19	51,385	*Prepaid pension expense*
Aset lain-lain	50,377	13	55,058	*Other assets*
Jumlah Aset Tidak Lancar	4,953,132		3,883,279	***Total Non-Current Assets***
JUMLAH ASET	8,701,262		7,484,990	***TOTAL ASSETS***

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(Expressed in millions of Rupiah, unless otherwise stated)

	2010	Catatan/ *Notes*	2009	
KEWAJIBAN				***LIABILITIES***
Kewajiban Lancar				***Current Liabilities***
Pinjaman jangka pendek	190,000	2q, 14	-	*Short-term loans*
Hutang usaha				*Trade creditors*
- Pihak ketiga	1,612,672	2r, 15	1,358,070	*Third parties -*
- Pihak hubungan istimewa	203,921	2c, 15	71,621	*Related parties -*
Hutang pajak	208,778	2s, 16d	317,931	*Taxes payable*
Beban yang masih harus dibayar	1,460,974	17	1,481,827	*Accrued expenses*
Hutang lain-lain				*Other liabilities*
- Pihak ketiga	555,057	18	225,420	*Third parties -*
- Pihak hubungan istimewa	171,538	2c, 8d	134,319	*Related parties -*
Jumlah Kewajiban Lancar	4,402,940		3,589,188	***Total Current Liabilities***
Kewajiban Tidak Lancar				***Non-Current Liabilities***
Kewajiban pajak tangguhan	49,939	2s, 16b	27,252	*Deferred tax liabilities*
Kewajiban imbalan kerja	199,530	2t, 19	159,975	*Employee benefits obligations*
Jumlah Kewajiban Tidak Lancar	249,469		187,227	***Total Non-Current Liabilities***
Jumlah Kewajiban	4,652,409		3,776,415	***Total Liabilities***
HAK MINORITAS	3,434	20a	5,756	***MINORITY INTERESTS***
EKUITAS				***EQUITY***
Modal saham (Modal dasar, seluruhnya ditempatkan dan disetor penuh: 7.630.000.000 lembar saham biasa dengan nilai nominal Rp 10 (nilai penuh) per lembar saham untuk tahun 2010 dan 2009)	76,300	2v, 21	76,300	*Share capital (Authorised, issued and fully paid-up: 7,630,000,000 common shares at a par value of Rp 10 (full amount) per share for 2010 and 2009)*
Agio saham	15,227	2v, 22	15,227	*Capital paid in excess of par value*
Selisih nilai transaksi restrukturisasi entitas sepengendali	80,773	2c, 23	80,773	*Balance arising from restructuring transactions between entities under common control*
Saldo laba yang dicadangkan	15,260	25	15,260	*Appropriated retained earnings*
Saldo laba yang belum dicadangkan	3,857,859		3,515,259	*Unappropriated retained earnings*
Jumlah Ekuitas	4,045,419		3,702,819	***Total Equity***
JUMLAH KEWAJIBAN DAN EKUITAS	8,701,262		7,484,990	***TOTAL LIABILITIES AND EQUITY***

Laporan Laba Rugi Konsolidasian
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(Expressed in millions of Rupiah, unless otherwise stated)

	2010	Catatan/ *Notes*	2009	
PENJUALAN BERSIH	19,690,239	2p, 26	18,246,872	***NET SALES***
HARGA POKOK PENJUALAN	(9,485,274)	2p, 27	(9,205,131)	***COST OF GOODS SOLD***
LABA KOTOR	10,204,965		9,041,741	***GROSS PROFIT***
BEBAN USAHA	(5,662,340)		(4,826,850)	***OPERATING EXPENSES***
Beban pemasaran dan penjualan	(4,523,283)	2p, 28a	(3,743,895)	*Marketing and selling expenses*
Beban umum dan administrasi	(1,139,057)	2p, 28b	(1,082,955)	*General and administration expenses*
LABA USAHA	4,542,625		4,214,891	***OPERATING INCOME***
(BEBAN)/PENGHASILAN LAIN-LAIN	(3,982)		33,699	***OTHER (EXPENSES)/INCOME***
Keuntungan pelepasan aset tetap	318	2i, 10d	444	*Gain on disposal of fixed asset*
(Kerugian)/keuntungan selisih kurs, bersih	(10,768)	2e	2,413	*(Loss)/gain on foreign exchange, net*
Penghasilan bunga	36,395		40,500	*Interest income*
Beban bunga	(29,927)		(9,658)	*Interest expense*
LABA SEBELUM PAJAK PENGHASILAN	4,538,643		4,248,590	***PROFIT BEFORE INCOME TAX***
Beban pajak penghasilan	(1,153,995)	2s, 16a	(1,205,236)	*Income tax expense*
LABA SEBELUM HAK MINORITAS	3,384,648		3,043,354	***INCOME BEFORE MINORITY INTERESTS***
HAK MINORITAS ATAS BAGIAN RUGI BERSIH ANAK PERUSAHAAN	2,322	20b	753	***MINORITY INTERESTS IN NET LOSS OF SUBSIDIARY***
LABA BERSIH	3,386,970		3,044,107	***NET INCOME***
LABA BERSIH PER SAHAM DASAR (dinyatakan dalam nilai penuh Rupiah per saham)	444	2x, 30	399	***BASIC EARNINGS PER SHARE*** *(expressed in Rupiah full amount per share)*

Laporan Arus Kas Konsolidasian
Untuk Tahun-Tahun Yang Berakhir Pada
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Consolidated Statements of Cash Flows
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(Dalam jutaan Rupiah kecuali dinyatakan lain)

(Expressed in millions of Rupiah, unless otherwise stated)

	2010	Catatan/ *Notes*	2009	
Arus kas dari aktivitas operasi				***Cash flows from operating activities***
Penerimaan dari pelanggan	21,263,743		19,704,297	*Receipts from customers*
Pembayaran kepada pemasok	(14,903,716)		(13,849,849)	*Payments to suppliers*
Pembayaran remunerasi direksi dan karyawan	(849,176)		(718,456)	*Payments of directors' and employees' remuneration*
Pembayaran imbalan kerja	(26,642)	19	(72,923)	*Payments of employee benefits*
Pembayaran untuk beban jasa dan royalti	(643,432)		(587,192)	*Payments of service fees and royalty*
Kas yang dihasilkan dari operasi	4,840,777		4,475,877	*Cash generated from operations*
Penerimaan dari pendapatan bunga	37,145		32,896	*Receipts from interest income*
Pembayaran bunga	(29,927)		(1,276)	*Interest paid*
Pelunasan pinjaman karyawan	4,127		5,660	*Repayment of employee loan*
Pembayaran atas kurang bayar pajak	-		(4,554)	*Payment of tax underpayment*
Pembayaran pajak penghasilan badan	(1,232,933)		(1,227,893)	*Payments of corporate income tax*
Arus kas bersih yang diperoleh dari aktivitas operasi	3,619,189		3,280,710	***Net cash flows provided from operating activities***
Arus kas dari aktivitas investasi				***Cash flows from investing activities***
Pembelian aset tetap	(1,238,520)	10a	(563,129)	*Acquisition of fixed assets*
Pembelian aset tidak berwujud	(73,872)		(140,994)	*Acquisition of intangible assets*
Hasil penjualan aset tetap	2,368	10c	4,076	*Proceeds from the sale of fixed assets*
Arus kas bersih yang digunakan untuk aktivitas investasi	(1,310,024)		(700,047)	***Net cash flows used in investing activities***
Arus kas dari aktivitas pendanaan				***Cash flows from financing activities***
Penerimaan pinjaman jangka pendek	190,000	14	-	*Proceeds from short-term loans*
Pembayaran dividen kepada pemegang saham	(3,037,461)	24	(2,436,028)	*Dividends paid to the shareholders*
Arus kas bersih yang digunakan untuk aktivitas pendanaan	(2,847,461)		(2,436,028)	***Net cash flows used in financing activities***
(Penurunan)/kenaikan bersih kas dan setara kas	(538,296)		144,635	***Net (decrease)/increase in cash and cash equivalents***
Dampak perubahan kurs terhadap kas dan setara kas	(2,267)		(8,660)	*Effect of exchange rate changes on cash and cash equivalents*
Kas dan setara kas pada awal tahun	858,322		722,347	***Cash and cash equivalents at the beginning of the year***
Kas dan setara kas pada akhir tahun	317,759	2a, 2d, 3	858,322	***Cash and cash equivalents at the end of the year***

	2010	Catatan/ *Notes*	2009	
Transaksi non-kas				***Non-cash transactions***
Perolehan aset tetap melalui hutang (dicatat dalam akun "Hutang lain-lain")	165,852		82,058	*Acquisition of fixed assets through payables (recorded in "Other liabilities")*
Perolehan aset tidak berwujud melalui hutang (dicatat dalam akun "Beban yang masih harus dibayar")	33,749	17	20,378	*Acquisition of intangible assets through payables (recorded in "Accrued expenses")*

Laporan Posisi Keuangan Konsolidasian
31 Desember 2011 dan 2010

Consolidated Statement of Financial Position
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(Dalam jutaan Rupiah, kecuali dinyatakan lain)

(Expressed in millions of Rupiah, unless otherwise stated)

	2011	Catatan/ *Notes*	2010	
ASET				***ASSETS***
Aset Lancar				***Current Assets***
Kas dan setara kas	336,143	2d, 3	317,759	*Cash and cash equivalents*
Piutang usaha				*Trade debtors*
- Pihak ketiga	1,877,699	2h, 4	1,445,450	*Third parties -*
- Pihak berelasi	198,384	2c, 4	122,088	*Related parties -*
Uang muka dan piutang lain-lain				*Advances and other debtors*
- Pihak ketiga	107,249	5	182,773	*Third parties -*
- Pihak berelasi	4,948	2c, 8c	2,322	*Related parties -*
Persediaan	1,812,821	2i, 6	1,574,060	*Inventories*
Pajak dibayar dimuka	48,127	2t, 16c	51,533	*Prepaid taxes*
Beban dibayar dimuka	60,848	2p, 9	52,145	*Prepaid expenses*
Jumlah Aset Lancar	4,446,219		3,748,130	***Total Current Assets***
Aset Tidak Lancar				***Non-Current Assets***
Aset tetap	5,314,311	2j, 2k, 10a	4,148,778	*Fixed assets*
Goodwill	61,925	2m, 11	61,925	*Goodwill*
Aset takberwujud	584,152	2n, 12	646,356	*Intangible assets*
Beban pensiun dibayar dimuka	-	2u, 19	45,696	*Prepaid pension expense*
Aset lain-lain	75,705	13	50,377	*Other assets*
Jumlah Aset Tidak Lancar	6,036,093		4,953,132	***Total Non-Current Assets***
JUMLAH ASET	10,482,312		8,701,262	***TOTAL ASSETS***

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31 Desember 2011 dan 2010

Consolidated Statement of Financial Position
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(Dalam jutaan Rupiah, kecuali dinyatakan lain)

(Expressed in millions of Rupiah, unless otherwise stated)

	2011	Catatan/ *Notes*	2010	
LIABILITAS				***LIABILITIES***
Liabilitas Jangka Pendek				***Current Liabilities***
Pinjaman jangka pendek	699,160	2r, 14	190,000	*Short-term loans*
Utang usaha				*Trade creditors*
- Pihak ketiga	2,158,530	2s, 15	1,612,672	*Third parties -*
- Pihak berelasi	275,730	2c, 15	203,921	*Related parties -*
Utang pajak	451,630	2t, 16d	208,778	*Taxes payable*
Akrual	2,209,403	17	1,460,974	*Accruals*
Utang lain-lain				*Other payables*
- Pihak ketiga	447,175	18	555,057	*Third parties -*
- Pihak berelasi	232,966	2c, 8d	171,538	*Related parties -*
Jumlah Liabilitas Jangka Pendek	6,474,594		4,402,940	***Total Current Liabilities***
Liabilitas Jangka Panjang				***Non-Current Liabilities***
Liabilitas pajak tangguhan	70,930	2t, 16b	49,939	*Deferred tax liabilities*
Kewajiban imbalan kerja	255,851	2u, 19	199,530	*Employee benefits obligation*
Jumlah Liabilitas Jangka Panjang	326,781		249,469	***Total Non-Current Liabilities***
Jumlah Liabilitas	6,801,375		4,652,409	***Total Liabilities***
EKUITAS				***EQUITY***
Modal saham (Modal dasar, seluruhnya ditempatkan dan disetor penuh: 7.630.000.000 lembar saham biasa dengan nilai nominal Rp 10 (nilai penuh) per lembar saham)	76,300	2v, 21	76,300	*Share capital (Authorised, issued and fully paid-up: 7,630,000,000 common shares at a par value of Rp 10 (full amount) per share)*
Agio saham	15,227	2v, 22	15,227	*Capital paid in excess of par value*
Selisih nilai transaksi restrukturisasi entitas sepengendali	80,773	2c, 23	80,773	*Balance arising from restructuring transactions between entities under common control*
Saldo laba yang dicadangkan	15,260	25	15,260	*Appropriated retained earnings*
Saldo laba yang belum dicadangkan	3,489,008		3,857,859	*Unappropriated retained earnings*
Ekuitas yang dapat diatribusikan kepada pemilik entitas induk	3,676,568		4,045,419	*Equity attributable to the owners of the parent*
Kepentingan nonpengendali	4,369	20	3,434	*Non-controlling interests*
Jumlah Ekuitas	3,680,937		4,048,853	***Total Equity***
JUMLAH LIABILITAS DAN EKUITAS	10,482,312		8,701,262	***TOTAL LIABILITIES AND EQUITY***

Laporan Laba Rugi Komprehensif Konsolidasian
Untuk Tahun-Tahun Yang Berakhir Pada
31 Desember 2011 dan 2010

Consolidated Statement of Comprehensive Income
For The Years Ended
31 December 2011 and 2010

(Dalam jutaan Rupiah, kecuali dinyatakan lain)

(Expressed in millions of Rupiah, unless otherwise stated)

	2011	Catatan/ *Notes*	2010	
PENJUALAN BERSIH	23,469,218	2q, 26	19,690,239	***NET SALES***
HARGA POKOK PENJUALAN	(11,462,805)	2q, 27	(9,485,274)	***COST OF GOODS SOLD***
LABA BRUTO	12,006,413		10,204,965	***GROSS PROFIT***
Beban pemasaran dan penjualan	(5,243,477)	2q, 28a	(4,523,283)	*Marketing and selling expenses*
Beban umum dan administrasi	(1,307,526)	2q, 28b	(1,139,057)	*General and administration expenses*
Keuntungan pelepasan aset tetap	769	2j, 10d	318	*Gain on disposal of fixed assets*
Keuntungan pelepasan aset takberwujud	112,762		-	*Gain on disposal of intangible assets*
Kerugian selisih kurs, bersih	(831)	2e	(10,768)	*Loss on foreign exchange, net*
Penghasilan bunga	33,189		36,395	*Interest income*
Beban bunga	(26,500)		(22,803)	*Interest expense*
LABA SEBELUM PAJAK PENGHASILAN	5,574,799		4,545,767	***PROFIT BEFORE INCOME TAX***
Beban pajak penghasilan	(1,410,495)	2t, 16a	(1,161,119)	*Income tax expense*
LABA TAHUN BERJALAN	4,164,304		3,384,648	***PROFIT FOR THE YEAR***
Pendapatan/(beban) komprehensif lain setelah pajak	-		-	*Other comprehensive income/(expenses) net of tax*
JUMLAH PENDAPATAN KOMPREHENSIF TAHUN BERJALAN	4,164,304		3,384,648	***TOTAL COMPREHENSIVE INCOME FOR THE YEAR***
Laba/jumlah pendapatan komprehensif yang dapat diatribusikan kepada:				***Profit/total comprehensive income attributable to:***
Pemilik entitas induk	4,163,369		3,386,970	*Owners of the parent*
Kepentingan nonpengendali	935		(2,322)	*Non-controlling interests*
	4,164,304		3,384,648	
LABA PER SAHAM DASAR (dinyatakan dalam nilai penuh Rupiah per saham)	546	2x, 30	444	***BASIC EARNING PER SHARE*** *(expressed in Rupiah full amount per share)*

Laporan Arus Kas Konsolidasian
Untuk Tahun-Tahun Yang Berakhir Pada
31 Desember 2011 dan 2010

Consolidated Statement of Cash Flows
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31 December 2011 and 2010

(Dalam jutaan Rupiah, kecuali dinyatakan lain)

(Expressed in millions of Rupiah, unless otherwise stated)

	2011	Catatan/ *Notes*	2010	
Arus kas dari aktivitas operasi				***Cash flows from operating activities***
Penerimaan dari pelanggan	25,200,151		21,263,743	*Receipts from customers*
Pembayaran kepada pemasok	(16,842,494)		(14,903,716)	*Payments to suppliers*
Pembayaran remunerasi direksi dan karyawan	(834,310)		(849,176)	*Payments of directors' and employees' remuneration*
Pembayaran imbalan kerja	(20,076)	19	(26,642)	*Payments of employee benefits*
Pembayaran untuk beban jasa dan royalti	(740,521)		(643,432)	*Payments of service fees and royalty*
Kas yang dihasilkan dari operasi	6,762,750		4,840,777	*Cash generated from operations*
Penerimaan dari pendapatan bunga	26,701		37,145	*Receipts from interest income*
Pembayaran bunga	(26,500)		(29,927)	*Interest paid*
Pelunasan pinjaman karyawan	3,398		4,127	*Repayment of employee loan*
Pembayaran pajak penghasilan badan	(1,304,473)		(1,232,933)	*Payments of corporate income tax*
Arus kas bersih yang diperoleh dari aktivitas operasi	5,461,876		3,619,189	***Net cash flows provided from operating activities***
Arus kas dari aktivitas investasi				***Cash flows from investing activities***
Pembelian aset tetap	(1,600,786)		(1,238,520)	*Acquisition of fixed assets*
Pembelian aset takberwujud	(91,438)		(73,872)	*Acquisition of intangible assets*
Hasil penjualan aset tetap	83,407	10c	2,368	*Proceeds from the sale of fixed assets*
Hasil penjualan aset takberwujud	175,679		-	*Proceeds from the sale of intangible assets*
Arus kas bersih yang digunakan untuk aktivitas investasi	(1,433,138)		(1,310,024)	***Net cash flows used in investing activities***
Arus kas dari aktivitas pendanaan				***Cash flows from financing activities***
Penerimaan pinjaman jangka pendek	699,160	14	190,000	*Proceeds from short-term loans*
Pembayaran pinjaman jangka pendek	(190,000)	14	-	*Payments of short-term loans*
Pembayaran dividen kepada pemegang saham	(4,519,907)	24	(3,037,461)	*Dividends paid to the shareholders*
Arus kas bersih yang digunakan untuk aktivitas pendanaan	(4,010,747)		(2,847,461)	***Net cash flows used in financing activities***
Kenaikan/(penurunan) bersih kas dan setara kas	17,991		(538,296)	***Net increase/(decrease) in cash and cash equivalents***
Dampak perubahan kurs terhadap kas dan setara kas	393		(2,267)	*Effect of exchange rate changes on cash and cash equivalents*
Kas dan setara kas pada awal tahun	317,759		858,322	***Cash and cash equivalents at the beginning of the year***
Kas dan setara kas pada akhir tahun	336,143	2a, 2d, 3	317,759	***Cash and cash equivalents at the end of the year***

Appendix 2
Beta Calculation

2004 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.001	.001		1.990	.047
	Rm	.559	.041	.436	13.536	.000

a. Dependent Variable: Ri.

2005 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.000	.001		.486	.627
	Rm	.605	.042	.458	14.427	.000

a. Dependent Variable: Ri.

2006 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.000	.001		.539	.590
	Rm	.689	.051	.432	13.394	.000

a. Dependent Variable: Ri.

2007 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	4.635E-005	.001		.076	.940
	Rm2006	.689	.049	.448	14.009	.000

a. Dependent Variable: Ri.

2008 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	6.199E-005	.001		.095	.925
	Rm2008	.775	.051	.479	15.236	.000

a. Dependent Variable: Ri.

2009 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.001	.001		1.175	.240
	Rm2009	.642	.037	.526	17.271	.000

a. Dependent Variable: Ri.

2010 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.001	.001		.809	.419
	Rm2010	.554	.038	.461	14.521	.000

a. Dependent Variable: Ri.

2011 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.001	.001		1.555	.120
	Rm2011	.530	.039	.434	13.464	.000

a. Dependent Variable: Ri.

Appendix 3
The Results of the Initial Model

Microsoft Excel 14.0 Structure Report

Worksheet: [UNilever_INT_Prob2908.xlsx]Unilever int prob

Report Created: 8/28/2012 1:10:34 AM

Model Type: LP Convex Assumption: LP

Statistics

	Variables	Functions	Dependents
All	97	177	661
Smooth	97	177	661
Linear	97	177	661

Microsoft Excel 14.0 Sensitivity Report

Worksheet: [UNilever_INT_Prob2908.xlsx]Unilever int prob

Report Created: 8/28/2012 1:10:17 AM

Engine: Gurobi Solver

Objective Cell (Max)

Cell	Name	Final Value
$C$191	Maximise FCFE CFO1	67214.38184

Decision Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$5	VALUE CFO1	3,823.37	0.00	1.073994	1E+100	0
$D$5	VALUE CFI1	2,650.52	0.00	–1.073994	1E+100	0
$E$5	VALUE CFF1	0.00	0.00	1.073994	0	1E+100
$F$5	VALUE CFO2	1,547.90	0.00	1.189366918	0	0
$G$5	VALUE CFI2	95.04	0.00	–1.189366918	0	1E+100
$H$5	VALUE CFF2	0.00	0.00	1.189366918	0	1E+100
$I$5	VALUE CFO3	5,107.01	0.00	1.398665329	0	0
$J$5	VALUE CFI3	3,270.33	0.00	–1.398665329	0	0
$K$5	VALUE CFF3	0.00	0.00	1.398665329	0	1E+100
$L$5	VALUE CFO4	5,047.83	0.00	1.391188408	0	0

$M$5	VALUE CFI4	3,989.33	0.00	–1.391188408	0	0
$N$5	VALUE CFF4	0.00	0.00	1.391188408	0	1E+100
$O$5	VALUE CFO5	7,029.02	0.00	1.515241047	0	0
$P$5	VALUE CFI5	4,752.35	0.00	–1.515241047	0	0
$Q$5	VALUE CFF5	0.00	0.00	1.515241047	0	1E+100
$R$5	VALUE CFO6	8113.10	0.00	1.513044571	0	0
$S$5	VALUE CFI6	5,532.43	0.00	–1.513044571	0	0
$T$5	VALUE CFF6	0.00	0.00	1.513044571	0	1E+100
$U$5	VALUE CFO7	7,907.36	0.00	1.553986546	0	0
$V$5	VALUE CFI7	5,408.20	0.00	–1.553986546	0	0
$W$5	VALUE CFF7	0.00	0.00	1.553986546	0	1E+100
$X$5	VALUE CFO8	5,851.76	0.00	10.78632754	0	0
$Y$5	VALUE CFI8	1,313.86	0.00	–10.78632754	0	0
$Z$5	VALUE CFF8	0.00	0.00	10.78632754	0	1E+100
$AA$5	VALUE AR1	495.05	0.00	0	1E+100	0
$AB$5	VALUE COGS1	2,143.49	0.00	0	0	0
$AC$5	VALUE Inv1	11.98	0.00	0	0	1E+100
$AD$5	VALUE AP1	0.00	0.00	0	0	1E+100
$AE$5	VALUE PPE1	943.65	0.00	0	0	0
$AF$5	VALUE LTI1	2,597.49	0.00	0	0	0
$AG$5	VALUE LTD1	0.00	0.00	0	0	1E+100
$AH$5	VALUE AR2	0.00	0.00	0	0	1E+100
$AI$5	VALUE COGS2	5,164.91	0.00	0	0	0
$AJ$5	VALUE Inv2	392.57	0.00	0	0	0
$AK$5	VALUE AP2	0.00	–0.00	0	0	1E+100
$AL$5	VALUE PPE2	1,348.40	0.00	0	0	1E+100
$AM$5	VALUE LTI2	222.97	0.00	0	0	0
$AN$5	VALUE LTD2	0.00	0.00	0	0	1E+100
$AO$5	VALUE AR3	527.75	0.00	0	0	0
$AP$5	VALUE COGS3	2,742.57	0.00	0	0	0

Continued

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$AQ$5	VALUE Inv3	0.00	–0.00	0	0	1E+100
$AR$5	VALUE AP3	0.00	0.00	0	0	1E+100
$AS$5	VALUE PPE3	1,495.66	0.00	0	0	1E+100
$AT$5	VALUE LTI3	3,849.27	0.00	0	0	0
$AU$5	VALUE LTD3	0.00	0.00	0	0	1E+100
$AV$5	VALUE AR4	631.81	0.00	0	0	0
$AW$5	VALUE COGS4	3,357.52	0.00	0	0	0
$AX$5	VALUE Inv4	0.00	–0.00	0	0	1E+100
$AY$5	VALUE AP4	0.00	0.00	0	0	1E+100
$AZ$5	VALUE PPE4	1,724.66	0.00	0	0	1E+100
$BA$5	VALUE LTI4	5,644.12	0.00	0	0	0
$BB$5	VALUE LTD4	0.00	–0.00	0	0	1E+100
$BC$5	VALUE AR5	955.78	0.00	0	1E+100	0
$BD$5	VALUE COGS5	3,612.91	0.00	0	0	0
$BE$5	VALUE Inv5	183.66	0.00	0	0	1E+100
$BF$5	VALUE AP5	0.00	–0.00	0	0	1E+100
$BG$5	VALUE PPE5	2,199.81	0.00	0	0	1E+100
$BH$5	VALUE LTI5	5,812.22	0.00	0	0	0
$BI$5	VALUE LTD5	0.00	–0.00	0	0	1E+100
$BJ$5	VALUE AR6	57.36	0.00	0	0	0
$BK$5	VALUE COGS6	5475.07	0.00	0	0	0
$BL$5	VALUE Inv6	0.00	–0.00	0	0	1E+100
$BM$5	VALUE AP6	0.00	0.00	0	0	1E+100
$BN$5	VALUE PPE6	2747.13	0.00	0	0	0
$BO$5	VALUE LTI6	6833.76	0.00	0	0	0
$BP$5	VALUE LTD6	0.00	0.00	0	0	1E+100
$BQ$5	VALUE AR7	1,567.54	0.00	0	1E+100	0
$BR$5	VALUE COGS7	3,815.58	0.00	0	0	0
$BS$5	VALUE Inv7	25.08	0.00	0	0	1E+100

$BT$5	VALUE AP7	0.00	–0.00	0	0	1E+100
$BU$5	VALUE PPE7	3,035.92	0.00	0	0	1E+100
$BV$5	VALUE LTI7	8,188.65	0.00	0	0	0
$BW$5	VALUE LTD7	0.00	–0.00	0	0	1E+100
$BX$5	VALUE AR8	2,076.08	0.00	0	1E+100	0
$BY$5	VALUE COGS8	10,580.92	0.00	0	0	0
$BZ$5	VALUE Inv8	141.17	0.00	0	0	1E+100
$CA$5	VALUE AP8	0.00	0.00	0	0	1E+100
$CB$5	VALUE PPE8	4,148.78	0.00	0	0	1E+100
$CC$5	VALUE LTI8	347.91	0.00	0	0	0
$CD$5	VALUE LTD8	0.00	0.00	0	0	1E+100
$CE$5	VALUE NDE1	119.40	0.00	0	0	0
$CF$5	VALUE NDE2	128.16	0.00	0	0	0
$CG$5	VALUE NDE3	122.63	0.00	0	0	0
$CH$5	VALUE NDE4	177.54	0.00	0	0	0
$CI$5	VALUE NDE5	165.72	0.00	0	0	0
$CJ$5	VALUE NDE6	128.76	0.00	0	0	0
$CK$5	VALUE NDE7	190.21	0.00	0	0	0
$CL$5	VALUE NDE8	199.57	0.00	0	0	0
$CM$5	VALUE REXX1	1.73	0.00	0	1E+100	0
$CN$5	VALUE REXX2	2.02	0.00	0	1E+100	0
$CO$5	VALUE REXX3	2.44	0.00	0	1E+100	0
$CP$5	VALUE REXX4	1.59	0.00	0	1E+100	0
$CQ$5	VALUE REXX5	3.22	0.00	0	1E+100	0
$CR$5	VALUE REXX6	3.36	0.00	0	1E+100	0
$CS$5	VALUE REXX7	3.24	0.00	0	1E+100	0
$CT$5	VALUE REXX8	5.47	0.00	0	1E+100	0
$CU$5	VALUE PPE0	0.00	0.00	0	0	1E+100

Continued

Constraints

Cell Name		Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$CV$142	PPE1	943.65	0.00	876.48	67.16735185	1E+100
$CV$143	PPE2	1348.40	0.00	1348.402	147.257	436.4332581
$CV$144	PPE3	1495.66	0.00	1495.659	229.004	320.9726866
$CV$145	PPE4	1724.66	0.00	1724.663	475.147	310.7883808
$CV$146	PPE5	2199.81	0.00	2199.81	360.065	634.3212011
$CV$147	PPE6	2747.13	0.00	2559.875	187.2510938	1E+100
$CV$148	PPE7	3035.92	0.00	3035.915	1112.863	738.7763987
$CV$149	PPE8	4148.78	0.00	4148.778	347.9089197	914.5105777
$CV$162	FUNDS1	−0.00	0.00	4814.997	1E+100	4814.997
$CV$163	FUNDS2	5462.44	0.00	5462.435	190.077303	5137.426046
$CV$164	FUNDS3	0.00	0.00	6080.772	1E+100	6080.772
$CV$165	FUNDS4	0.00	0.00	5782.346	1E+100	5782.346
$CV$166	FUNDS5	0.00	0.00	8581.321	1E+100	8581.321
$CV$167	FUNDS6	0.00	0.00	9669.097	1E+100	9669.097
$CV$168	FUNDS7	0.00	0.00	9497.255	1E+100	9497.255
$CV$169	FUNDS8	11484.31	0.00	11484.311	695.8178394	11484.311
$CV$173	EC1	1.04	0.00	0	1.037151517	1E+100
$CV$174	EC2	1.21	0.00	0	1.209059796	1E+100
$CV$175	EC3	1.46	0.00	0	1.46441488	1E+100
$CV$176	EC4	0.96	0.00	0	0.956082861	1E+100
$CV$177	EC5	1.93	0.00	0	1.932358097	1E+100
$CV$178	EC6	2.02	0.00	0	2.017353724	1E+100
$CV$179	EC7	1.95	0.00	0	1.946814625	1E+100
$CV$180	EC8	3.28	0.00	0	3.280757704	1E+100

$CV$182	EC1	0.00	0.00	0	1.037151517	1E+100
$CV$183	EC2	0.00	0.00	0	1.209059796	1E+100
$CV$184	EC3	0.00	0.00	0	1.46441488	1E+100
$CV$185	EC4	0.00	0.00	0	0.956082861	1E+100
$CV$186	EC5	0.00	0.00	0	1.932358097	1E+100
$CV$187	EC6	0.00	0.00	0	2.017353724	1E+100
$CV$188	EC7	0.00	0.00	0	1.946814625	1E+100
$CV$189	EC8	0.00	0.00	0	3.280757704	1E+100
$CV$24	CFO1	6473.89	0.00	6473.885	4655.863356	3689.41568
$CV$25	CFO2	6598.35	0.00	6598.352	498.5824218	190.077303
$CV$26	CFO3	7984.77	0.00	7984.765	6790.330594	4863.153513
$CV$27	CFO4	8509.41	0.00	8509.414	7004.912393	5970.403023
$CV$28	CFO5	11149.55	0.00	11149.547	10359.67194	4953.595616
$CV$29	CFO6	12506.09	0.00	12506.093	8354.941352	10882.54674
$CV$30	CFO7	13258.20	0.00	13258.202	14474.35725	5754.150217
$CV$31	CFO8	17057.32	0.00	17057.32	6429.866641	695.8178394
$CV$34	CFI1	890.62	0.00	890.616	1E+100	2597.486148
$CV$35	CFI2	532.68	0.00	532.682	1E+100	222.9660033
$CV$36	CFI3	726.20	0.00	726.198	1E+100	3849.267193
$CV$37	CFI4	1883.79	0.00	1883.787	1E+100	5644.117727
$CV$38	CFI5	1535.03	0.00	1535.025	1E+100	5812.223079
$CV$39	CFI6	1848.64	0.00	1848.637	1E+100	6833.755069
$CV$40	CFI7	3069.24	0.00	3069.243	1E+100	8188.652393
$CV$41	CFI8	3182.82	0.00	3182.823	1E+100	347.9089197
$CV$44	CFF1	0.00	0.00	0	0	4655.863356
$CV$45	CFF2	0.00	0.00	0	0	498.5824218
$CV$46	CFF3	0.00	0.00	0	0	6790.330594
$CV$47	CFF4	0.00	0.00	0	0	7004.912393

Continued

Cell Name		Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$CV$48	CFF5	0.00	0.00	0	0	10359.67194
$CV$49	CFF6	0.00	0.00	0	0	8354.941352
$CV$50	CFF7	0.00	0.00	0	0	11567.73661
$CV$51	CFF8	0.00	0.00	0	0	4886.78651
$CV$54	ATD1	100.31	0.00	100.3076999	1E+100	100.3076999
$CV$55	ATD2	91.77	0.00	91.77407834	1E+100	91.77407834
$CV$56	ATD3	103.24	0.00	103.2441155	1E+100	103.2441155
$CV$57	ATD4	146.77	0.00	146.7708797	1E+100	146.7708797
$CV$58	ATD5	140.46	0.00	140.4634881	1E+100	140.4634881
$CV$59	ATD6	104.20	0.00	104.1995725	1E+100	104.1995725
$CV$60	ATD7	164.70	0.00	164.7020798	1E+100	164.7020798
$CV$61	ATD8	146.85	0.00	146.8544635	1E+100	146.8544635
$CV$65	CR1	507.03	0.00	507.026303	67.16735185	11.97930299
$CV$66	CR2	392.57	0.00	392.5683853	337.3958805	156.8573911
$CV$67	CR3	527.75	0.00	527.7524541	125.4545459	320.9726866
$CV$68	CR4	631.81	0.00	631.814158	101.544842	310.7883808
$CV$69	CR5	1139.44	0.00	1139.438326	344.6783466	183.6633264
$CV$70	CR6	57.36	0.00	57.3595992	187.2510938	57.3595992
$CV$71	CR7	1592.62	0.00	1592.616839	521.557129	25.07883944
$CV$72	CR8	2217.25	0.00	2217.254308	1322.958021	141.1713085
$CV$75	CCDC1	3823.37	0.00	977.7462136	2845.621286	1E+100
$CV$76	CCDC2	1547.90	0.00	984.2512088	563.6534427	1E+100
$CV$77	CCDC3	5107.01	0.00	1432.613708	3674.393485	1E+100
$CV$78	CCDC4	5047.83	0.00	1449.253533	3598.578194	1E+100
$CV$79	CCDC5	7029.02	0.00	1797.436412	5231.579667	1E+100
$CV$80	CCDC6	8113.10	0.00	964.6658989	7148.431264	1E+100

$CV$81	CCDC7	7907.36	0.00	2123.494993	5783.868306	1E+100
$CV$82	CCDC8	5851.76	0.00	3408.368665	2443.393255	1E+100
$CV$86	ARTO1	8984.82	0.00	8984.822	217.4175483	5451.515491
$CV$87	ARTO2	0.00	0.00	9992.135	1E+100	9992.135
$CV$88	ARTO3	9158.20	0.00	11335.241	1E+100	2177.03961
$CV$89	ARTO4	10807.87	0.00	12544.901	1E+100	1737.034645
$CV$90	ARTO5	15609.84	0.00	15609.836	2999.612257	6539.366754
$CV$91	ARTO6	832.03	0.00	18246.872	1E+100	17414.83782
$CV$92	ARTO7	19690.24	0.00	19690.239	315.0216086	7638.602125
$CV$93	ARTO8	23469.22	0.00	23469.218	1595.880422	17320.64558
$CV$96	ITO1	2061.28	0.00	0	2061.283029	1E+100
$CV$97	ITO2	2568.71	0.00	0	2568.713023	1E+100
$CV$98	ITO3	2742.57	0.00	0	2742.573739	1E+100
$CV$99	ITO4	3357.52	0.00	0	3357.520569	1E+100
$CV$100	ITO5	2476.80	0.00	0	2476.797808	1E+100
$CV$101	ITO6	5475.07	0.00	0	5475.074564	1E+100
$CV$102	ITO7	3664.46	0.00	0	3664.456558	1E+100
$CV$103	ITO8	9688.27	0.00	0	9688.268121	1E+100
$CV$151	PPE1	819.77	0.00	1171.386126	1E+100	351.6191607
$CV$152	PPE2	1176.48	0.00	1304.966088	1E+100	128.482088
$CV$153	PPE3	1284.94	0.00	1481.685501	1E+100	196.7409902
$CV$154	PPE4	1478.36	0.00	1885.64554	1E+100	407.2891846
$CV$155	PPE5	1690.62	0.00	1967.342852	1E+100	276.7210523
$CV$156	PPE6	2356.28	0.00	2603.978016	1E+100	247.7012574
$CV$157	PPE7	2743.61	0.00	3749.321508	1E+100	1005.713292
$CV$158	PPE8	3345.91	0.00	4285.892316	1E+100	939.9805409
$CV$119	LEV1	541.28	0.00	541.2840247	151.0244735	25.06188378
$CV$120	LEV2	756.15	0.00	566.5916964	189.5534093	1E+100

Continued

Cell Name		Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$CV$121	LEV3	987.42	0.00	830.7845983	156.6336303	1E+100
$CV$122	LEV4	1167.00	0.00	1013.087353	153.9118666	1E+100
$CV$123	LEV5	1747.68	0.00	1415.694476	331.9886189	1E+100
$CV$124	LEV6	1417.11	0.00	1417.108701	145.9252485	94.61811662
$CV$125	LEV7	2476.62	0.00	2081.317703	395.3020751	1E+100
$CV$126	LEV8	4130.56	0.00	3537.181837	593.3738073	1E+100
$CV$12	FCFE1	1172.85	1.07	1172.85	3689.41568	1172.85
$CV$13	FCFE2	1452.87	1.19	1452.866	190.077303	498.5824218
$CV$14	FCFE3	1836.68	1.40	1836.681	4863.153513	1836.681
$CV$15	FCFE4	1058.50	1.39	1058.497	5970.403023	1058.497
$CV$16	FCFE5	2276.67	1.52	2276.671	4953.595616	2276.671
$CV$17	FCFE6	2580.66	1.51	2580.663	10882.54674	2580.663
$CV$18	FCFE7	2499.17	1.55	2499.165	5754.150217	2499.165
$CV$19	FCFE8	4537.90	10.79	4537.898	695.8178394	4537.898
$CV$130	Z1	12396.44	0.00	28040.13756	1E+100	15643.70088
$CV$131	Z2	33153.59	0.00	34828.82952	1E+100	1675.236937
$CV$132	Z3	16340.20	0.00	39155.7066	1E+100	22815.51079
$CV$133	Z4	20060.55	0.00	43597.0598	1E+100	23536.50564
$CV$134	Z5	19766.56	0.00	54575.05532	1E+100	34808.49772
$CV$135	Z6	36565.36	0.00	64637.96	1E+100	28072.60294
$CV$136	Z7	19333.94	0.00	67967.78508	1E+100	48633.84035
$CV$137	Z8	62323.46	0.00	83927.81136	1E+100	21604.35191
$CV$107	ATO1	3557.61	0.00	6062.968104	1E+100	2505.358979
$CV$108	ATO2	4527.44	0.00	7070.537271	1E+100	2543.097919

$CV$109	ATO3	4958.03	0.00	7697.15301	1E+100	2739.120915
$CV$110	ATO4	5542.76	0.00	8916.085362	1E+100	3373.328509
$CV$111	ATO5	8013.41	0.00	11519.61221	1E+100	3506.201866
$CV$112	ATO6	6865.69	0.00	13734.2256	1E+100	6868.532658
$CV$113	ATO7	10473.99	0.00	16497.52023	1E+100	6023.534023
$CV$114	ATO8	14253.13	0.00	20605.40262	1E+100	6352.268383
$CV$130	Z1	12396.44	0.00	0	12396.43668	1E+100
$CV$131	Z2	33153.59	0.00	0	33153.59258	1E+100
$CV$132	Z3	16340.20	0.00	0	16340.19581	1E+100
$CV$133	Z4	20060.55	0.00	0	20060.55416	1E+100
$CV$134	Z5	19766.56	0.00	0	19766.5576	1E+100
$CV$135	Z6	36565.36	0.00	0	36565.35706	1E+100
$CV$136	Z7	19333.94	0.00	0	19333.94473	1E+100
$CV$137	Z8	62323.46	0.00	0	62323.45945	1E+100
$CV$162	FUNDS1	−0.00	0.00	0	4655.863356	3689.41568
$CV$163	FUNDS2	5462.44	0.00	0	5462.435	1E+100
$CV$164	FUNDS3	0.00	0.00	0	6080.772	4863.153513
$CV$165	FUNDS4	0.00	0.00	0	5782.346	5970.403023
$CV$166	FUNDS5	0.00	0.00	0	8581.321	4953.595616
$CV$167	FUNDS6	0.00	0.00	0	8354.941352	10882.54674
$CV$168	FUNDS7	0.00	0.00	0	9497.255	5754.150217
$CV$169	FUNDS8	11484.31	0.00	0	11484.311	1E+100
$CV$54	ATD1	100.31	0.00	0	100.3076999	1E+100
$CV$55	ATD2	91.77	0.00	0	91.77407834	1E+100
$CV$56	ATD3	103.24	0.00	0	103.2441155	1E+100
$CV$57	ATD4	146.77	0.00	0	146.7708797	1E+100
$CV$58	ATD5	140.46	0.00	0	140.4634881	1E+100
$CV$59	ATD6	104.20	0.00	0	104.1995725	1E+100

Continued

Cell Name		Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$CV$60	ATD7	164.70	0.00	0	164.7020798	1E+100
$CV$61	ATD8	146.85	0.00	0	146.8544635	1E+100
$CV$86	ARTO1	8984.82	0.00	0	8984.822	1E+100
$CV$87	ARTO2	0.00	0.00	0	0	1E+100
$CV$88	ARTO3	9158.20	0.00	0	9158.20139	1E+100
$CV$89	ARTO4	10807.87	0.00	0	10807.86636	1E+100
$CV$90	ARTO5	15609.84	0.00	0	15609.836	1E+100
$CV$91	ARTO6	832.03	0.00	0	832.0341774	1E+100
$CV$92	ARTO7	19690.24	0.00	0	19690.239	1E+100
$CV$93	ARTO8	23469.22	0.00	0	23469.218	1E+100
$CV$107	ATO1	3557.61	0.00	0	3557.609125	1E+100
$CV$108	ATO2	4527.44	0.00	0	4527.439352	1E+100
$CV$109	ATO3	4958.03	0.00	0	4958.032096	1E+100
$CV$110	ATO4	5542.76	0.00	0	5542.756853	1E+100
$CV$111	ATO5	8013.41	0.00	0	8013.410343	1E+100
$CV$112	ATO6	6865.69	0.00	0	6865.692938	1E+100
$CV$113	ATO7	10473.99	0.00	0	10473.9862	1E+100
$CV$114	ATO8	14253.13	0.00	0	14253.13424	1E+100

Appendix 4
The Final Model 1[1]

Microsoft Excel 14.0 Sensitivity Report

Worksheet: [UNilever_INT_rem 3008.xlsx]Unilever int rem

Report Created: 8/30/2012 11:57:45 PM

Engine: Gurobi Solver

Objective Cell (Max)

Cell	Name	Final Value
$C$191	Maximise FCFE CFO1	269678.549

Decision Variable Cells

		Final	Reduced	Objective	Allowable	Allowable
Cell	Name	Value	Cost	Coefficient	Increase	Decrease
$C$5	VALUE CFO1	5658.19	0.00	1.073994	0.437149907	0.115406372
$D$5	VALUE CFI1	0.00	–0.67	–1.073994	0.672862265	1E+100
$E$5	VALUE CFF1	52.90	0.00	1.073994	0.225896652	1.073361218
$F$5	VALUE CFO2	6886.07	0.00	1.189366918	0.258086024	0.083909771
$G$5	VALUE CFI2	0.00	–0.67	–1.189366918	0.672423344	1E+100
$H$5	VALUE CFF2	132.48	0.00	1.189366918	0.208754778	1.188707431
$I$5	VALUE CFO3	8066.16	0.00	1.398665329	0.187064374	0.208121168

$J$5	VALUE CFI3	0.00	–0.72	–1.398665329	0.715740736	1E+100
$K$5	VALUE CFF3	56.02	0.00	1.398665329	0.510025078	1.397922272
$L$5	VALUE CFO4	8345.49	0.00	1.391188408	0.429245512	1.043132802
$M$5	VALUE CFI4	239.50	0.00	–1.391188408	0.521375892	8.708085691
$N$5	VALUE CFF4	0.00	0.00	1.391188408	1.417132109	1E+100
$O$5	VALUE CFO5	10261.75	0.00	1.515241047	8.713013101	0.687950299
$P$5	VALUE CFI5	0.00	–0.72	–1.515241047	0.721791527	1E+100
$Q$5	VALUE CFF5	253.98	0.00	1.515241047	1.379106519	1.514384144
$R$5	VALUE CFO6	13130.56	0.00	1.513044571	0.407423771	0.19784921
$S$5	VALUE CFI6	0.00	–0.50	–1.513044571	0.503606562	1E+100
$T$5	VALUE CFF6	0.00	0.00	1.513044571	0.483881319	1E+100
$U$5	VALUE CFO7	4280.48	0.00	1.553986546	0.090188395	0.342171991
$V$5	VALUE CFI7	0.00	–0.57	–1.553986546	0.571463516	1E+100
$W$5	VALUE CFF7	952.85	0.00	1.553986546	0.863733277	1.190466738
$X$5	VALUE CFO8	17111.12	0.00	10.78632754	2.417539994	0.637298091
$Y$5	VALUE CFI8	0.00	–3.79	–10.78632754	3.785869467	1E+100
$Z$5	VALUE CFF8	376.44	0.00	10.78632754	5.834800308	10.78113126
$AA$5	VALUE AR1	495.05	0.00	0	1E+100	0.053340087
$AB$5	VALUE COGS1	291.08	0.00	0	0.210570955	1E+100

Continued

Cell	Name	Value	Cost	Coefficient	Increase	Decrease
$AC$5	VALUE Inv1	42.42	0.00	0	1.445046723	0.055306972
$AD$5	VALUE AP1	18.81	0.00	0	12.37991983	0.089499412
$AE$5	VALUE PPE1	1105.38	0.00	0	0.672862265	0.400498953
$AF$5	VALUE LTI1	0.00	−0.40	0	0.400498953	1E+100
$AG$5	VALUE LTD1	52.90	0.00	0	0.225896652	1.073361218
$AH$5	VALUE AR2	457.15	0.00	0	1E+100	0.181492967
$AI$5	VALUE COGS2	192.13	0.00	0	0.153211042	1E+100
$AJ$5	VALUE Inv2	29.05	0.00	0	1.013238289	0.19298476
$AK$5	VALUE AP2	69.24	0.00	0	11.12214511	0.229270499
$AL$5	VALUE PPE2	1282.79	0.00	0	0.672423344	0.516284087
$AM$5	VALUE LTI2	0.00	−0.52	0	0.516284087	1E+100
$AN$5	VALUE LTD2	132.48	0.00	0	0.208754778	1.188707431
$AO$5	VALUE AR3	653.21	0.00	0	1E+100	0.246510441
$AP$5	VALUE COGS3	234.54	0.00	0	0.377967426	1E+100
$AQ$5	VALUE Inv3	31.39	0.00	0	2.824335077	0.262592198
$AR$5	VALUE AP3	123.90	0.00	0	13.85339707	0.332418626
$AS$5	VALUE PPE3	1386.54	0.00	0	0.715740736	0.682181536
$AT$5	VALUE LTI3	0.00	−0.68	0	0.682181536	1E+100
$AU$5	VALUE LTD3	56.02	0.00	0	0.510025078	1.397922272
$AV$5	VALUE AR4	733.36	0.00	0	1E+100	0.748067074

$AW$5	VALUE COGS4	470.19	0.00	0	1.195235374	0.781447306
$AX$5	VALUE Inv4	64.54	0.00	0	8.708085691	0.687561247
$AY$5	VALUE AP4	0.00	–1.16	0	1.158924242	1E+100
$AZ$5	VALUE PPE4	1247.79	0.00	0	0.521375892	8.708085691
$BA$5	VALUE LTI4	0.00	–1.39	0	1.390351189	1E+100
$BB$5	VALUE LTD4	0.00	–1.42	0	1.417132109	1E+100
$BC$5	VALUE AR5	955.78	0.00	0	1E+100	9.433198532
$BD$5	VALUE COGS5	1136.11	0.00	0	1.397183966	1E+100
$BE$5	VALUE Inv5	183.66	0.00	0	8.642733594	1E+100
$BF$5	VALUE AP5	0.00	–10.19	0	10.18905647	1E+100
$BG$5	VALUE PPE5	2050.76	0.00	0	0.721791527	0.792592616
$BH$5	VALUE LTI5	0.00	–0.79	0	0.792592616	1E+100
$BI$5	VALUE LTD5	253.98	0.00	0	1.379106519	1.514384144
$BJ$5	VALUE AR6	1257.92	0.00	0	1E+100	0.168922442
$BK$5	VALUE COGS6	194.80	0.00	0	0.360130773	0.741758996
$BL$5	VALUE Inv6	28.37	0.00	0	2.472709172	0.171370053
$BM$5	VALUE AP6	413.17	0.00	0	1.106011432	0.339144668
$BN$5	VALUE PPE6	2335.87	0.00	0	0.503606562	1.008649903
$BO$5	VALUE LTI6	0.00	–1.01	0	1.008649903	1E+100

Continued

Cell	Name	Value	Cost	Coefficient	Increase	Decrease
$BP$5	VALUE LTD6	0.00	–0.48	0	0.483881319	1E+100
$BQ$5	VALUE AR7	1567.54	0.00	0	1E+100	10.01339619
$BR$5	VALUE COGS7	7618.33	0.00	0	0.400992084	0.105707244
$BS$5	VALUE Inv7	1264.24	0.00	0	2.416375351	0.636991074
$BT$5	VALUE AP7	0.00	–10.78	0	10.78113126	1E+100
$BU$5	VALUE PPE7	2838.75	0.00	0	0.571463516	0.88358065
$BV$5	VALUE LTI7	0.00	–0.88	0	0.88358065	1E+100
$BW$5	VALUE LTD7	952.85	0.00	0	0.863733277	1.190466738
$BX$5	VALUE AR8	2076.08	0.00	0	1E+100	9.286197692
$BY$5	VALUE COGS8	1231.75	0.00	0	8.122235435	1E+100
$BZ$5	VALUE Inv8	194.80	0.00	0	51.35840822	11.33585152
$CA$5	VALUE AP8	78.09	0.00	0	49.64736575	7.784531112
$CB$5	VALUE PPE8	3881.17	0.00	0	3.785869467	6.99526179
$CC$5	VALUE LTI8	0.00	–7.00	0	6.99526179	1E+100
$CD$5	VALUE LTD8	376.44	0.00	0	5.834800308	10.78113126
$CE$5	VALUE NDE1	2.59	0.00	0	1.073361218	1E+100

$CF$5	VALUE NDE2	1.35	0.00	0	1.188707431	1E+100
$CG$5	VALUE NDE3	1.66	0.00	0	1.397922272	1E+100
$CH$5	VALUE NDE4	4.31	0.00	0	1.390351189	85.26669344
$CI$5	VALUE NDE5	7.94	0.00	0	1.514384144	1E+100
$CJ$5	VALUE NDE6	0.87	0.00	0	1.512256465	165.3560282
$CK$5	VALUE NDE7	50.94	0.00	0	1.553179942	15.80960422
$CL$5	VALUE NDE8	6.14	0.00	0	10.78113126	1E+100
$CM$5	VALUE REXX1	3.37	0.00	0	1.073994	324.8279664
$CN$5	VALUE REXX2	3.89	0.00	0	1.189366918	252.8988282
$CO$5	VALUE REXX3	4.32	0.00	0	1.398665329	661.4543947
$CP$5	VALUE REXX4	4.88	0.00	0	1.391188408	1968.059228
$CQ$5	VALUE REXX5	5.95	0.00	0	1.515241047	1215.796775
$CR$5	VALUE REXX6	6.84	0.00	0	1.513044571	642.2422715
$CS$5	VALUE REXX7	2.72	0.00	0	1.553986546	547.8748342
$CT$5	VALUE REXX8	8.43	0.00	0	10.78632754	1322.252658
$CU$5	VALUE REXM1	0.00	–1.07	0	1.073361218	1E+100
$CV$5	VALUE REXM2	0.00	–1.19	0	1.188707431	1E+100
$CW$5	VALUE REXM3	0.00	–1.40	0	1.397922272	1E+100

Continued

Cell	Name	Value	Cost	Coefficient	Increase	Decrease
$CX$5	VALUE REXM4	0.00	–1.39	0	1.390351189	1E+100
$CY$5	VALUE REXM5	0.00	–1.51	0	1.514384144	1E+100
$CZ$5	VALUE REXM6	0.00	–1.51	0	1.512256465	1E+100
$DA$5	VALUE REXM7	0.00	–1.55	0	1.553179942	1E+100
$DB$5	VALUE REXM8	0.00	–10.78	0	10.78113126	1E+100

Appendix 5
The Final Validated Model 1 – Without Perpetuity[1]

Microsoft Excel 14.0 Structure Report

Worksheet: [UNilever_INT_1-8rem 3008.xlsx]Unilever int rem

Report Created: 8/31/2012 2:32:05 PM

Model Type: LP Convex Assumption: LP

Statistics

	Variables	Functions	Dependents
All	104	129	557
Smooth	104	129	557
Linear	104	129	557

Microsoft Excel 14.0 Answer Report

Worksheet: [UNilever_INT_1-8rem 3008.xlsx]Unilever int rem

Report Created: 8/31/2012 2:31:54 PM

Result: Solver found a solution. All constraints and optimality conditions are satisfied.

Engine: Standard LP/Quadratic

Solution Time: 00 Seconds

Iterations: 0

Subproblems: 0

Incumbent Solutions: 0

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$C$191	Maximise FCFE CFO1	0	119515.6528

Decision Variable Cells

Cell	Name	Original Value	Final Value	Type
$C$5	VALUE CFO1	0.00	5658.19	Normal
$D$5	VALUE CFI1	0.00	0.00	Normal
$E$5	VALUE CFF1	0.00	52.90	Normal
$F$5	VALUE CFO2	0.00	6886.07	Normal
$G$5	VALUE CFI2	0.00	0.00	Normal
$H$5	VALUE CFF2	0.00	132.48	Normal
$I$5	VALUE CFO3	0.00	8066.16	Normal
$J$5	VALUE CFI3	0.00	0.00	Normal
$K$5	VALUE CFF3	0.00	56.02	Normal
$L$5	VALUE CFO4	0.00	8345.49	Normal
$M$5	VALUE CFI4	0.00	239.50	Normal
$N$5	VALUE CFF4	0.00	0.00	Normal
$O$5	VALUE CFO5	0.00	10261.75	Normal
$P$5	VALUE CFI5	0.00	0.00	Normal
$Q$5	VALUE CFF5	0.00	253.98	Normal
$R$5	VALUE CFO6	0.00	13130.56	Normal
$S$5	VALUE CFI6	0.00	0.00	Normal
$T$5	VALUE CFF6	0.00	0.00	Normal
$U$5	VALUE CFO7	0.00	12373.82	Normal

Continued

Cell	Name	Original Value	Final Value	Type
$V$5	VALUE CFI7	0.00	0.00	Normal
$W$5	VALUE CFF7	0.00	218.25	Normal
$X$5	VALUE CFO8	0.00	15853.01	Normal
$Y$5	VALUE CFI8	0.00	0.00	Normal
$Z$5	VALUE CFF8	0.00	376.44	Normal
$AA$5	VALUE AR1	0.00	495.05	Normal
$AB$5	VALUE COGS1	0.00	291.08	Normal
$AC$5	VALUE Inv1	0.00	42.42	Normal
$AD$5	VALUE AP1	0.00	18.81	Normal
$AE$5	VALUE PPE1	0.00	1105.38	Normal
$AF$5	VALUE LTI1	0.00	0.00	Normal
$AG$5	VALUE LTD1	0.00	52.90	Normal
$AH$5	VALUE AR2	0.00	457.15	Normal
$AI$5	VALUE COGS2	0.00	192.13	Normal
$AJ$5	VALUE Inv2	0.00	29.05	Normal
$AK$5	VALUE AP2	0.00	69.24	Normal
$AL$5	VALUE PPE2	0.00	1282.79	Normal
$AM$5	VALUE LTI2	0.00	0.00	Normal
$AN$5	VALUE LTD2	0.00	132.48	Normal
$AO$5	VALUE AR3	0.00	653.21	Normal
$AP$5	VALUE COGS3	0.00	234.54	Normal
$AQ$5	VALUE Inv3	0.00	31.39	Normal
$AR$5	VALUE AP3	0.00	123.90	Normal
$AS$5	VALUE PPE3	0.00	1386.54	Normal
$AT$5	VALUE LTI3	0.00	0.00	Normal
$AU$5	VALUE LTD3	0.00	56.02	Normal
$AV$5	VALUE AR4	0.00	733.36	Normal
$AW$5	VALUE COGS4	0.00	470.19	Normal
$AX$5	VALUE Inv4	0.00	64.54	Normal
$AY$5	VALUE AP4	0.00	0.00	Normal
$AZ$5	VALUE PPE4	0.00	1247.79	Normal
$BA$5	VALUE LTI4	0.00	0.00	Normal
$BB$5	VALUE LTD4	0.00	0.00	Normal
$BC$5	VALUE AR5	0.00	955.78	Normal
$BD$5	VALUE COGS5	0.00	1136.11	Normal
$BE$5	VALUE Inv5	0.00	183.66	Normal
$BF$5	VALUE AP5	0.00	0.00	Normal
$BG$5	VALUE PPE5	0.00	2050.76	Normal
$BH$5	VALUE LTI5	0.00	0.00	Normal
$BI$5	VALUE LTD5	0.00	253.98	Normal
$BJ$5	VALUE AR6	0.00	1257.92	Normal
$BK$5	VALUE COGS6	0.00	194.80	Normal
$BL$5	VALUE Inv6	0.00	28.37	Normal
$BM$5	VALUE AP6	0.00	413.17	Normal
$BN$5	VALUE PPE6	0.00	2335.87	Normal

Continued

Cell	Name	Original Value	Final Value	Type
$BO$5	VALUE LTI6	0.00	0.00	Normal
$BP$5	VALUE LTD6	0.00	0.00	Normal
$BQ$5	VALUE AR7	0.00	1567.54	Normal
$BR$5	VALUE COGS7	0.00	825.29	Normal
$BS$5	VALUE Inv7	0.00	136.96	Normal
$BT$5	VALUE AP7	0.00	131.42	Normal
$BU$5	VALUE PPE7	0.00	2838.75	Normal
$BV$5	VALUE LTI7	0.00	0.00	Normal
$BW$5	VALUE LTD7	0.00	218.25	Normal
$BX$5	VALUE AR8	0.00	2076.08	Normal
$BY$5	VALUE COGS8	0.00	1231.75	Normal
$BZ$5	VALUE Inv8	0.00	194.80	Normal
$CA$5	VALUE AP8	0.00	78.09	Normal
$CB$5	VALUE PPE8	0.00	3881.17	Normal
$CC$5	VALUE LTI8	0.00	0.00	Normal
$CD$5	VALUE LTD8	0.00	376.44	Normal
$CE$5	VALUE NDE1	0.00	2.59	Normal
$CF$5	VALUE NDE2	0.00	1.35	Normal
$CG$5	VALUE NDE3	0.00	1.66	Normal
$CH$5	VALUE NDE4	0.00	4.31	Normal
$CI$5	VALUE NDE5	0.00	7.94	Normal
$CJ$5	VALUE NDE6	0.00	0.87	Normal
$CK$5	VALUE NDE7	0.00	5.52	Normal
$CL$5	VALUE NDE8	0.00	6.14	Normal
$CM$5	VALUE REXX1	0.00	3.37	Normal
$CN$5	VALUE REXX2	0.00	3.89	Normal
$CO$5	VALUE REXX3	0.00	4.32	Normal
$CP$5	VALUE REXX4	0.00	4.88	Normal
$CQ$5	VALUE REXX5	0.00	5.95	Normal
$CR$5	VALUE REXX6	0.00	6.84	Normal
$CS$5	VALUE REXX7	0.00	6.54	Normal
$CT$5	VALUE REXX8	0.00	7.82	Normal
$CU$5	VALUE REXM1	0.00	0.00	Normal
$CV$5	VALUE REXM2	0.00	0.00	Normal
$CW$5	VALUE REXM3	0.00	0.00	Normal
$CX$5	VALUE REXM4	0.00	0.00	Normal
$CY$5	VALUE REXM5	0.00	0.00	Normal
$CZ$5	VALUE REXM6	0.00	0.00	Normal
$DA$5	VALUE REXM7	0.00	0.00	Normal
$DB$5	VALUE REXM8	0.00	0.00	Normal

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$DC$162	FUNDS1	756.84	$DC$162<=$DE$162	Not Binding	4058.157142
$DC$163	FUNDS2	476.60	$DC$163<=$DE$163	Not Binding	4985.831037
$DC$164	FUNDS3	739.21	$DC$164<=$DE$164	Not Binding	5341.558818
$DC$165	FUNDS4	1028.58	$DC$165<=$DE$165	Not Binding	4753.762503
$DC$166	FUNDS5	2021.57	$DC$166<=$DE$166	Not Binding	6559.753649
$DC$167	FUNDS6	1067.92	$DC$167<=$DE$167	Not Binding	8601.174826
$DC$168	FUNDS7	2180.12	$DC$168<=$DE$168	Not Binding	7317.136777
$DC$169	FUNDS8	3048.10	$DC$169<=$DE$169	Not Binding	8436.214686
$DC$173	EC1	−0.00	$DC$173>=$DE$173	Binding	0
$DC$174	EC2	−0.00	$DC$174>=$DE$174	Binding	0
$DC$175	EC3	0.00	$DC$175>=$DE$175	Binding	0
$DC$176	EC4	−0.00	$DC$176>=$DE$176	Binding	0
$DC$177	EC5	0.00	$DC$177>=$DE$177	Binding	0
$DC$178	EC6	−0.00	$DC$178>=$DE$178	Binding	0
$DC$179	EC7	−0.00	$DC$179>=$DE$179	Binding	0
$DC$180	EC8	0.00	$DC$180>=$DE$180	Binding	0
$DC$24	CFO1	6473.89	$DC$24=$DE$24	Binding	0
$DC$25	CFO2	6981.75	$DC$25=$DE$25	Binding	0
$DC$26	CFO3	8450.42	$DC$26=$DE$26	Binding	0
$DC$27	CFO4	9062.07	$DC$27=$DE$27	Binding	0
$DC$28	CFO5	11753.30	$DC$28=$DE$28	Binding	0
$DC$29	CFO6	13066.76	$DC$29=$DE$29	Binding	0
$DC$30	CFO7	13911.13	$DC$30=$DE$30	Binding	0
$DC$31	CFO8	17718.44	$DC$31=$DE$31	Binding	0
$DC$34	CFI1	1105.38	$DC$34=$DE$34	Binding	0
$DC$35	CFI2	1282.79	$DC$35=$DE$35	Binding	0
$DC$36	CFI3	1386.54	$DC$36=$DE$36	Binding	0
$DC$37	CFI4	1008.29	$DC$37=$DE$37	Binding	0
$DC$38	CFI5	2050.76	$DC$38=$DE$38	Binding	0
$DC$39	CFI6	2335.87	$DC$39=$DE$39	Binding	0
$DC$40	CFI7	2838.75	$DC$40=$DE$40	Binding	0
$DC$41	CFI8	3881.17	$DC$41=$DE$41	Binding	0
$DC$44	CFF1	0.00	$DC$44=$DE$44	Binding	0
$DC$45	CFF2	0.00	$DC$45=$DE$45	Binding	0
$DC$46	CFF3	0.00	$DC$46=$DE$46	Binding	0
$DC$47	CFF4	0.00	$DC$47=$DE$47	Binding	0
$DC$48	CFF5	0.00	$DC$48=$DE$48	Binding	0
$DC$49	CFF6	0.00	$DC$49=$DE$49	Binding	0
$DC$50	CFF7	0.00	$DC$50=$DE$50	Binding	0
$DC$51	CFF8	0.00	$DC$51=$DE$51	Binding	0
$DC$54	ATD1	−0.00	$DC$54<=$DE$54	Not Binding	100.3076999
$DC$55	ATD2	0.00	$DC$55<=$DE$55	Not Binding	91.77407834
$DC$56	ATD3	−0.00	$DC$56<=$DE$56	Not Binding	103.2441155

Continued

Cell	Name	Cell Value	Formula	Status	Slack
$DC$57	ATD4	−0.00	$DC$57<=$DE$57	Not Binding	146.7708797
$DC$58	ATD5	−0.00	$DC$58<=$DE$58	Not Binding	140.4634881
$DC$59	ATD6	−0.00	$DC$59<=$DE$59	Not Binding	104.1995725
$DC$60	ATD7	−0.00	$DC$60<=$DE$60	Not Binding	164.7020798
$DC$61	ATD8	−0.00	$DC$61<=$DE$61	Not Binding	146.8544635
$DC$65	CR1	507.03	$DC$65>=$DE$65	Binding	0
$DC$66	CR2	392.57	$DC$66>=$DE$66	Binding	0
$DC$67	CR3	527.75	$DC$67>=$DE$67	Binding	0
$DC$68	CR4	797.90	$DC$68>=$DE$68	Not Binding	166.0808996
$DC$69	CR5	1139.44	$DC$69>=$DE$69	Binding	0
$DC$70	CR6	552.08	$DC$70>=$DE$70	Not Binding	494.7162479
$DC$71	CR7	1592.62	$DC$71>=$DE$71	Binding	0
$DC$72	CR8	2217.25	$DC$72>=$DE$72	Binding	0
$DC$86	ARTO1	8984.82	$DC$86<=$DE$86	Binding	0
$DC$87	ARTO2	9992.14	$DC$87<=$DE$87	Binding	0
$DC$88	ARTO3	11335.24	$DC$88<=$DE$88	Binding	0
$DC$89	ARTO4	12544.90	$DC$89<=$DE$89	Binding	0
$DC$90	ARTO5	15609.84	$DC$90<=$DE$90	Binding	0
$DC$91	ARTO6	18246.87	$DC$91<=$DE$91	Binding	0
$DC$92	ARTO7	19690.24	$DC$92<=$DE$92	Binding	0
$DC$93	ARTO8	23469.22	$DC$93<=$DE$93	Binding	0
$DC$96	ITO1	0.00	$DC$96>=$DE$96	Binding	0
$DC$97	ITO2	0.00	$DC$97>=$DE$97	Binding	0
$DC$98	ITO3	0.00	$DC$98>=$DE$98	Binding	0
$DC$99	ITO4	0.00	$DC$99>=$DE$99	Binding	0
$DC$100	ITO5	−0.00	$DC$100>=$DE$100	Binding	0
$DC$101	ITO6	0.00	$DC$101>=$DE$101	Binding	0
$DC$102	ITO7	0.00	$DC$102>=$DE$102	Binding	0
$DC$103	ITO8	0.00	$DC$103>=$DE$103	Binding	0
$DC$151	PPE1	960.27	$DC$151<=$DE$151	Not Binding	211.1158876
$DC$152	PPE2	1119.24	$DC$152<=$DE$152	Not Binding	185.7287164
$DC$153	PPE3	1191.20	$DC$153<=$DE$153	Not Binding	290.4903006
$DC$154	PPE4	1069.59	$DC$154<=$DE$154	Not Binding	816.0546834
$DC$155	PPE5	1576.07	$DC$155<=$DE$155	Not Binding	391.2698036
$DC$156	PPE6	2003.53	$DC$156<=$DE$156	Not Binding	600.447311
$DC$157	PPE7	2565.43	$DC$157<=$DE$157	Not Binding	1183.891054
$DC$158	PPE8	3130.09	$DC$158<=$DE$158	Not Binding	1155.798963
$DC$119	LEV1	541.28	$DC$119>=$DE$119	Binding	0
$DC$120	LEV2	566.59	$DC$120>=$DE$120	Binding	0
$DC$121	LEV3	830.78	$DC$121>=$DE$121	Binding	0
$DC$122	LEV4	1013.09	$DC$122>=$DE$122	Binding	0
$DC$123	LEV5	1415.69	$DC$123>=$DE$123	Binding	0
$DC$124	LEV6	1417.11	$DC$124>=$DE$124	Binding	0
$DC$125	LEV7	2081.32	$DC$125>=$DE$125	Binding	0
$DC$126	LEV8	3537.18	$DC$126>=$DE$126	Binding	0
$DC$130	Z1	0.00	$DC$130<=$DE$130	Not Binding	28040.13756

Continued

Cell	Name	Cell Value	Formula	Status	Slack
$DC$131	Z2	–0.00	$DC$131<=$DE$131	Not Binding	34828.82952
$DC$132	Z3	–0.00	$DC$132<=$DE$132	Not Binding	39155.7066
$DC$133	Z4	–0.00	$DC$133<=$DE$133	Not Binding	43597.0598
$DC$134	Z5	3122.48	$DC$134<=$DE$134	Not Binding	51452.57898
$DC$135	Z6	0.00	$DC$135<=$DE$135	Not Binding	64637.96
$DC$136	Z7	–0.00	$DC$136<=$DE$136	Not Binding	67967.78508
$DC$137	Z8	0.00	$DC$137<=$DE$137	Not Binding	83927.81136
$DC$130	Z1	0.00	$DC$130>=0	Binding	0
$DC$131	Z2	–0.00	$DC$131>=0	Binding	0
$DC$132	Z3	–0.00	$DC$132>=0	Binding	0
$DC$133	Z4	–0.00	$DC$133>=0	Binding	0
$DC$134	Z5	3122.48	$DC$134>=0	Not Binding	3122.476336
$DC$135	Z6	0.00	$DC$135>=0	Binding	0
$DC$136	Z7	–0.00	$DC$136>=0	Binding	0
$DC$137	Z8	0.00	$DC$137>=0	Binding	0
$DC$162	FUNDS1	756.84	$DC$162>=0	Not Binding	756.8398584
$DC$163	FUNDS2	476.60	$DC$163>=0	Not Binding	476.6039626
$DC$164	FUNDS3	739.21	$DC$164>=0	Not Binding	739.2131817
$DC$165	FUNDS4	1028.58	$DC$165>=0	Not Binding	1028.583497
$DC$166	FUNDS5	2021.57	$DC$166>=0	Not Binding	2021.567351
$DC$167	FUNDS6	1067.92	$DC$167>=0	Not Binding	1067.922174
$DC$168	FUNDS7	2180.12	$DC$168>=0	Not Binding	2180.118223
$DC$169	FUNDS8	3048.10	$DC$169>=0	Not Binding	3048.096314
$DC$54	ATD1	–0.00	$DC$54>=0	Binding	0
$DC$55	ATD2	0.00	$DC$55>=0	Binding	0
$DC$56	ATD3	–0.00	$DC$56>=0	Binding	0
$DC$57	ATD4	–0.00	$DC$57>=0	Binding	0
$DC$58	ATD5	–0.00	$DC$58>=0	Binding	0
$DC$59	ATD6	–0.00	$DC$59>=0	Binding	0
$DC$60	ATD7	–0.00	$DC$60>=0	Binding	0
$DC$61	ATD8	–0.00	$DC$61>=0	Binding	0
$DC$86	ARTO1	8984.82	$DC$86>=0	Not Binding	8984.822
$DC$87	ARTO2	9992.14	$DC$87>=0	Not Binding	9992.135
$DC$88	ARTO3	11335.24	$DC$88>=0	Not Binding	11335.241
$DC$89	ARTO4	12544.90	$DC$89>=0	Not Binding	12544.901
$DC$90	ARTO5	15609.84	$DC$90>=0	Not Binding	15609.836
$DC$91	ARTO6	18246.87	$DC$91>=0	Not Binding	18246.872
$DC$92	ARTO7	19690.24	$DC$92>=0	Not Binding	19690.239
$DC$93	ARTO8	23469.22	$DC$93>=0	Not Binding	23469.218

Microsoft Excel 14.0 Sensitivity Report

Worksheet: [UNilever_INT_1–8rem 3008.xlsx]Unilever int rem

Report Created: 8/31/2012 2:31:59 PM

Engine: Standard LP/Quadratic

Objective Cell (Max)

Cell	Name	Final Value
$C$191	Maximise FCFE CFO1	119515.6528

Decision Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$5	VALUE CFO1	5658.19	0.00	1.073994	0.437150547	0.115406439
$D$5	VALUE CFI1	0.00	−0.67	−1.073994	0.672862265	1E+30
$E$5	VALUE CFF1	52.90	0.00	1.073994	0.225896983	1.073361233
$F$5	VALUE CFO2	6886.07	0.00	1.189366918	0.258086174	0.08390983
$G$5	VALUE CFI2	0.00	−0.67	−1.189366918	0.672423344	1E+30
$H$5	VALUE CFF2	132.48	0.00	1.189366918	0.208754926	1.188707444
$I$5	VALUE CFO3	8066.16	0.00	1.398665329	0.187064506	0.208121225
$J$5	VALUE CFI3	0.00	−0.72	−1.398665329	0.715740736	1E+30
$K$5	VALUE CFF3	56.02	0.00	1.398665329	0.510025217	1.397922283
$L$5	VALUE CFO4	8345.49	0.00	1.391188408	0.429245522	1.043132871

$M$5	VALUE CFI4	239.50	0.00	–1.391188408	0.521375904	8.708086266
$N$5	VALUE CFF4	0.00	–1.42	1.391188408	1.417132109	1E+30
$O$5	VALUE CFO5	10261.75	0.00	1.515241047	8.713013677	0.687950374
$P$5	VALUE CFI5	0.00	–0.72	–1.515241047	0.721791527	1E+30
$Q$5	VALUE CFF5	253.98	0.00	1.515241047	1.379106532	1.514384155
$R$5	VALUE CFO6	13130.56	0.00	1.513044571	0.407423777	0.197849212
$S$5	VALUE CFI6	0.00	–0.50	–1.513044571	0.503606562	1E+30
$T$5	VALUE CFF6	0.00	–0.48	1.513044571	0.483881319	1E+30
$U$5	VALUE CFO7	12373.82	0.00	1.553986546	0.441401801	0.166528557
$V$5	VALUE CFI7	0.00	–0.72	–1.553986546	0.722109465	1E+30
$W$5	VALUE CFF7	218.25	0.00	1.553986546	0.4068401	1.553179953
$X$5	VALUE CFO8	15853.01	0.00	1.665383998	0.369100828	0.941841528
$Y$5	VALUE CFI8	0.00	–0.58	–1.665383998	0.58452948	1E+30
$Z$5	VALUE CFF8	376.44	0.00	1.665383998	0.900879668	1.664581714
$AA$5	VALUE AR1	495.05	0.00	0	1E+30	0.053340165
$AB$5	VALUE COGS1	291.08	0.00	0	0.210571078	1E+30
$AC$5	VALUE Inv1	42.42	0.00	0	1.445047563	0.055307146
$AD$5	VALUE AP1	18.81	0.00	0	12.37992079	0.089499543
$AE$5	VALUE PPE1	1105.38	0.00	0	0.672862271	0.400498959
$AF$5	VALUE LTI1	0.00	–0.40	0	0.400498953	1E+30
$AG$5	VALUE LTD1	52.90	0.00	0	0.225896983	1.073361233
$AH$5	VALUE AR2	457.15	0.00	0	1E+30	0.181493048
$AI$5	VALUE COGS2	192.13	0.00	0	0.15321115	1E+30
$AJ$5	VALUE Inv2	29.05	0.00	0	1.013239006	0.192984932
$AK$5	VALUE AP2	69.24	0.00	0	11.12214589	0.229270661
$AL$5	VALUE PPE2	1282.79	0.00	0	0.67242335	0.516284093
$AM$5	VALUE LTI2	0.00	–0.52	0	0.516284087	1E+30
$AN$5	VALUE LTD2	132.48	0.00	0	0.208754926	1.188707444
$AO$5	VALUE AR3	653.21	0.00	0	1E+30	0.246510522

Continued

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$AP$5	VALUE COGS3	234.54	0.00	0	0.377967529	1E+30
$AQ$5	VALUE Inv3	31.39	0.00	0	2.824335848	0.262592384
$AR$5	VALUE AP3	123.90	0.00	0	13.85339791	0.332418735
$AS$5	VALUE PPE3	1386.54	0.00	0	0.715740743	0.682181542
$AT$5	VALUE LTI3	0.00	–0.68	0	0.682181536	1E+30
$AU$5	VALUE LTD3	56.02	0.00	0	0.510025217	1.397922283
$AV$5	VALUE AR4	733.36	0.00	0	1E+30	0.748067155
$AW$5	VALUE COGS4	470.19	0.00	0	1.195235453	0.781447324
$AX$5	VALUE Inv4	64.54	0.00	0	8.708086266	0.687561411
$AY$5	VALUE AP4	0.00	–1.16	0	1.158924242	1E+30
$AZ$5	VALUE PPE4	1247.79	0.00	0	0.521375904	8.708086266
$BA$5	VALUE LTI4	0.00	–1.39	0	1.390351189	1E+30
$BB$5	VALUE LTD4	0.00	0.00	0	1.417132115	1E+30
$BC$5	VALUE AR5	955.78	0.00	0	1E+30	9.433198613
$BD$5	VALUE COGS5	1136.11	0.00	0	1.397183983	1E+30
$BE$5	VALUE Inv5	183.66	0.00	0	8.642733696	1E+30
$BF$5	VALUE AP5	0.00	–10.19	0	10.18905647	C1E+30
$BG$5	VALUE PPE5	2050.76	0.00	0	0.721791534	0.792592622
$BH$5	VALUE LTI5	0.00	–0.79	0	0.792592616	1E+30
$BI$5	VALUE LTD5	253.98	0.00	0	1.379106532	1.514384155
$BJ$5	VALUE AR6	1257.92	0.00	0	1E+30	0.168922523
$BK$5	VALUE COGS6	194.80	0.00	0	0.360130778	0.741759005
$BL$5	VALUE Inv6	28.37	0.00	0	2.472709205	0.171370212
$BM$5	VALUE AP6	413.17	0.00	0	1.106011446	0.339144831
$BN$5	VALUE PPE6	2335.87	0.00	0	0.503606568	1.008649909
$BO$5	VALUE LTI6	0.00	–1.01	0	1.008649903	1E+30

$BP$5	VALUE LTD6	0.00	0.00	0	0.483881325	1E+30
$BQ$5	VALUE AR7	1567.54	0.00	0	1E+30	0.48746668
$BR$5	VALUE COGS7	825.29	0.00	0	0.305405764	1E+30
$BS$5	VALUE Inv7	136.96	0.00	0	1.84037289	0.569327165
$BT$5	VALUE AP7	131.42	0.00	0	8.883051556	0.46141967
$BU$5	VALUE PPE7	2838.75	0.00	0	0.722109472	0.831070483
$BV$5	VALUE LTI7	0.00	−0.83	0	0.831070477	1E+30
$BW$5	VALUE LTD7	218.25	0.00	0	0.4068401	1.553179953
$BX$5	VALUE AR8	2076.08	0.00	0	1E+30	1.433767513
$BY$5	VALUE COGS8	1231.75	0.00	0	1.254054424	1E+30
$BZ$5	VALUE Inv8	194.80	0.00	0	7.929619813	1.750229414
$CA$5	VALUE AP8	78.09	0.00	0	7.665438739	1.201913655
$CB$5	VALUE PPE8	3881.17	0.00	0	0.584529487	1.08005223
$CC$5	VALUE LTI8	0.00	−1.08	0	1.080052224	1E+3C0
$CD$5	VALUE LTD8	376.44	0.00	0	0.900879668	1.664581714
$CE$5	VALUE NDE1	2.59	0.00	0	1.073362307	1E+30
$CF$5	VALUE NDE2	1.35	0.00	0	1.188708656	1E+30
$CG$5	VALUE NDE3	1.66	0.00	0	1.397923494	1E+30
$CH$5	VALUE NDE4	4.31	0.00	0	1.390352262	85.2666954
$CI$5	VALUE NDE5	7.94	0.00	0	1.514385373	1E+30
$CJ$5	VALUE NDE6	0.87	0.00	0	1.512257999	165.3560304
$CK$5	VALUE NDE7	5.52	0.00	0	1.553181199	1E+30
$CL$5	VALUE NDE8	6.14	0.00	0	1.664583161	1E+30
$CM$5	VALUE REXX1	3.37	0.00	0	1.073998121	324.8281552
$CN$5	VALUE REXX2	3.89	0.00	0	1.189371165	252.899007
$CO$5	VALUE REXX3	4.32	0.00	0	1.398669668	661.4545752
$CP$5	VALUE REXX4	4.88	0.00	0	1.391192485	1968.059358
$CQ$5	VALUE REXX5	5.95	0.00	0	1.515245254	1215.796907
$CR$5	VALUE REXX6	6.84	0.00	0	1.513048954	642.2422798

Continued

$CS$5	VALUE REXX7	6.54	0.00	0	1.553990936	542.8744826
$CT$5	VALUE REXX8	7.82	0.00	0	1.665388555	3455.303669
$CU$5	VALUE REXM1	0.00	–1.07	0	1.073361218	1E+30
$CV$5	VALUE REXM2	0.00	–1.19	0	1.188707431	1E+30
$CW$5	VALUE REXM3	0.00	–1.40	0	1.397922272	1E+30
$CX$5	VALUE REXM4	0.00	–1.39	0	1.390351189	1E+30
$CY$5	VALUE REXM5	0.00	–1.51	0	1.514384144	1E+30
$CZ$5	VALUE REXM6	0.00	–1.51	0	1.512256465	1E+30
$DA$5	VALUE REXM7	0.00	–1.55	0	1.553179942	1E+30
$DB$5	VALUE REXM8	0.00	–1.66	0	1.664581705	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$DC$162	FUNDS1	756.84	0.00	4814.997	1E+30	4058.157142
$DC$163	FUNDS2	476.60	0.00	5462.435	1E+30	4985.831037
$DC$164	FUNDS3	739.21	0.00	6080.772	1E+30	5341.558818
$DC$165	FUNDS4	1028.58	0.00	5782.346	1E+30	4753.762503
$DC$166	FUNDS5	2021.57	0.00	8581.321	1E+30	6559.753649
$DC$167	FUNDS6	1067.92	0.00	9669.097	1E+30	8601.174826
$DC$168	FUNDS7	2180.12	0.00	9497.255	1E+30	7317.136777
$DC$169	FUNDS8	3048.10	0.00	11484.311	1E+30	8436.214686
$DC$173	EC1	–0.00	–1.07	0	5661.52593	3.368861346
$DC$174	EC2	–0.00	–1.19	0	6889.889153	3.896002686
$DC$175	EC3	0.00	–1.40	0	8070.450564	4.319593813
$DC$176	EC4	–0.00	–1.39	0	8350.51682	4.884074022
$DC$177	EC5	0.00	–1.51	0	10267.55807	5.953621708
$DC$178	EC6	–0.00	–1.51	0	13137.39831	6.846504017

$DC$179	EC7	–0.00	–1.55	0	12380.24951	6.542760475
$DC$180	EC8	0.00	–1.66	0	15860.65286	7.826027786
$DC$24	CFO1	6473.89	1.07	6473.885	1E+30	5661.52593
$DC$25	CFO2	6981.75	1.19	6981.747	1E+30	6889.889153
$DC$26	CFO3	8450.42	1.40	8450.418	1E+30	8070.450564
$DC$27	CFO4	9062.07	1.39	9062.067	1E+30	8110.872882
$DC$28	CFO5	11753.30	1.51	11753.296	1E+30	10267.55807
$DC$29	CFO6	13066.76	1.51	13066.756	1E+30	13137.39831
$DC$30	CFO7	13911.13	1.55	13911.125	1E+30	12380.24951
$DC$31	CFO8	17718.44	1.66	17718.439	1E+30	15860.65286
$DC$34	CFI1	1105.38	0.40	1105.383	243.019	141.7640085
$DC$35	CFI2	1282.79	0.52	1282.79	212.869	305.0289768
$DC$36	CFI3	1386.54	0.68	1386.536	338.127	114.803959
$DC$37	CFI4	1008.29	1.39	1008.294	239.4997195	1028.583497
$DC$38	CFI5	2050.76	0.79	2050.761	509.114	485.2722011
$DC$39	CFI6	2335.87	1.01	2335.868	286.9218605	907.399818
$DC$40	CFI7	2838.75	0.83	2838.754	1310.024	407.8789005
$DC$41	CFI8	3881.17	1.08	3881.173	1433.138	580.1763134
$DC$44	CFF1	0.00	–1.07	0	52.89583418	9603400.147
$DC$45	CFF2	0.00	–1.19	0	132.481385	12418846.93
$DC$46	CFF3	0.00	–1.40	0	56.02395976	15183036.67
$DC$47	CFF4	0.00	–2.81	0	340.6738147	0
$DC$48	CFF5	0.00	–1.51	0	253.9799199	18145589.88
$DC$49	CFF6	0.00	–2.00	0	458.5098012	0
$DC$50	CFF7	0.00	–1.55	0	218.2465168	23839162.08
$DC$51	CFF8	0.00	–1.66	0	376.4433527	32907348.57
$DC$54	ATD1	–0.00	0.00	100.3076999	1E+30	100.3076999
$DC$55	ATD2	0.00	0.00	91.77407834	1E+30	91.77407834
$DC$56	ATD3	–0.00	0.00	103.2441155	1E+30	103.2441155
$DC$57	ATD4	–0.00	0.00	146.7708797	1E+30	146.7708797

Continued

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$DC$58	ATD5	−0.00	0.00	140.4634881	1E+30	140.4634881
$DC$59	ATD6	−0.00	0.00	104.1995725	1E+30	104.1995725
$DC$60	ATD7	−0.00	0.00	164.7020798	1E+30	164.7020798
$DC$61	ATD8	−0.00	0.00	146.8544635	1E+30	146.8544635
$DC$65	CR1	507.03	−0.17	507.026303	34.52370642	89.80985288
$DC$66	CR2	392.57	−0.15	392.5683853	109.2976234	190.4104198
$DC$67	CR3	527.75	−0.38	527.7524541	181.377471	74.78849414
$DC$68	CR4	797.90	0.00	631.814158	166.0808996	1E+30
$DC$69	CR5	1139.44	−8.64	1139.438326	984.5861772	83.02529592
$DC$70	CR6	552.08	0.00	57.3595992	494.7162479	1E+30
$DC$71	CR7	1592.62	−0.42	1592.616839	144.8269068	212.058865
$DC$72	CR8	2217.25	−2.87	2217.254308	72.19235644	301.4958722
$DC$86	ARTO1	8984.82	0.00	8984.822	4065.749232	572.7806326
$DC$87	ARTO2	9992.14	0.01	9992.135	10088.98282	2176.111929
$DC$88	ARTO3	11335.24	0.01	11335.241	3429.799497	2899.267501
$DC$89	ARTO4	12544.90	0.04	12544.901	3765.533126	2611.206103
$DC$90	ARTO5	15609.84	0.58	15609.836	1226.803547	15609.836
$DC$91	ARTO6	18246.87	0.01	18246.872	28814.23524	12032.70176
$DC$92	ARTO7	19690.24	0.04	19690.239	5005.768755	1641.305749
$DC$93	ARTO8	23469.22	0.13	23469.218	6434.324558	740.0470067
$DC$96	ITO1	0.00	−0.01	0	216.5751889	1537.308278
$DC$97	ITO2	0.00	−0.03	0	204.2929758	3052.576032
$DC$98	ITO3	0.00	−0.03	0	249.8399487	1476.898505
$DC$99	ITO4	0.00	−0.10	0	432.1579821	1603.781193
$DC$100	ITO5	−0.00	−1.52	0	6559.753649	464.6542167
$DC$101	ITO6	0.00	−0.02	0	197.6240407	13639.07274
$DC$102	ITO7	0.00	−0.08	0	787.3814495	2401.410866

$DC$103	ITO8	0.00	−0.23	0	413.9437984	3599.026445
$DC$151	PPE1	960.27	0.00	1171.386126	1E+30	211.1158876
$DC$152	PPE2	1119.24	0.00	1304.966088	1E+30	185.7287164
$DC$153	PPE3	1191.20	0.00	1481.685501	1E+30	290.4903006
$DC$154	PPE4	1069.59	0.00	1885.64554	1E+30	816.0546834
$DC$155	PPE5	1576.07	0.00	1967.342852	1E+30	391.2698036
$DC$156	PPE6	2003.53	0.00	2603.978016	1E+30	600.447311
$DC$157	PPE7	2565.43	0.00	3749.321508	1E+30	1183.891054
$DC$158	PPE8	3130.09	0.00	4285.892316	1E+30	1155.798963
$DC$119	LEV1	541.28	−1.07	541.2840247	52.89583418	756.8398584
$DC$120	LEV2	566.59	−1.19	566.5916964	132.481385	476.6039626
$DC$121	LEV3	830.78	−1.40	830.7845983	56.02395976	739.2131817
$DC$122	LEV4	1013.09	−2.81	1013.087353	471.4674415	118.6075515
$DC$123	LEV5	1415.69	−1.51	1415.694476	253.9799199	2021.567351
$DC$124	LEV6	1417.11	−2.00	1417.108701	458.5098012	144.981829
$DC$125	LEV7	2081.32	−1.55	2081.317703	218.2465168	2180.118223
$DC$126	LEV8	3537.18	−1.66	3537.181837	376.4433527	3048.096314
$DC$130	Z1	0.00	0.00	28040.13756	1E+30	28040.13756
$DC$131	Z2	−0.00	0.00	34828.82952	1E+30	34828.82952
$DC$132	Z3	−0.00	0.00	39155.7066	1E+30	39155.7066
$DC$133	Z4	−0.00	0.00	43597.0598	1E+30	43597.0598
$DC$134	Z5	3122.48	0.00	54575.05532	1E+30	51452.57898
$DC$135	Z6	0.00	0.00	64637.96	1E+30	64637.96
$DC$136	Z7	−0.00	0.00	67967.78508	1E+30	67967.78508
$DC$137	Z8	0.00	0.00	83927.81136	1E+30	83927.81136
$DC$130	Z1	0.00	−0.16	0	10330.71163	1455.385269
$DC$131	Z2	−0.00	−0.17	0	20513.31094	1372.848798
$DC$132	Z3	−0.00	−0.20	0	9924.757951	1678.924455
$DC$133	Z4	−0.00	−0.19	0	10777.40962	2904.10164
$DC$134	Z5	3122.48	0.00	0	3122.476336	1E+30

Continued

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$DC$135	Z6	0.00	−0.22	0	54696.55292	1328.033553
$DC$136	Z7	−0.00	−0.22	0	16137.48102	5291.203341
$DC$137	Z8	0.00	−0.22	0	24185.45771	2781.702325
$DC$162	FUNDS1	756.84	0.00	0	756.8398584	1E+30
$DC$163	FUNDS2	476.60	0.00	0	476.6039626	1E+30
$DC$164	FUNDS3	739.21	0.00	0	739.2131817	1E+30
$DC$165	FUNDS4	1028.58	0.00	0	1028.583497	1E+30
$DC$166	FUNDS5	2021.57	0.00	0	2021.567351	1E+30
$DC$167	FUNDS6	1067.92	0.00	0	1067.922174	1E+30
$DC$168	FUNDS7	2180.12	0.00	0	2180.118223	1E+30
$DC$169	FUNDS8	3048.10	0.00	0	3048.096314	1E+30
$DC$54	ATD1	−0.00	−1.07	0	100.3076999	2.592193164
$DC$55	ATD2	0.00	−1.19	0	91.77407834	1.353409857
$DC$56	ATD3	−0.00	−1.40	0	103.2441155	1.658057846
$DC$57	ATD4	−0.00	−1.39	0	146.7708797	4.309153494
$DC$58	ATD5	−0.00	−1.51	0	140.4634881	7.942007251
$DC$59	ATD6	−0.00	−1.51	0	104.1995725	0.873846168
$DC$60	ATD7	−0.00	−1.55	0	164.7020798	5.51813054
$DC$61	ATD8	−0.00	−1.66	0	146.8544635	6.136663303
$DC$86	ARTO1	8984.82	0.00	0	8984.822	1E+30
$DC$87	ARTO2	9992.14	0.00	0	9992.135	1E+30
$DC$88	ARTO3	11335.24	0.00	0	11335.241	1E+30
$DC$89	ARTO4	12544.90	0.00	0	12544.901	1E+30
$DC$90	ARTO5	15609.84	0.00	0	15609.836	1E+30
$DC$91	ARTO6	18246.87	0.00	0	18246.872	1E+30
$DC$92	ARTO7	19690.24	0.00	0	19690.239	1E+30
$DC$93	ARTO8	23469.22	0.00	0	23469.218	1E+30

Microsoft Excel 14.0 Limits Report

Worksheet: [UNilever_INT_1-8rem 3008.xlsx]Unilever int rem

Report Created: 8/31/2012 2:38:41 PM

Engine: Standard LP/Quadratic

	Objective	
Cell	**Name**	**Value**
$C$191	Maximise FCFE CFO1	119515.65

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$C$5	VALUE CFO1	5658.19	5658.19	119515.65	5658.19	119515.65
$D$5	VALUE CFI1	0.00	0.00	119515.65	0.00	119515.65
$E$5	VALUE CFF1	52.90	52.90	119515.65	52.90	119515.65
$F$5	VALUE CFO2	6886.07	6886.07	119515.65	6886.07	119515.65
$G$5	VALUE CFI2	0.00	0.00	119515.65	−0.00	119515.65
$H$5	VALUE CFF2	132.48	132.48	119515.65	132.48	119515.65
$I$5	VALUE CFO3	8066.16	8066.16	119515.65	8066.16	119515.65
$J$5	VALUE CFI3	0.00	0.00	119515.65	0.00	119515.65
$K$5	VALUE CFF3	56.02	56.02	119515.65	56.02	119515.65
$L$5	VALUE CFO4	8345.49	8345.49	119515.65	8345.49	119515.65
$M$5	VALUE CFI4	239.50	239.50	119515.65	239.50	119515.65
$N$5	VALUE CFF4	0.00	0.00	119515.65	−0.00	119515.65
$O$5	VALUE CFO5	10261.75	10261.75	119515.65	10261.75	119515.65
$P$5	VALUE CFI5	0.00	0.00	119515.65	0.00	119515.65
$Q$5	VALUE CFF5	253.98	253.98	119515.65	253.98	119515.65

Continued

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$R$5	VALUE CFO6	13130.56	13130.56	119515.65	13130.56	119515.65
$S$5	VALUE CFI6	0.00	0.00	119515.65	0.00	119515.65
$T$5	VALUE CFF6	0.00	0.00	119515.65	–0.00	119515.65
$U$5	VALUE CFO7	12373.82	12373.82	119515.65	12373.82	119515.65
$V$5	VALUE CFI7	0.00	0.00	119515.65	–0.00	119515.65
$W$5	VALUE CFF7	218.25	218.25	119515.65	218.25	119515.65
$X$5	VALUE CFO8	15853.01	15853.01	119515.65	15853.01	119515.65
$Y$5	VALUE CFI8	0.00	0.00	119515.65	0.00	119515.65
$Z$5	VALUE CFF8	376.44	376.44	119515.65	376.44	119515.65
$AA$5	VALUE AR1	495.05	495.05	119515.65	495.05	119515.65
$AB$5	VALUE COGS1	291.08	291.08	119515.65	291.08	119515.65
$AC$5	VALUE Inv1	42.42	42.42	119515.65	42.42	119515.65
$AD$5	VALUE AP1	18.81	18.81	119515.65	18.81	119515.65
$AE$5	VALUE PPE1	1105.38	1105.38	119515.65	1105.38	119515.65
$AF$5	VALUE LTI1	0.00	0.00	119515.65	0.00	119515.65
$AG$5	VALUE LTD1	52.90	52.90	119515.65	52.90	119515.65
$AH$5	VALUE AR2	457.15	457.15	119515.65	457.15	119515.65
$AI$5	VALUE COGS2	192.13	192.13	119515.65	192.13	119515.65
$AJ$5	VALUE Inv2	29.05	29.05	119515.65	29.05	119515.65
$AK$5	VALUE AP2	69.24	69.24	119515.65	69.24	119515.65
$AL$5	VALUE PPE2	1282.79	1282.79	119515.65	1282.79	119515.65
$AM$5	VALUE LTI2	0.00	0.00	119515.65	0.00	119515.65
$AN$5	VALUE LTD2	132.48	132.48	119515.65	132.48	119515.65
$AO$5	VALUE AR3	653.21	653.21	119515.65	653.21	119515.65
$AP$5	VALUE COGS3	234.54	234.54	119515.65	234.54	119515.65
$AQ$5	VALUE Inv3	31.39	31.39	119515.65	31.39	119515.65
$AR$5	VALUE AP3	123.90	123.90	119515.65	123.90	119515.65
$AS$5	VALUE PPE3	1386.54	1386.54	119515.65	1386.54	119515.65
$AT$5	VALUE LTI3	0.00	0.00	119515.65	0.00	119515.65

$AU$5	VALUE LTD3	56.02	56.02	119515.65	56.02	119515.65
$AV$5	VALUE AR4	733.36	733.36	119515.65	733.36	119515.65
$AW$5	VALUE COGS4	470.19	470.19	119515.65	470.19	119515.65
$AX$5	VALUE Inv4	64.54	64.54	119515.65	64.54	119515.65
$AY$5	VALUE AP4	0.00	0.00	119515.65	0.00	119515.65
$AZ$5	VALUE PPE4	1247.79	1247.79	119515.65	1247.79	119515.65
$BA$5	VALUE LTI4	0.00	0.00	119515.65	0.00	119515.65
$BB$5	VALUE LTD4	0.00	0.00	119515.65	0.00	119515.65
$BC$5	VALUE AR5	955.78	955.78	119515.65	955.78	119515.65
$BD$5	VALUE COGS5	1136.11	1136.11	119515.65	1136.11	119515.65
$BE$5	VALUE Inv5	183.66	183.66	119515.65	183.66	119515.65
$BF$5	VALUE AP5	0.00	0.00	119515.65	–0.00	119515.65
$BG$5	VALUE PPE5	2050.76	2050.76	119515.65	2050.76	119515.65
$BH$5	VALUE LTI5	0.00	0.00	119515.65	0.00	119515.65
$BI$5	VALUE LTD5	253.98	253.98	119515.65	253.98	119515.65
$BJ$5	VALUE AR6	1257.92	1257.92	119515.65	1257.92	119515.65
$BK$5	VALUE COGS6	194.80	194.80	119515.65	194.80	119515.65
$BL$5	VALUE Inv6	28.37	28.37	119515.65	28.37	119515.65
$BM$5	VALUE AP6	413.17	413.17	119515.65	413.17	119515.65
$BN$5	VALUE PPE6	2335.87	2335.87	119515.65	2335.87	119515.65
$BO$5	VALUE LTI6	0.00	0.00	119515.65	0.00	119515.65
$BP$5	VALUE LTD6	0.00	0.00	119515.65	0.00	119515.65
$BQ$5	VALUE AR7	1567.54	1567.54	119515.65	1567.54	119515.65
$BR$5	VALUE COGS7	825.29	825.29	119515.65	825.29	119515.65
$BS$5	VALUE Inv7	136.96	136.96	119515.65	136.96	119515.65
$BT$5	VALUE AP7	131.42	131.42	119515.65	131.42	119515.65
$BU$5	VALUE PPE7	2838.75	2838.75	119515.65	2838.75	119515.65
$BV$5	VALUE LTI7	0.00	0.00	119515.65	0.00	119515.65
$BW$5	VALUE LTD7	218.25	218.25	119515.65	218.25	119515.65
$BX$5	VALUE AR8	2076.08	2076.08	119515.65	2076.08	119515.65
$BY$5	VALUE COGS8	1231.75	1231.75	119515.65	1231.75	119515.65

Continued

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$BZ$5	VALUE Inv8	194.80	194.80	119515.65	194.80	119515.65
$CA$5	VALUE AP8	78.09	78.09	119515.65	78.09	119515.65
$CB$5	VALUE PPE8	3881.17	3881.17	119515.65	3881.17	119515.65
$CC$5	VALUE LTI8	0.00	0.00	119515.65	0.00	119515.65
$CD$5	VALUE LTD8	376.44	376.44	119515.65	376.44	119515.65
$CE$5	VALUE NDE1	2.59	2.59	119515.65	2.59	119515.65
$CF$5	VALUE NDE2	1.35	1.35	119515.65	1.35	119515.65
$CG$5	VALUE NDE3	1.66	1.66	119515.65	1.66	119515.65
$CH$5	VALUE NDE4	4.31	4.31	119515.65	4.31	119515.65
$CI$5	VALUE NDE5	7.94	7.94	119515.65	7.94	119515.65
$CJ$5	VALUE NDE6	0.87	0.87	119515.65	0.87	119515.65
$CK$5	VALUE NDE7	5.52	5.52	119515.65	5.52	119515.65
$CL$5	VALUE NDE8	6.14	6.14	119515.65	6.14	119515.65
$CM$5	VALUE REXX1	3.37	3.37	119515.65	3.37	119515.65
$CN$5	VALUE REXX2	3.89	3.89	119515.65	3.89	119515.65
$CO$5	VALUE REXX3	4.32	4.32	119515.65	4.32	119515.65
$CP$5	VALUE REXX4	4.88	4.88	119515.65	4.88	119515.65
$CQ$5	VALUE REXX5	5.95	5.95	119515.65	5.95	119515.65
$CR$5	VALUE REXX6	6.84	6.84	119515.65	6.84	119515.65
$CS$5	VALUE REXX7	6.54	6.54	119515.65	6.54	119515.65
$CT$5	VALUE REXX8	7.82	7.82	119515.65	7.82	119515.65
$CU$5	VALUE REXM1	0.00	0.00	119515.65	0.00	119515.65
$CV$5	VALUE REXM2	0.00	0.00	119515.65	0.00	119515.65
$CW$5	VALUE REXM3	0.00	0.00	119515.65	–0.00	119515.65
$CX$5	VALUE REXM4	0.00	0.00	119515.65	–0.00	119515.65
$CY$5	VALUE REXM5	0.00	0.00	119515.65	0.00	119515.65
$CZ$5	VALUE REXM6	0.00	0.00	119515.65	–0.00	119515.65
$DA$5	VALUE REXM7	0.00	0.00	119515.65	0.00	119515.65
$DB$5	VALUE REXM8	0.00	0.00	119515.65	0.00	119515.65

Appendix 6
The Present Value of the Perpetuity of the Final Validated Model 1[1]

Microsoft Excel 14.0 Structure Report

Worksheet: [Book3]Unilever int rem

Report Created: 8/31/2012 2:37:47 PM

Model Type: LP Convex Assumption: LP

Statistics

	Variables	Functions	Dependents
All	13	17	67
Smooth	13	17	67
Linear	13	17	67

Microsoft Excel 14.0 Answer Report

Worksheet: [Book3]Unilever int rem

Report Created: 8/31/2012 2:36:23 PM

Result: Solver found a solution. All constraints and optimality conditions are satisfied.

Engine: Standard LP/Quadratic

Solution Time: 00 Seconds

Iterations: 0

Subproblems: 0

Incumbent Solutions: 0

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$C$72	Maximise FCFE CFO8	0	145738.3893

Decision Variable Cells

Cell	Name	Original Value	Final Value	Type
$C$5	VALUE CFO8	0.00	15602.07	Normal
$D$5	VALUE CFI8	0.00	0.00	Normal
$E$5	VALUE CFF8	0.00	376.44	Normal
$F$5	VALUE AR8	0.00	2076.08	Normal
$G$5	VALUE COGS8	0.00	1231.75	Normal
$H$5	VALUE Inv8	0.00	194.80	Normal
$I$5	VALUE AP8	0.00	78.09	Normal
$J$5	VALUE PPE8	0.00	3881.17	Normal
$K$5	VALUE LTI8	0.00	0.00	Normal
$L$5	VALUE LTD8	0.00	376.44	Normal
$M$5	VALUE NDE8	0.00	6.14	Normal
$N$5	VALUE REXX8	0.00	7.70	Normal
$O$5	VALUE REXM8	0.00	0.00	Normal

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
\$P\$64	FUNDS8	3048.10	\$P\$64<=\$R\$64	Not Binding	8436.214686
\$P\$68	EC8	–0.00	\$P\$68>=\$R\$68	Binding	0
\$P\$17	CFO8	19040.44	\$P\$17=\$R\$17	Binding	0
\$P\$20	CFI8	3881.17	\$P\$20=\$R\$20	Binding	0
\$P\$23	CFF8	0.00	\$P\$23=\$R\$23	Binding	0
\$P\$26	ATD8	–0.00	\$P\$26<=\$R\$26	Not Binding	146.8544635
\$P\$30	CR8	2217.25	\$P\$30>=\$R\$30	Binding	0
\$P\$37	ARTO8	23469.22	\$P\$37<=\$R\$37	Binding	0
\$P\$40	ITO8	0.00	\$P\$40>=\$R\$40	Binding	0
\$P\$60	PPE8	3130.09	\$P\$60<=\$R\$60	Not Binding	1155.798963
\$P\$49	LEV8	3537.18	\$P\$49>=\$R\$49	Binding	0
\$P\$53	Z8	0.00	\$P\$53<=\$R\$53	Not Binding	83927.81136
\$P\$53	Z8	0.00	\$P\$53>=0	Binding	0
\$P\$64	FUNDS8	3048.10	\$P\$64>=0	Not Binding	3048.096314
\$P\$26	ATD8	–0.00	\$P\$26>=0	Binding	0
\$P\$37	ARTO8	23469.22	\$P\$37>=0	Not Binding	23469.218

Microsoft Excel 14.0 Sensitivity Report

Worksheet: [Book3]Unilever int rem

Report Created: 8/31/2012 2:37:36 PM

Engine: Standard LP/Quadratic

Objective Cell (Max)

Cell	Name	Final Value
$C$72	Maximise FCFE CFO8	145738.3893

Decision Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$5	VALUE CFO8	15602.07	0.00	9.1209	18923.85127	5.158234957
$D$5	VALUE CFI8	0.00	−3.20	−9.1209	3.201324705	1E+30
$E$5	VALUE CFF8	376.44	0.00	9.1209	4.933897108	9.116506044
$F$5	VALUE AR8	2076.08	0.00	0	1E+30	7.852392874
$G$5	VALUE COGS8	1231.75	0.00	0	6.868148382	1E+30
$H$5	VALUE Inv8	194.80	0.00	0	43.42858209	9.585576723
$I$5	VALUE AP8	78.09	0.00	0	41.98172744	6.582586185
$J$5	VALUE PPE8	3881.17	0.00	0	3.201324712	5.915181335
$K$5	VALUE LTI8	0.00	−5.92	0	5.91518133	1E+30
$L$5	VALUE LTD8	376.44	0.00	0	4.933897108	9.116506044

$M$5	VALUE NDE8	6.14	0.00	0	9.116507491	1E+30
$N$5	VALUE REXX8	7.70	0.00	0	9.120904557	18923.85127
$O$5	VALUE REXM8	0.00	–9.12	0	9.116506035	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$P$64	FUNDS8	3048.10	0.00	11484.311	1E+30	8436.214686
$P$68	EC8	–0.00	–9.12	0	15609.58623	7.705018928
$P$17	CFO8	19040.44	9.12	19040.444	1E+30	15609.58623
$P$20	CFI8	3881.17	5.92	3881.173	1433.138	580.1763134
$P$23	CFF8	0.00	–9.12	0	376.4433527	32386440.82
$P$26	ATD8	–0.00	0.00	146.8544635	1E+30	146.8544635
$P$30	CR8	2217.25	–15.72	2217.254308	72.19235644	301.4958722
$P$37	ARTO8	23469.22	0.69	23469.218	6434.324558	740.0470067
$P$40	ITO8	0.00	–1.24	0	413.9437984	3599.026445
$P$60	PPE8	3130.09	0.00	4285.892316	1E+30	1155.798963
$P$49	LEV8	3537.18	–9.12	3537.181837	376.4433527	3048.096314
$P$53	Z8	0.00	0.00	83927.81136	1E+30	83927.81136
$P$53	Z8	0.00	–1.18	0	24185.45771	2781.702325
$P$64	FUNDS8	3048.10	0.00	0	3048.096314	1E+30
$P$26	ATD8	–0.00	–9.12	0	146.8544635	6.136663303
$P$37	ARTO8	23469.22	0.00	0	23469.218	1E+30

Microsoft Excel 14.0 Limits Report

Worksheet: [Book3]Unilever int rem

Report Created: 8/31/2012 2:37:54 PM

Engine: Standard LP/Quadratic

	Objective	
Cell	**Name**	**Value**
$C$72	Maximise FCFE CFO8	145738.39

Cell	Decision Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$C$5	VALUE CFO8	15602.07	15602.07	145738.39	15602.07	145738.39
$D$5	VALUE CFI8	0.00	0.00	145738.39	0.00	145738.39
$E$5	VALUE CFF8	376.44	376.44	145738.39	376.44	145738.39
$F$5	VALUE AR8	2076.08	2076.08	145738.39	2076.08	145738.39
$G$5	VALUE COGS8	1231.75	1231.75	145738.39	1231.75	145738.39
$H$5	VALUE Inv8	194.80	194.80	145738.39	194.80	145738.39
$I$5	VALUE AP8	78.09	78.09	145738.39	78.09	145738.39
$J$5	VALUE PPE8	3881.17	3881.17	145738.39	3881.17	145738.39
$K$5	VALUE LTI8	0.00	0.00	145738.39	0.00	145738.39
$L$5	VALUE LTD8	376.44	376.44	145738.39	376.44	145738.39
$M$5	VALUE NDE8	6.14	6.14	145738.39	6.14	145738.39
$N$5	VALUE REXX8	7.70	7.70	145738.39	7.70	145738.39
$O$5	VALUE REXM8	0.00	0.00	145738.39	0.00	145738.39

Appendix 7
The Final Validated Model 2 – Without Perpetuity[1]

Microsoft Excel 14.0 Structure Report

Worksheet: [Book2]Unilever CAPM main

Report Created: 8/31/2012 4:27:12 PM

Model Type: LP Convex Assumption: LP

Statistics

	Variables	Functions	Dependents
All	104	129	557
Smooth	104	129	557
Linear	104	129	557

Microsoft Excel 14.0 Answer Report

Worksheet: [Book2]Unilever CAPM main

Report Created: 8/31/2012 4:27:04 PM

Result: Solver found a solution. All constraints and optimality conditions are satisfied

Engine: Standard LP/Quadratic

Solution Time: 00 Seconds

Iterations: 0

Subproblems: 0

Incumbent Solutions: 0

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$C$191	Maximise FCFE CFO1	0	205357.3424

Decision Variable Cells

Cell	Name	Original Value	Final Value	Type
$C$5	VALUE CFO1	0.00	5607.02	Normal
$D$5	VALUE CFI1	0.00	0.00	Normal
$E$5	VALUE CFF1	0.00	73.23	Normal
$F$5	VALUE CFO2	0.00	6719.76	Normal
$G$5	VALUE CFI2	0.00	0.00	Normal
$H$5	VALUE CFF2	0.00	208.53	Normal
$I$5	VALUE CFO3	0.00	8151.03	Normal
$J$5	VALUE CFI3	0.00	0.00	Normal
$K$5	VALUE CFF3	0.00	56.02	Normal
$L$5	VALUE CFO4	0.00	8345.49	Normal
$M$5	VALUE CFI4	0.00	239.50	Normal
$N$5	VALUE CFF4	0.00	0.00	Normal
$O$5	VALUE CFO5	0.00	10261.75	Normal
$P$5	VALUE CFI5	0.00	0.00	Normal
$Q$5	VALUE CFF5	0.00	253.98	Normal
$R$5	VALUE CFO6	0.00	13130.56	Normal
$S$5	VALUE CFI6	0.00	0.00	Normal
$T$5	VALUE CFF6	0.00	0.00	Normal

Continued

Cell	Name	Original Value	Final Value	Type
$U$5	VALUE CFO7	0.00	12373.82	Normal
$V$5	VALUE CFI7	0.00	0.00	Normal
$W$5	VALUE CFF7	0.00	218.25	Normal
$X$5	VALUE CFO8	0.00	15853.01	Normal
$Y$5	VALUE CFI8	0.00	0.00	Normal
$Z$5	VALUE CFF8	0.00	376.44	Normal
$AA$5	VALUE AR1	0.00	495.05	Normal
$AB$5	VALUE COGS1	0.00	319.13	Normal
$AC$5	VALUE Inv1	0.00	46.50	Normal
$AD$5	VALUE AP1	0.00	0.00	Normal
$AE$5	VALUE PPE1	0.00	1105.38	Normal
$AF$5	VALUE LTI1	0.00	0.00	Normal
$AG$5	VALUE LTD1	0.00	73.23	Normal
$AH$5	VALUE AR2	0.00	457.15	Normal
$AI$5	VALUE COGS2	0.00	295.74	Normal
$AJ$5	VALUE Inv2	0.00	44.72	Normal
$AK$5	VALUE AP2	0.00	0.00	Normal
$AL$5	VALUE PPE2	0.00	1282.79	Normal
$AM$5	VALUE LTI2	0.00	0.00	Normal
$AN$5	VALUE LTD2	0.00	208.53	Normal
$AO$5	VALUE AR3	0.00	653.21	Normal
$AP$5	VALUE COGS3	0.00	234.54	Normal
$AQ$5	VALUE Inv3	0.00	31.39	Normal
$AR$5	VALUE AP3	0.00	123.90	Normal
$AS$5	VALUE PPE3	0.00	1386.54	Normal
$AT$5	VALUE LTI3	0.00	0.00	Normal
$AU$5	VALUE LTD3	0.00	56.02	Normal
$AV$5	VALUE AR4	0.00	733.36	Normal
$AW$5	VALUE COGS4	0.00	470.19	Normal
$AX$5	VALUE Inv4	0.00	64.54	Normal
$AY$5	VALUE AP4	0.00	0.00	Normal
$AZ$5	VALUE PPE4	0.00	1247.79	Normal
$BA$5	VALUE LTI4	0.00	0.00	Normal
$BB$5	VALUE LTD4	0.00	0.00	Normal
$BC$5	VALUE AR5	0.00	955.78	Normal
$BD$5	VALUE COGS5	0.00	1136.11	Normal
$BE$5	VALUE Inv5	0.00	183.66	Normal
$BF$5	VALUE AP5	0.00	0.00	Normal
$BG$5	VALUE PPE5	0.00	2050.76	Normal
$BH$5	VALUE LTI5	0.00	0.00	Normal
$BI$5	VALUE LTD5	0.00	253.98	Normal
$BJ$5	VALUE AR6	0.00	1257.92	Normal
$BK$5	VALUE COGS6	0.00	194.80	Normal
$BL$5	VALUE Inv6	0.00	28.37	Normal
$BM$5	VALUE AP6	0.00	413.17	Normal
$BN$5	VALUE PPE6	0.00	2335.87	Normal

Continued

Cell	Name	Original Value	Final Value	Type
$BO$5	VALUE LTI6	0.00	0.00	Normal
$BP$5	VALUE LTD6	0.00	0.00	Normal
$BQ$5	VALUE AR7	0.00	1567.54	Normal
$BR$5	VALUE COGS7	0.00	825.29	Normal
$BS$5	VALUE Inv7	0.00	136.96	Normal
$BT$5	VALUE AP7	0.00	131.42	Normal
$BU$5	VALUE PPE7	0.00	2838.75	Normal
$BV$5	VALUE LTI7	0.00	0.00	Normal
$BW$5	VALUE LTD7	0.00	218.25	Normal
$BX$5	VALUE AR8	0.00	2076.08	Normal
$BY$5	VALUE COGS8	0.00	1231.75	Normal
$BZ$5	VALUE Inv8	0.00	194.80	Normal
$CA$5	VALUE AP8	0.00	78.09	Normal
$CB$5	VALUE PPE8	0.00	3881.17	Normal
$CC$5	VALUE LTI8	0.00	0.00	Normal
$CD$5	VALUE LTD8	0.00	376.44	Normal
$CE$5	VALUE NDE1	0.00	2.84	Normal
$CF$5	VALUE NDE2	0.00	2.08	Normal
$CG$5	VALUE NDE3	0.00	1.66	Normal
$CH$5	VALUE NDE4	0.00	4.31	Normal
$CI$5	VALUE NDE5	0.00	7.94	Normal
$CJ$5	VALUE NDE6	0.00	0.87	Normal
$CK$5	VALUE NDE7	0.00	5.52	Normal
$CL$5	VALUE NDE8	0.00	6.14	Normal
$CM$5	VALUE REXX1	0.00	3.35	Normal
$CN$5	VALUE REXX2	0.00	3.84	Normal
$CO$5	VALUE REXX3	0.00	4.36	Normal
$CP$5	VALUE REXX4	0.00	4.88	Normal
$CQ$5	VALUE REXX5	0.00	5.95	Normal
$CR$5	VALUE REXX6	0.00	6.84	Normal
$CS$5	VALUE REXX7	0.00	6.54	Normal
$CT$5	VALUE REXX8	0.00	7.82	Normal
$CU$5	VALUE REXM1	0.00	0.00	Normal
$CV$5	VALUE REXM2	0.00	0.00	Normal
$CW$5	VALUE REXM3	0.00	0.00	Normal
$CX$5	VALUE REXM4	0.00	0.00	Normal
$CY$5	VALUE REXM5	0.00	0.00	Normal
$CZ$5	VALUE REXM6	0.00	0.00	Normal
$DA$5	VALUE REXM7	0.00	0.00	Normal
$DB$5	VALUE REXM8	0.00	0.00	Normal

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$DC$162	FUNDS1	787.45	$DC$162<=$DE$162	Not Binding	4027.54877
$DC$163	FUNDS2	589.08	$DC$163<=$DE$163	Not Binding	4873.353643
$DC$164	FUNDS3	739.21	$DC$164<=$DE$164	Not Binding	5341.558818
$DC$165	FUNDS4	1028.58	$DC$165<=$DE$165	Not Binding	4753.762503
$DC$166	FUNDS5	2021.57	$DC$166<=$DE$166	Not Binding	6559.753649
$DC$167	FUNDS6	1067.92	$DC$167<=$DE$167	Not Binding	8601.174826
$DC$168	FUNDS7	2180.12	$DC$168<=$DE$168	Not Binding	7317.136777
$DC$169	FUNDS8	3048.10	$DC$169<=$DE$169	Not Binding	8436.214686
$DC$173	EC1	−0.00	$DC$173>=$DE$173	Binding	0
$DC$174	EC2	0.00	$DC$174>=$DE$174	Binding	0
$DC$175	EC3	0.00	$DC$175>=$DE$175	Binding	0
$DC$176	EC4	−0.00	$DC$176>=$DE$176	Binding	0
$DC$177	EC5	0.00	$DC$177>=$DE$177	Binding	0
$DC$178	EC6	−0.00	$DC$178>=$DE$178	Binding	0
$DC$179	EC7	−0.00	$DC$179>=$DE$179	Binding	0
$DC$180	EC8	0.00	$DC$180>=$DE$180	Binding	0
$DC$24	CFO1	6473.89	$DC$24=$DE$24	Binding	0
$DC$25	CFO2	6981.75	$DC$25=$DE$25	Binding	0
$DC$26	CFO3	8450.42	$DC$26=$DE$26	Binding	0
$DC$27	CFO4	9062.07	$DC$27=$DE$27	Binding	0
$DC$28	CFO5	11753.30	$DC$28=$DE$28	Binding	0
$DC$29	CFO6	13066.76	$DC$29=$DE$29	Binding	0
$DC$30	CFO7	13911.13	$DC$30=$DE$30	Binding	0
$DC$31	CFO8	17718.44	$DC$31=$DE$31	Binding	0
$DC$34	CFI1	1105.38	$DC$34=$DE$34	Binding	0
$DC$35	CFI2	1282.79	$DC$35=$DE$35	Binding	0
$DC$36	CFI3	1386.54	$DC$36=$DE$36	Binding	0
$DC$37	CFI4	1008.29	$DC$37=$DE$37	Binding	0
$DC$38	CFI5	2050.76	$DC$38=$DE$38	Binding	0

Continued

Cell	Name	Cell Value	Formula	Status	Slack
$DC$39	CFI6	2335.87	$DC$39=$DE$39	Binding	0
$DC$40	CFI7	2838.75	$DC$40=$DE$40	Binding	0
$DC$41	CFI8	3881.17	$DC$41=$DE$41	Binding	0
$DC$44	CFF1	0.00	$DC$44=$DE$44	Binding	0
$DC$45	CFF2	0.00	$DC$45=$DE$45	Binding	0
$DC$46	CFF3	0.00	$DC$46=$DE$46	Binding	0
$DC$47	CFF4	0.00	$DC$47=$DE$47	Binding	0
$DC$48	CFF5	0.00	$DC$48=$DE$48	Binding	0
$DC$49	CFF6	0.00	$DC$49=$DE$49	Binding	0
$DC$50	CFF7	0.00	$DC$50=$DE$50	Binding	0
$DC$51	CFF8	0.00	$DC$51=$DE$51	Binding	0
$DC$54	ATD1	0.00	$DC$54<=$DE$54	Not Binding	100.3076999
$DC$55	ATD2	0.00	$DC$55<=$DE$55	Not Binding	91.77407834
$DC$56	ATD3	–0.00	$DC$56<=$DE$56	Not Binding	103.2441155
$DC$57	ATD4	–0.00	$DC$57<=$DE$57	Not Binding	146.7708797
$DC$58	ATD5	–0.00	$DC$58<=$DE$58	Not Binding	140.4634881
$DC$59	ATD6	–0.00	$DC$59<=$DE$59	Not Binding	104.1995725
$DC$60	ATD7	–0.00	$DC$60<=$DE$60	Not Binding	164.7020798
$DC$61	ATD8	–0.00	$DC$61<=$DE$61	Not Binding	146.8544635
$DC$65	CR1	541.55	$DC$65>=$DE$65	Not Binding	34.52370642
$DC$66	CR2	501.87	$DC$66>=$DE$66	Not Binding	109.2976234
$DC$67	CR3	527.75	$DC$67>=$DE$67	Binding	0
$DC$68	CR4	797.90	$DC$68>=$DE$68	Not Binding	166.0808996
$DC$69	CR5	1139.44	$DC$69>=$DE$69	Binding	0
$DC$70	CR6	552.08	$DC$70>=$DE$70	Not Binding	494.7162479
$DC$71	CR7	1592.62	$DC$71>=$DE$71	Binding	0
$DC$72	CR8	2217.25	$DC$72>=$DE$72	Binding	0
$DC$86	ARTO1	8984.82	$DC$86<=$DE$86	Binding	0
$DC$87	ARTO2	9992.14	$DC$87<=$DE$87	Binding	0
$DC$88	ARTO3	11335.24	$DC$88<=$DE$88	Binding	0
$DC$89	ARTO4	12544.90	$DC$89<=$DE$89	Binding	0

Continued

Cell	Name	Cell Value	Formula	Status	Slack
$DC$90	ARTO5	15609.84	$DC$90<=$DE$90	Binding	0
$DC$91	ARTO6	18246.87	$DC$91<=$DE$91	Binding	0
$DC$92	ARTO7	19690.24	$DC$92<=$DE$92	Binding	0
$DC$93	ARTO8	23469.22	$DC$93<=$DE$93	Binding	0
$DC$96	ITO1	0.00	$DC$96>=$DE$96	Binding	0
$DC$97	ITO2	0.00	$DC$97>=$DE$97	Binding	0
$DC$98	ITO3	0.00	$DC$98>=$DE$98	Binding	0
$DC$99	ITO4	0.00	$DC$99>=$DE$99	Binding	0
$DC$100	ITO5	−0.00	$DC$100>=$DE$100	Binding	0
$DC$101	ITO6	0.00	$DC$101>=$DE$101	Binding	0
$DC$102	ITO7	0.00	$DC$102>=$DE$102	Binding	0
$DC$103	ITO8	0.00	$DC$103>=$DE$103	Binding	0
$DC$151	PPE1	960.27	$DC$151<=$DE$151	Not Binding	211.1158876
$DC$152	PPE2	1119.24	$DC$152<=$DE$152	Not Binding	185.7287164
$DC$153	PPE3	1191.20	$DC$153<=$DE$153	Not Binding	290.4903006
$DC$154	PPE4	1069.59	$DC$154<=$DE$154	Not Binding	816.0546834
$DC$155	PPE5	1576.07	$DC$155<=$DE$155	Not Binding	391.2698036
$DC$156	PPE6	2003.53	$DC$156<=$DE$156	Not Binding	600.447311
$DC$157	PPE7	2565.43	$DC$157<=$DE$157	Not Binding	1183.891054
$DC$158	PPE8	3130.09	$DC$158<=$DE$158	Not Binding	1155.798963
$DC$119	LEV1	541.28	$DC$119>=$DE$119	Binding	0
$DC$120	LEV2	566.59	$DC$120>=$DE$120	Binding	0
$DC$121	LEV3	830.78	$DC$121>=$DE$121	Binding	0
$DC$122	LEV4	1013.09	$DC$122>=$DE$122	Binding	0
$DC$123	LEV5	1415.69	$DC$123>=$DE$123	Binding	0
$DC$124	LEV6	1417.11	$DC$124>=$DE$124	Binding	0
$DC$125	LEV7	2081.32	$DC$125>=$DE$125	Binding	0
$DC$126	LEV8	3537.18	$DC$126>=$DE$126	Binding	0
$DC$130	Z1	−0.00	$DC$130<=$DE$130	Not Binding	28040.13756
$DC$131	Z2	−0.00	$DC$131<=$DE$131	Not Binding	34828.82952
$DC$132	Z3	−0.00	$DC$132<=$DE$132	Not Binding	39155.7066

Continued

Cell	Name	Cell Value	Formula	Status	Slack
$DC$133	Z4	−0.00	$DC$133<=$DE$133	Not Binding	43597.0598
$DC$134	Z5	3122.48	$DC$134<=$DE$134	Not Binding	51452.57898
$DC$135	Z6	0.00	$DC$135<=$DE$135	Not Binding	64637.96
$DC$136	Z7	−0.00	$DC$136<=$DE$136	Not Binding	67967.78508
$DC$137	Z8	0.00	$DC$137<=$DE$137	Not Binding	83927.81136
$DC$130	Z1	−0.00	$DC$130>=0	Binding	0
$DC$131	Z2	−0.00	$DC$131>=0	Binding	0
$DC$132	Z3	−0.00	$DC$132>=0	Binding	0
$DC$133	Z4	−0.00	$DC$133>=0	Binding	0
$DC$134	Z5	3122.48	$DC$134>=0	Not Binding	3122.476336
$DC$135	Z6	0.00	$DC$135>=0	Binding	0
$DC$136	Z7	−0.00	$DC$136>=0	Binding	0
$DC$137	Z8	0.00	$DC$137>=0	Binding	0
$DC$162	FUNDS1	787.45	$DC$162>=0	Not Binding	787.4482301
$DC$163	FUNDS2	589.08	$DC$163>=0	Not Binding	589.0813571
$DC$164	FUNDS3	739.21	$DC$164>=0	Not Binding	739.2131817
$DC$165	FUNDS4	1028.58	$DC$165>=0	Not Binding	1028.583497
$DC$166	FUNDS5	2021.57	$DC$166>=0	Not Binding	2021.567351
$DC$167	FUNDS6	1067.92	$DC$167>=0	Not Binding	1067.922174
$DC$168	FUNDS7	2180.12	$DC$168>=0	Not Binding	2180.118223
$DC$169	FUNDS8	3048.10	$DC$169>=0	Not Binding	3048.096314
$DC$54	ATD1	0.00	$DC$54>=0	Binding	0
$DC$55	ATD2	0.00	$DC$55>=0	Binding	0
$DC$56	ATD3	−0.00	$DC$56>=0	Binding	0
$DC$57	ATD4	−0.00	$DC$57>=0	Binding	0
$DC$58	ATD5	−0.00	$DC$58>=0	Binding	0
$DC$59	ATD6	−0.00	$DC$59>=0	Binding	0
$DC$60	ATD7	−0.00	$DC$60>=0	Binding	0
$DC$61	ATD8	−0.00	$DC$61>=0	Binding	0
$DC$86	ARTO1	8984.82	$DC$86>=0	Not Binding	8984.822

Continued

Cell	Name	Cell Value	Formula	Status	Slack
$DC$87	ARTO2	9992.14	$DC$87>=0	Not Binding	9992.135
$DC$88	ARTO3	11335.24	$DC$88>=0	Not Binding	11335.241
$DC$89	ARTO4	12544.90	$DC$89>=0	Not Binding	12544.901
$DC$90	ARTO5	15609.84	$DC$90>=0	Not Binding	15609.836
$DC$91	ARTO6	18246.87	$DC$91>=0	Not Binding	18246.872
$DC$92	ARTO7	19690.24	$DC$92>=0	Not Binding	19690.239
$DC$93	ARTO8	23469.22	$DC$93>=0	Not Binding	23469.218

Microsoft Excel 14.0 Sensitivity Report

Worksheet: [Book2]Unilever CAPM main

Report Created: 8/31/2012 4:27:17 PM

Engine: Standard LP/Quadratic

Objective Cell (Max)

Cell	Name	Final Value
$C$191	Maximise FCFE CFO1	205357.3424

Decision Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$5	VALUE CFO1	5607.02	0.00	1.167316936	0.009877788	0.910978824
$D$5	VALUE CFI1	0.00	–0.73	–1.167316936	0.73132952	1E+30
$E$5	VALUE CFF1	73.23	0.00	1.167316936	1.960007	0.024859399
$F$5	VALUE CFO2	6719.76	0.00	1.595316882	0.079421315	0.022089932
$G$5	VALUE CFI2	0.00	–0.90	–1.595316882	0.901932193	1E+30
$H$5	VALUE CFF2	208.53	0.00	1.595316882	2.076634812	0.197588183
$I$5	VALUE CFO3	8151.03	0.00	2.304022636	9.222852275	0.126231872
$J$5	VALUE CFI3	0.00	–1.18	–2.304022636	1.179040349	1E+30
$K$5	VALUE CFF3	56.02	0.00	2.304022636	0.309345854	2.302798609
$L$5	VALUE CFO4	8345.49	0.00	2.77789239	0.283335302	1.940835821
$M$5	VALUE CFI4	239.50	0.00	–2.77789239	1.401351679	16.20212173

$N$5	VALUE CFF4	0.00	–2.83	2.77789239	2.829696164	1E+30
$O$5	VALUE CFO5	10261.75	0.00	4.212249025	16.21128959	2.560334333
$P$5	VALUE CFI5	0.00	–2.01	–4.212249025	2.006522766	1E+30
$Q$5	VALUE CFF5	253.98	0.00	4.212249025	3.833805928	4.209866912
$R$5	VALUE CFO6	13130.56	0.00	2.018611096	0.748747412	0.058727832
$S$5	VALUE CFI6	0.00	–0.93	–2.018611096	0.925508362	1E+30
$T$5	VALUE CFF6	0.00	–0.14	2.018611096	0.143631101	1E+30
$U$5	VALUE CFO7	12373.82	0.00	2.531102666	0.131021856	0.283699108
$V$5	VALUE CFI7	0.00	–1.18	–2.531102666	1.176157668	1E+30
$W$5	VALUE CFF7	218.25	0.00	2.531102666	0.69309538	2.529788896
$X$5	VALUE CFO8	15853.01	0.00	2.68492622	0.628802517	1.518433561
$Y$5	VALUE CFI8	0.00	–0.94	–2.68492622	0.942376371	1E+30
$Z$5	VALUE CFF8	376.44	0.00	2.68492622	1.452395024	2.683632774
$AA$5	VALUE AR1	495.05	0.00	0	1E+30	0.185425188
$AB$5	VALUE COGS1	319.13	0.00	0	1.051247947	0.018023053
$AC$5	VALUE Inv1	46.50	0.00	0	7.214206715	0.123683506
$AD$5	VALUE AP1	0.00	–0.03	0	0.026874859	1E+30
$AE$5	VALUE PPE1	1105.38	0.00	0	0.731329527	0.435299654
$AF$5	VALUE LTI1	0.00	–0.44	0	0.435299648	1E+30
$AG$5	VALUE LTD1	73.23	0.00	0	1.960007	0.024859399
$AH$5	VALUE AR2	457.15	0.00	0	1E+30	0.499148486
$AI$5	VALUE COGS2	295.74	0.00	0	1.393840055	0.145015562
$AJ$5	VALUE Inv2	44.72	0.00	0	9.217952528	0.454671698
$AK$5	VALUE AP2	0.00	–0.22	0	0.217006459	1E+30
$AL$5	VALUE PPE2	1282.79	0.00	0	0.9019322	0.692500115
$AM$5	VALUE LTI2	0.00	–0.69	0	0.692500109	1E+30
$AN$5	VALUE LTD2	208.53	0.00	0	2.076634812	0.197588183
$AO$5	VALUE AR3	653.21	0.00	0	1E+30	0.501891051
$AP$5	VALUE COGS3	234.54	0.00	0	0.229248837	1E+30
$AQ$5	VALUE Inv3	31.39	0.00	0	1.713045854	0.534633332

Continued

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$AR$5	VALUE AP3	123.90	0.00	0	22.69150907	0.339240992
$AS$5	VALUE PPE3	1386.54	0.00	0	1.179040355	1.123758254
$AT$5	VALUE LTI3	0.00	–1.12	0	1.123758248	1E+30
$AU$5	VALUE LTD3	56.02	0.00	0	0.309345854	2.302798609
$AV$5	VALUE AR4	733.36	0.00	0	1E+30	2.784070033
$AW$5	VALUE COGS4	470.19	0.00	0	2.223835377	2.522849092
$AX$5	VALUE Inv4	64.54	0.00	0	16.20212173	2.558886494
$AY$5	VALUE AP4	0.00	–3.74	0	3.741507496	1E+30
$AZ$5	VALUE PPE4	1247.79	0.00	0	1.401351679	16.20212173
$BA$5	VALUE LTI4	0.00	–2.78	0	2.77622065	1E+30
$BB$5	VALUE LTD4	0.00	0.00	0	2.82969617	1E+30
$BC$5	VALUE AR5	955.78	0.00	0	1E+30	26.22353817
$BD$5	VALUE COGS5	1136.11	0.00	0	4.237511908	1E+30
$BE$5	VALUE Inv5	183.66	0.00	0	26.2125013	1E+30
$BF$5	VALUE AP5	0.00	–28.33	0	28.3333807	1E+30
$BG$5	VALUE PPE5	2050.76	0.00	0	2.006522772	2.20334414
$BH$5	VALUE LTI5	0.00	–2.20	0	2.203344135	1E+30
$BI$5	VALUE LTD5	253.98	0.00	0	3.833805928	4.209866912
$BJ$5	VALUE AR6	1257.92	0.00	0	1E+30	0.44852262
$BK$5	VALUE COGS6	194.80	0.00	0	0.106898075	1.363175562
$BL$5	VALUE Inv6	28.37	0.00	0	0.733977406	0.455021588
$BM$5	VALUE AP6	413.17	0.00	0	2.032584389	0.159392058
$BN$5	VALUE PPE6	2335.87	0.00	0	0.925508368	1.092051297
$BO$5	VALUE LTI6	0.00	–1.09	0	1.092051291	1E+30
$BP$5	VALUE LTD6	0.00	0.00	0	0.143631107	1E+30
$BQ$5	VALUE AR7	1567.54	0.00	0	1E+30	0.79810534
$BR$5	VALUE COGS7	825.29	0.00	0	0.5202912	1E+30

$BS$5	VALUE Inv7	136.96	0.00	0	3.135270952	0.932131456
$BT$5	VALUE AP7	131.42	0.00	0	14.46443357	0.786077482
$BU$5	VALUE PPE7	2838.75	0.00	0	1.176157675	1.353631223
$BV$5	VALUE LTI7	0.00	–1.35	0	1.353631217	1E+30
$BW$5	VALUE LTD7	218.25	0.00	0	0.69309538	2.529788896
$BX$5	VALUE AR8	2076.08	0.00	0	1E+30	2.311514883
$BY$5	VALUE COGS8	1231.75	0.00	0	2.02178208	1E+30
$BZ$5	VALUE Inv8	194.80	0.00	0	12.78410485	2.821713588
$CA$5	VALUE AP8	78.09	0.00	0	12.3581931	1.937720919
$CB$5	VALUE PPE8	3881.17	0.00	0	0.942376377	1.7412564
$CC$5	VALUE LTI8	0.00	–1.74	0	1.741256395	1E+30
$CD$5	VALUE LTD8	376.44	0.00	0	1.452395024	2.683632774
$CE$5	VALUE NDE1	2.84	0.00	0	1.166630258	2.023835843
$CF$5	VALUE NDE2	2.08	0.00	0	1.594433527	20.5861671
$CG$5	VALUE NDE3	1.66	0.00	0	2.302799819	1E+30
$CH$5	VALUE NDE4	4.31	0.00	0	2.776221724	275.2776785
$CI$5	VALUE NDE5	7.94	0.00	0	4.20986813	1E+30
$CJ$5	VALUE NDE6	0.87	0.00	0	2.017561187	303.884817
$CK$5	VALUE NDE7	5.52	0.00	0	2.529790142	1E+30
$CL$5	VALUE NDE8	6.14	0.00	0	2.683634222	1E+30
$CM$5	VALUE REXX1	3.35	0.00	0	1.167321057	1621.661126
$CN$5	VALUE REXX2	3.84	0.00	0	1.59532113	39.81653135
$CO$5	VALUE REXX3	4.36	0.00	0	2.304026975	333.1014212
$CP$5	VALUE REXX4	4.88	0.00	0	2.777896468	3661.738792
$CQ$5	VALUE REXX5	5.95	0.00	0	4.212253231	4524.812663
$CR$5	VALUE REXX6	6.84	0.00	0	2.018615479	190.6375897
$CS$5	VALUE REXX7	6.54	0.00	0	2.531107056	924.8444187
$CT$5	VALUE REXX8	7.82	0.00	0	2.684930778	5570.628402

Continued

$CU$5	VALUE REXM1	0.00	–1.17	0	1.166629169	1E+30
$CV$5	VALUE REXM2	0.00	–1.59	0	1.594432302	1E+30
$CW$5	VALUE REXM3	0.00	–2.30	0	2.302798597	1E+30
$CX$5	VALUE REXM4	0.00	–2.78	0	2.77622065	1E+30
$CY$5	VALUE REXM5	0.00	–4.21	0	4.2098669	1E+30
$CZ$5	VALUE REXM6	0.00	–2.02	0	2.017559653	1E+30
$DA$5	VALUE REXM7	0.00	–2.53	0	2.529788885	1E+30
$DB$5	VALUE REXM8	0.00	–2.68	0	2.683632766	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$DC$162	FUNDS1	787.45	0.00	4814.997	1E+30	4027.54877
$DC$163	FUNDS2	589.08	0.00	5462.435	1E+30	4873.353643
$DC$164	FUNDS3	739.21	0.00	6080.772	1E+30	5341.558818
$DC$165	FUNDS4	1028.58	0.00	5782.346	1E+30	4753.762503
$DC$166	FUNDS5	2021.57	0.00	8581.321	1E+30	6559.753649
$DC$167	FUNDS6	1067.92	0.00	9669.097	1E+30	8601.174826
$DC$168	FUNDS7	2180.12	0.00	9497.255	1E+30	7317.136777
$DC$169	FUNDS8	3048.10	0.00	11484.311	1E+30	8436.214686
$DC$173	EC1	–0.00	–1.17	0	5610.322178	3.350669442
$DC$174	EC2	0.00	–1.59	0	6723.489537	3.845898394
$DC$175	EC3	0.00	–2.30	0	8155.35903	4.36472639
$DC$176	EC4	–0.00	–2.78	0	8350.51682	4.884074022
$DC$177	EC5	0.00	–4.21	0	10267.55807	5.953621708

$DC$178	EC6	−0.00	−2.02	0	13137.39831	6.846504017
$DC$179	EC7	−0.00	−2.53	0	12380.24951	6.542760475
$DC$180	EC8	0.00	−2.68	0	15860.65286	7.826027786
$DC$24	CFO1	6473.89	1.17	6473.885	1E+30	5610.322178
$DC$25	CFO2	6981.75	1.59	6981.747	1E+30	6723.489537
$DC$26	CFO3	8450.42	2.30	8450.418	1E+30	8155.35903
$DC$27	CFO4	9062.07	2.78	9062.067	1E+30	8110.872882
$DC$28	CFO5	11753.30	4.21	11753.296	1E+30	10267.55807
$DC$29	CFO6	13066.76	2.02	13066.756	1E+30	13137.39831
$DC$30	CFO7	13911.13	2.53	13911.125	1E+30	12380.24951
$DC$31	CFO8	17718.44	2.68	17718.439	1E+30	15860.65286
$DC$34	CFI1	1105.38	0.44	1105.383	243.019	196.2593546
$DC$35	CFI2	1282.79	0.69	1282.79	212.869	480.1188815
$DC$36	CFI3	1386.54	1.12	1386.536	338.127	114.803959
$DC$37	CFI4	1008.29	2.78	1008.294	239.4997195	1028.583497
$DC$38	CFI5	2050.76	2.20	2050.761	509.114	485.2722011
$DC$39	CFI6	2335.87	1.09	2335.868	286.9218605	907.399818
$DC$40	CFI7	2838.75	1.35	2838.754	1310.024	407.8789005
$DC$41	CFI8	3881.17	1.74	3881.173	1433.138	580.1763134
$DC$44	CFF1	0.00	−1.17	0	73.22946342	9516545.449
$DC$45	CFF2	0.00	−1.59	0	208.5271211	12118915.93
$DC$46	CFF3	0.00	−2.30	0	56.02395976	15342775.99
$DC$47	CFF4	0.00	−5.61	0	340.6738147	0
$DC$48	CFF5	0.00	−4.21	0	253.9799199	18145589.88
$DC$49	CFF6	0.00	−2.16	0	458.5098012	0
$DC$50	CFF7	0.00	−2.53	0	218.2465168	23839162.08
$DC$51	CFF8	0.00	−2.68	0	376.4433527	32907348.57
$DC$54	ATD1	0.00	0.00	100.3076999	1E+30	100.3076999
$DC$55	ATD2	0.00	0.00	91.77407834	1E+30	91.77407834

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Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$DC$56	ATD3	−0.00	0.00	103.2441155	1E+30	103.2441155
$DC$57	ATD4	−0.00	0.00	146.7708797	1E+30	146.7708797
$DC$58	ATD5	−0.00	0.00	140.4634881	1E+30	140.4634881
$DC$59	ATD6	−0.00	0.00	104.1995725	1E+30	104.1995725
$DC$60	ATD7	−0.00	0.00	164.7020798	1E+30	164.7020798
$DC$61	ATD8	−0.00	0.00	146.8544635	1E+30	146.8544635
$DC$65	CR1	541.55	0.00	507.026303	34.52370642	1E+30
$DC$66	CR2	501.87	0.00	392.5683853	109.2976234	1E+30
$DC$67	CR3	527.75	−0.23	527.7524541	181.377471	74.78849414
$DC$68	CR4	797.90	0.00	631.814158	166.0808996	1E+30
$DC$69	CR5	1139.44	−26.21	1139.438326	984.5861772	83.02529592
$DC$70	CR6	552.08	0.00	57.3595992	494.7162479	1E+30
$DC$71	CR7	1592.62	−0.71	1592.616839	144.8269068	212.058865
$DC$72	CR8	2217.25	−4.63	2217.254308	72.19235644	301.4958722
$DC$86	ARTO1	8984.82	0.01	8984.822	54944.10413	572.7806326
$DC$87	ARTO2	9992.14	0.02	9992.135	83997.18343	2176.111929
$DC$88	ARTO3	11335.24	0.03	11335.241	3429.799497	2899.267501
$DC$89	ARTO4	12544.90	0.16	12544.901	3765.533126	2611.206103
$DC$90	ARTO5	15609.84	1.61	15609.836	1226.803547	15609.836
$DC$91	ARTO6	18246.87	0.03	18246.872	28814.23524	12032.70176
$DC$92	ARTO7	19690.24	0.06	19690.239	5005.768755	1641.305749
$DC$93	ARTO8	23469.22	0.20	23469.218	6434.324558	740.0470067
$DC$96	ITO1	0.00	−0.03	0	216.5751889	20775.02111
$DC$97	ITO2	0.00	−0.08	0	269.3901964	25414.63232
$DC$98	ITO3	0.00	−0.07	0	249.8399487	1476.898505

$DC$99	ITO4	0.00	−0.38	0	432.1579821	1603.781193
$DC$100	ITO5	−0.00	−4.24	0	6559.753649	464.6542167
$DC$101	ITO6	0.00	−0.07	0	197.6240407	13639.07274
$DC$102	ITO7	0.00	−0.13	0	787.3814495	2401.410866
$DC$103	ITO8	0.00	−0.37	0	413.9437984	3599.026445
$DC$151	PPE1	960.27	0.00	1171.386126	1E+30	211.1158876
$DC$152	PPE2	1119.24	0.00	1304.966088	1E+30	185.7287164
$DC$153	PPE3	1191.20	0.00	1481.685501	1E+30	290.4903006
$DC$154	PPE4	1069.59	0.00	1885.64554	1E+30	816.0546834
$DC$155	PPE5	1576.07	0.00	1967.342852	1E+30	391.2698036
$DC$156	PPE6	2003.53	0.00	2603.978016	1E+30	600.447311
$DC$157	PPE7	2565.43	0.00	3749.321508	1E+30	1183.891054
$DC$158	PPE8	3130.09	0.00	4285.892316	1E+30	1155.798963
$DC$119	LEV1	541.28	−1.17	541.2840247	73.22946342	787.4482301
$DC$120	LEV2	566.59	−1.59	566.5916964	208.5271211	589.0813571
$DC$121	LEV3	830.78	−2.30	830.7845983	56.02395976	739.2131817
$DC$122	LEV4	1013.09	−5.61	1013.087353	471.4674415	118.6075515
$DC$123	LEV5	1415.69	−4.21	1415.694476	253.9799199	2021.567351
$DC$124	LEV6	1417.11	−2.16	1417.108701	458.5098012	144.981829
$DC$125	LEV7	2081.32	−2.53	2081.317703	218.2465168	2180.118223
$DC$126	LEV8	3537.18	−2.68	3537.181837	376.4433527	3048.096314
$DC$130	Z1	−0.00	0.00	28040.13756	1E+30	28040.13756
$DC$131	Z2	−0.00	0.00	34828.82952	1E+30	34828.82952
$DC$132	Z3	−0.00	0.00	39155.7066	1E+30	39155.7066
$DC$133	Z4	−0.00	0.00	43597.0598	1E+30	43597.0598
$DC$134	Z5	3122.48	0.00	54575.05532	1E+30	51452.57898
$DC$135	Z6	0.00	0.00	64637.96	1E+30	64637.96
$DC$136	Z7	−0.00	0.00	67967.78508	1E+30	67967.78508
$DC$137	Z8	0.00	0.00	83927.81136	1E+30	83927.81136

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Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$DC$130	Z1	−0.00	−0.17	0	22670.17501	1455.385269
$DC$131	Z2	−0.00	−0.23	0	27480.28748	1810.30212
$DC$132	Z3	−0.00	−0.34	0	9924.757951	1678.924455
$DC$133	Z4	−0.00	−0.36	0	10777.40962	2904.10164
$DC$134	Z5	3122.48	0.00	0	3122.476336	1E+30
$DC$135	Z6	0.00	−0.29	0	54696.55292	1328.033553
$DC$136	Z7	−0.00	−0.36	0	16137.48102	5291.203341
$DC$137	Z8	0.00	−0.35	0	24185.45771	2781.702325
$DC$162	FUNDS1	787.45	0.00	0	787.4482301	1E+30
$DC$163	FUNDS2	589.08	0.00	0	589.0813571	1E+30
$DC$164	FUNDS3	739.21	0.00	0	739.2131817	1E+30
$DC$165	FUNDS4	1028.58	0.00	0	1028.583497	1E+30
$DC$166	FUNDS5	2021.57	0.00	0	2021.567351	1E+30
$DC$167	FUNDS6	1067.92	0.00	0	1067.922174	1E+30
$DC$168	FUNDS7	2180.12	0.00	0	2180.118223	1E+30
$DC$169	FUNDS8	3048.10	0.00	0	3048.096314	1E+30
$DC$54	ATD1	0.00	−1.17	0	100.3076999	2.84195739
$DC$55	ATD2	0.00	−1.59	0	91.77407834	2.083304778
$DC$56	ATD3	−0.00	−2.30	0	103.2441155	1.658057846
$DC$57	ATD4	−0.00	−2.78	0	146.7708797	4.309153494
$DC$58	ATD5	−0.00	−4.21	0	140.4634881	7.942007251

$DC$59	ATD6	–0.00	–2.02	0	104.1995725	0.873846168
$DC$60	ATD7	–0.00	–2.53	0	164.7020798	5.51813054
$DC$61	ATD8	–0.00	–2.68	0	146.8544635	6.136663303
$DC$86	ARTO1	8984.82	0.00	0	8984.822	1E+30
$DC$87	ARTO2	9992.14	0.00	0	9992.135	1E+30
$DC$88	ARTO3	11335.24	0.00	0	11335.241	1E+30
$DC$89	ARTO4	12544.90	0.00	0	12544.901	1E+30
$DC$90	ARTO5	15609.84	0.00	0	15609.836	1E+30
$DC$91	ARTO6	18246.87	0.00	0	18246.872	1E+30
$DC$92	ARTO7	19690.24	0.00	0	19690.239	1E+30
$DC$93	ARTO8	23469.22	0.00	0	23469.218	1E+30

Microsoft Excel 14.0 Limits Report

Worksheet: [Book1]Unilever CAPM main

Report Created: 9/1/2012 11:14:34 AM

Engine: Standard LP/Quadratic

	Objective	
Cell	**Name**	**Value**
$C$191	Maximise FCFE CFO1	205357.34

Cell	Decision Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$C$5	VALUE CFO1	5607.02	5607.02	205357.34	5607.02	205357.34
$D$5	VALUE CFI1	0.00	0.00	205357.34	0.00	205357.34
$E$5	VALUE CFF1	73.23	73.23	205357.34	73.23	205357.34
$F$5	VALUE CFO2	6719.76	6719.76	205357.34	6719.76	205357.34
$G$5	VALUE CFI2	0.00	0.00	205357.34	0.00	205357.34
$H$5	VALUE CFF2	208.53	208.53	205357.34	208.53	205357.34
$I$5	VALUE CFO3	8151.03	8151.03	205357.34	8151.03	205357.34
$J$5	VALUE CFI3	0.00	0.00	205357.34	0.00	205357.34
$K$5	VALUE CFF3	56.02	56.02	205357.34	56.02	205357.34
$L$5	VALUE CFO4	8345.49	8345.49	205357.34	8345.49	205357.34
$M$5	VALUE CFI4	239.50	239.50	205357.34	239.50	205357.34
$N$5	VALUE CFF4	0.00	0.00	205357.34	–0.00	205357.34

$O$5	VALUE CFO5	10261.75	10261.75	205357.34	10261.75	205357.34
$P$5	VALUE CFI5	0.00	0.00	205357.34	0.00	205357.34
$Q$5	VALUE CFF5	253.98	253.98	205357.34	253.98	205357.34
$R$5	VALUE CFO6	13130.56	13130.56	205357.34	13130.56	205357.34
$S$5	VALUE CFI6	0.00	0.00	205357.34	0.00	205357.34
$T$5	VALUE CFF6	0.00	0.00	205357.34	−0.00	205357.34
$U$5	VALUE CFO7	12373.82	12373.82	205357.34	12373.82	205357.34
$V$5	VALUE CFI7	0.00	0.00	205357.34	−0.00	205357.34
$W$5	VALUE CFF7	218.25	218.25	205357.34	218.25	205357.34
$X$5	VALUE CFO8	15853.01	15853.01	205357.34	15853.01	205357.34
$Y$5	VALUE CFI8	0.00	0.00	205357.34	0.00	205357.34
$Z$5	VALUE CFF8	376.44	376.44	205357.34	376.44	205357.34
$AA$5	VALUE AR1	495.05	495.05	205357.34	495.05	205357.34
$AB$5	VALUE COGS1	319.13	319.13	205357.34	319.13	205357.34
$AC$5	VALUE Inv1	46.50	46.50	205357.34	46.50	205357.34
$AD$5	VALUE AP1	0.00	0.00	205357.34	0.00	205357.34
$AE$5	VALUE PPE1	1105.38	1105.38	205357.34	1105.38	205357.34
$AF$5	VALUE LTI1	0.00	0.00	205357.34	0.00	205357.34
$AG$5	VALUE LTD1	73.23	73.23	205357.34	73.23	205357.34
$AH$5	VALUE AR2	457.15	457.15	205357.34	457.15	205357.34
$AI$5	VALUE COGS2	295.74	295.74	205357.34	295.74	205357.34
$AJ$5	VALUE Inv2	44.72	44.72	205357.34	44.72	205357.34
$AK$5	VALUE AP2	0.00	0.00	205357.34	0.00	205357.34
$AL$5	VALUE PPE2	1282.79	1282.79	205357.34	1282.79	205357.34
$AM$5	VALUE LTI2	0.00	0.00	205357.34	0.00	205357.34
$AN$5	VALUE LTD2	208.53	208.53	205357.34	208.53	205357.34
$AO$5	VALUE AR3	653.21	653.21	205357.34	653.21	205357.34
$AP$5	VALUE COGS3	234.54	234.54	205357.34	234.54	205357.34

Continued

Cell	Decision Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$AQ$5	VALUE Inv3	31.39	31.39	205357.34	31.39	205357.34
$AR$5	VALUE AP3	123.90	123.90	205357.34	123.90	205357.34
$AS$5	VALUE PPE3	1386.54	1386.54	205357.34	1386.54	205357.34
$AT$5	VALUE LTI3	0.00	0.00	205357.34	0.00	205357.34
$AU$5	VALUE LTD3	56.02	56.02	205357.34	56.02	205357.34
$AV$5	VALUE AR4	733.36	733.36	205357.34	733.36	205357.34
$AW$5	VALUE COGS4	470.19	470.19	205357.34	470.19	205357.34
$AX$5	VALUE Inv4	64.54	64.54	205357.34	64.54	205357.34
$AY$5	VALUE AP4	0.00	0.00	205357.34	0.00	205357.34
$AZ$5	VALUE PPE4	1247.79	1247.79	205357.34	1247.79	205357.34
$BA$5	VALUE LTI4	0.00	0.00	205357.34	0.00	205357.34
$BB$5	VALUE LTD4	0.00	0.00	205357.34	0.00	205357.34
$BC$5	VALUE AR5	955.78	955.78	205357.34	955.78	205357.34
$BD$5	VALUE COGS5	1136.11	1136.11	205357.34	1136.11	205357.34
$BE$5	VALUE Inv5	183.66	183.66	205357.34	183.66	205357.34
$BF$5	VALUE AP5	0.00	0.00	205357.34	–0.00	205357.34
$BG$5	VALUE PPE5	2050.76	2050.76	205357.34	2050.76	205357.34
$BH$5	VALUE LTI5	0.00	0.00	205357.34	0.00	205357.34
$BI$5	VALUE LTD5	253.98	253.98	205357.34	253.98	205357.34
$BJ$5	VALUE AR6	1257.92	1257.92	205357.34	1257.92	205357.34
$BK$5	VALUE COGS6	194.80	194.80	205357.34	194.80	205357.34
$BL$5	VALUE Inv6	28.37	28.37	205357.34	28.37	205357.34
$BM$5	VALUE AP6	413.17	413.17	205357.34	413.17	205357.34
$BN$5	VALUE PPE6	2335.87	2335.87	205357.34	2335.87	205357.34
$BO$5	VALUE LTI6	0.00	0.00	205357.34	0.00	205357.34

$BP$5	VALUE LTD6	0.00	0.00	205357.34	0.00	205357.34
$BQ$5	VALUE AR7	1567.54	1567.54	205357.34	1567.54	205357.34
$BR$5	VALUE COGS7	825.29	825.29	205357.34	825.29	205357.34
$BS$5	VALUE Inv7	136.96	136.96	205357.34	136.96	205357.34
$BT$5	VALUE AP7	131.42	131.42	205357.34	131.42	205357.34
$BU$5	VALUE PPE7	2838.75	2838.75	205357.34	2838.75	205357.34
$BV$5	VALUE LTI7	0.00	0.00	205357.34	0.00	205357.34
$BW$5	VALUE LTD7	218.25	218.25	205357.34	218.25	205357.34
$BX$5	VALUE AR8	2076.08	2076.08	205357.34	2076.08	205357.34
$BY$5	VALUE COGS8	1231.75	1231.75	205357.34	1231.75	205357.34
$BZ$5	VALUE Inv8	194.80	194.80	205357.34	194.80	205357.34
$CA$5	VALUE AP8	78.09	78.09	205357.34	78.09	205357.34
$CB$5	VALUE PPE8	3881.17	3881.17	205357.34	3881.17	205357.34
$CC$5	VALUE LTI8	0.00	0.00	205357.34	0.00	205357.34
$CD$5	VALUE LTD8	376.44	376.44	205357.34	376.44	205357.34
$CE$5	VALUE NDE1	2.84	2.84	205357.34	2.84	205357.34
$CF$5	VALUE NDE2	2.08	2.08	205357.34	2.08	205357.34
$CG$5	VALUE NDE3	1.66	1.66	205357.34	1.66	205357.34
$CH$5	VALUE NDE4	4.31	4.31	205357.34	4.31	205357.34
$CI$5	VALUE NDE5	7.94	7.94	205357.34	7.94	205357.34
$CJ$5	VALUE NDE6	0.87	0.87	205357.34	0.87	205357.34
$CK$5	VALUE NDE7	5.52	5.52	205357.34	5.52	205357.34
$CL$5	VALUE NDE8	6.14	6.14	205357.34	6.14	205357.34
$CM$5	VALUE REXX1	3.35	3.35	205357.34	3.35	205357.34
$CN$5	VALUE REXX2	3.84	3.84	205357.34	3.84	205357.34
$CO$5	VALUE REXX3	4.36	4.36	205357.34	4.36	205357.34
$CP$5	VALUE REXX4	4.88	4.88	205357.34	4.88	205357.34
$CQ$5	VALUE REXX5	5.95	5.95	205357.34	5.95	205357.34
$CR$5	VALUE REXX6	6.84	6.84	205357.34	6.84	205357.34

Continued

Cell	Decision Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$CS$5	VALUE REXX7	6.54	6.54	205357.34	6.54	205357.34
$CT$5	VALUE REXX8	7.82	7.82	205357.34	7.82	205357.34
$CU$5	VALUE REXM1	0.00	0.00	205357.34	0.00	205357.34
$CV$5	VALUE REXM2	0.00	0.00	205357.34	0.00	205357.34
$CW$5	VALUE REXM3	0.00	0.00	205357.34	–0.00	205357.34
$CX$5	VALUE REXM4	0.00	0.00	205357.34	–0.00	205357.34
$CY$5	VALUE REXM5	0.00	0.00	205357.34	0.00	205357.34
$CZ$5	VALUE REXM6	0.00	0.00	205357.34	–0.00	205357.34
$DA$5	VALUE REXM7	0.00	0.00	205357.34	0.00	205357.34
$DB$5	VALUE REXM8	0.00	0.00	205357.34	0.00	205357.34

Appendix 8
The Present Value of the Perpetuity of the Final Validated Model 2

Microsoft Excel 14.0 Answer Report

Worksheet: [CAPM perpetuity.xlsx]Unilever int rem

Report Created: 8/31/2012 4:47:55 PM

Result: Solver found a solution. All constraints and optimality conditions are satisfied.

Engine: Standard LP/Quadratic

Solution Time: 01 Seconds

Iterations: 0

Subproblems: 0

Incumbent Solutions: 0

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$C$72	Maximise FCFE CFO8	0	45290.31726

Decision Variable Cells

Cell	Name	Original Value	Final Value	Type
$C$5	VALUE CFO8	0.00	15,602.07	Normal
$D$5	VALUE CFI8	0.00	0.00	Normal
$E$5	VALUE CFF8	0.00	376.44	Normal
$F$5	VALUE AR8	0.00	2,076.08	Normal
$G$5	VALUE COGS8	0.00	1,231.75	Normal
$H$5	VALUE Inv8	0.00	194.80	Normal

Continued

$I$5	VALUE AP8	0.00	78.09	Normal
$J$5	VALUE PPE8	0.00	3,881.17	Normal
$K$5	VALUE LTI8	0.00	0.00	Normal
$L$5	VALUE LTD8	0.00	376.44	Normal
$M$5	VALUE NDE8	0.00	6.14	Normal
$N$5	VALUE REXX8	0.00	7.70	Normal
$O$5	VALUE REXM8	0.00	0.00	Normal

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$P$64	FUNDS8	3048.10	$P$64<=$R$64	Not Binding	8436.214686
$P$68	EC8	–0.00	$P$68>=$R$68	Binding	0
$P$17	CFO8	19040.44	$P$17=$R$17	Binding	0
$P$20	CFI8	3881.17	$P$20=$R$20	Binding	0
$P$23	CFF8	0.00	$P$23=$R$23	Binding	0
$P$26	ATD8	–0.00	$P$26<=$R$26	Not Binding	146.8544635
$P$30	CR8	2217.25	$P$30>=$R$30	Binding	0
$P$37	ARTO8	23469.22	$P$37<=$R$37	Binding	0
$P$40	ITO8	0.00	$P$40>=$R$40	Binding	0
$P$60	PPE8	3130.09	$P$60<=$R$60	Not Binding	1155.798963
$P$49	LEV8	3537.18	$P$49>=$R$49	Binding	0
$P$53	Z8	0.00	$P$53<=$R$53	Not Binding	83927.81136
$P$53	Z8	0.00	$P$53>=0	Binding	0
$P$64	FUNDS8	3048.10	$P$64>=0	Not Binding	3048.096314
$P$26	ATD8	–0.00	$P$26>=0	Binding	0
$P$37	ARTO8	23469.22	$P$37>=0	Not Binding	23469.218

Microsoft Excel 14.0 Sensitivity Report

Worksheet: [CAPM perpetuity.xlsx]Unilever int rem
Report Created: 8/31/2012 4:48:01 PM
Engine: Standard LP/Quadratic
Objective Cell (Max)

Cell	Name	Final Value
$C$72	Maximise FCFE CFO8	45290.31726

Decision Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$5	VALUE CFO8	15,602.07	0.00	2.834451902	5880.861138	1.602996333
$D$5	VALUE CFI8	0.00	−0.99	−2.834451902	0.994858062	1E+30
$E$5	VALUE CFF8	376.44	0.00	2.834451902	1.533280061	2.833086423
$F$5	VALUE AR8	2,076.08	0.00	0	1E+30	2.440244985
$G$5	VALUE COGS8	1,231.75	0.00	0	2.134376732	1E+30
$H$5	VALUE Inv8	194.80	0.00	0	13.49606182	2.978857057
$I$5	VALUE AP8	78.09	0.00	0	13.0464307	2.045634137
$J$5	VALUE PPE8	3,881.17	0.00	0	0.994858069	1.838228357
$K$5	VALUE LTI8	0.00	−1.84	0	1.838228352	1E+30
$L$5	VALUE LTD8	376.44	0.00	0	1.533280061	2.833086423
$M$5	VALUE NDE8	6.14	0.00	0	2.83308787	1E+30
$N$5	VALUE REXX8	7.70	0.00	0	2.834456459	5880.861138
$O$5	VALUE REXM8	0.00	−2.83	0	2.833086414	1E+30

Continued

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$P$64	FUNDS8	3048.10	0.00	11484.311	1E+30	8436.214686
$P$68	EC8	−0.00	−2.83	0	15609.58623	7.705018928
$P$17	CFO8	19040.44	2.83	19040.444	1E+30	15609.58623
$P$20	CFI8	3881.17	1.84	3881.173	1433.138	580.1763134
$P$23	CFF8	0.00	−2.83	0	376.4433527	32386440.82
$P$26	ATD8	−0.00	0.00	146.8544635	1E+30	146.8544635
$P$30	CR8	2217.25	−4.89	2217.254308	72.19235644	301.4958722
$P$37	ARTO8	23469.22	0.22	23469.218	6434.324558	740.0470067
$P$40	ITO8	0.00	−0.39	0	413.9437984	3599.026445
$P$60	PPE8	3130.09	0.00	4285.892316	1E+30	1155.798963
$P$49	LEV8	3537.18	−2.83	3537.181837	376.4433527	3048.096314
$P$53	Z8	0.00	0.00	83927.81136	1E+30	83927.81136
$P$53	Z8	0.00	−0.37	0	24185.45771	2781.702325
$P$64	FUNDS8	3048.10	0.00	0	3048.096314	1E+30
$P$26	ATD8	−0.00	−2.83	0	146.8544635	6.136663303
$P$37	ARTO8	23469.22	0.00	0	23469.218	1E+30

Microsoft Excel 14.0 Limits Report

Worksheet: [CAPM perpetuity.xlsx]Unilever int rem

Report Created: 8/31/2012 4:48:10 PM

Engine: Standard LP/Quadratic

	Objective	
Cell	**Name**	**Value**
$C$72	**Maximise FCFE CFO8**	**45290.32**

	Decision Variable		Lower	Objective	Upper	Objective
Cell	**Name**	**Value**	**Limit**	**Result**	**Limit**	**Result**
$C$5	VALUE CFO8	15,602.07	15,602.07	45290.32	15,602.07	45290.32
$D$5	VALUE CFI8	0.00	0.00	45290.32	0.00	45290.32
$E$5	VALUE CFF8	376.44	376.44	45290.32	376.44	45290.32
$F$5	VALUE AR8	2,076.08	2,076.08	45290.32	2,076.08	45290.32
$G$5	VALUE COGS8	1,231.75	1,231.75	45290.32	1,231.75	45290.32
$H$5	VALUE Inv8	194.80	194.80	45290.32	194.80	45290.32
$I$5	VALUE AP8	78.09	78.09	45290.32	78.09	45290.32
$J$5	VALUE PPE8	3,881.17	3,881.17	45290.32	3,881.17	45290.32
$K$5	VALUE LTI8	0.00	0.00	45290.32	0.00	45290.32
$L$5	VALUE LTD8	376.44	376.44	45290.32	376.44	45290.32
$M$5	VALUE NDE8	6.14	6.14	45290.32	6.14	45290.32
$N$5	VALUE REXX8	7.70	7.70	45290.32	7.70	45290.32
$O$5	VALUE REXM8	0.00	0.00	45290.32	0.00	45290.32

Notes

2 The Foundations for Formulating Sound Financial Management Strategies Using an Integrated Financial Optimisation Model

1. DeAngelo, DeAngelo and Skinner (2008), referring to La Porta et al. (2000), pointed out that the conclusion of Handley (2008) is a fallacy because of the ignorance on tunnelling and the simplicity that agency costs cause investment distortions only.
2. Free cash flows are 'cash flows in excess of that required to fund all projects that have positive values when discounted at the relevant cost of capital' (Jensen 1986, p. 323).
3. Scarcity in economics is defined as a fundamental economic problem caused by humans' 'unlimited' wants or needs while there are only 'limited' resources. As a consequence, humans must make priorities in fulfilling their needs; hence, there will be an 'opportunity cost' because of choosing a particular option rather than another option (Lipsey & Chrystal 2011; Samuelson & Nordhaus 2010).
4. Intrinsic value is value that financial analysts, investors and other market players look for in assessing the financial health and profitability of a company now and in the future (Chew 2003b).

3 Conceptual Framework and Research Methodology

1. For further analysis of an infeasible solution and how to solve the problem, see more advanced texts such as Zilinskas (2009) and Chinneck (2008).
2. The quantitative characteristics are summarised from Nandakumar (2010), Plumlee (2010), Rodgers (2007) and van Greuning (2009).

4 An Integrated Financial Optimisation Model for Formulating Sound Financial Management Strategies

1. See Pinto, Henry and Robinson (2010, pp. 146–147).

5 The Context of the Case Study

1. See Indonesia Taxation Office (2007, 2008).
2. See further IAI (2008).
3. Most of information adopted from Unilever (2012).
4. The former IDX.

6 The Numerical Model, Results and Analysis

1. The IDX composite index is also called ISHG: 'Index Harga Saham Gabungan'.
2. Based on five-year calculation of dividend, g = 25.0216%. Because g is greater than r, the figure cannot be used in the model (Ehrhardt & Brigham 2011, p. 267). Therefore, for the perpetuity of the future cash flows, simple discount rate is used and the perpetuity of the future FCFE equals to
$$\frac{FCFE_8 / 0.065833}{(1+0.065833)^8}$$

7 Implications of The Results for Sound Financial Management Strategies, Corporate Governance, and Managerial and Financial Accounting Perspectives

1. All values discussed in this chapter are in thousand million rupiahs.

Appendix 4

1. An interest rate is used as a discount factor for this model.

Appendix 5

1. An interest rate is used as a discount factor of the model.

Appendix 6

1. An interest rate is used as a discount factor of the present value of the perpetuity.

Appendix 7

1. This model uses CAPM Rate as a discount rate.

Appendix 8

1. CAPM rate is used as a discount factor of the present value of the perpetuity.

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