FINANCIAL MODELLING AND CORPORATE GOVERNANCE: A FEMINIST PERSPECTIVE USING AN OPTIMIZATION APPROACH

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Abstract

This study is aimed at projecting the financial condition of the company using the feminist ethics of care integrated in corporate governance principles. The research question to be answered is: How the financial condition of the company in the future is affected if the feminist ethics of care is applied in its corporate governance practices? The research question is answered using the quantitative optimisation method to develop the financial planning model for the period 2012-2016. BHP Billiton which is one of the world's largest resources company is selected to be the sample of this case study. The projection of the financial condition for the five-year period 2012-2016 showed that BHP Billiton, Ltd. can achieve an overall positive economic value retained in the projected period even though negative results exist for 2015 and 2016. Sensitivity analysis was performed by providing two examples of alternatives or scenarios to show the impact on the projected financial condition. It can be concluded that the Company's financial condition will be stable in the future. The use of the ethics of care simultaneously as a lens to support corporate governance practices and as guidance in financial projection has not been conducted in previous studies. This study therefore, offers an original contribution to the literature of corporate governance, business ethics and financial planning.

Keywords: Financial Management, Corporate Governance, the Ethics of Care

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1 Introduction

Sound financial management strategies are inevitably needed by companies all around the world to support the achievement of their short-term and long-term objectives. Those strategies will guide a firm in the decision making of three major policies: investment, financing and dividends policies. Theories and methodologies of financial management have been developed in these areas, acknowledging the interrelationships and simultaneous considerations of investment, financing and dividend options facing firms (Lee, Lee & Lee 2009, p. 668; Myers & Pogue 1974).

Good financial management is also essential to managing the divergence of interests between shareholders and managers as the consequence of the separation of ownership and control posited in the classical work of Berle and Means (1932) and the agency theory of Jensen and Meckling (1976). A corporate governance concept was then developed as a tool to manage conflicts of interest among parties and as an internal and external control mechanism in a firm (Farrar 2008). Good corporate governance is beneficial not only for shareholders, but also for stakeholders including investors, creditors, managers, employees and society as a whole, by resolving conflicts of interest, encouraging controls and a sense of ethics, and improving transparency as well.

Financial management strategies that are developed within good governance principles will normatively guarantee the value maximisation and long-term performance of all companies. One of the important aspects of governance, which should be exercised by a company, is the appropriate and effective risk management to minimize or avoid the possibility of unexpected huge losses arising from financial and operating risks, and other kind of risks. Risk governance requires a company through the board of directors to develop a risk strategy and risk tolerance in making decisions under uncertain conditions in the future.

Promoting good governance in financial management is not only supported by theory, but also imposed or recommended by regulators, the stock exchange and industrial groups. Rules and guidelines for good practices can be found in corporate and securities laws, bankruptcy procedures, corporate control practices, internal and external audit requirements, and stock market regulations. Each country has a slightly different set of rules in line with its conditions, but clearly these rules share the same message: to enhance the performance and sustainability of all companies to benefit stakeholders.

Despite the adequacy of theories and regulations in the field of financial management available to companies seeking sustainability, company failures still occur. There are at least three reasons for company failure in relation to financial management issues: f*irstly*, failure in corporate governance processes underpinning financial management strategies, these include unclear corporate strategies, liberal accounting policies, and inadequate internal audits (Banks 2004); *secondly*, the improper risk management leading to excessive risk-taking; and *thirdly*, unethical behaviour conducted by directors, executives, managers and employees. However, although these three factors have been widely investigated, they have not been examined using the feminist ethical perspective as adopted in this study. This project applis the ethics of care from a feminist perspective in the belief that the financial aspect of a company should be managed by exercising a more caring approach -- which is an ethics of care point of view -- rather than focusing only on formal rules and contracts.

2 Aims of the research

The main aim of this research is to design sound financial management strategies which integrate good corporate governance and good risk management principles using a feminist perspective. The feminist theory applied is restricted to the ethics of care that is most closely associated with the research work by Carol Gilligan (1982) which has driven many research in this area afterwards (see for instance Bampton & Maclagan 2009; French & Weis 2000; Reiter 1997). The ethics of care has been selected for this research due to the stance that the masculinist ethical theories, which are reflected in the premise of conflicts of interest amongst competitive stakeholders, are not adequate to shape the financial management strategies of a company. Indeed, maybe the root cause of corporate collapses is the failure of applying the feminist ethics within company financial management strategies. This inadequacy, which calls for a practical contribution and creates a knowledge gap, is explicated further in the literature review. More specifically, the objectives of this research are:

1. To examine the corporate governance model and risk management principle based on the feminist ethical perspective that should be incorporated into the financial management strategies of a company.
2. To quantify the policy and mechanism of those principles and identify the right proxy for them.
3. To develop an integrative optimisation model for sound financial management strategies.
4. To simulate the model to obtain sound financial management strategies. The simulation will be done using data of an Australian company. The reason for choosing the sample from this particular country will be discussed in Section 4: Approach and Methodology.

3 Literature review

Like it or not, we must admit that a large proportion of mainstream literature in accounting and finance conceptualises the conflict of interests between shareholders and managers, or what was firstly articulated by Jensen and Meckling (1976) as the agency problems, in terms of competing and conflicting claims, problem solving using rules and laws, and the rights and obligations measurement in legitimacy and the power dimension (Machold, Ahmed & Farquhar 2008). Implicitly or explicitly, we can see that the moral reasoning within this discourse is a masculinist view (Gilligan 1982). Under this perspective, which is called the ethics of rights, the agency problem due to the conflicting interests among parties in a company, can be reduced but not really eradicated at the roots. The corporate collapses that occur repeatedly are strong evidence which proves that the solutions using rules, laws and a power framework are just a short-term remedy without sufficient guarantee of long term-success.

The failure of governance in using the ethics of rights perspective gives rise to some writings which try to view governance from the feminist ethics perspective, which is called the ethics of care. While the rights perspective emphasises the rules and respect for the rights of others, the care point of view stresses the responsibility, relationship, concern, care, continued attachment, sacrifice and the avoidance of hurting another (Reiter 1997).

Traditionally, a different moral emphasis can be traced back to the gender stereotypes; however, 'the difference between masculinist and feminist perspectives is not exclusively and sharply defined along sexual lines' (Machold, Ahmed & Farquhar 2008, p. 668). With this idea, we can envisage that a feminine firm, which values connectedness and relationships in its vision and mission, can generate the bonds of trust from its stakeholders and, hence, overcome the inefficiencies of its masculine counterpart.

Within the framework of ethics of care we can then formulate the sound financial management strategies that enhance the long-term performance and sustainability of a company.

3.1 The ethics of care as the underpinning perspective

As one branch of the social sciences, financial management and accounting cannot be treated as a value neutral science like its natural science counterpart. Indeed, there are behavioural aspects and human and social factors that should be considered (Hopwood 1974). Within these considerations, the issues of gender become relevant, especially in respect of ethics (Gaffikin 2008). The attention to the significance of this aspect was drawn from Carol Gilligan's work in 1982 as a response to the

observations made by developmental psychologist Kohlberg (1981), who found that women scored lower on the test of moral development. Gilligan argued that the result might be bias since Kohlberg's theory was developed using exclusively male samples; therefore, she introduced a different perspective of female moral discourse which is labelled the ethics of care, as the opposite to the ethics of justice attributed to males. The different concerns of the ethics of care and the ethics of rights are depicted in Table 1: Comparison of the ethics of care and the ethics of rights.

Table 1. Comparison of the ethics of care and the ethics of rights

Ethics of care	*Ethics of rights*
Achieved thorugh perception of one's self as connected to others	Achieved through process of separation and individuation of self from others
Moral dilemmas contextual	Moral dilemmas universal
Dilemmas solved through inductive thinking	Dilemmas solved through application of abstract or formal thinking
Development through stages is sequential and hiearchical	Development through stages is invariantly sequential and hierarchical
Principle of moral responsibility is reflected in the voices of women	Principle of moral responsibilty is universal
Distinguished by an emphasis on attachments, issues of self-sacrifice and selfishness, and consideration of relationships as primary	Distinguished by an emphasis on separateness, issues of rules and legalities, and consideration of the individual as primary

Source: Brabeck (1993) cited in Reiter (1997).

There has been much research which has used the ethics of care as the framework to solve the issues being studied, namely to improve auditor independence (Reiter 1997), to prevent organizational crisis (Simola 2003, 2005), and to develop the stakeholder theory (Burton & Dunn 1996). None of the existing studies found to have used the care perspective to develop sound and integrative financial management strategies for a company. This study fills the gap found in literature and shed light on the importance of the feminist ethical perspective for the financial management aspect.

3.2 The ethics of care as the moral grounding for financial management strategies

The current normative orthodoxy of corporate governance is built on the masculinist ethical theories with discourses of power, influence, rights and duties, on the other hand the ethics of care from feminist theories emphasises more the relationships, and is considered as an alternative lens through which to study corporate governance (Machold, Ahmed & Farquhar 2008). They proposed a feminist corporate governance model which "recognises a multiplicity of actual and potential relationships with varying degrees of asymmetry of power distribution, within which there is an obligation of care" (p. 673). Implicitly, this model has many points of contact with the stakeholder theory principles; but actually it goes beyond that. The "traditional" stakeholder theory, as inherently lied in Freeman's definition (1984) stated the firm as *contractually* related to any number of stakeholders; it means the approaches to management are focused on the legalistic, contractual, masculine side of human existence (Burton & Dunn 1996). Furthermore, Burton and Dunn claim that any theory based on these approaches will run into problems when "two stakeholders have opposite views of a decision and will be affected adversely if the decision goes against them" (p. 141). In this case, the hard part is to try to answer the question: who should be given a privilege when a decision must be made? Whose contract should be broken? They then recommend a caring principle, that is, special attention should be given to the least advantaged members of the moral community. The suggested principle would then become, "Care enough for the least advantaged stakeholders that they not be harmed; insofar as they are not harmed, privilege those stakeholders with whom you have a close relationship" (p. 144).

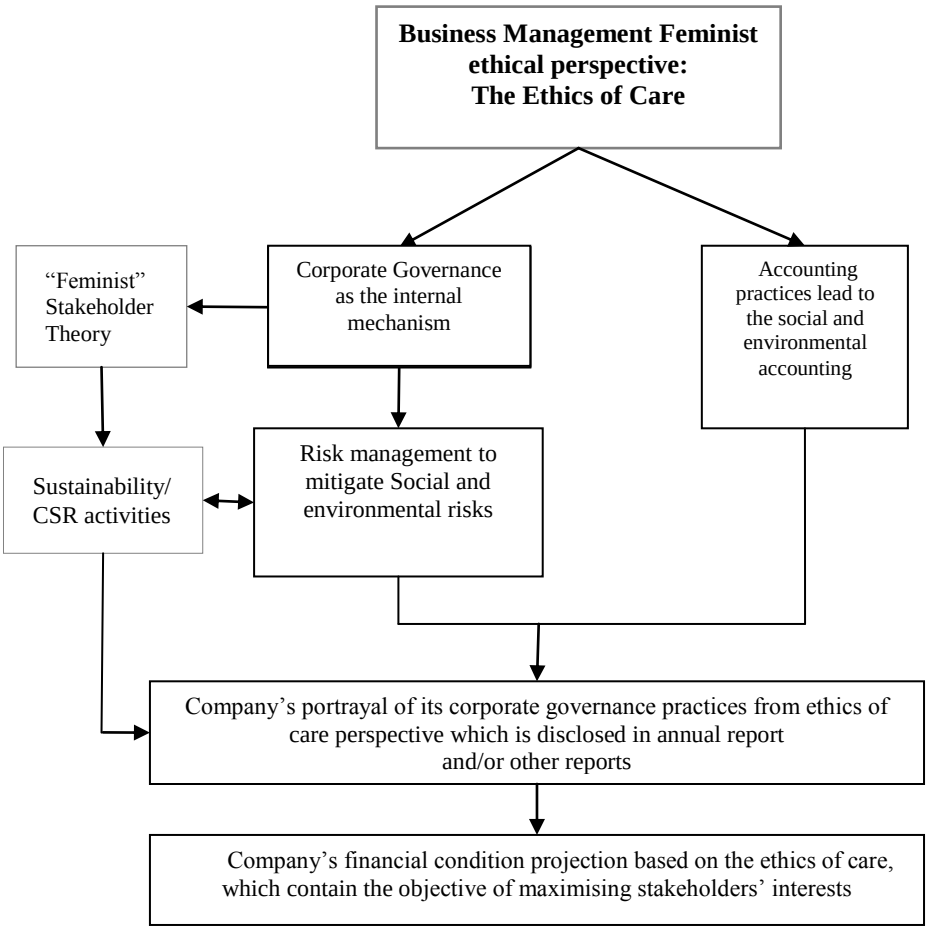
The principle introduced by Burton and Dunn (1996) posseses several implications: (i) this approach may not eliminate harm, but it at least limits harm amongst the most vulnerable parties; and (ii) a firm must perform a stakeholder analysis in order to recognize which stakeholders have power and which have a stake in decisions, and most importantly, to understand which stakeholders are most vulnerable to the action. For the purpose of this study, the Clarkson (1995) model of stakeholders ranking is applied, i.e. primary and secondary stakeholders, to analyse the stakeholders of a company. Primary stakeholders are prioritized as they contribute a vital support to the survival of a company. Such primary stakeholders comprise shareholders, employees, customers, suppliers, lenders, as well as government and community. The secondary stakeholders are those parties that are not considered to be critical for the survival of an organisation; they include the environmentalists, media and consumer advocates.

The second area of concern that will be illuminated by the caring approach is the risk management area. It is argued that the risk aversion approach is better to prevent a company from suffering huge losses in investment and other activities; and under the feminist ethics of care, it is also aimed at caring for the stakeholders to prevent them from suffering any harm resulted from corporate collapses. We have seen that the failure to adopt a risk aversion approach has led to recurring crises; for instance, the spectacular risks with extremely leveraged positions on many securities and derivatives that have been taken by investment banks and other financial institutions which have led to the systemic crisis in international financial markets commencing in 2007 (Clarke 2010).

4 Conceptual framework, research questions, and propositions

Based on the brief discussion about feminist ethics, financial management, corporate governance and risk management in the previous subsections, the conceptual framework of this project is shown in Figure 1. The ethics of care becomes the under-pinning perspective to shape the corporate governance and accounting practices of a company. Risk management then emerges as an essential component of corporate governance which receives special attention in this study because of its importance in developing the financial management strategies of a company. Together with external factors in the form of regulatory environments, they become the factors to be considered in developing such strategies to achieve the benefits of good corporate governance.

Figure 1. Conceptual framework



Having presented a conceptual framework, it is now appropriate to develop the research questions and propositions of this study. As has been explained, the aim of this study is to develop integrative financial management strategies in a financial planning model using the feminist ethics of care as the framework. It is presumed that the ethics of care can be used as an approach to design the strategies. The research questions and the related propositions of this study are set out in Table 2.

Table 2. Research questions and propositions

Research questions	*Propositions*
How is the financial condition of the company affected if the feminist ethics of care is applied in its corporate governance practices? *(This will be projected using the quantitative optimisation model)*	It is projected that the financial condition will be stable as the company will put an effort to balance the stakeholders' interest and to address the social and environmental risk.

5 Research method

5.1 Introduction to an optimization approach

Mathematical programming, also known as optimization, is an approach used to find the best possible solution (the optimal or most efficient way) of using limited resources to achieve certain definitive objectives (Ragsdale 2001). This project utilizes an optimization approach to develop the financial planning model of a company, because it can clearly incorporate the objectives statement of a company and the contraints that the company faces; and hence, it fits within the aim of this project. Specifically, this research uses the linear programming method, which is one of the deterministic models, with the assumption that all controllable and uncontrollable variables are known.

5.2 Optimisation model: "traditional" vs feminist model

This study develops a quantitative financial optimization model based on Carleton's linear programming model (1970, see Appendix A), that will be referred to as the "traditional" model because it was developed using the "masculinist" view of finance and accounting theory. This study offers a financial optimization model based on feminist perspective as the alternative. For the purpose of easier comparison, the modification is presented in a table format that can be read in Appendix B: Model Comparison.

5.3 Sample selection

This project is a case study of one particular company in Australia. The case study approach is chosen on the ground that unlike the empirical research, the optimization model does not require much samples as it is not mainly intended to test hypotheses. Rather, the application of the model can be tested using data of a company.

6 Results and analysis

The optimization model for financial management developed based on the ethics of care is as follows.

The derivation of the concepts and principles of the corporate governance from the ethics of care perspective to the optimisation model is depicted in Table 4. This serves as a validation tool of the model in gaining the understanding of whether the model represents the underpinning theory. The derivation also takes into account the limitations of financial accounting identified by Deegan (2010).

Table 3. Quantitative optimisation model for financial management
(based on the Ethics of Care Principles of Corporate Governance)

I. Objective-function	Maximise $\sum_{t=1}^{T}$ economic value retained$_t$
II. Decision variables	
II.a Decision variables in the objective function	a. The amount of payment to suppliers and contractors (PSC_t); b. The amount of employee wages and benefits in particular year (EWB_t); c. Dividend amount in particular year (Div_t); d. Long-term debt amount in particular year (LTD_t); e. The amount to pay to government in particular year (PG_t); f. The amount of the contributions to community in particular year (CC_t); and g. The total environmental expenditure in particular year which comprises of: 1. Environmental research expenditure (ERE_t) 2. Environmental costs (EC_t) 3. Environmental program expenditure (EPE_t) 4. Biodiversity and land management (BLE_t)
II.b Decision variables in the constraint functions	a. After tax profit (ATP_t) b. Investments in financial assets ($InvFA_t$) c. Investments in capital assets ($InvCA_t$) d. Total environmental fines amount (TEF_t) e. Provision amounts related to sustainable activities ($Prov_t$) f. Health, safety, environmental and community expenditure ($HSEC_t$) g. Communication expenses ($Comm.\ Exp_t$) h. Litigation proceeding amount ($LitExp_t$) i. Female recruitment expenses (FRE_t) j. Female leadership program expenses (FLP_t) k. Research development expenses ($R\&D_t$) l. Work-life balance policy amount (WLB_t) m. Costs of employee turnover (CTO_t) n. Women empowerment program expenses (WEP_t)

Table 3. Quantitative optimisation model for financial management
(based on the Ethics of Care Principles of Corporate Governance) (continued)

III. Constraints	
A. Accounting definitional constraints	*1. Payments to government* Payments to government$_t$ = Gross taxes$_t$ + Other Payments$_t$ *2. After tax profit definition* After tax Profit$_t$= (1-tax rate) (EBIT$_t$ $-\sum_{t=1}^{5}$ i x Long Term Debt$_t$)
B. Investment constraints	*1. Investments in financial assets* Investment in financial assets$_t \geq$ Investment in financial assets$_{t-1}$ *2. Investments in capital assets* Investments in capital assets$_t$ - ρ Investments in capital assets$_{t-1} \geq 0$
C. Company's policy constraints derived from the corporate governance practices from feminist ethics of care perspective	*1. Payments to suppliers and contractors (PSC$_t$)* Payments to suppliers and contractors $_t$ - δPayment to suppliers and contractors $_{t-1} \geq 0$ *2. Employee wages and benefits amount* Employee wages and benefits $_t$ - γ Employee wages and benefits $_{t-1} \geq 0$
C1. Corporations are webs of relations among stakeholders	*3. Dividends policy* Div$_t$ – θ Div$_{t-1} \geq 0$ *4. Total environmental fines amounts* $\frac{\text{Total environmental fines}_t}{\text{Environmental program expenditure}_t} \leq X$ *5. Provision amounts* Provision$_t$ = (1+ε) Provision$_{t-1}$
C2. Corporations should thrive on chaos and environmental change (Social and environmental risk management)	*6. The interest coverage* $\frac{\text{EBIT}_t}{(\sum_{t=1}^{5} \text{i x Existing LTD} + \sum_{t=1}^{5} \text{i}' \text{x } \Delta\text{LTD})} \geq Y$ *7. Current ratio* $\frac{\text{CA}_t}{\text{CL}_t} \geq \text{Average} \sum_{t=1}^{T} \frac{\text{CA}}{\text{CL}}$ *8. Environmental research expenditure* ERE$_t \geq$ ERE$_{t-1}$ *9. Environmental costs* Environmental costs$_t$ - ϕ Environmental costs$_{t-1}$ = 0 *10. The biodiversity and land management expenditures* BLE$_t \geq$ BLE$_{t-1}$ *11. HSEC risk management program expenditures* HSEC risk program$_t \geq$ HSEC risk program$_{t-1}$
C3. Replacing conflict and competition with communication and collective action	*12. The communication expenses* Communication expenses$_t \geq \left(\text{Average } \sum_{t=1}^{T} \frac{\text{Communication expenses}}{\text{Total expenses}}\right)$ x Total expenses$_{t-1}$ *13. The litigation proceedings amounts* Litigation expenses$_t \leq$ Lowest litigation expenses$_{t=1}^{T}$
C4. Principle of moral responsibility is reflected in the voices of women	*14. The female recruitment expenditure* Female recruitment expenses$_t \geq \left(\text{Average } \sum_{t=1}^{T} \frac{\text{Female recruitment expenses}}{\text{Total expenses}}\right)$ x Total expenses$_{t-1}$ *15. Expenditures for the leadership and mentoring program for future women leader* Female leadership program expenses$_t \geq$ Female leadership program expenses$_{t-1}$
C5. The voluntary or discretionary nature of the CSR activities	*16. Research and development expenses* R&D expenses$_t$ = ϵ Total expenses$_{t-1}$ *17. Community contribution and environmental program expenditure* Community contribution$_t \geq$ Z% Pre – tax profit$_t$ Environmental program expenditure$_t \geq$ Z% Pre – tax profit$_t$
C6. Women's interests in the employee group and other stakeholder groups are acknowledged	*18. Equal pay for women employee* Female employees wages rate$_t$ - Male employees wages rate$_t$ = 0 *19. Work-life balance policy* Work – life balance policy expenses$_t \geq$ Work – life balance policy expenses$_{t-1}$ *20. Cost savings from decrease in employee turnover* Costs of employee turnover$_t \leq$ Costs of employee turnover$_{t-1}$ *21. Women empowerment program expenses in community group* Women empowerment program$_t \geq$ Women empowerment program x Community contributions$_t$

Table 4. The derivation from the ethics of care principles and accounting limitations to the optimisation model

Corporate governance principles under the ethics of care	***The limitations of financial accounting identified by Deegan (2010)***	***The proposed optimisation model***
a. Achieved through perception of one's self as connected to others.		Objective Function: Maximise $\sum_{t=1}^{T}$ economic value retained$_t$
		Constraints:
		Accounting definitional constraints 1. Payments to government 2. After-tax profit definition
1. Corporations are webs of relationships among stakeholders	1. Tends to focus on the information needs of stakeholders with a financial interest 2. Applies the concept of 'materiality' 3. Adopts the practice of discounting liabilities 4. Applies the 'entity assumption' 5. Excludes from expenses the impacts on resources not controlled by the entity 6. Applies the recognition criteria of 'measurability' and probability.	1. Payments to suppliers and contractors 2. Employee wages and benefits amount 3. Dividends policy 4. Total environmental fines amounts 5. Provision amounts 6. Investment in financial and capital assets
2. Corporations should thrive on chaos and environmental change		1. The interest coverage 2. Current ratio 3. Environmental research expenditure 4. Environmental costs 5. The biodiversity and land management expenditures 6. HSEC risk management program expenditures
3. Replacing conflict and competition with communication and collective action		1. The communication expenses 2. The litigation proceedings amounts
3. Strategy as solidarity		
4. Replace hierarchy with radical decentralisation and empowerment		
b. Moral dilemmas contextual		
c. Dilemmas solved through inductive thinking.		
d. Development through stages is sequential and hierarchical.		
e. Principle of moral responsibility is reflected in the voices of women.		1. The female recruitment expenditure 2. Expenditures for the leadership and mentoring program for future women leaders
f. Distinguished by an emphasis on attachments, issues of self-sacrifice and selflessness, and consideration of relationships as primary.		
g. Additional interpretation: The nature of the CSR activities should not only be mandatory or compulsory but also more importantly, voluntary or discretionary responsibilities.		1. Research and development expenses 2. Community contribution and environmental expenditure.
h. Additional interpretation: Women's interests in the employee group and other stakeholder groups are acknowledged.		1. Equal pay for women employee 2. Work-life balance policy 3. Cost savings from decrease in employee turnover 4. Women empowerment program expenses in community group

As depicted in Table 4, there are several principles which are not translated and not included in the optimisation model. In contrast, the accounting definitional constraints have no principles associated to them as these constraints represent the relationships among accounts in the financial statements and are not specifically related to the ethics of care. The principles that are not included in the model imply that they cannot be translated into financial amounts and are better investigated using the qualitative analysis. This is in line with recommendations made by Wicks, Gilbert and Freeman (1994) as the feminist reading of the stakeholder concept that strategy does not have to be objective that makes the decision making be dictated by numbers; it is better to be complemented by experiences, perceptions and interpretations of the languages used.

6.1 Data inputs

BHP Billiton's data for the 6 year period (2006-2011) has been gathered to project the financial condition in 2012-2016.

Table 5. Key data inputs of BHP Billiton (consolidated), for the year 2006-2011 (in US$ Million, otherwise stated)

Key Data Inputs	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
Revenues (Net sales revenue plus other income)	39,886	47,962	59,991	50,762	53,212	72,229
Sales revenue	32,153	39,498	59,473	50,211	52,798	71,739
Operating expenses (Expenses excluding finance costs)	24,612	28,370	35,976	38,640	33,295	40,454
Payments to suppliers, contractors, etc)	17,988	19,936	26,358	23,877	22,306	26,997
Employee wages and benefits (Expenditure on wages and benefits of the employee workforce and not future commitments)	2,982	3,311	4,360	4,345	4,830	5,457
Payments to providers of capital: shareholder dividends	1,936	2,271	3,135	4,563	4,618	5,054
Payments to providers of capital: interest payments made to providers of loans	626	601	722	589	496	497
Payments to government (gross taxes and royalties)	5,341	6,061	8,121	7,940	6,892	9,943
Community investments (voluntary contributions of funds in the broader community)	81.3	103	141	198	200	195.5
Environmental program expenditure (including environmental program in certain sites, site rehabilitation, environmental monitoring, and other environment expenditure such as environmental impact assessment and training)	309	288	The Company's focus on integrating environmental responsibility into activities means that it is not possible to accurately extract expenditure spent on the environment and, for that reason, it is no longer reported in the Annual Report and Sustainability Report			
EBIT (Earnings before interest and taxes)	14,671	18,401	24,145	12,160	20,031	31,980
Long Term Debt (non-current interest bearing liabilities)	7,648	9,291	9,234	15,325	13,573	12,388
After tax profit	10,534	13,496	15,962	6,338	13,009	23,946
Preferred dividends ($ per share)	0	0	0	0	0	0
Property, plant and equipment (net book value)	30,985	36,705	47,332	49,032	55,576	68,468
Earnings before tax	15,116	19,212	22,483	11,617	19,572	31,255
Deferred tax expense	(612)	(719)	418	(799)	1,168	(1,536)
Assets	48,516	58,168	75,889	78,770	88,852	102,891
Current assets	8,776	13,756	21,561	22,486	25,134	25,280
Current liabilities	8,861	11,307	16,359	11,850	13,042	19,733
Financial assets (shares and other available for sale investments)		486	535	449	762	742
Sustainable activities in current and non-current provision account (comprised of the closure, rehabilitation, and restoration costs)	4,112	5,101	5,360	6,156	6,642	7,993
Research and development expenses	76	169	244	156	65	74
Total fines for breaching environmental regulation	0.48	0.04	0.12	0	0.04	0.002

The optimal output generated by the simplex algorithm using the Premium Solver application in Microsoft Excel consists of values for each decision variables for five years period ahead (t = 2012-2016). The output is depicted in the Answer Report generated by the Solver application in Appendix A.

Based on these optimal solutions and other projections already carried out in the previous section, the pro forma financial data and key financial ratios of BHP Billiton for the period of 2012-2016 in Table 7.

Table 6. Selected ratios

	2006	*2007*	*2008*	*2009*	*2010*	*2011*	*Rate applied in computation*
Revenues growth (%)		20.25	25.08	-15.38	4.83	35.74	14.10 (average)
Sales revenue growth (%)		23.15	50.57	-15.57	5.15	35.87	12.15 (average for four years excluding the highest amount in year 2008)
Ratio of Property, plant and equipment/Sales Revenue	0.64	0.63	0.63	0.62	0.63	0.67	0.64 (average)
Ratio of Operating expenses/Revenue	0.62	0.59	0.60	0.76	0.63	0.56	0.63 (average)
Growth of Payments to suppliers and contractors		0.11	0.32	-0.09	-0.06	0.21	0.098 (average)
Ratio of Employee wages and benefits/Revenues	0.07	0.07	0.07	0.09	0.09	0.08	0.078 (average)
EBIT/Long term debt ratio	1.92	1.98	2.61	0.79	1.48	2.58	
EBIT/Sales ratio	0.46	0.47	0.41	0.24	0.38	0.45	0.4 (average)
Interest coverage ratio	28x	33x	33x	21x	41x	65x	21x (minimum)
Current ratio	0.99	1.08	1.32	1.90	1.93	1.28	1.42 (average)
Ratio of Current assets/Total assets	0.18	0.24	0.28	0.29	0.28	0.25	0.25 (average)
Dividend growth (%)		17.30	38.04	45.55	1.21	9.44	22.31 (average)
Growth in sustainable activities in provision amount (%)		24.05	5.08	14.85	7.89	20.34	14.44 (average)
Ratio of R&D/Operating expenses	0.0034	0.0064	0.0068	0.004	0.002	0.0018	0.0041 (average)
Ratio of interest on loans/Long Term Debt	0.08	0.07	0.08	0.04	0.04	0.04	0.06 (average)
Ratio of Assets/Sales	1.51	1.47	1.28	1.57	1.68	1.43	1.49 (average)
Ratio of Financial Assets/Assets		0.008	0.007	0.006	0.009	0.007	0.07 average)
Ratio of Total environmental fines/Environmental program expenditure	0.002	0.0001	Environmental expenditure data is not available as the Company's focus on integrating environmental responsibility into activities means that it is not possible to accurately extract expenditure spent on the environment and, for that reason, it is no longer reported in the Annual Report and Sustainability Report				0.0001 (minimum)

As shown in Table 7, it is predicted that in the year of 2015 and 2016 the Company will have a negative economic value retained (US$ -505.4 Million and US$ -25,605.4 Million respectively) despite the positive after tax profit projected in those years. It implies that to maintain a positive economic value retained, the company should increase its Revenues and/or decrease certain expenses. By doing so, the Company has also maintained its business sustainability by distributing economic value to its stakeholders without sacrificing its revenues and profits generating ability.

6.2 Sensitivity analysis

Formulating and solving an optimisation or linear programming model does not necessarily mean that the decision problem has been solved. Since it is formed as a projection, no relevant factors are known with certainty. Sensitivity analysis can assist managerial decisions in this area by providing a better description of how the solution to a problem may change if different factors in the model change.

Table 7. BHP Billiton's Pro forma financial data (in US$ Million) and key ratios

	2012	***2013***	***2014***	***2015***	***2016***
Economic value generated (Revenues: Net sales revenue plus other income)	82,413	94,034	107,292	122,421	139,682
Economic value distributed:					
1. Payments to suppliers, contractors, etc	29,643	42,389	60,617	86,682	123,956
2. Employee wages and benefits	5,915	6,376	6,874	7,410	7,988
3. Payments to providers of capital: shareholder dividends	6,181	7,559	9,245	11,307	13,828
4. Payments to providers of capital: interest payments (6% of Long term debt)	1,532	1,719	1,927	2,162	2,424
5. Payments to government: gross taxes and royalties	9,195	10,312	11,565	12,970	14,546
6. Community contribution	307	344	386	432	485
7. Environmental expenditure:					
a. Environmental research expenditure	500	500	500	500	500
b. Environmental costs	620	611	603	594	586
c. Environmental program expenditure	613	688	771	865	970
d. Biodiversity and land management expenditure	4.4	4.4	4.4	4.4	4.4
Total economic value distributed	54,510.4	70,502.4	92,492.4	122,926.4	165,287.4
Economic value retained	*27,902.6*	*23,531.6*	*14,799.6*	*-505.4*	*-25,605.4*
Total economic value retained	*40,122*				
A.					
Sales revenue	80,455	90,230	101,193	113,488	127,277
Operating expenses	50,231	57,942	66,815	77,026	88,771
Total environmental fines	0.06	0.07	0.08	0.09	0.10
Health, safety, environmental and community (HSEC) expenditures	50	55	61	67	73
Communication expenses	251	290	334	385	444
Litigation expenses	712	712	712	712	712
Female staff recruitment expenditure	10	13	14	17	19
Female leadership program expenses	5.06	6.28	7.24	8.35	9.63
Research and development expenses	166	206	238	274	316
Work-life balance policy expenses	59	64	70	75	82
Costs of employee turnover	280	268	257	244	232
Women empowerment program expenses	1.32	1.48	1.66	1.86	2.08
Profit from operations (EBIT)	*32,182*	*36,092*	*40,477*	*45,395*	*50,911*
After tax profit	*21,454*	*24,061*	*26,985*	*30,264*	*33,941*
B.					
Current assets	29,970	33,611	37,695	42,274	47,411
Assets	119,878	134,443	150,778	169,097	189,643
Investments in financial assets	839	941	1,055	1,184	1,328
Investments in capital assets (Property, plant and equipment)	82,162	98,594	118,313	141,976	170,371
Current liabilities	21,106	23,670	26,546	29,770	33,388
Provisions	9,079	10,350	11,799	13,451	15,334
Long term debt (interest bearing liabilities)	25,541	28,644	32,125	36,028	40,406
Key ratios					
Interest coverage ratio	21x	21x	21x	21x	21x
Current ratio	1.42	1.42	1.42	1.42	1.42
Ratio of female to male salary	1:1	1:1	1:1	1:1	1:1

In regards to the negative economic value retained projected to occur in 2015 and 2016, the Company can prepare several alternative plans and analyse the impact onto the financial condition. In other words, the Company can exercise some action plans assuming that it intends to maintain a positive economic value retained in the years to come. The plans are also part of the sensitivity analysis to gain understanding of the impact that the changes in projections may have on the original result. This will assist in the decision making process to determine the appropriate strategic actions to achieve the Company's objective.

6.2.1 Increase the revenues

Assume that the Company plans to have revenues and sales revenues growth of 20% and 15%, respectively. The economic value retained is increased and positive for the period 2012-2016 if the Company can reach the increase in revenues by 20%. Following this, the Company can prepare the strategy to increase the revenues (especially through sales and marketing strategies) to be able to contribute to the stakeholders through the distribution of the economic value without ignoring the bottom line profitability.

6.2.2 Decrease certain expenses

Suppose that the Company chooses another alternative or scenario to decrease certain expenses rather than increasing the revenues. The expenses to be cut can be selected using the Sensitivity Analysis report generated by Solver.

The selected expenses are as follows.

a. Payments to suppliers and contractors
b. Employee wages and benefits

After reducing the two expenditure amounts, the total economic value retained is increase from the original result even though it is predicted to be negative in 2016. The Company can choose further to decrease other expenses or mix the decision of increasing revenues and decreasing certain expenses at the same time to achieve the proposed company's objective of maximising the stakeholders' interests through the economic value retained based on the ethics of care principle. Besides using the Sensitivity Report, the decisions made for the sensitivity analysis can also be guided by the Company's strategies on prioritising certain type of revenues or expenses. The Sensitivity Report should be viewed as assistance for such decision-making process instead of as a primary guidance.

6.3 Comparison of projected and actual data for the year of 2012 and 2013

The comparison of the forecast results with the actual data are presented in Table 8.

Based on the comparison presented in Table 8, it can be seen that there are several items which cannot be compared due to the unavailability of the data in the published report (Sustainability Report and Annual Report). They might be available in the company's accounting system but are not disclosed because of several reasons including immateriality or the cost of extracting the data is deemed to outweigh the benefits of presenting it in the published statement.

Most of the comparisons are negative which means that the projected data are in larger amounts compared to the actual ones. This is normal in the estimation process which signifies the importance of managerial judgement to accompany the results provided by the forecast. This is a good use of the model as the manager or planner can use it in a simulation scheme to exercise "what if" questions as has been demonstrated in the sensitivity analysis section.

Several things are interesting. In the years 2012 and 2013, the actual litigation expenses are significantly higher than expected and they are also an increase from year 2011 (US$ 2,077 Million). Unfortunately, the accurate data of communication expenses are not available so we cannot precisely know which approach the Company has performed in solving its problem with stakeholders: is it through legal action as predicted by the ethics of justice or has it moved to a more communicative approach as suggested by the ethics of care. In addition, the research and development expense is significantly lower than expected even though it is only slightly different compared to 2011 (US$ 74 Million).

The last interesting fact is that the ratios of female and male salary in 2012 and 2013 tend to be unfavourable for female employees as the ratios are increased which means that the pay equity gap does exist. The true reason behind this is not disclosed and hopefully the gap does not represent a bad financial condition that forces the Company to pay less to its female employees.

7 Conclusion, implications, and research limitations

Based on the financial data of 2006-2011, the projection is performed for the five-year period of 2012-2016. The result shows that the company can achieve an overall positive economic value retained in the projected period; however, the economic value retained for 2015 and 2016 showed a negative result. Sensitivity analyses were conducted to discover the impact on the projected financial condition, especially on the economic value retained. The sensitivity analysis is an example of the managerial discretion and judgement that should be used to complement the analysis provided by the mathematical estimation.

Table 8. Comparison of projected and actual data of BHP Billiton for the year of 2012 and 2013

	2012 Prediction	***2012 Actual***	***Difference (%)***	***2013***	***2013 Actual***	***Difference (%)***
Economic value generated (Revenues: Net sales revenue plus other income)	82,413	73,016	-13%	94,034	66,732	-41%
Economic value distributed:						
1. Payments to suppliers, contractors, etc	29,643	29,243	-1%	42,389	28,036	-51%
2. Employee wages and benefits	5,915	6,915	14%	6,376	7,618	16%
3. Payments to providers of capital: shareholder dividends	6,181	5,877	-5%	7,559	6,167	-23%
4. Payments to providers of capital: interest payments (6% of Long term debt)	1,532	755	-103%	1,719	1,031	-67%
5. Payments to government: gross taxes and royalties	9,195	11,862	22%	10,312	11,597	11%
6. Community contribution	307	214	-43%	344	246	-40%
7. Environmental expenditure:						
a. Environmental research expenditure	500	Data is not available		500	Data is not available	
b. Environmental costs	620	Data is not available		611	Data is not available	
c. Environmental program expenditure	613	Data is not available		688	Data is not available	
d. Biodiversity and land management expenditure	4.4	Data is not available		4.4	Data is not available	
Total economic value distributed	54,510.4			70,502.4		
Economic value retained	*27,902.6*			*23,531.6*		
Sales revenue	80,455	72,226	-11%	90,230	65,968	-37%
Operating expenses	50,231	49,380	-2%	57,942	50,873	-14%
Total environmental fines	0.06	0.027	-122%	0.07	0.20	65%
Health, safety, environmental and community (HSEC) expenditures	50	Data is not available		55	Data is not available	
Communication expenses	251	Data is not available		290	Data is not available	
Litigation expenses	712	2,096	66%	712	2,700	74%
Female staff recruitment expenditure	10	Data is not available		13	Data is not available	
Female leadership program expenses	5.06	Data is not available		6.28		
Research and development expenses	166	75	-121%	206	64	-222%
Work-life balance policy expenses	59	Data is not available		64	Data is not available	
Costs of employee turnover	280	Data is not available		268	Data is not available	
Women empowerment program expenses	1.32	Data is not available		1.48	Data is not available	
Profit from operations (EBIT)	*32,182*	*23,752*	-35%	*36,092*	*19,225*	-88%
After tax profit	*21,454*	*15,532*	-38%	*24,061*	*11,075*	-117%
Current assets	29,970	20,451	-47%	33,611	19,786	-70%
Assets	119,878	129,273	7%	134,443	138,109	3%
Investments in financial assets	839	2,163	61%	941	1,857	49%
Investments in capital assets (Property, plant and equipment)	82,162	95,247	14%	98,594	102,927	4%
Current liabilities	21,106	22,034	4%	23,670	20,372	-16%
Provisions	9,079	11,698	22%	10,350	8,864	-17%
Long term debt (interest bearing liabilities)	25,541	24,799	-3%	28,644	35,165	19%
Key ratios						
Interest coverage ratio	21x	33x	36%	21x	19x	-11%
Current ratio	1.42	0.93	-53%	1.42	0.97	-46%
Ratio of female to male salary	1:1	1:1.034		1:1	1:1.066	

Despite the limitation in accessing the unpublished data, the model presented in this research provides an example of how we can systematically build the feminist ethics of care theory into a practical model to explore its economic implications as indicated by Folbre (1995) With the data accessibility and/or the availability of the accounting system specifically designed under the ethics of care principles, the limitation can be overcome to provide better estimations and analysis in the future.

The implications of this research are presented as follows.

1. A sophisticated financial planning model can be developed to serve as financial management strategies that a company can take in the future to perform sustainability activities without sacrificing the profit objective. However, as the model requires accurate accounting and financial data, an accounting system should be designed in a company to capture and record the required data input such as the externalities amount, the extensive communication with stakeholders amount and the expenses amount related to women's interests in the employee group and other stakeholder groups.

2. If the ethics of care becomes more popular in the future for investors, academics and other stakeholders to analyse the corporate governance practices of a company through the disclosures in the publicly available report, an accurate accounting system should also be designed to assist the company in producing and disclosing necessary items and amounts in line with the ethics of care principles.

3. Despite the attention has been given to the ethics of care in this study, it does not mean to disregard the rights, fairness and rules as suggested by the ethics of justice. Gilligan herself believes that rights are an essential, though not a dominant, component of caring (Liedtka 2009). Without rights, 'the injunction to care is paralysing, rights allow us to appropriately value self-interest…to act responsively towards self *and* others and thus to sustain connection" (Gilligan 1982, p. 149). The point is to show that the ethics of care and ethics of justice are complementary; they are incomplete without each other. The justice approach is still needed to determine which needs and interests should be met given limited capacity and resources. As Anwar (2009) puts it, the ethics of care should be applied in conjunction with the strengthening of regulation because regulatory failure has brought about corporate fraud, insider trading and other unethical business conduct.

This research contains several limitations. The analysis of the corporate governance practices from the feminist ethics of care perspective in this study was conducted based on the publicly available information in the Annual and Sustainability Reports. This secondary data source might be too simple and not adequate to explore the issue. Future researchers can gather the primary data from interviews, questionnaires or direct observation of the sample companies to complement the content analysis method.

The financial planning model developed using the linear programming optimisation approach follows a deterministic approach assuming that the future financial condition can be predicted with a certain degree of accuracy. In reality, the dynamics of the business processes and operations contain a degree of uncertainty which might not be captured in the current proposed model. A more dynamic model is required to reflect better the reality.

It should also be noted that the financial planning model developed in this research is just an early step that demand more contemplation. There are still much works to do better to translate the principles of the ethics of care into the financial management strategies of a company.

The analysis performed in this study is based on one company as a sample. Although generalisability is not the main purpose of this research, its application to other companies can be done for future research to gain an understanding of the corporate governance practices from the feminist ethics of care perspective. The value and significance of this research will be greatly enhanced when further research is undertaken to test its applicability to other organisations and to modify it if necessary.

Last but not least, the complementarity of the ethics of care and the ethics of justice has been stated several times in this study. However, the issue of how we set the boundaries of care has not been discussed and needs a more in-depth analysis in future research. Without the effort to make this clear, it will be difficult to make an operationally meaningful translation of the ethics of care to the competitive business environment. Several questions need to be answered, for instance, do we need to care about competitors? Do all customers or employees have an equal claim on a company's care-giving resources? One suggestion from Liedtka (2009) still needs thorough thought and empirical research that "the business organization, conceived of as a "community of mutual care," would have a responsibility to care for those in proximity to them who have needs that they are especially well-suited, by their capability base, to fulfil, where giving such care does not act against their own needs. Such care should be growth-enhancing for its recipients," (p.196).

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Appendix A

Table A.1. Carleton's linear-programming model (1970)

I. Objective-function	$\text{MAX}\ \frac{Po}{No} = \sum_{t=1}^{T-1}\left[\frac{D_t}{No(t+k)} - \frac{\Delta E_t^n}{No(t+k)^t(1-C)}\right] + \frac{P_t - \Delta E_t^n}{N_t(1+k)^t}$ Po = theoretical equity value in period zero; No = number of common shares outstanding; D_t = total dividends paid by the firm in period *t;* ΔE_t^n = net funds received from equity issued in period *t;* P_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.
II. Constraints	
A. *Definitional constraints*	*1. Available-for-common definition* $AFC_t = ATP_t - Pfdiv_t - SA_t;$ $ATP_t = (1-\tau)\left\{\pi_t + \Delta eA_t - \Delta aAa_t - \sum_{z=1}^{Z} i_z\left(L_{z,0} + C_{z,t}\right) - i_t'\sum_{z=1}^{Z}\Delta DL_t\right\}$ $+ B_1B_2\left(I_t + \Delta eA_{t-1}\right) + (1-\tau)\left(\Delta aAa_t - \Delta eA_{t-1}\right);$ $\pi_t = \pi_{0,t} + \sum_{s=1}^{t}\pi_s'(I_s);$ $I_t = \frac{\rho - C_0}{C_t}\left(1 + \frac{\rho - C_0}{C_t}\right)^{t-1} A_0;$ $A_t = \left(1 + \frac{\rho - C_0}{C_t}\right)^t A_0$ AFC_t = Available for common funds; ATP = after tax profits; $Pfdiv$ = preferred dividends; SA_t = special adjustments; τ = corporate tax rate; π_t = period's EBIT; Δ_e = stockholder report depreciation rate of assets; A_t = total net assets; Δa = tax-reported accelerated depreciation; Aa_t = tax report assets; i_z = interest rate of z^{th} liability; $L_{z,0}$ = initial amount in liability account z; $C_{z,t}$ = known cumulative in $L_{z,0}$ as a result of prearranged loan "takedown" amortization schedule, etc., $C_{z,t} = \sum_{T-1}^{t} CL_{z,\tau}$. It includes expansion of trade credit and payment of long-term debt through sinking funds; i_t' = interest rate for new long-term debt in year *t;* ΔDL_t = change in long-term debt in period t; B_1 = investment tax credit rate; B_2 = proportion of firm's assets on which investment tax credit is applicable; $\pi_{0,t}$ = known profit at time *t* associated with the firm's initial stock of assets A_0; $\pi_s'(I_s)$ = the level of annual profits resulting from period τ's net investment I_s. I_t = net investment; ρ = internal rate-of-return per period earned on I_1 (Growth Profit Margin as a proxy); and C_0 and C_1 = production function parameters associated with $(C_0>0, C_1<0)$.

Table A.1. Carleton's linear-programming model (1970) (continued)

B. *Sources and uses of funds constraints*	*1. Sources and uses of funds are equal* $I_t = AFC_{t-1} - D_{t-1} + \sum_{z=1}^{Z} \Delta CL_{z,t} + \Delta DL_t + \Delta DTL_{t-1} + \Delta E_t^n$ I_t = net investment; AFC_t = available for common funds; D_t = total dividends paid by the firm in period *t;* ΔCL_z = change in $C_{z,t}$; ΔDL_t = change in long-term debt in year t; ΔDTL_{t-1} = change of deferred corporate income tax; and ΔE_t^n = net funds received from equity issued in period *t.*
C. Policy constraints	*1. Interest coverage* $\frac{\Pi_t}{\sum_{z=1}^{Z} i_z (L_{z,0} + C_{z,t}) + i_t' \sum_{s=1}^{t} \Delta DL_s} \geq X$ X = minimum acceptable interest coverage; π_t = period's EBIT; i_z = interest rate of z^{th} liability; $(L_{z,0} + C_{z,t})$ = liabilities$_t$ + long-term debt$_0$ i_t' = interest rate for new long-term debt in year *t;* and $\sum_{s=1}^{t} \Delta DL_s$ = cumulative change in long-term debt since the beginning of the planning horizon. *2. Maximum leverage* $\sum_{z=1}^{z} i_z (L_{z,0} + C_{z,t}) + \sum_{t=1}^{T} \Delta DL_t \leq (\frac{S}{1+S}) A_t$ i_z = interest rate of z^{th} liability; $L_{z,0}$ = initial amount in liability account z; $C_{z,t}$ = known cumulative in $L_{z,0}$ as a result of prearranged loan "takedown" amortization schedule, etc., $C_{z,t} = \sum_{T-1}^{t} CL_{z,\tau}$. it includes expansion of trade credit and payment of long-term debt through sinking funds; ΔDL_t = change in long-term debt in year t; S = maximum debt/equity ratio; and A_t = total net assets. *3. Prefinancing limitation* $\sum_{t=1}^{T} \Delta DL_t - \sum_{t=1}^{T-1} \Delta DL_t \leq I_t$ I_t = net investment; and ΔDL_t = change in long-term debt in year *t*. *4. Minimum dividend growth* $D_t - \alpha_{t-1} \geq 0;$ $P_t - \Delta E_t^n \geq \frac{1}{\alpha_t} P_t$ D_t = total dividends paid by the firm in period *t;* P_t = aggregate market value of the firm's equity at the beginning of period *t* (*t*=0,1,2,...,t); α_t = 1 + the minimum dividend growth rate; and ΔE_t^n = net funds received from equity issued in period *t.*

Table A.1. Carleton's linear-programming model (1970) (continued)

C. Policy constraints	*5. Payout restriction* $D_t \geq \delta_1 AFC_t$; $D_t \geq \delta_2 AFC_t$ D_t = total dividends paid by the firm in period *t*; δ_1 = lower-bound payout ratio; δ_2 = upper-bound payout ratio; and AFC_t = available for common funds. *6. Cumulative payout restriction* $\sum_{t=1}^{T} D_t - \delta \sum_{t=1}^{T-1} AFC_t \leq 0$ D_t = total dividends paid by the firm in period *t*; AFC_t = available for common funds; and δ = cumulative payout restriction.

Appendix B

Table B.1. (Early) model comparison

Optimization elements	***Carleton's "traditional" model***	***Proposed "feminist ethics" model and modifications***
Objective Function	Corporate governance theory: shareholder aspect *Objective: Maximize shareholders wealth,* represented by a proxy-share price using stream-of-dividends approach	Corporate governance theory: stakeholder aspect *Objective: Maximize stakeholders wealth* To reflect the stakeholder theory, the objective function will consist of several objectives and utilize the Multiple Objective Linear Programming (MOLP). The stakeholders that will be considered are the primary ones according to Clarkson (1995) priority ranking. Specifically, the example of objectives are: 1. Maximize shareholders wealth, 2. Minimize rework and spoilage costs (to increase the customer satisfaction) 3. Minimize the life-threatening accidents in the workplace (for employees interest) 4. Minimize the production of toxic waste water (for community and environment interests) The interests of suppliers, lenders, and government are not reflected explicitly in the objective functions; however, it is assumed that if the business is running well, then these parties will also benefited, either directly or indirectly.
Constraints-:Corporate Governance Policy	Corporate governance policy: dividend payment to shareholders. *Contraints:* 1. Available funds for common shareholders. 2. Minimum dividend growth. 3. Payout restriction. 4. Cumulative payout restriction.	Same as Carleton's.
	Corporate governance policy: investment *The constraint reflected in sources and uses of funds.*	Same as Carleton's, with additional constraints of percentage of each type of investment instrument to ensure investment diversification, such as: 1. Investment in securities should not exceed certain percentage. 2. Investment in bonds and money market should at least achieve certain percentage.
	Corporate governance policy: financing *Constraints:* 1. Interest coverage. 2. Maximum leverage. 3. Prefinancing limitation.	Same as Carleton's.
Contraints:Risk Management	Were not included.	Risk management toward accounting risk *Constraints:* Restriction of discretionary accruals (Scott 2006), such as: 1. The generous credit policy should be limited to certain percentage of sales (to avoid the increase in net accounts receivable as the effect of irregular policy that may cause bad debts in the future). 2. The production of inventory in a period of excess manufacturing capacity should be limited to certain percentage of previous year stock (to avoid the absorption of fixed overhead costs in inventory rather than charging them off to expense)
	Only credit risk is included in corporate governance-financing policy.	Risk management toward financial risk *Constraints:* Hedging instrument value must not less than the value of hedged assets and liabilities (to manage currency risk and interest rate risk).
Constraints:External factor--regulatory environments of Australian companies	Corporate tax rate and interest rate have been used in the model.	Same as Carleton's, and other macroeconomic indicators will be added as needed (for instance the probability of economic condition to be used in scenario approach of linear programming).