

**An Investigation into the Effects of the Use of
Financial and Operational Hedges on
Australian Corporate Foreign Currency Risk
Exposure**

Thesis submitted by

Mohammad AL-SHBOUL
BSc. Econ.; MBus. Fin.

in February 2008

for the degree of Doctorate of Philosophy
in the School of Business
James Cook University

STATEMENT ON SOURCES

Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

.....
(Signature)

.....
(Date)

STATEMENT OF ACCESS

I, the undersigned author of this work, understand that James Cook University will make this thesis available for use within the University Library and, via the Australian Digital Theses network, for use elsewhere.

I understand that, as an unpublished work, a thesis has significant protection under the Copyright Act and;

I do not wish to place any further restriction on access to this work

Signature

Date

ELECTRONIC COPY

I, the undersigned, the author of this work, declare that the electronic copy of this thesis provided to the James Cook University Library, is an accurate copy of the print thesis submitted, within the limits of the technology available.

Signature

Date

DECLARATION ON ETHICS

I declare that the proposed research methodology presented and reported in this thesis did not require an ethics approval from the James Cook University Experimentation Ethics Review Committee.

Signature

Date

ACKNOWLEDGEMENTS

Writing this thesis is the most intense experience in my academic life. It has been a long project involving clear objectives, planning, focus, and determination. However, the accomplishment of this project has not been achieved without the support of many people. Each of them has been very important to this work and it is my great pleasure to express my appreciation to them.

I especially thank my PhD thesis supervisors. I express many thanks to A/Professor Stewart Alison for his constructive, constant supervision and guidance, over the life of this project. I also strongly express my gratitude and grateful to Professor Brendan O'Connell for his guidance to finalise this research. I do appreciate his comments and support. I also wish to deeply thank Dr. Rabiul Beg for his guidance especially from an econometrics perspective. I am always grateful to them all times.

In addition, special thanks to Dr. Gina Curro for her support and the exceptional editorial services that she has provided. I am also indebt to thank the School of Business and the Graduate Research School at JCU and all their employees who have been helpful on so many occasions.

It is impossible to describe how much I owe my parents, for their love, support, and patience. I will be always grateful to them for teaching me that education is the greatest of all assets and that no-body can take it way from us. Finally, I should thank Al-Hussein Bin Talal University/Jordan for the financial support provided to achieve this work.

Mohammad Al-Shboul

February 2008

ABSTRACT

The purpose of this thesis is to investigate the effects of the use of financial and operational hedging on foreign exchange rate exposure among Australian multinational corporations. Since the flotation of the Australian dollar at the end of 1983, Australian firms have become increasingly exposed to foreign exchange rate risk. To eliminate this risk, Australian firms have undertaken substantial corporate hedging programs, which are both financial and operational in nature. It is notable that there has been an increase in financial hedging techniques such as derivatives and foreign-currency denominated debt, and operational hedging such as diversifying and spreading subsidiaries across foreign countries. Despite the substantial involvement in corporate hedging strategies, there is a paucity of Australian research studies examining the relationship between the use of financial and operational hedging by firms and their levels of foreign exchange rate exposure.

A two-stage market model was used to investigate the main research problem using a sample of 62 Australian multinational corporations. The first-stage model - Jorion's (1991) model – was adopted, to test the first hypothesis of whether there exists a relationship between stock returns and changes in exchange rates, by estimating the exposure coefficients to foreign currency risk during the period from January 2000 to December 2004. Next, the second-stage model utilised cross-sectional regression models to examine the effects of the use of financial hedging, separately and/or in combination with, operational hedging on foreign exchange risk exposure. This second-stage model was estimated for the 2004 financial year data to test seven hypotheses. These seven hypotheses were related to whether the use of financial separately, or in combination with, operational hedging effectively reduced exposure. Therefore, eight main research hypotheses were tested in the study.

Findings of the study were that there is only weak evidence to support the hypothesis that stock returns were sensitive to changes in value of the Australian dollar. It was found that the use of foreign currency derivatives was significantly related to exposure reduction. The use of foreign debt was also found to be significantly related to exposure reduction, indicating that foreign debt is used for hedging purposes. Furthermore, the combined use of these two financial hedging strategies was found

to be significantly associated with the exposure reduction. By the same token, these two financial hedging strategies were found to be substitutive to each other in reducing exposure. Operational hedging proxies were also significantly associated with the exposure reduction. This latter finding indicates that, for the purposes of hedging, firms diversify and disperse foreign operations and subsidiaries across countries and geographical regions. In addition, the combined use of financial and operational hedging was found to be negatively associated with exposure. Finally, the use of financial hedging was found to complement operational hedging in reducing exposure.

The models used in this study could be applied to further research into the relationship between the use of financial and operational hedging and exposure. This could be achieved by using different time spans, different markets (countries) data, and larger samples, together with other measures. As Australian firms are greatly exposed to foreign exchange rate risk and consequently are heavily involved with financial and operational hedging activities, the results of this study could be beneficial to corporate managers, individual and corporate investors, researchers, derivatives designers and regulators.

JEL classification: F23; F31; F37; G30; G32

Keywords: foreign exchange risk exposure; multinational firms; International Finance; financial Risk management; operational hedging; financial hedging; financial derivatives.

PUBLICATIONS FORM THE RESEARCH

Conferences (refereed):

- 1- Al-Shboul, M. (2008). Does The Use of Financial and Operational Hedges Reduce Foreign Exchange Rate Exposure?. Accounting and Finance Association of Australian and New Zealand (AFAANZ) Conference, Gold Coast, Australia, Submitted on the 22nd of January.
- 2- Al-Shboul, M. (2007). The Impact of The Use of Derivatives and Operational Hedging on The Foreign exchange Risk Exposure. Paper presented at the 20th Australasian Finance and Banking Conference, University of New South Wales, Sydney, Australia (December).
- 3- Al-Shboul, M., & Alison, S. (2007). Translation Exposure and Firm Value: Evidence From Australian Multinational Corporations. Paper presented at the 5th International Business Research Conference, University of Wollongong, Dubai, UAE (April).
- 4- Al-Shboul, M., & Alison, S. (2007). The Effectiveness of The Use of Derivatives on The Foreign Exchange Risk Exposure. Paper presented at the 7th International Business Research Conference, University of Technology, Sydney, Australia (December).

Papers (refereed):

- 1- Al-Shboul, M., & Alison, S. (2008). Translation Exposure and Firm Value: Evidence From Australian Multinational Corporations. *International Review of Business Research Papers*, 4(1), 23-44.
- 2- Al-Shboul, M., & Alison, S. (2008). The Effect of The Use of Corporate Derivatives On The Foreign Exchange Rate Exposure. *Journal of Accounting-Business and Management*, Submitted on the 2nd of January.

TABLES OF CURRENCY SYMBOLS AND ABBREVIATIONS

CURRENCY SYMBOLS

The following currency symbols are used frequently in this dissertation:

AUD	Australian Dollar
CAD	Canadian Dollar
CHF	Swiss Franc
CPAM	Capital Asset Pricing Model
EUR	European Union Euro
FJD	Fijian Dollar
GBP	United Kingdom Pound
DM	Douche Mark
HKD	Hong Kong Dollar
IDR	Indonesian Rupiah
INR	Indian Rupee
JPY	Japanese Yen
KRW	Korean Won
KWD	Kuwait Dinar
MXP	Mexican Peso
MYR	Malaysian Ringitt
NOK	Norwegian Krone
NZD	New Zealand Dollar
PHP	Philippine Peso
SAR	Saudi Arabian Riyal
SBD	Solomon Island Dollar
SEK	Swedish Krone
SGD	Singapore Dollar
SUR	Russian Rouble
THB	Thai Baht
USD	United States Dollar
ZAR	South African Rand

ABBREVIATIONS

The following abbreviations are used frequently in this dissertation:

3SLS	Three-Stage Least Squares
AASB	Australian Accounting Standards Board
ABS	Australian Bureau Of Statistics
ADF	Augmented Dickey-Fuller Test
AGSM	Australian Graduate School of Management
AIET	Australian International Equity Trust
AOI	All Ordinary Index
APT	Arbitrage Pricing Theory
AR	Autoregressive Order Scheme
ARCH	Autoregressive Conditional Heteroskedastic
ARMA	Autoregressive Moving Average
ASX	Australian Securities Exchange
BIS	Bank For International Settlements
BLO	The percentage of shares held by block-holders
BLUE	Best Linear Unbiased Estimators
CAPEX	The percentage of capital expenditures to total assets
CLRM	Classical Linear Regression Model
CMT	Capital Market Theory
CPAM	Capital Asset Pricing Model
CR	Current ratio
DER	Derivatives to Total Assets Ratio
DF	Dickey-Fuller Test
DIR	The percentage of shares held by directors
DW	Durbin-Watson Test
EBIT	Earnings Before Interest And Taxes
EMH	Efficient Market Hypothesis
EMS	European Monetary System
Eq(s)	Equation(s)
EWI	Equally-Weighted Index
FASB	Financial Accounting Standards Board
FCD	Foreign Currency Derivatives
FDD	Foreign Currency Denominated Debt
FDI	Foreign Direct Investment
FS	Foreign Sales Ratio
FX	Foreign Exchange
GARCH	Generalized Autoregressive Conditional Heteroskedastic
GDP	Gross Domestic Products
GLS	Generalized Least Squares
GMM	Generalized Method Of Moment
HERF1	Herfindahl Index 1 (country level)
HERF2	Herfindahl Index 2 (geographical region level)
IAS	International Accounting Standards
IMF	International Monetary Funds

INS	The percentage of shares held by institutions
IPC	International Parity Conditions
IRR	Internal Rate of Return
LEV	Leverage ratio
LM	Lagrange Multiplier
MERM	Multilateral Exchange Rate Model
MLE	Maximum Likelihood Estimation
M-M	Modigliani and Miller Theorem
MNCs	Multinational Corporations
MSCI	Morgan Stanley Capital International
NAB	National Australia Bank
NAFTA	North American Free Trade Agreement
NPV	Net Present Value
NRC	The natural logarithm of the number of subsidiaries per country.
NRF	The natural logarithm of the number of subsidiaries per geographical region.
NSGM	The number of business segments
NZ	New Zealand
OLS	Ordinary Least Squares
OTC	Over-the-Counter
p.a.	Per Annum
PER	Price-to-Earnings
POT	Pecking Order Theory
PPP	Purchasing Power Parity
RBA	Reserve Bank of Australia
RD	Research And Developments
RIP	Real Interest Rate
ROA	Return on Assets
SASB	Statements of Accounting Standards Board
SDR	Special Drawing Right
SFE	Sydney Futures Exchange
Size	Firm Size
SIZE	The Size of the firm
SUR	Seemingly Unrelated Method
TWI	Trade Weighted Index
TWIVER	Trade-Weighted Index Value Excess Return
U.K.	United Kingdom
U.S.	United States
UEH	Unbiased Efficiency Hypothesis
UIP	Uncovered Interest Parity
VaR	Value-at-Risk
VWR	Value-Weighted Index
WLS	Weighted Least Square

TABLE OF CONTENTS

LIST OF TABLES.....	xvi
LIST OF FIGURES.....	xvi
LIST OF EQUATIONS.....	xvii

CHAPTER ONE

INTRODUCTION TO THE THESIS

1.0 STRUCTURE OF CHAPTER ONE.....	1
1.1 INTRODUCTION.....	1
1.2 JUSTIFICATION FOR THE STUDY.....	4
1.3 STATEMENT OF THE RESEARCH PROBLEM AND HYPOTHESES.....	9
1.4 CONTRIBUTIONS OF THE STUDY.....	11
1.5 DATA AND METHODOLOGY.....	23
1.5.1 Data.....	23
1.5.2 Methodology.....	25
1.6 FINDINGS AND EMPIRICAL RESULTS.....	26
1.7 OUTLINE OF THE THESIS.....	32
1.8 DELIMITATIONS OF SCOPE AND KEY ASSUMPTIONS OF THE THESIS.....	35
1.9 CONCLUSION.....	36

CHAPTER TWO

AN OVERVIEW OF FOREIGN EXCHANGE RISK MANAGEMENT

2.0 STRUCTURE OF CHAPTER TWO.....	37
2.1 INTRODUCTION.....	37
2.2 FOREIGN EXCHANGE RISK AND EXPOSURE.....	38
2.2.1 Foreign Exchange Rate.....	38
2.2.2 Foreign Exchange Rate Risk and Exposure.....	39
2.2.3 The Relationship Between Foreign Exchange Rate Risk and Exposure.....	41
2.3 THE TYPES OF FOREIGN EXCHANGE RATE EXPOSURE.....	43
2.3.1 Transaction Exposure.....	43
2.3.2 Economic Exposure.....	44
2.3.3 Translation Exposure.....	45
2.4 MEASURING FOREIGN EXCHANGE RATE EXPOSURE.....	46
2.4.1 Measuring Transaction Exposure.....	46
2.4.2 Measuring Economic Exposure.....	47
2.4.3 Measuring Translation Exposure.....	49
2.5 MANAGING FOREIGN EXCHANGE RATE EXPOSURE.....	50
2.5.1 Managing Transaction Exposure.....	52
2.5.1.1 Internal Hedging.....	53
2.5.1.2 External Hedging.....	60
2.5.2 Managing Economic Exposure.....	60
2.5.3 Managing Translation Exposure.....	63
2.6 WHY FIRMS UNDERTAKE THE HEDGING OF FOREIGN EXCHANGE RISK.....	64
2.7 CONCLUSION.....	67

CHAPTER THREE

REVIEW OF LITERATURE

3.0 STRUCTURE OF CHAPTER THREE	70
3.1 INTRODUCTION	70
3.2 THE EFFECT OF EXCHANGE RATE CHANGES ON FIRM VALUE	73
3.2.1 Introduction	73
3.2.2 Studies of Foreign Exchange Rate Exposure	75
3.2.2.1 The First Phase: The Fundamentals of Exchange Risk Exposure Estimation Models.....	77
3.2.2.2 The Second Phase: A New Shift in Model Design (Post-Jorion 1990)	85
3.2.2.3 The Third Phase: The Characteristics of Foreign exchange rate exposure	100
3.2.3 Conclusion.....	116
3.3 THE EFFECT OF THE USE OF FINANCIAL HEDGING ON FOREIGN EXCHANGE RATE EXPOSURE	117
3.3.1 Introduction	117
3.3.2 The Effect of The Use Of Currency Derivatives On Exposure	118
3.3.3 The Effect of the Use of Foreign Debt on Exposure	124
3.3.4 The Effect of the Combined Use of Derivatives and Foreign Debt on Exposure ..	128
3.3.5 Currency Derivatives As Complements To, Or Substitutes for, Foreign Debt	131
3.3.6 Conclusion.....	135
3.4 THE EFFECT OF THE USE OF OPERATIONAL HEDGING ON FOREIGN EXCHANGE RATE EXPOSURE	135
3.4.1 Introduction	135
3.4.2 Operational Hedging Studies.....	136
3.4.3 Conclusion.....	140
3.5 THE EFFECT OF THE COMBINED USE OF DERIVATIVES AND OPERATIONAL HEDGING ON FOREIGN EXCHANGE RATE EXPOSURE	140
3.5.1 Introduction	140
3.5.2 Studies Of The Combined Use Of Derivatives And Operational Hedging	141
3.5.3 Conclusion.....	145
3.6 CURRENCY DERIVATIVES ARE COMPLEMENTS TO, OR SUBSTITUTES FOR, OPERATIONAL HEDGING	146
3.7 SUMMARY OF LITERATURE REVIEW AND EXPECTED CONTRIBUTION OF PRESENT STUDY TO KNOWLEDGE	149
3.7.1 Introduction	149
3.7.2 The Relationship Between Exchange Rate Changes And Firm Value.....	149
3.7.3 The Effect of Financial Hedging on Exposure	150
3.7.3.1 The effect of the use of currency derivatives on exposure.....	150
3.7.3.2 The effect of the use of foreign debt on exposure.....	151
3.7.3.3 The effect of the combined use of derivatives and foreign debt on exposure.	151
3.7.3.4 Currency derivatives as complements to, or substitutes, for foreign debt	152
3.7.4 The Effect of the Use of Operational Hedging on Exposure.....	152
3.7.5 The Effect of the Combined Use of Currency Derivatives and Operational Hedges on Exposure	153
3.7.6 Currency Derivatives as Complement to, Substitute for, Operational Hedging....	153

CHAPTER FOUR

DATA AND METHODOLOGY

4.0 STRUCTURE OF CHAPTER FOUR	154
4.1 INTRODUCTION	155
4.2 DATA.....	155
4.2.1 Sample Selection	155
4.2.2 Sources of Data Collection	159
4.2.2.1 Time Series Data.....	159
4.2.2.2 Cross-sectional data	160

4.3 METHODOLOGY	161
4.3.1 Introduction	161
4.3.2 First-stage Model: The Two-Factor Linear Regression.....	162
4.3.2.1 The asset-excess return generating process.....	164
4.3.2.2 Estimation of the first-stage model	168
4.3.3 Second-stage Model (Cross-Sectional Regression Model)	170
4.3.3.1 Description of the variables used in the second-stage model.....	170
4.3.3.2 Financial hedging models	185
4.3.3.3 Operational hedging models	193
4.3.3.4 Operational and financial hedging models.....	195
4.4 CONCLUSION	199

CHAPTER FIVE

DATA ANALYSIS AND RESULTS

5.0 STRUCTURE OF CHAPTER FIVE	201
5.1 INTRODUCTION	201
5.2 THE EMPIRICAL RESULTS OF THE FIRST-STAGE MODEL	202
5.3 THE EMPIRICAL RESULTS OF THE SECOND-STAGE MODEL	216
5.3.1 The Effect of The Use of Financial Hedging on The Exposure	216
5.3.1.1 Univariate Analysis.....	216
5.3.1.2 Multiple Regression Analysis	222
5.3.2 The Effect Of The Use Of Operational Hedging On The Exposure.....	238
5.3.2.1 Univariate Analysis.....	238
5.3.2.2 Multiple Regression Analysis	245
5.3.3 The Effect of the Combined Use of Financial and Operational Hedging on Exposure	251
5.3.3.1 Univariate Analysis.....	251
5.3.3.2 Multiple Regression Analysis	254
5.3.4 Financial Hedging As A Complement To Operational Hedging.....	258
5.3.4.1 Univariate Analysis.....	258
5.3.4.2 Multiple Regression Analysis	259
5.4 CONCLUSION	263

CHAPTER SIX

CONCLUSIONS AND IMPLICATIONS

6.0 STRUCTURE OF CHAPTER SIX.....	266
6.1 INTRODUCTION	266
6.2 OVERVIEW OF HYPOTHESES AND FINDINGS.....	267
6.3 CONTRIBUTION OF THE STUDY TO THE RESEARCH LITERATURE	274
6.3.1 Estimation of Foreign Exchange Rate Exposure (First-stage Model)	274
6.3.2 Cross-sectional Regression Model (Second-stage Model)	275
6.4 CONTRIBUTION TO THE BODY OF KNOWLEDGE	280
6.5 LIMITATIONS	282
6.6 IMPLICATIONS FOR FURTHER RESEARCH DIRECTIONS	283
6.7 WHO WOULD BENEFIT FROM THIS THESIS?	287

REFERENCES	291
-------------------------	------------

APPENDICES.....	316
------------------------	------------

Appendix 5.1: Stationarity Tests Results.....	316
--	------------

Appendix 5.2: Auto-correlation Tests Results	318
Appendix 5.3: Heteroskedasticity Tests Results	320
Appendix 5.4: Conditional Heteroskedasticity Tests Results	321
Appendix 5.5: Survey of the Number of Foreign Subsidiaries	322

LIST OF TABLES

Table 4.1	Descriptive Of The Variables Used In The Second-Stage Model Regression.....	172
Table 5.1	Summary Statistics For Exposure Coefficients.....	204
Table 5.2	Summary Statistics For Financial Hedging Variables.....	218
Table 5.3	The Pearson Correlation Coefficients Matrix For Financial Hedging Variables.....	220
Table 5.4	The Effect Of The Use Of Foreign Currency Derivatives On The Exposure.....	224
Table 5.5	The Effect Of The Use Of Foreign Debt On Exposure.....	229
Table 5.6	The Effect Of The Combined Use Of Currency Derivatives And Foreign Debt On Exposure.....	233
Table 5.7	Foreign Currency Derivatives Is A Complement To, A Substitutive For, Foreign Debt.....	236
Table 5.8	A Summary Statistics For Operating Hedging Variables.....	239
Table 5.9	Pearson Correlation Coefficient Matrix For Operational Hedging Variables.....	243
Table 5.10	The Effect Of The Use Of Operational Hedging On Exposure....	247
Table 5.11	Operational Hedging Variables.....	253
Table 5.12	The Effect Of The Combined Use Of Derivatives And Operational Hedging On Exposure.....	256
Table 5.13	Financial Hedging Is A Complement To, Or Substitutive For, & 5.14 Operational Hedging.....	260 & 262

LIST OF FIGURES

Figure 3.1	Contents Of Chapter 3.....	72
Figure 3.2	The Relationship Between Changes In Exchange Rate And Stock Returns.....	74

LIST OF EQUATIONS

Eq. 2.1	Foreign Exchange Risk Exposure.....	42
Eq. 2.2	Basic Model Of Foreign Exchange Risk Exposure.....	43
Eq. 2.3	Measuring Foreign Exchange Rate Risk	43
Eq. 3.1	The Simple Market Model - Adler And Dumas's (1984) Model.....	77
Eq. 3.2	Jorion's (1990) Augmented Model.....	79
Eq. 3.3	Jorion's (1991) Model.....	86
Eq. 3.4	Martin and Mauer's (2005) Model.....	91
Eq. 3.5	Choi et al.'s (1997a) Model.....	95
Eq. 3.6	Choi et al.'s (1997b) Model.....	96
Eq. 3.7	Gao's Model.....	97
Eq. 3.8	Three-Factor Linear Model.....	98
Eq. 3.9	Bodnar and Bartov's (1994) Model.....	101
Eq. 3.10	Gao's (2000) Model.....	105
Eq. 3.11 & 3.12	Williamson's (2001) Model.....	107 & 108
Eq. 3.13	Bratram's (2004) Model	109
Eq. 3.14	Priestley and Qdegaard's (2007) Model.....	110
Eq. 3.15	Koutmos And Martin's (2003) Model.....	112
Eq. 3.16	The Relationship Between The Use of Derivatives and Exposure.....	120
Eq. 3.17	The Relationship Between The Use of Foreign Debt and Exposure.....	126
Eq. 3.18	The Relationship Between The Combined Use of Both Derivatives And Foreign Debt and Exposure.....	128
Eq. 3.19	Currency Derivatives As Complements To, Or Substitutes For, Foreign Debt.....	133
Eq. 3.20	The Relationship Between The Use Of Operational Hedging And Exposure.....	138
Eq. 3.21	The Relationship Between The Combined Use Of Derivatives and Operational Hedging and Exposure.....	142
Eq. 3.22	Currency Derivatives Are Complements To, Or Substitutes For, Operational Hedging.....	146
Eq. 4.1	First-stage Model: The Two-Factor Linear Regression Model..	163
Eq. 4.2 & 4.3	The Effect of The Use of Foreign Currency Derivatives on Exposure.....	186 & 187
Eq. 4.4 & 4.5	The Effect of The Use of Foreign Debt On Exposure.....	189
Eq. 4.6 & 4.7	The Effect of The Combined Use Of Currency Derivative And Foreign Debt On Exposure.....	191
Eq. 4.8 & 4.9	Currency Derivatives as Complements To, Or Substitutes For, Foreign Debt	192
Eq. 4.10	The Effect Of The Use of Operational Hedging On Exposure...	194
Eq. 4.11	The Effect of The Combined Use Of Currency Derivatives and Operational Hedging On Exposure.....	196
Eq. 4.12 & 4.13	Financial Hedging As A Complement To, or A Substitute For, Operational Hedging.....	198