

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

LIQUIDITY AND STOCK RETURNS IN ORDER DRIVEN MARKETS

A thesis presented in partial fulfilment of the requirements for the degree
of Master of Business Studies in Finance at Massey University

BEN MARSHALL
1999

Abstract

This thesis examines the relationship between liquidity and stock returns in the New Zealand and Australian stock markets, for the periods of 1993 to 1998 and 1994 to 1998 respectively. There is evidence to suggest that investors are compensated for holding less liquid stocks with higher returns. However, this is the first study (that the author is aware of) to test the return-liquidity relationship in pure order driven stock exchanges. The combined use of bid-ask spread, turnover rate, and amortised spread as proxies for liquidity, also makes this study unique. Previous studies have investigated the return-liquidity relationship using only one or two of these proxies. In addition to liquidity, other factors that have been found by previous researchers to influence stock returns, such as beta, size, and book-to-market equity are also considered. Seemingly Unrelated Regressions (SUR) and a variant of the General Pooled Cross-Sectional Time-Series Model, known as the Cross Sectionally Correlated Timewise Autoregressive (CSCTA) Model, form the methodological basis for this research. A small liquidity premium is found in both markets. This premium persists for the entire year in the Australian market, while in the New Zealand market the premium is only evident in the month of January. There is strong evidence of a negative size effect in Australia. In New Zealand, there is weak evidence of a negative size effect in the month of January. The returns of high book-to-market equity (value) firms are found to be larger than those of their low book-to-market equity (growth) firm counterparts in New Zealand.

Acknowledgements

There are many people to whom I am grateful for their assistance in the completion of this thesis.

I would like to thank Dr. Martin Young, my supervisor, for the freedom given in developing the topic, and for the guidance provided throughout the year. Martin shifted to Singapore shortly after this thesis was initiated; yet his commitment and enthusiasm never waned.

My gratitude also extends to Dr. Claudio Michelini, my advisor. The support he provided was invaluable.

Peter Grundy of Otago University and Giancarlo Filippo Maisetti of the Securities Industry Research Centre of Asia-Pacific (SIRCA) provided the data on which this research is based. Their assistance is much appreciated.

I also appreciate the kind co-operation of Yakov Amihud, Jerry Bowman, Paul Brockman, Louis Chan, Kee Chung, Venkat Eleswarapu, Shing-yang Hu, Roger Huang, Leslie Marx, Haim Mendelson, Narayan Naik, and Dimitri Vayanos for providing me with working papers and readily responding to my queries.

Finally, to my family and friends who have provided endless support and encouragement throughout the year – undoubtedly, you have all contributed to the completion of this thesis.

Table of Contents

Abstract	ii
Acknowledgements	iii
List of Tables	vii
List of Figures	xi
Introduction	1
Part One: Literature Review	4
Chapter One : Asset Pricing	5
1.1 Introduction	5
1.2 Early Empirical Evidence	6
1.3 Post Fama and French (1992)	9
1.3.1 Theoretical Justification for Size and Book-to-Market Equity Factors	9
1.3.2 Literature that Criticises the Conclusions of Fama and French (1992) as Spurious	11
1.3.3 Literature that Uses New Data and Methodology to Re-test the CAPM	12
Chapter Two : Liquidity and Asset Pricing	16
2.1 Liquidity: An Introduction	16
2.2 Transactions Costs and Asset Pricing	19
2.3 Turnover Rate and Asset Pricing	27
2.4 Amortised Spread and Asset Pricing	31
2.5 Market Microstructure and Liquidity	32

Chapter Three : Stock Exchanges and Liquidity	33
3.1 Introduction	33
3.2 Nasdaq	34
3.3 New York Stock Exchange	36
3.4 Tokyo Stock Exchange	38
3.5 Australian Stock Exchange / New Zealand Stock Exchange	41
3.6 Liquidity Across Stock Exchange Mechanisms	42
Part Two: Data and Methodology	50
Chapter Four : Data Description	51
4.1 Raw Data and Variable Definition	51
4.2 Portfolio Formation	55
Chapter Five : Methodology	58
5.1 Introduction	58
5.2 Methodology of Previous Liquidity Asset Pricing Studies	58
5.2.1 Long Portfolio Formation Period	58
5.2.2 Errors-In-Variables Problem	60
5.2.3 Beta Estimation Problems	61
5.3 Methodology of This Study	62
5.4 Seemingly Unrelated Regression (SUR) Model	64
5.5 Cross-Sectionally Correlated and Timewise Autoregressive (CSCTA) Model	73
5.6 Specific Models Used	77
5.6.1 New Zealand Return-Spread Models	77
5.6.2 New Zealand Return-Turnover Models	79
5.6.3 New Zealand Return-Amortised Spread Models	81

Part Three: Results and Analysis	83
Chapter Six : New Zealand Results	84
6.1 New Zealand Data Characteristics	84
6.2 New Zealand Basic Model Regression Results	98
6.3 New Zealand Full Model Regression Results	107
6.4 Summary of the New Zealand Results	118
Chapter Seven : Australian Results	119
7.1 Australian Data Characteristics	119
7.2 Australian Basic Model Regression Results	132
7.3 Australian Full Model Regression Results	140
7.4 Summary of the Australian Results	149
Chapter Eight : Discussion	150
8.1 Do the Results Conflict with the Efficient Market Hypothesis ?	150
8.2 The Relationship Between Return and Liquidity	151
8.3 The Relationship Between Return and the Non-Liquidity Explanatory Variables	155
Conclusions	161
Future Research	165
References	166

List of Tables

6.1	Number of New Zealand Companies Used in Analysis	84
6.2	Spread Model Summary Statistics (New Zealand)	85
6.3	Turnover Model Summary Statistics (New Zealand)	85
6.4	Amortised Spread Model Summary Statistics (New Zealand)	85
6.5	Return Seasonality (New Zealand)	86
6.6	Spread Model Correlation Coefficients (New Zealand)	87
6.7	Turnover Model Correlation Coefficients (New Zealand)	87
6.8	Amortised Spread Model Correlation Coefficients (New Zealand)	87
6.9	Seasonality of Liquidity Proxies (New Zealand)	89
6.10	Time-Variation in Liquidity Proxies (New Zealand)	89
6.11	Basic Model Breusch-Pagan Lagrange Multiplier Statistics (New Zealand)	91
6.12	Full Model Breusch-Pagan Lagrange Multiplier Statistics (New Zealand)	93
6.13	Full Model Breusch-Pagan Homoskedasticity Test Results (New Zealand)	94
6.14	Full Model Durbin-Watson Test Results (New Zealand)	95
6.15	Results of Tests for Variable Coefficient Equality Across Portfolios in the Spread Model (New Zealand)	96
6.16	Results of Tests for Variable Coefficient Equality Across Portfolios in the Turnover Model (New Zealand)	96

6.17	Results of Tests for Variable Coefficient Equality Across Portfolios in the Amortised Spread Model (New Zealand)	97
6.18	Results of Tests for Variable Coefficient Equality Across All Portfolios in Each Liquidity Model (New Zealand)	97
6.19	Basic Spread Model SUR Regression Results (New Zealand)	100
6.20	Basic Spread Model CSCTA Regression Results (New Zealand)	100
6.21	Basic Turnover Model SUR Regression Results (New Zealand)	103
6.22	Basic Turnover Model CSCTA Regression Results (New Zealand)	103
6.23	Basic Amortised Spread Model SUR Regression Results (New Zealand)	106
6.24	Basic Amortised Spread Model CSCTA Regression Results (New Zealand)	106
6.25	Full Spread Model SUR Regression Results (New Zealand)	108
6.26	Full Spread Model CSCTA Regression Results (New Zealand)	109
6.27	Full Turnover Model SUR Regression Results (New Zealand)	112
6.28	Full Turnover Model CSCTA Regression Results (New Zealand)	112
6.29	Full Amortised Spread Model SUR Regression Results (New Zealand)	115
6.30	Full Amortised Spread Model CSCTA Regression Results (New Zealand)	115
7.1	Number of Australian Companies Used in Analysis	119
7.2	Spread Model Summary Statistics (Australia)	120
7.3	Turnover Model Summary Statistics (Australia)	120
7.4	Amortised Spread Model Summary Statistics (Australia)	120
7.5	Return Seasonality (Australia)	121
7.6	Spread Model Correlation Coefficients (Australia)	122

7.7	Turnover Model Correlation Coefficients (Australia)	122
7.8	Amortised Spread Model Correlation Coefficients (Australia)	122
7.9	Seasonality of Liquidity Proxies (Australia)	123
7.10	Time-Variation in Liquidity Proxies (Australia)	124
7.11	Basic Model Breusch-Pagan Lagrange Multiplier Statistics (Australia)	125
7.12	Full Model Breusch-Pagan Lagrange Multiplier Statistics (Australia)	127
7.13	Full Model Breusch-Pagan Homoskedasticity Test Results (Australia)	128
7.14	Full Model Durbin-Watson Test Results (Australia)	129
7.15	Results of Tests for Variable Coefficient Equality Across Portfolios in the Spread Model (Australia)	130
7.16	Results of Tests for Variable Coefficient Equality Across Portfolios in the Turnover Model (Australia)	131
7.17	Results of Tests for Variable Coefficient Equality Across Portfolios in the Amortised Spread Model (Australia)	131
7.18	Results of Tests for Variable Coefficient Equality Across All Portfolios in Each Liquidity Model (Australia)	131
7.19	Basic Spread Model SUR Regression Results (Australia)	134
7.20	Basic Spread Model CSCTA Regression Results (Australia)	134
7.21	Basic Turnover Model SUR Regression Results (Australia)	136
7.22	Basic Turnover Model CSCTA Regression Results (Australia)	137
7.23	Basic Amortised Spread Model SUR Regression Results (Australia)	139
7.24	Basic Amortised Spread Model CSCTA Regression Results (Australia)	139

7.25	Full Spread Model SUR Regression Results (Australia)	141
7.26	Full Spread Model CSCTA Regression Results (Australia)	142
7.27	Full Turnover Model SUR Regression Results (Australia)	144
7.28	Full Turnover Model CSCTA Regression Results (Australia)	144
7.29	Full Amortised Spread Model SUR Regression Results (Australia)	146
7.30	Full Amortised Spread Model CSCTA Regression Results (Australia)	147
8.1	Summary of the New Zealand and Australian Regression Results	151

List of Figures

1.1	Three Concepts of Market Liquidity	17
-----	------------------------------------	----