An Analysis of the Covered Warrants Market in the UK

Submitted by
Apinya Klinpratoom

to the University of Exeter as a thesis for the degree of
Doctor of Philosophy in Finance
in the University of Exeter Business School

April 2010

This thesis is available for library use on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.
I certify that all the material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other university.

(Signature) ..........................................................
Abstract

The covered warrant market in the UK has gained in popularity over time since first launched in 2002. This has opened up an alternative investment choice which offers derivative securities with a life of typically one to two years. It seems to fulfill many of the functions of a traded options market. Since most research has been focused on options trading, the investigation on covered warrants trading is still very limited. This is also largely due to the lack of readily available data for end-traded covered warrants and the existing covered warrants. A unique set of hand-collected data, supplemented by public and private data from main covered warrants issuer and the financial database are employed, making this thesis possible. The sample periods can be divided into two separate sets.

The UK covered warrants trading during the period July 2004 - December 2006 are used to examine the impact of warrant introduction and expiration on the price, volume and volatility of the underlying securities. For the introduction analyses, both the announcement and listing of covered warrants have negative impacts on the price of underlying securities for both call and put features, though the impact of the announcement is more pronounced than that of the listing. These affects are temporary and do not persist much beyond the introduction of the warrants. Negative price impacts of the expiration event are also reported for both call and put covered warrants. However, this study finds no significant impacts on the volume of underlying securities trading from the announcement, listing and expiration of call and put covered warrants. Further evidence indicates an increase in volatility of the underlying securities during the announcement and listing of covered warrants. The results hold true for both call and put warrants cases. On the other hand, a decreasing stock volatility is found as a consequence of the expiration of both call and put covered warrants.

The second data set involves the call covered warrants traded in the UK market between April 2007 and December 2008; this was analysed for evidence of the best appropriate covered warrants pricing model. This study suggests default risk as a major concern for the warrant price which is called the Vulnerable warrant price. The reasons
behind this arise from concern about the issuer’s creditworthiness due to traders’ fraudulent action and the recent subprime problem, the difficulties of dynamic hedging by issuers because of market imperfections, as well as the no guarantees on covered warrant trading provided by the London Stock Exchange. The most salient findings of the study are the following. The Vulnerable warrant price is generally lower than both the Black-Scholes price and warrant market price throughout the warrant’s lifetime. The evidence suggests an overvalued warrant price in the UK market. Moreover, the in-the-money warrants indicate a higher rate of default in comparison to the out-of-the-money warrants. An additional finding shows that the market becomes aware of the default risk only on a short-term basis. The presentation of negative abnormal returns of both market and the Black-Sholes prices support the assumption that default risk is a relevant factor in pricing the UK covered warrants.

These findings add to the literature dealing with the effect of derivatives trading on the underlying securities as well as providing more empirical evidence on a particular covered warrant market. This could be of interest not only for practitioners to widen their investment opportunities but also for regulators to have this as a guideline for their future related policies planning.
Acknowledgement

I am deeply indebted to my former first supervisor Prof. Paul Draper for his invaluable suggestions, stimulating support and encouragement. His constant understanding has kept me going. His expert advice and assistance on my writing of this thesis including content, English style, grammar corrections, and proof-reading added polish to my work.

My heart-felt thanks to Prof. Richard Harris for taking over my supervision and for his additional technical guidance. All his responses to my queries are very much appreciated. My final version of this thesis would not have been possible without his professional comments and support.

My further thanks go to my second supervisor Dr. Brian Wright for his support, guidance and helpful advice. I am also very grateful to Dr. Grzegorz Trojanowski for his help with my various research problems. His challenging comments were always encouraging to me and helped shape my research direction for which I am very grateful.

I would like to express my great appreciation to Dr. Supachai Srisuchart for giving his time to look at my work, providing useful comments and encouraging me. Moreover, my personal thanks to Dr. Jian Shen for all her kind advice and helpful recommendations on my data collections.

My gratitude goes also to the IT team for providing me with necessary programmes for my research. My sincere thanks go to Jan Adkin for her kind assistance during my PhD. I would also like to thank all my colleagues who supported me in my research work and my extended thanks to all my friends who always cheered me along.

I have furthermore to thank the University of Exeter Business School for providing me with a supportive environment, research facilities and a large proportion of my PhD
funding. Additional thanks to all the lecturers who implicitly helped me gain a great deal of knowledge that I could then further extend to use on my thesis.

Last but not least, I would like to give my special thanks to my dear parents who gave me an initial chance to come and study in the UK and supported me in every way. Their patience and unconditional love have always inspired and guided me through my difficult times. Thank you very much for believing in me and for always being there for me.
# Table of Contents

Abstract........................................................................................................................... 2
Acknowledgement............................................................................................................ 4
Table of Contents ........................................................................................................... 6
List of Tables .................................................................................................................. 10
List of Figures ............................................................................................................... 12
Chapter 1 : Introduction ................................................................................................. 13
  1.1 Background ............................................................................................................. 13
    1.1.1 Covered warrants definition and characteristics ................................................. 13
    1.1.2 Covered warrants compared ........................................................................... 14
    1.1.3 History of covered warrants .......................................................................... 21
    1.1.4 An overview of the UK covered warrants market ............................................ 22
  1.2 Objectives and Motivations of the Research ...................................................... 29
  1.3 Organisation of the Thesis ................................................................................... 32
Chapter 2 : Literature Review ....................................................................................... 35
  2.1 Introduction ............................................................................................................ 35
  2.2 Pricing effect of derivatives trading ....................................................................... 35
  2.3 Volume effect of derivatives introduction ............................................................ 39
  2.4 Volatility effect of derivatives introduction .......................................................... 41
  2.5 Valuation of derivatives ....................................................................................... 45
    2.5.1 The company warrants pricing models ........................................................... 45
    2.5.2 Covered warrants pricing models ................................................................. 46
Chapter 3 : Research Methodology ............................................................................... 49
  3.1 Event and estimation period .................................................................................. 49
  3.2 Calculation of returns ........................................................................................... 50
  3.3 The benchmark for Abnormal returns .................................................................... 50
    3.3.1 Market Models ............................................................................................... 51
    3.3.2 Mean-adjusted Models ................................................................................. 54
    3.3.3 Market-adjusted Model (Index model) ............................................................ 55
    3.3.4 Economic Models ......................................................................................... 56
  3.4 Aggregation of Abnormal Returns ........................................................................ 58
List of Tables

Table 1.1: The characteristics differences among the company warrants, options and covered warrants .................................................................................................................. 14
Table 1.2: The Lot size of covered warrants and traded options ........................................ 15
Table 1.3: The monthly trading value of individual equity options and covered warrants on the same underlying security ............................................................................. 17
Table 1.4: The number of issues and value of daily trading volume of options and covered warrants on the same underlying security ............................................................................ 17
Table 1.5: The monthly trading value of Covered warrants and other Listed structured products within the LSE ....................................................................................................... 20
Table 1.6: The sample of current prices data on covered warrants issued by Societe Generale (SG) on 29-Sep-2009 ........................................................................................................... 27
Table 4.1: Abnormal returns around the announcement event for call event ...................... 83
Table 4.2: Abnormal returns around the listing event for call event ................................... 86
Table 4.3: Abnormal returns around the announcement event for put event ...................... 89
Table 4.4: The difference between Announcement and Listing dates (days) ....................... 91
Table 4.5: Abnormal returns around the delisting event for call event ............................... 93
Table 4.6: The differences of the underlying securities prices on listing and delisting dates of 36 call warrants ................................................................................................................ 96
Table 4.7: Abnormal returns around the delisting event for 25 in-the-money call warrants ............................................................................................................................. 97
Table 4.7.1: Abnormal returns around the delisting event for 15 in-the-money call warrants ............................................................................................................................. 98
Table 4.8: Abnormal returns around the delisting event for put event ............................... 98
Table 4.9: Abnormal trading volumes around the announcement event for call event ........ 107
Table 4.10: Abnormal trading volumes around the listing event for call event ................. 108
Table 4.11: Abnormal trading volumes around the announcement event for put event .... 111
Table 4.12: Abnormal trading volumes around the listing event for put event ................. 112
Table 4.13: Abnormal trading volumes around the delisting event for call event ............ 114
Table 4.14: Abnormal trading volumes around the delisting event for 25 in-the-money call warrants ............................................................................................................................. 115
Table 4.15: Abnormal trading volumes around the delisting event for 11 out-of-the-money **call warrants** ......................................................................................................................................................................................... 116
Table 4.16: Abnormal trading volumes around the delisting event for **put event** .......... 117
Table 4.17: Name of the underlying securities for the small and large groups under both call and put cases ..................................................................................................................................................................................... 119
Table 5.1: Volatility test around announcement days ...................................................... 137
Table 5.2: Volatility test around listing days ................................................................... 138
Table 5.3: Volatility test around delisting days ............................................................... 140
Table 5.4: Volatility test around delisting days (In/Out-of-the-money Call case)............. 141
Table 6.1: Comparison of Vulnerable Warrant Price, Black-Scholes Price, and Market Value (on average for each of 103 call covered warrants over its life-time)................................. 165
Table 6.2: Mean of Price Difference between Vulnerable Warrant (α=1%) and Market Value (The case of In/Out-of-the-money for 12 call covered warrants)............................ 169
Table 6.3: Price Difference between Black-Scholes Price and Market Value of 154 call covered warrants ...................................................................................................................................................................................... 172
Table 6.4: Price Difference between Vulnerable Warrant Price (for the case α = 1%), Black-Scholes Price and Market Value of 103 call covered warrants.............................. 177
Table 6.5: Comparison of Vulnerable Warrant Price, Black-Scholes Price and Market Value (on average for the case of 103 call covered warrants) ............................................. 178
Table 6.6: Abnormal returns (AR) and Cumulative abnormal returns (CAR) of market price and Black-Scholes price around the financial distress event for 154 call covered warrants via the market-adjusted model ................................................................. 181
List of Figures

Figure 1.1: The monthly trading value of Covered warrants and other Listed structured products within the LSE (£'m) ........................................................................................................21
Figure 3.1: Time line for an event study .............................................................................. 49
Figure 4.1: Abnormal returns around the announcement event for call event .......... 84
Figure 4.2: Abnormal returns around the listing event for call event .......................... 87
Figure 4.3: Abnormal returns around the announcement event for put event ............... 90
Figure 4.4: Abnormal returns around the listing event for put event .............................. 91
Figure 4.5: Abnormal returns around the delisting event for call event ...................... 94
Figure 4.6: Abnormal returns around the delisting event for 25 in-the-money call warrants .............................................................................................................................................. 99
Figure 4.6.1: Abnormal returns around the delisting event for 15 in-the-money call warrants ........................................................................................................................................ 100
Figure 4.7: Abnormal returns around the delisting event for put event ........................ 103
Figure 4.8: Abnormal trading volumes around the announcement event for call event considering the warrant issue size (the difference between the small and large groups) ........................................ 120
Figure 4.9: Abnormal trading volume around the announcement event for put event considering the warrant issue size (the difference between the small and large groups) ........................................ 121
Figure 6.1: U.S. Household Properties with Foreclosure Activity – 2007 ......................... 147
Figure 6.2: Daily prices of Vulnerable warrant over its life-time (The case of SCGN. ARM HDGS. Covered WTS. 20/06/08: 98748X) ...................................................................................... 170
Figure 6.3: Comparison of Black-Scholes Price and Market Value (on average for the case of 154 call covered warrants) ........................................................................................................... 173
Figure 6.4: Price difference between Black-Scholes Price and Market Value (on average for the case of 154 call covered warrants) ........................................................................................................... 174
Figure 6.5: Price difference between Vulnerable warrant price for the case $\alpha = 1\%$, Black-Scholes Price and Market Value (on average for the case of 103 call covered warrants). 179
Figure 6.6: Cumulative abnormal returns (CAR) of market price around the financial distress event for 154 call covered warrants via the market-adjusted model......................... 182