

**POTENTIAL OF  
WEATHER DERIVATIVES AS A RISK  
MANAGEMENT TOOL FOR  
AUSTRALIAN WHEAT FARMERS**

by

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**A THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY  
OF THE UNIVERSITY OF NEW ENGLAND**

**September 2006**

## Declaration

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*I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree.*

*I certify that to the best of my knowledge any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.*

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Miriam Joy East

## Acknowledgements

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I would like to say thank you to many people who have provided the encouragement I needed to continue through the process of researching and writing this thesis. Without all the support I have received from you during this period it would have been a lot more difficult to get to the end of this research project.

The first thank you goes to my supervisors. Firstly my principal supervisor Associate Professor Phil Simmons who kept telling me that one day I would wake up and all the information would “click” and then the rest of my work would be easier. It turned out that there were many “clicks” as different pieces of my research began to make sense and fit together until now they form this thesis. Thank you for helping me through the research process and for encouraging me to present my research at a variety of conferences. Secondly, my associate supervisor Associate Professor Oscar Cacho who provided helpful suggestions along the way that have prompted me to think about my work from a different angle. Thank you for your help with editing my work to produce the final document.

Thank you to Rene Villano and Pauline Fleming for helping with my series of econometric questions and also to other academics in the School of Economics at the University of New England who have also provided valuable feedback after my three seminars.

Thank you to audiences at the Annual Conferences of the Australian Agricultural and Resource Economics Society, the European Applied Business Research Conference, and the Environmental and Resource Economists Early Career Workshop.

Thank you to the Capital Markets Co-operative Research Centre who provided the initial suggestion for this research topic and for providing funding to undertake the research. This time would not have been possible without your generous financial assistance, and presenting at conferences would also have been difficult without your financial assistance.

Lastly, deep thanks go to my family and friends for being there when I needed some encouragement. To my husband Andrew, thank you for providing me with friendship and support throughout these years, especially for your encouragement and assistance in the last twelve months. To my parents and Andrew’s parents, thank you for pushing me to keep going and keep aiming for the end. Thank you for all the laughs, hugs, smiles and prayers that kept me going. To my friends, thank you for your encouragement and prayers.

# Abstract

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This thesis is concerned with determining the potential of weather derivatives as a weather risk management tool for Australian wheat farmers. The research is intended to provide the fledgling Australian weather derivative market and the Australian agricultural industry with indications of their potential for weather risk management. It provides information to agricultural producers on their usefulness, as well as providing information to Australian banks and other underwriters as they attempt to establish weather derivatives in their current risk transfer portfolios.

A review of the weather derivatives literature is presented, followed by research on different areas of weather derivative use by Australian farmers. The applications of this research focus on wheat producers in New South Wales and southern Queensland in the wheat-sheep belt; and provides a basis for further analysis of weather derivatives in other Australian agricultural industries.

First a theoretical optimal hedging model is developed to determine potential demand for weather derivatives by Australian wheat farmers. The theoretical willingness to pay by farmers is estimated using historical price and yield data along with previously published elasticities and risk aversion levels. The results indicate potential demand is likely to be small although farmers who are more risk averse or who operate in riskier situations would be willing to pay a higher amount for this risk management tool.

The second section investigates one of the potential practical problems that may limit uptake of weather derivatives by Australian wheat farmers. Using historical rainfall data for three regional locations it explores how the benefits of a weather derivative contract are affected by geographical distance between the farmer and the location where the rainfall data is recorded. This geographical basis risk is found to be smaller than many imagine.

The third section answers the question of how useful weather derivatives are for reducing risk exposure of wheat farmers from unfavourable weather events. A hypothetical weather derivative is constructed and used to analyse the risk-reducing ability of the instrument for wheat farmers in two local government areas in New South Wales. The weather derivative proves to have little risk-reducing effect due primarily to difficulties in determining an accurate weather-yield relationship.

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