

# RESEARCH PROPOSAL

<b>Risk Theme</b>	Market Risk/Model Risk
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**Client Info:** (only applicable if proposal is in response to a client problem statement)

<b>PS Title</b>					
		<b>Designation</b>			
<b>E-mail</b>		<b>Tel (w)</b>		<b>Mobile</b>	

**Research Team:**

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<b>University</b>	UCT	<b>Classification</b>	Open
<b>Theme No</b>		<b>Type</b>	Technology-Push
<b>Project No</b>	RP15018	<b>Date</b>	25 May 2015

**PROJECT TITLE:** Model Uncertainty and Hedging

**PROJECT GOAL:**

Develop and evaluate robust model-free hedging strategies for exotic equity options

**PROJECT SCOPE**

The typical approach to derivatives pricing proceeds as follows: (1) Choose a reasonable model for asset dynamics; (2) Calibrate it to the prices of liquid instruments (e.g. vanilla calls and puts); (3) Use the models to compute prices and hedge ratios for non-liquid exotic instruments

Thus an asset pricing model is essentially an extrapolation device, and must provide two things (efficiently): (i) It must extrapolate the prices of non-traded (possibly exotic) securities from the prices of liquidly traded ones (e.g. vanilla options), and (ii) it must provide a hedging strategy.

Though there is wide-spread agreement about the inadequacies of the Black--Scholes model, no single model of asset price dynamics has managed to usurp its central place, and the world of asset price modelling is a lively place, with wide-spread disagreements about the nature of the underlying asset price process. Therefore it is natural to ask: *What can we say about the price and hedge ratios of an option based solely on the current market data, without making assumptions about the type of model for the underlying asset dynamics?* There are now several approaches in the literature on such model-free methods, which use techniques such as static hedging, Skorokhod embeddings, martingale optimal transport, mass transport, and martingale inequalities.

**PROJECT OBJECTIVES**

This is a *pilot project*, to test the implications of model-free approaches for actual practice (in South Africa). The aims are to

- Become familiar with the currently available literature on model-free and robust approaches to pricing (which is not large), and to make this topic better known via research seminars
- Select a suitable class of “exotic” instruments and run numerical tests to obtain insight into the effects of model uncertainty and misspecification on pricing and hedging.

**RESEARCH OUTPUTS / DELIVERABLES**

<b>PUBLICATIONS:</b>	<b>Name(s) / Title(s)</b>
Articles	1 or 2
<b>STUDENTS:</b>	<b>Name(s) of Student(s)</b>
M.Phil	1
<b>OTHER:</b>	

**APPROACH TO BE FOLLOWED**

Simulation tests to evaluate the performance and robustness of model-free approaches to hedging (exotic) equity options, as compared to performance of various parametric (exponential Levy and stochastic volatility) models.