

## DIRECTED RISK RESEARCH PROPOSAL

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

<b>Problem Title</b>	<i>The use and effectiveness of artificial intelligence / machine learning methodologies in risk measurement and decision-making</i>		
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<b>University</b>	UP	<b>Classification</b>	Unrestricted
<b>Problem Nr.</b>	PS17005	<b>Type</b>	Technology-Pull
<b>Proposal Nr.</b>	RP17005	<b>Date</b>	15 December 2016

### PROJECT TITLE:

A method of parameterising a feed forward multi-layered perceptron artificial neural network, with reference to South African financial markets

### PROJECT GOAL:

The development of analytic procedures for determining optimal artificial neural network structures and parameters for the modelling of four South African economic variables, namely the average monthly returns on the money, bond and equity markets as well as monthly inflation.

### PROJECT SCOPE

A key aim of this study is to develop a general method that could be used to construct artificial neural networks by exploring the model structure and parameter space so that informed decisions could be made relating to the model design. This approach is demonstrated through the modelling of four South African economic variables, namely the average monthly returns on the money, bond and equity

markets as well as monthly inflation. Artificial neural networks can be constructed on the aforementioned variables in isolation or, jointly, in an integrated model. The performance of a range of more traditional time series models is to be compared with that of the artificial neural network models.

## **PROJECT OBJECTIVES**

Artificial neural networks are typically applied to financial modelling problems by making a priori assumptions regarding model structure and parameter choices. The project aims to develop analytic procedures for determining optimal artificial neural network structures and parameters for the modelling of four South African economic variables, namely the average monthly returns on the money, bond and equity markets as well as monthly inflation in South Africa. In particular, the project aims to determine:

- whether (or not), on a statistical level, artificial neural networks perform on par with time series models at forecasting the returns for financial markets;
- whether hybrid models, combining artificial neural networks with the time series models, lead to significant improvements of the modelling accuracy for the different indices under consideration;

## **RESEARCH OUTPUTS / DELIVERABLES**

<b>PUBLICATIONS:</b>	<b>Name(s) / Title(s)</b>
Articles	1

## **APPROACH TO BE FOLLOWED**

- 1) Study relevant literature on ANN's and their application in practice – including financial applications.
- 2) Obtain a suitable dataset for testing the model on.
- 3) Develop and apply the ANN models.
- 4) Compare the results of the ANN models with the popular existing methods found in literature

## **STRATEGIC VALUE TO DIRECTED RISK RESEARCH**

This research should contribute to a better understanding of the use of artificial neural network techniques in financial modelling in general, and its application in South African markets in particular.