

## DIRECTED RISK RESEARCH PROPOSAL

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

<b>PS Title</b>					
<b>Client Name</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>	RP15015	<b>Date</b>	2015-06-20

**PROJECT TITLE:** Multiscale testing of the Efficient-Market Hypothesis on JSE

**PROJECT GOAL:**

Evaluation of the market inefficiencies at various temporal scales on the Johannesburg Stock Exchange using the concept of Shannon's entropy rate.

**PROJECT SCOPE**

The Efficient-Market Hypothesis (EMH) states that trading decisions based solely on past market data cannot be consistently profitable as current market prices already take this data into account. Works of Joseph Stiglitz disproved the strong version of the hypothesis in the 1980s. Recent studies investigating specific trading rules indicate that the EMH does not fully hold in smaller markets even in its weak form. Another problem recently emerged with the growing popularity of algorithmic trading, namely whether market inefficiencies differ at various time scales. It is important to note that the EMH implies that in an efficient market, it is not possible to earn above average returns without taking on above average risk. Therefore a thorough analysis of the Efficient-Market Hypothesis on the JSE is needed with respect to various time scales, so that a clear outlook for the relation between risk and returns for various trading strategies is provided for investment professionals.

## PROJECT OBJECTIVES

The project involves improving the methodology for testing the Efficient-Market Hypothesis [Fiedor 2015, Risks 3(2), 219-233], so that it is more robust (in particular avoiding the discretization process by employing the concept of permutation entropy [Garland et al. 2014, Physical Review E 90, 052910]). The project also involves obtaining and preparing JSE historical data in a manner which can be used by the above-mentioned estimators used for testing the Efficient-Market Hypothesis. The project further involves an analysis of how appropriately the multiscale structure of market inefficiencies is modelled by various price formation models, and an analysis of how this structure affects the value of various trading strategies.

## RESEARCH OUTPUTS / DELIVERABLES

<b>PUBLICATIONS:</b>	<b>Name(s) / Title(s)</b>
Articles	1
<b>STUDENTS:</b>	<b>Name(s) of Student(s)</b>
PDRF	Paweł Fiedor
<b>OTHER:</b>	
Dissemination through academic/industry conferences	

## APPROACH TO BE FOLLOWED

- 1) Study of the relevant literature, both on testing EMH and relevant information-theoretic measures
- 2) Construction of appropriate (for financial data and various scales) tests of the efficiency of the market
- 3) Implementation of the above in computationally efficient manner and analysis of historical JSE data
- 4) Preparation of the final analysis, evaluation of the usefulness and limitations of the approach

## STRATEGIC VALUE TO DIRECTED RISK RESEARCH

The outputs of this research have some value for theoretical understanding of the complexity of financial markets, particularly with respect to various spatio-temporal scales and the usefulness (in terms of being able to reproduce these multiscale characteristics) of various price formation models, but it is mostly aimed at investment managers, for whom a careful analysis of the interplay between market inefficiencies, risk and returns at various time scales is of great importance to their choosing appropriate long-term trading strategies.