SINGAPORE MANAGEMENT UNIVERSITY
International Trading Institute

ITI Research

Identifying Trends, Spearheading Research

May 2009

The **International Trading Institute @SMU (ITI)** aims to be a leading centre for applied research into trends and developments in international trading with a distinctive Asian focus, by creating significant impact and practical application to the industry.

ITI invites submissions of research proposals and awards research grants through two research funding cycles a year. Research proposals are evaluated by the ITI Research Sub-Committee and published results will be shared via various channels such as public forums and/or research reports. We also invite global firms to be our partners in commissioned projects or as participants in collaborated research.

The highlights of research projects which ITI has been involved in for the past year are shared here.

The **International Trading Institute @SMU (ITI)** is a collaboration amongst Singapore Management University (SMU), International Enterprise (IE) Singapore and leading industry partners. ITI aims to establish itself as the premier industry platform for thought leadership in the arena of international trading.

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What Makes a Good Trader?

Research Project : A Tool for Psychologically Profiling Traders
Principle Researchers : Anil Gaba, Professor of Decision Sciences, Dean of Faculty, INSEAD and J. Neil Bearden, Assistant Professor of Decision Sciences, INSEAD

The International Trading Institute (ITI) at Singapore Management University has partnered leading graduate business school, *INSEAD* in an exciting collaborative effort to research the psychological and behavioral characteristics associated with successful trading performance. The research project, *A Tool for Psychologically Profiling Traders* is expected to shed light on how people's potential for various positions in a trading firm can be assessed and how their decision-making skills can be enhanced.

The researchers will first develop a software tool to assess an array of psychological and behavioral characteristics that have been associated with successful trading performance. The tool will measure fundamental personality characteristics and higher level decision tendencies. The second phase of this project will involve surveying people currently working as traders in Singapore. For example, the characteristics needed for success in "paper trading" may be very different from those needed in "physical trading." The data from this second phase will help the researchers to refine their methods and measures developed in the first phase. In the third phase, the research will focus on training and particularly on whether the software assessment tool developed earlier (which take the form of computerized games and simulations) can help people learn to avoid certain decision traps (e.g., anchoring too strongly on certain salient historical prices when making entry-exit decisions).

The research will look into issues such as:

- Measuring fundamental personality characteristics (e.g., neuroticism, conscientiousness, agreeableness) and higher level decision tendencies (e.g., illusion of control, risk attitudes, tendency to chase losses)
- If and how characteristics for success in "physical trading" may differ from those needed in "paper trading"
- How training can help people to learn to avoid certain decision traps (e.g., anchoring too strongly on certain salient historical prices when making entry-exit decisions) and become better decision-makers

Ultimately, the software tool can be used to identify individual's strengths and weakness for various positions within trading firms (e.g.., trader, risk manager, etc.), and to help train people to become better decision makers. The project is expected to be completed by end-2009.

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Intelligent Commodity Trading Simulation

Research Project : Creating a Better Commodity Trading Simulation – A Multi-Agent Approach
Principle Researcher : Cheng Shih-Fen, Assistant Professor, School of Information Systems, Singapore Management University

In recent years, the study of trading in electronic markets has received significant amount of attention, particularly in the areas of artificial intelligence and electronic commerce. With increasingly sophisticated technologies being applied in analyzing information and making decisions, fully autonomous software agents are expected to take up significant roles in many important fields.

Despite the successes of automated trading in many important classes of financial markets, commodity trading has lagged behind, mainly because of its complicated product categorization and logistical fulfillment considerations. These two factors greatly hinder automation efforts because whenever an event that has significant physical impact on the commodity supply chain occurs, complicated and commodity-specific reactions (might include trading, re-hedging, or even logistic adjustment, to name just a few) would be required. Due to this reason, to master even just a particular commodity market would take several years of intensive training and exposure. To facilitate better understanding on the event-centric commodity market, we built an agent-based commodity trading simulation that is driven by physical events. The simulation platform serves two purposes: First, it is used as a tool that allows more effective training; second, professional trader's behaviors in face of uncertain events could be measured comprehensively for thorough analysis.

This research project expands on a software platform developed earlier for simulating commodity trading, and focuses on creating a multi-agent model that better captures the price dynamics of the commodity markets. Although the price dynamics of commodity market have been studied extensively in the finance domain, to the best of our knowledge, none of them specifically considers physical events as the primary price driver (and thus the possibility of using sequence of events in generating desired market dynamics). This is how our event-based simulation model differs from most past models. The price dynamics in response to the announced events are not determined by a fixed econometric model; instead, the price dynamics are generated through the interaction of a set of autonomous agents that play different roles in a commodity chain (typical such roles include producers, consumers, and speculators). The trading interface is shown in Figure 1.

An additional important purpose of the trading simulation platform is that it allows for the study of people's trading behaviors in response to various events. To facilitate such analysis, the platform is able to record the actions performed by the player in the trading environment. Such data would be invaluable in examining the triggers for trading decisions and track a player's performance in relation to particular behavioral patterns. An example of one such analysis is illustrated in Figure 2.

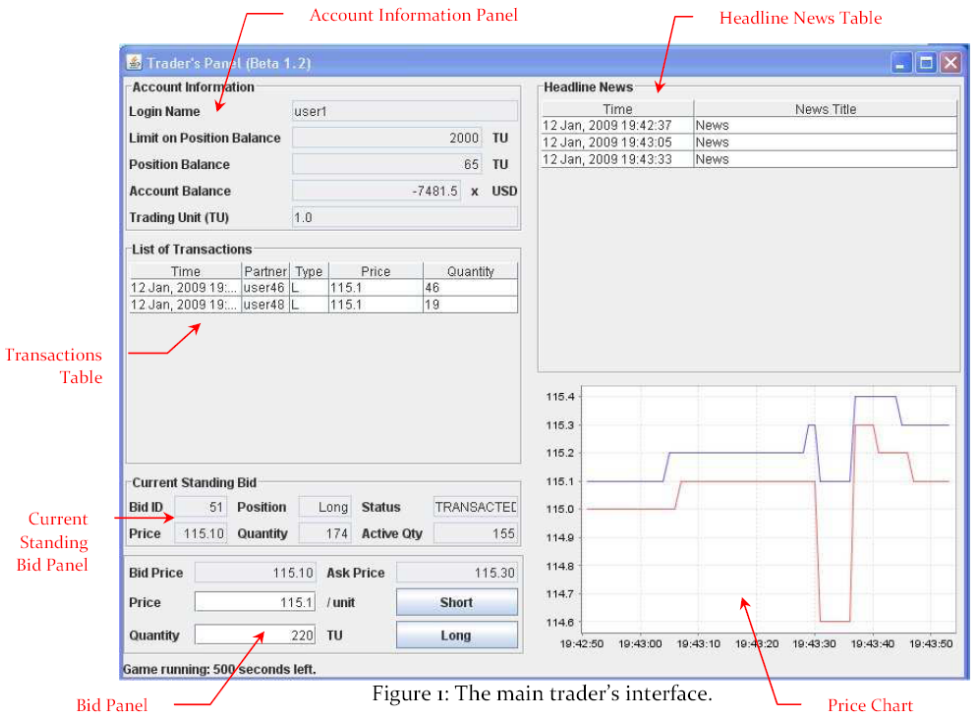

Figure 1: The main trader's interface.

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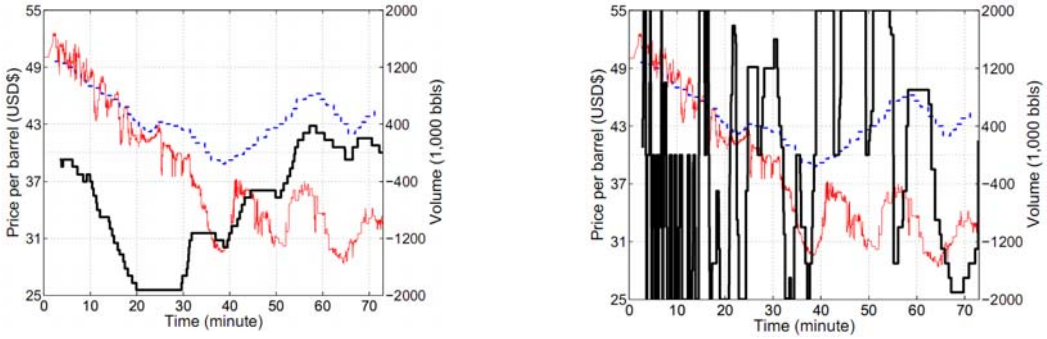

(a) Best trader's strategy (b) Worst trader's strategy

Figure 2: The best and worst trader in one of the sessions. Thick line is player's position balance, thin line is the real market price, and dotted line is the estimated market price dynamics.

Creating a Global Carbon Price Index

Research Project : Singapore Carbon Online Unilateral Trading System (SCOUTS)
Principle Researchers : Timothy Cornelius, CEO, Atlantis Resources Corporation and Shane Thatcher

Carbon markets globally are developing at a rapid rate as governments and corporates try to establish a foothold in what some experts believe will be the largest commodity market in the world. To date the development of cap and trade systems has been the preferred method by jurisdictions to reduce carbon emissions. Of all of the exchanges and auction houses currently participating in the carbon space, none participate in the market. They simply provide matching and credit services to buyers and sellers. Furthermore there are a number of funds which are attracting significant investment from both the private and public sector which are looking to provide a return from investing in carbon related assets and derivatives. All of the current carbon contracts available require physical delivery of emissions reduction permits and physical trading tends to dissuade non-natural (speculative) players from market participation.

The SCOUTS project undertakes the qualitative analysis required to investigate the establishment of an online market-making carbon fund in Singapore. The fund aims to promote carbon market liquidity in Asia (and globally), launch Singapore as the hub for Asian carbon markets, establish a significant buyer of Certified Emissions Reduction certificates (CERs) within the Asian region and provide excellent returns to investors by:

- Assessing existing or create a 'mechanical' global carbon price index appropriately weighted and with inherent flexibility to adapt to imminent regulatory change.
- Quoting of index daily and listing of carbon derivative/s related to the index.
- Creating (or co-opting in) of a fund/trading house to make markets in the carbon derivative/s to facilitate trading around the spreads.

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The researchers have designed the *Singapore Carbon Index (SCI)* to be a global indicator of price trends in the Carbon Dioxide emissions market creating a benchmark for emissions related trading and hedging activities. Emissions markets are evolving at a rapid rate and whilst the index only contains two component assets at inception it has been designed in such a way as to evolve with the markets it represents so as to continue to represent global price trends in carbon dioxide emissions reductions far into the future. The index aims at not only being representative of global trends in emissions markets but also tradable in the sense that its calculation and structure are consistent with those required to develop liquid markets. The SCI is designed to provide exposure to the global carbon price with the liquidity of an equity position.

The researchers also anticipate that carbon derivative instruments may be created, including:

- Vanilla carbon future, cash settled against index, quote on Singapore exchange
- Quoted spreads to correlated commodities [carbon Vs coal, natural gas, climate, oil and oil derivatives]
- Structured products eg. emission linked bonds

As the next step, the researchers will determine how to effectively provide a market-making service around the SCI as well as test fund investment strategies to quote spread around the SCI.

The Energy Economy of Singapore

Research Project : Singapore, The Energy Economy: An Overview and Structure of An Evolving Industry
Principle Researcher : Ng Weng Hoong, EnergyAsia

Energy has long been a vital, if under-appreciated, component of Singapore's economy. Starting with the oil industry, Singapore's modern economic rise can be attributed to the decision by four of the world's then largest oil companies to each invest in a refinery on the island in the 1960s. The refineries provided a huge boost to the

republic's industrialisation programme as well as globalisation strategy that has proved to be one of the most successful in modern times.

While the economy has diversified over the last few decades, oil remains a pillar of the success story. It has spawned large support services in banking, shipping, trading, information technology, engineering and storage terminalling. Oil refining provided the foundation for petrochemicals and chemicals manufacturing, enabling Singapore to build Southeast Asia's first petrochemical complex in 1985.

Between 2002 and 2008, the crude oil price rose by more than six times to over US$147 a barrel. While prices have since fallen back, they remain volatile and unpredictable, with huge implications for the prosperity and even survival of many countries. Unlike the Oil Shocks of the 1970s, this current threat has been sustained, measured and increasingly structural in nature. The growing body of evidence points disturbingly to a world facing long-term scarcity, and the possibility of sustained higher energy prices. How is Singapore responding to this challenge?

In recent years, Singapore has started to explore a role for alternative energy sources, energy efficiency and energy conservation. In 2007, the government released the country's first national policy on energy, which provides a role for both fossil and non-fossil fuels. There's also been an acknowledgment of the previously sensitive issue of greenhouse gas emissions, and Singapore's role in climate change due to its high per capita consumption of fossil fuels.

Due to be completed in December 2009, this project aims to provide a comprehensive survey and update of Singapore's current and recent energy landscape. It will analyse the role of energy in the economy and Singapore's ties with the neighbours, the Middle East and key countries like the US, India and China. The study will look at the institutions in place, the government policies, the infrastructure and various types of energy facilities and their capacities, and the role of the oil, gas, petrochemical, marine, offshore and renewable energy industries. It will examine the energy sector's links with some of the other pillars of the economy: trade, financial, offshore/maritime, manufacturing and transportation. It will consider possible threats and challenges: Singapore's rising energy intensity, our vulnerability to energy supply cut-offs, the implications of sustained high oil prices, terrorism and environmental / global warming. What are the policy options and measures available for Singapore to meet these challenges? What are the strengths and weaknesses of Singapore's energy landscape? Is Singapore well positioned to launch an electric vehicle industry and a smart grid infrastructure? What scope is there for reduction in energy use, and is this a policy option?

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Primer in Commodity Finance

Research Project : A Primer in Commodity Finance (working title)
Principle Researchers : Maureen DeRooij, Chief Operating Officer, Origination & Client Coverage, Standard Chartered Bank and Prof Annie Koh, Dean, Executive & Professional Education; Associate Dean (Strategic Planning & Programme Development); Associate Professor of Finance;Academic Director of the International Trading Institute

This research project which will take the form of a book publication, will focus on various specific structured commodity transactions, highlight macro trends relating to the specific commodity involved (oil, steel, corn etc) as well as particular structuring and financing techniques. Each chapter includes a study case based on a real-life example. What is missing in the current landscape is an intermediary or advanced textbook with an overview of the various types of commodity structures and its financing techniques. This book is intended for an audience already familiar with the basics of commodities and will provide an alternative to the materials currently available in the market which have a greater focus on the investment angle and/or technical commodity derivatives.

With the continued strong global focus on commodities, in financial markets as well as in the media, the book will show students and industry players the wider reach and application of commodity finance and its relevant structures. The research will follow the trends in commodities with Asia, Africa and the Middle East as the biggest origination and destination of commodities.

The research will cover:

- Various specific commodity transactions and its structures and financing techniques.
- Transactions ranging from project finance to structured pre-export finance to commodity derivatives
- Macro trends relating to the commodity involved
- Interviews with physical and financial traders and bankers – providing practical insights on topics covered
- Case studies of real-life financing deals