

SMU Knowledge hub

M.I.T.A. (P) No. 198/05/2004

A news update on research activity at SMU

inside this issue

Pg 5 Do Changes in Housing Prices Affect Singaporeans' Spending Behaviors?

Associate Professor Phang Sock Yong
Associate Dean
School of Economics and Social Sciences

Pg 6 To Trust or to Monitor: A Look at How Societies Deal with Moral Hazard Problems

Assistant Professor Fali Huang
School of Economics and Social Sciences

Pg 7 MBA Graduates Want to Work for Caring, Ethical and Intellectually Challenging Employers

Professor David Montgomery
Dean, School of Business

Pg 8 Effects of Electronic Trading on the Hang Seng Index Futures Market

Professor Tse Yiu Kuen, Associate Dean
School of Economics and Social Sciences

New US Accounting Rule on Goodwill and Its Implications

Assistant Professor Yoonseok Zang
School of Accountancy

Pg 9 The Power of Demand Postponement

Assistant Professor Zhengping Wu
School of Business

Pg 10 Moving towards a Pervasive Computing World?

Assistant Professor Zheng Baibua
School of Information Systems

A Fragile Watermarking Scheme to Detect Modifications to Database Relations

Assistant Professor Yingjiu Li
School of Information Systems

Pg 11 The Making of Knowledge Economies in Asia

Practice Associate Professor Thomas Menkhoff
School of Business

Professor Hans-Dieter Evers
Director, ZEF-Center for Development Research
University of Bonn

Professor Marshall W. Meyer
Department of Management
The Wharton School, University of Pennsylvania

Associate Professor Chay Yue Wah
School of Business

A Matter of Perspectives

Prof Lawrence Klein (University of Pennsylvania) and Prof Robert Engle (New York University), both Nobel Prize winning economists, were in town in May to participate in the conference on "Econometric Forecasting and High-Frequency Data Analysis" jointly organized by the School of Economics and Social Sciences, Singapore Management University and the Institute of Mathematical Studies (IMS), National University of Singapore. Knowledge Hub together with Imprints from IMS caught up with them separately to get their views on a wide range of issues. Here are excerpts from the two interviews.



How did they get started in economics?

KLEIN: I thought first of being an economist and I stayed with that. I thought of mathematics as a tool to gain better understanding of economics. Also, when I was very early in university, we used to go out in teams to different colleges in the area to participate in mathematics competitions. I decided that I wasn't really going to be good enough to be a mathematician to win those competitions and that there were young people of my age who were better mathematicians. So I stayed with economics.

ENGLE: I went to graduate school to study physics without being sure that I wanted to continue in physics. I've always loved physics but I started my graduate work in the basement of the physics building studying superconductivity. I decided that I didn't really want to spend my life doing research on a topic which only a handful of people would ever understand. So I went to talk to people in the economics department because economics is the most quantitative of the social sciences and I thought that there was a possibility of doing something useful and interesting to a large number of people. To my amazement, they were interested in having me switch. And so I did. That was in Cornell.

Do mathematics and physics help in the training of an economist?

KLEIN: When I went to MIT for graduate studies in economics, I picked up more mathematics. This was a period when mathematics was just beginning to be used in economics on a bigger scale. When John von Neumann and Oscar Morgenstern introduced the theory of games, one had to learn set theory and other kinds of mathematical reasoning. So I made the shift. There was also a lot of work dealing with dynamic systems in economics which requires stochastic studies of dynamics and stability properties of systems as well as differential equations of a more complicated sort. So I had to, for some time, keep studying mathematics. But then I got more and more involved in the applications of mathematics to economics and in the applications of economics to real world problems. Gradually over the years, mathematics got more and more complicated and deeper for economists. I didn't keep up studying mathematics endlessly but shifted more towards doing things with economics and the mathematical basics that I had already started.

ENGLE: I think my physics training was particularly important in dealing with the relationship between theory and evidence. Sometimes it starts with a theoretical hypothesis and then you look for empirical evidence. Sometimes there is empirical evidence first and the theorist looks for a model that works. I feel that whichever way it happens, that's the role for the econometrician. He is the person who really must strive to relate the data with the theoretical models to make it work. I think econometrics is a natural way for a physicist to approach the world.



A Matter of Perspectives

Professor Lawrence Klein, *University of Pennsylvania*

Are there such things as economic “laws”?

KLEIN: I wrote a paper once on “Some Laws of Economics”. One of the interesting laws I looked at from time to time is “Engel’s Law” which says that the percentage of a family’s income spent on food declines as income rises. Engel found the law by studying social groupings of people in Europe in 1857. It may be a fairly weak law, but it holds. At the 100th anniversary of Engel’s Law, Professor Houthakker, an econometrician, wrote a paper surveying countries all over the world to see if Engel’s Law held. When it came to China, he couldn’t get data from modern China (i.e. the beginning of the communist regime in China), but he found some Chinese family budgets from around 1920, or so, like the ones Engel found, and he said, “Yes, Engel’s Law held.” When I went to China for the first time in 1979, I got hold of a paper by a Chinese American economist surveying consumers in Tianjin and he got almost the same coefficient for Engel’s Law that Houthakker had found using the 1920’s data. So that particular observation by Engel has great longevity. There are many others that I cited. They don’t give you enough information to know as much as you want to about the economy, but they have held up through centuries or decades.

ENGL: When physicists talk about laws, they think about Newton or Einstein or something like that. These are inexorable laws. I don’t think that there are going to be economic laws in that sense because what we are looking at when we build models for the economy is the average behavior of a lot of people. By averaging you can get a lot closer to a law, but it isn’t clear that it is amenable in the same way as physical laws are going to be. We find general principles, tendencies and patterns that are preserved over time. To be sure, principles are a weak form of laws. A lot of economic models are based on very strong optimizing results and general equilibrium results. The assumption of rational behavior gives you very strong hypotheses about how the world is going to be. Many of those are good descriptions of how you see people behave. In a sense, you could think of those as economic laws even though they do not explain things exactly.

Which is more important, technical rigor or intuition?

KLEIN: Rigor is important. You could be wrong while thinking you are right by not being quite rigorous and finding that there are exceptions and things that you have missed. I think what one really wants is imagination above rigor. And then you go to your friends who are mathematicians and check if your imagination and intuition took you in the right direction.

ENGL: I think they are both important in econometric modeling. I tend to try to prove

theorems with my intuition before I get technical about them. They have to make sense to me and then I say, “Ok, now, how can I prove it?” To me, of the two, the intuition comes first. But when I say the intuition, you have to have the technical skills to rewrite your intuition in such a way that it looks like you can understand where it fits. It’s very hard to take a new idea, because you can look at it in so many different ways. Unless you’ve got a wide technical background, you don’t know how to begin proving the theorem. What’s this theorem that you’re proving? How do you phrase this theorem? You need a lot of technical background before you can even formulate the question. I don’t think you can get the right intuition without having a lot of technical background. I’m better at intuition than at technical details.

We find general principles, tendencies and patterns that are preserved over time. To be sure, principles are a weak form of laws. A lot of economic models are based on very strong optimizing results and general equilibrium results.

How does one develop economic intuition?

KLEIN: I don’t know if economic intuition should be innate but I think that if mathematicians (or any others) want to comment on the role of economics in social and political life, or economics as a social scientific discipline, then they should learn something about the way the economy functions and the way economic decisions are made, and then there will be better communication. Such skills can be learned.

ENGL: It took me a long time. When I started graduate school as a student in economics, I could do problems that someone would set but I couldn’t figure out what the problems should be or what should be an interesting problem. It took me probably ten years of my time teaching at MIT and so forth. I was continually trying to develop and understand this economic intuition that so many other people had taken so easily. But it was hard for me to grasp. So I don’t know whether in the beginning, you should expect that. But I think people should try and develop it. Of course, that’s what graduate education is about. That’s why you go to meetings and you listen to talks. You try to develop your economic intuition.

Are economists these days too mathematical and specialized and not practical enough?

KLEIN: I won’t say it’s too mathematical but it’s

often too abstract. I think that some of the theoretical work in mathematical economics has drifted away from the important problems. Those who teach economics do have an important obligation to teach and give students ideas about economics and we should keep in mind that we are doing economics and not pure mathematics.

ENGL: I think specialization is natural. It’s a lot to ask people to be expert in a particular area and making innovations that are valuable to the profession and to people in that particular area and still be able to speak as a generalist. However, I think a lot of times making advances in a particular area is aided if you’ve got a little broader interest so that you can bring things from other disciplines. You can bring stuff from mathematics, from statistics and from other areas of economics to answer problems in your particular area. I think that some amount of generalism is a good thing. But it’s a lot to expect anybody in any particular area to be able to comment widely on economic issues of the day.

There are a lot of successful econometricians who are very narrow, technical people. They have to pick good problems. That’s where you make your name. You solve a good problem and it’s a kind of intuition which makes you choose the problem. I like to take problems from the world around me and figure out what the nature of this problem is and how you can solve it. But there are people who take problems from the current state of econometric research. They formulate it and they solve it. I think that’s a valuable contribution.

Economics and other disciplines

KLEIN: Non-quantifiable elements of politics and culture contribute a lot to our understanding in economics. Take for example the way we use sample surveys for people’s attitudes after a big event like the attack on the World Trade Center: if you were better off, worse off (on a 5-point scale), much better, much worse or about the same. These surveys have limited quantifiability, but we find them very important in giving us guidelines on what consumers are going to do after the big event. There are many such things and I claim that it’s important to study subjective attitudes in decision making, political structure, and legal structure of politics and culture. We should be aware of them and we should take them into account to the extent possible. Sometimes that extent possible can be stretched because we learn new methods of finding out about political and cultural events.

ENGL: I have not found many interesting analogies between physics and economics or econometrics. The finance theory that the physicists are doing - - “econophysics” is what I would call it -- is mechanical. It tries to apply mechanical principles to economic systems and doesn’t recognize that



Professor Robert Engle, *New York University*

there is behavior and that it is not actually a physical model. These are agents with dual optimizing and behaving in ways that atoms and molecules do not. So I think that while there may be interesting things that could come up out of this, it's not obvious that there's something very useful that physical principles can be applied to economics. I don't think that quantum mechanics has any direct implications for finance because quantum mechanics is a probabilistic statement about the future evolution of particles and atoms. It doesn't talk about the fact that in every price movement there is a buyer and a seller and somehow sellers and buyers have to agree to a certain outcome. It isn't that one person can push the market without somebody agreeing to sell to them. There is an optimizing character of the economy which is really not present in quantum physics.

Klein on "controlled experiments" in economics

Economics is very different from physics, chemistry and biology. The broad concepts of science include some sciences that are very respectable but have no controlled experiments: meteorology (it's not an experimental science), seismology (it's not quite an experimental science) and astronomy. Yet these disciplines go far with mathematics. And astronomy is very precise.

Now, in addition to controlled experiments, which are important, the defining thing is the ratio of noise to signal. In astronomy the noise to signal ratio is very low. Meteorologists have gone very far in this regard. If you judge meteorology by looking ahead as far as one month or more, they don't look impressive. But if you judge meteorology by the next minute, the next day or two days, it looks impressive and it's getting better. Economists should follow some of the techniques that meteorologists use. They tie in to the computer much more intensively. They send balloons into the atmosphere, fly aeroplanes through the hurricane's eye and learn more. We don't get enough of that extreme information flow in economics. Seismology understands what happens during an earthquake but they don't understand how to control or predict it.

Now to some extent people are trying to introduce controlled experiments in economics. I often thought about that issue, say like going to an institution like a prison, change the economic values and look at the outcomes. It is possible to have some experimentation in economics. Nobel Prizes were awarded to some economists who did experimental work and went further than collection of data (*Vernon Smith of George Mason University and Daniel Kahnemann of Princeton University, 2002*). But, by and large, economics is not an experimental science, and we must try to do the best we can with that limitation. The lecture I have

just given in this conference was an attempt to show how we might improve our ability to forecast the economy by small steps even though we can't experiment.

Engle on the ARCH model

I was on sabbatical at the London School of Economics when I started thinking about the ARCH model. I was interested in a macroeconomic question that Milton Friedman had posed. He said that he thought that the cause of business cycles was not just the level of inflation but the uncertainty of inflation. The argument is that businesses try to invest in the future. If they don't know what the price level or wage level is going to be (and there's a lot of uncertainty about it) they are likely to withhold their investments. That will lead to a downturn in the economy. If that is really the case, then you will expect to see the uncertainty of inflation forecast changing over time and being correlated with business cycles. So that was the question I was trying to solve.

I always say that there are three inputs to the ARCH model. I brought two ideas from time series. I had done a lot of work on Kalman filtering and using predictive densities to write likelihood functions. The third input was what Clive Granger, my long-time collaborator and friend with whom I shared the Nobel Prize, had just proposed: a test for a bilinear process which is a type of time series model that involves looking at the correlations of the squares of the residuals of an econometric model. One day I was on the computer and Clive came by and said, "Let's take a look at your residuals, square them, fit an autoregression." And lo and behold, that was very significant, and I said, "Wow, isn't that interesting? The data really had evidence of this sort of thing in it." But I didn't really believe that it was evidence of a bilinear model. I thought that it was evidence of something else - I didn't know what. It turned out that if I were working with this data evidence, I was able to come up with a model which could be used for convoluting volatilities to answer the Friedman hypothesis.

I would say ARCH is the first model to be interested in volatility and in that sense it is the mother of all volatility models. I'm quite surprised how popular it was although I knew it was a good idea at that time. It has turned out to be very important for so many applications that are still growing.

Klein on the next big break-through in economic theories

I think that there is plenty of room for creative thinking of a major sort to come but I feel that some of the work being done now is not getting far. For example, I think that economists accept "rational expectations" as though it is realistic and correct; it is a hypothesis and I don't think it

has been validated. There are others. I don't see a big event or a big change in the way of thinking among the most modern branches of economics that would have the same impact as the Keynesian revolution.

I would say ARCH is the first model to be interested in volatility and in that sense it is the mother of all volatility models.

I think the information technology revolution had a very big impact -- certainly a very big impact on what I do. It's not an economic theory, but it enables us to judge economic theory and principles much better. That was the basis of the lecture that I just gave. How can we improve economic forecasting by drawing upon the computer, the flow of information, the dissemination of information and the dissemination of findings? There may also be a breakthrough eventually using the new kinds of techniques and facilities in the same way that I claim meteorologists have definitely added, one day, two days, sometimes just half an hour, to the validity of meteorological forecasts. It helps utilities, it helps the airlines and it helps state planning. The economist will use the same information facilities to develop more accurate judgments and predictions.

So I would agree that the next big changes are likely to come more from the use of better techniques rather than a great change in conceptual framework. I think the conceptual framework that's popular these days is getting only that far and it isn't taking us further along.

Klein on predicting the predictable and the unpredictable ...

What economists and econometricians should predict:

In the work that I do in economics and econometrics, when something very big happens, like the OPEC decision in 1973 to limit oil production, to limit oil exports, to raise the price of oil four-fold or eight-fold, it is almost an arbitrary decision, unexpected. Now I say we cannot predict that OPEC is going to do that, but once OPEC has done that we can predict the outcome. I think we did very well with that. A number of the predictions that I have been involved with were of that sort. During the closing days of the Second World War, I shifted from MIT and was asked to help build a model to predict whether the United States will revert back to the Great Depression as soon as demobilization and peace were achieved. We made a prediction which was against almost everyone else's view, and it turned out to be right: America *would not* go back to the times of the

Great Depression. And there have been similar times after the Korean War, the Vietnam War, and even now, the Iraq war. So I say we can't do a really good job in predicting those events but when events have occurred, we can do a reasonably good job in judging the outcome.

What is the demand for electricity at different times of the day, how do you forecast that, how does it depend on appliances and things like that. This is another example of how you develop statistical methodology.

Predicting China's future: Can China overtake the US as the economic super power in the world? I think you can say that China is aiming at a moving target. I don't see China overtaking on a per capita basis eventually. I won't say it's impossible but it's not my judgment. On the other hand, I regard China's present projection as plausible. China's leaders say that since reforms started in 1978, China had more than quadrupled in GDP. The new target is to quadruple again between 2000 and 2020. In looking at that, I'd say there's an excellent chance of doubling by 2010. I am not saying they won't double between 2010 and 2020, but they will have to work harder than they have. I've been combing records. No country has had 40 years of that size of growth in terms of established statistics. One reason why I think the decade will show whether it is favorable for China's plan is the infrastructure work in preparation for the Olympics in 2008 and the preparation for World Expo in 2010. I think those two events are going to keep China very busy providing the necessary infrastructure and facilities, and China wants to show the world what it can do in those circumstances.

Engle on econometrics, finance and consulting

Juggling the work of teaching, researching and consultancy: I manage it by keeping them working together. So when I do my consultancy, I make sure that what I do is actually going to be an important part of my research, and I have had some wonderful research that comes out of consulting projects. I think consultancy is a way of keeping your research focused on problems which people are interested in. I think it's important to do that but I do not like doing my consulting on things that would never end up as part of my research.

Are the econometric solutions useful in the trading world? I'm not so involved in trading strategy. I've avoided that because that actually doesn't ever lead to publishable research. Either it works, in which case you can't publish it; or it doesn't work and nobody cares. Even if you do publish one that does work, no one will really believe you because then people will ask, "Why did you publish it?", and it goes away as soon as you publish it anyway.

I have tried not to get involved in trading strategy. But if you talk about strategies like what is the best way to forecast risk or something like that, I think those are not proprietary typically. Initially you may have to wait a little bit before you put it in the academic discipline. I try not to get involved in things that have too much conflict of interest with my role as a researcher.

Another set of consulting that I did for a long time (although I'm not doing it any more) is energy research and electricity modeling. What is the demand for electricity at different times of the day, how do you forecast that, how does it depend on appliances and things like that. This is another example of how you develop statistical methodology. People build these models for utilities and forecast what the needs will be in the future. You know it's not proprietary. There's a lot of non-proprietary stuff you can do both in the financial sector and more broadly in the industrial sector.

Is training as engineers and physicists better suited for the finance industry than finance graduates? I think that finance education is typically not as quantitative as what financial practitioners require. In financial practice you need to handle an enormous amount of data, a lot of computing tasks. Finance PhDs are often not that well trained in econometrics or in computer methods and they are often trained in particular corporate finance theory or something like that. I think that finance service sectors hire a lot of engineers, physicists, chemical engineers and mathematicians because they have skills that are needed and the industry cannot get a finance person to do. I think that academic finance is not as close to practitioner finance as you might think. In fact, practitioner finance does have a lot of economics and econometrics in it.

Winning the Nobel Prize and life after

ENGLE: In one sense the Nobel Prize changes everything in my life and, in another, it doesn't change anything. The press was never interested in talking to me before the Nobel Prize. Now I have lots of interviews with the news media. They wanted to know about things that I never thought I was an expert in. But I ended up talking about them anyway. I'm now more of a generalist. I've met so many interesting people from different

areas of science, economics and journalism and so forth. I meet finance practitioners. People like hedge fund traders and so forth tell me their strategies which they would not want to reveal in the past.

I haven't actually taken on any causes. Sometimes Nobel Prize winners do say, "I want to do this thing." I haven't done that yet. It could happen. I think I reach a bigger audience because I'm speaking about more general things. My professional comments would be about financial management and risk assessment and that sort of things. Now I end up talking about general macroeconomic issues in the US and international issues. In that sense, a lot of things have changed.

In many ways, I do my best to keep my research and my life the same as before. I'm continuing to give talks and do my research and I think I don't want that to stop.

In financial practice you need to handle an enormous amount of data, a lot of computing tasks. Finance PhDs are often not that well trained in econometrics or in computer methods and they are often trained in particular corporate finance theory or something like that.

KLEIN: Winning the Nobel Prize was a great satisfaction in my professional life. Another big satisfaction is to see that the models I developed over the years have been widely used. For me, one of the great things was that when I started in the faculty in the University of Pennsylvania, we were able to develop models that were used by the business and government communities. This helped us raise enough funds so that over the years, we were able to support between 10 and 15 PhD students every year. We paid their university fees and living expenses, and now they have gone out into the world and many have been very successful. That gives me a lot of satisfaction. We were able to use our approach to apply economics using mathematical, statistical, numerical methods to support enough students so that they have successful careers. ■

Do Changes in Housing Prices Affect Singaporeans' Spending Behaviors?



Associate Professor Phang Sock Yong
Associate Dean, School of Economics and
Social Sciences

With more than 90% of its citizens living in their own homes, Singapore has one of the highest home-ownerships in the world. At the same time, Singaporeans are also the highest savers in the world, putting aside 57 cents for every dollar they earn. What do economists have to say about Singaporeans' spending behavior? In particular, how is such behavior affected by housing prices?

This is the question that Assoc Prof Phang Sock Yong tries to answer in her paper, "House Prices and Aggregate Consumption: Do They Move Together? Evidence from Singapore", recently published in the *Journal of Housing Economics*, Vol.13, No.2 (June 2004).

The URA's index for private housing prices, for example, swung between 12 in 1975 and 181 in 1996.

As an urban economist, Prof Phang has long been a keen observer and researcher of Singapore's housing and transportation economics and policy issues. In her earlier publications, she had focused more on microeconomic spatial issues – in particular, the housing, location and commute decisions of households and the extent to which these were affected by public housing policies and regulations. More recently, her research interest has extended to exploring the linkages between housing markets, the financial sector and the macro economy.

In most countries, consumption has always been one of the most important components of total spending. The ratio of private consumption to GDP is fairly stable across countries. In the US and the UK, the ratio has hovered around two-thirds from the 1960s to 1990s, increasing to around 70 percent in recent years for the US. In Singapore however, the ratio has declined steadily from 0.82 in 1960 to 43 percent in 2003 – earning Singapore the distinction of having the lowest such ratio in the world.

Housing prices in Singapore, like many other countries, have fluctuated widely. The URA's index for private housing prices, for example, swung between 12 in 1975 and 181 in 1996. Can the changing housing prices help explain the low propensity to consume in Singapore?

Theoretically, house price changes, through their impact on a household's housing wealth, should affect its consumption. This is known as "housing wealth effect". In the aggregate, there may be some netting out as increases in housing prices benefit those aiming to trade down or exit the market and harm those who are waiting to trade up or enter. In addition, house price increases are usually

accompanied by positive consumer sentiments and increased housing transactions, increasing the demand for non-housing goods and consumer durables. There is also a "collateral enhancement" effect – households can cash out part of their home equity through loans and refinancing if these instruments are available.

A number of recent empirical studies found that changes in housing wealth in the OECD countries are indeed positively associated with changes in total consumption. In the US, the Federal Reserve Board estimated that for every additional dollar rise in housing wealth, total consumption in the economy rises by 3 to 5 cents. The Bank of England, too, found that there are significant housing wealth effects in the UK.

Given that residential properties account for the bulk of most Singaporeans' wealth, one would expect such a relationship to be even stronger in Singapore than the OECD countries. Yet, Prof Phang's research using 1981 to 2000 quarterly data led her to conclude that house price increases in Singapore have not produced either the wealth or the collateral enhancement effects on the aggregate consumption in the country.

Using an econometric technique that allows for households to respond differently to an increase versus a decrease in expected income and housing wealth, Prof Phang found that household consumption behavior does not conform to that expected by the life-cycle/permanent income hypothesis. The hypothesis, which forms the basis for most empirical research in this area, suggests that consumers' expenditure depends on human capital as well as the value of their assets. Housing wealth is the single most important component of wealth in household's portfolios. In Singapore's case, liquidity constraints rather than myopic behavior on the part of the home owners seem to be the main reason why the hypothesis does not work. Households are either unable or unwilling to borrow against uncertain future work income as well as withdraw housing equity to finance consumption.

Interestingly, both an expected increase and an expected decline in house prices are found to have a dampening effect on consumption, although the effects are much more significant in the latter than the former. Prof Phang attributes this asymmetric result to strong bequest motives and the fact that downsizing is not widely practiced in a market dominated by apartment housing. Moreover households may view housing as a risky asset with uncertain value, leading them to regard gains as temporary and losses as permanent.

Prof Phang results suggest that it would not be appropriate to generalize the recent empirical findings for OECD countries -- changes in housing wealth are unambiguously associated with changes

in aggregate consumption – to Singapore. Such a conclusion has considerable implications for policy makers trying to influence the level of consumption in the economy. ■

Wharton-SMU Research Center: Seminars By Wharton Professors In January - July 2004:

"Coping with Conflict and Information in Emotion-Laden Domains" by Mary Frances Luce, Associate Professor of Marketing

"Musings about Mathematical Models and the Music Market" by Peter S. Fader, Professor of Marketing

"A Segmentation of Store Loyalty based on Spending and Switching Strategies" by Xavier Drèze, Assistant Professor of Marketing

"Real Estate Crashes and Bank Lending" by Susan Wachter, Professor of Real Estate, Finance and City and Regional Planning

"Illiquidity and Closed-End Country Fund Discounts" by Yihong Xia, Assistant Professor of Finance

"Semiparametric and Nonparametric Estimation for Longitudinal Data" by Jianhua Huang, Assistant Professor of Statistics

"International Capital Market and Foreign Exchange Risk" by Yihong Xia, Assistant Professor of Finance

"Indicia of Moral Imperialism in Laws Implementing the OECD Antibribery Convention" by Philip M. Nichols, Associate Professor of Legal Studies

"Financial Asset Returns, Direction-of-Change Forecasting, and Volatility Dynamics" by Francis X. Diebold, W.P. Carey Professor of Economics, Finance, and Statistics

"Off-Shoring Of Services and Business Processes: Emerging Governance Structures & IT-Enabled Instruments of Governance – Empirical Evidence from Field Research" by Ravi Aron, Assistant Professor of Operations and Information Management

"Amateur-To-Amateur" by Dan Hunter, Assistant Professor of Legal Studies

"Axiomatic Theories of Naive Choice Processes in Dynamic Decision Problems" by Robert Meyer, Professor of Marketing

"Variety for the Sake of Variety? Diversification Motives in Consumer Choice" by Barbara E. Kahn, Dorothy Silberberg Professor and Professor of Marketing



To Trust or to Monitor: A Look at How Societies Deal with Moral Hazard Problems

Assistant Professor Fali Huang, *School of Economics and Social Sciences*

All societies have to deal with moral hazard problems. But each society resolves such problems in different ways. Some rely on social trust among its people, while others depend on heavy use of governance and monitoring rules. What makes these societies respond the way they do? How are they likely to change over time? These are the questions that Prof Fali Huang explores in her paper, "Social Trust and Economic Governance."

A simple example of a mother looking to hire a baby-sitter can help to illustrate the nature of the problem Prof Huang is exploring. The cost of finding a good baby sitter would be small if people in the society are generally trustworthy. Otherwise, the mother will not only have to expend time and resources interviewing but also to install a (hidden) video camera to monitor the baby-sitter's behavior. The more a society depends on the use of such monitoring devices, the higher the cost to the society since these devices are not by themselves productive. Yet, from a society's point of view, it is far from costless to produce a large supply of trustworthy people in a society. Considerable resources, for example, are involved in setting up schools, religious institutions, not to mention the time and resources spent by the parents, to inculcate moral values in its people.

The more a society depends on the use of such monitoring devices, the higher the cost to the society since these devices are not by themselves productive.

This baby-sitter example points to two ways through which a society can deal with moral hazard problems: the society can invest in increasing the intrinsic trustworthiness of its people (intrinsic incentive), or it can invest in new technology to reduce the monitoring costs (extrinsic incentive). These two approaches are distinct yet interdependent. Thus if the technology is so advanced that it costs very little to achieve perfect monitoring, the society may not deem necessary to invest in trustworthy baby-sitters. At the same time, if there is a sufficiently large pool of trustworthy individuals, the society will not invest to improve on the monitoring technology.

Prof Huang argues that the insights above could lead us to deeper understanding of the broad evolution paths of social trust and economic governance over time and across societies. The logic goes as follows. Firms prefer trustworthy employees since less monitoring costs are required. But competition among firms for trustworthy

workers would eventually drain away the extra profits and pass them on as sign-in bonuses to the workers. At the end of the day, firms in a perfect competitive market will not be able to capture any rent from worker trustworthiness. They can, however, earn higher profits by employing less trustworthy workers and adopting more effective monitoring schemes simultaneously. Workers have incentives to invest in social trust since it can raise their income. Firms on the other hand, will find it worthwhile to invest in better monitoring schemes. Prof Huang shows how the interaction of these basic incentives of firms and workers will determine the development of social trust and economic governance in a society over time.

A number of external factors could alter the developmental path of social trust and economic governance. For example, two societies may have equal access to the same monitoring technologies but firms may control relatively more resources in society one than in society two. The incentive structure that Prof Huang derives suggests that society one would end up developing more effective economic governance methods, while society two would rely more on the trustworthiness of its workers. Moreover, the relative merits between social trust and economic governance would persist or become reinforced as time goes by in these two societies. This prediction is consistent with the differences between, among others, the behavior of the Genoese and the Maghribi traders in the late medieval period.

Technological progress could also affect the level of social trust in a society. For example, societies that find it difficult to make progress on monitoring technologies would tend to rely more on intrinsic incentives to reduce moral hazard problems. As technologies develop over time and hence monitoring costs go down, the society will resort more and more to the use of sophisticated monitoring schemes (including accounting and auditing systems etc). This has been the case through most of human history and is likely to continue. The ever-decreasing monitoring costs, however, may lead to over-use of monitoring to the extent that the total governance cost becomes even higher than before.

Since the causes of such technological changes include both exogenous technology breakthroughs and endogenous knowledge accumulation driven by the incentive structure outlined above, it remains an intriguing empirical question which cause is more important in shaping social changes. For example, the paucity of our knowledge in cultivating and screening trustworthy individuals could be mostly due to insufficient resources allocated to such research because firms, which often control more resources than workers, could not gain much from it. ■

Wharton-SMU Research Center: Research Projects For Year 2004 - 2005

"Risks and Returns from Trading Strategies Based on Mean-Reverting Models of the Term Structure of Interest Rates"

Wharton Faculty: Krishna Ramaswamy, Professor of Finance

SMU Faculty: Chua Choong Tze, Assistant Professor of Finance; Koh Winston, Associate Professor of Economics

"Global Volatility Dynamics, Financial Asset Return Predictability, and Market Timing: The U.S., Europe and Asia"

Wharton Faculty: Francis X. Diebold, W.P. Carey Professor of Economics, Finance and Statistics

SMU Faculty: Tay Swee Ann Anthony, Assistant Professor of Economics; Roberto S. Mariano, Professor of Economics & Statistics; Tse Yiu Kuen, Professor of Economics

"Analysis of Price, Price Dispersion and Market Dynamics in Online Markets Using Panel Data"

Wharton Faculty: Jianhua Huang, Assistant Professor of Statistics

SMU Faculty: Yang Zhenlin, Assistant Professor of Economics & Statistics; Roberto S. Mariano, Professor of Economics & Statistics; Tse Yiu Kuen, Professor of Economics

"Variety in Appeal in Consumer Reviews"

Wharton Faculty: Barbara E. Kahn, Dorothy Silberberg Professor, Professor of Marketing

SMU Faculty: Susheela Varghese, Assistant Professor of Communication Studies; Michelle Lee, Assistant Professor of Marketing

"Constructive Processes in Strategic Learning Tasks: An Application to Competitive New-Product Launch Decisions"

Wharton Faculty: Robert Meyer, Professor of Marketing

SMU Faculty: Jin Kyung Han, Associate Professor of Marketing

"Impact of Mergers on Brand Level Competition: Empirical Analysis of the Kimberly Clark - Scott Paper Merger"

Wharton Faculty: Jagmohan S. Raju, Joseph J. Areesty Professor and Professor of Marketing

SMU Faculty: André Bonfrer, Assistant Professor of Marketing

Professor David Montgomery
Dean, School of Business



MBA Graduates Want to Work for Caring, Ethical and Intellectually Challenging Employers

Wharton-SMU Research Center: Research Projects For Year 2004 - 2005

"Liquidity and Closed-End Country Fund Discounts"

Wharton Faculty: Yihong Xia, Assistant Professor of Finance

SMU Faculty: Justin Chan, Assistant Professor of Finance

"Internet Governance and Sovereignty"

Wharton Faculty: Dan Hunter, Assistant Professor of Legal Studies

SMU Faculty: Andrew Phang, Professor of Law; Mary Wong, Associate Professor of Law

"Understandings of Corruption in Southeast Asia"

Wharton Faculty: Philip M. Nichols, Associate Professor of Legal Studies

SMU Faculty: Austin Pullè, Associate Professor of Law

"Toward an Understanding of Recruitment Practices and Employee Performance"

Wharton Faculty: Emilio J. Castilla, Assistant Professor of Management

"The Board of Directors: Analysis of the United States, Asia and Europe"

Wharton Faculty: Martin J. Conyon, Assistant Professor of Management

"A Framework to Measure the Impact of Risk on the Nature and Extent of Cross-Border Outsourcing of IT-Enabled Service – An Empirical Study"

Wharton Faculty: Ravi Aron, Assistant Professor of Operations and Information Management

SMU Faculty: Tan Chin Tiong, Professor of Marketing; Ted Tschang, Assistant Professor of Economics and Technology

"Real Estate Indexes and Financial Instability Indicators: A Study of Early Warning Indicators of Speculation and Financial Crises in Emerging Economies"

Wharton Faculty: Susan Wachter, Professor of Real Estate, Finance and City and Regional Planning

SMU Faculty: Roberto S. Mariano, Professor of Economics & Statistics; Augustine Tan, Associate Professor Emeritus of Economics; Phang Sock Yong, Associate Professor of Economics; Winston Koh, Associate Professor of Economics

Are MBA graduates synonymous with greed and avarice? Are they capable of looking beyond money in making their career choices?

"Most people think that business graduates have no time for morality issues in deciding which job to take up," said Professor David B. Montgomery, Dean of the Business School at SMU and Kresge Professor of Marketing - Emeritus at Stanford. "But the fact is that many of them care a lot about their potential employer's reputation on ethics and social responsibility At least this is what we found in our work."

Intellectual challenge topped the list as the most important attribute affecting a MBA graduate's job choice.

Prof Montgomery was referring to research he is conducting with Assistant Prof Catherine Ramus from the Donald Bren School of Environmental Science and Management, University of California, Santa Barbara. A preliminary report of the ongoing research has been published as "Corporate Social Responsibility Reputation Effects on MBA Job Choice", in G. Papanikos and C. Veloutsou (Eds.), *Global Issues of Business Vol. 2*, Athens Institute for Education and Research (2003).

The paper was motivated by the major changes in the US corporate culture after the fall of WorldCom, Enron and Arthur Andersen, and the public humiliation of Kenneth Lay, Dennis Kowalski and Richard Grasso. These scandals have not only led to the emergence of new corporate governance rules, they have also dramatically changed the perception of what makes a good employer in the US. As a recent survey of 800 MBA graduates from 11 leading North American and European business schools have shown, firms with better reputation for social responsibility and ethics are now considered more desirable as employers. Just how important are such attributes? That is the question that Professors Montgomery and Ramus tried to answer in their study.

How much of their income were the graduates willing to forego to work for a more ethical firm?

Earlier studies on factors influencing an MBA graduate's job choice typically focus on things like financial compensation, geographical location of the workplace, the extent of business travel and

opportunities for advancement. Missing from these early studies, which generally employed the so-called "conjoint analysis" technique, were attributes that Prof. Montgomery and Ramus believe to be important for MBA graduates in the 21st century. These include attributes such as reputation for high ethical standards, care for employees, environmental sustainability and community stakeholders, as well as the intellectual challenge of the job. In total, 14 attributes were included in the analysis.

As it turned out, their belief was right on the mark. Intellectual challenge topped the list as the most important attribute affecting a MBA graduate's job choice. This was followed by the financial package, which was considered about 80% as important as intellectual challenge. But reputation for ethics and caring about employees both rose to become the third most important factors, not far behind financial package (77%). In fact, an overwhelming majority (over 97%) of the MBA graduates in their sample said they were willing to forego financial benefits in order to work for an organization with a better reputation for corporate social responsibility and ethics. How much of their income were the graduates willing to forego to work for a more ethical firm? The answer was surprisingly high - 14% on average. This was about 20% higher than the corresponding number in the pre-Enron days.

While no one is claiming that they are perfect, our study shows that MBAs are more moral across a number of dimensions than we thought

These findings have important practical implications not only for employers hoping to attract top talents from the business schools but also for HR and career experts in providing advice to their corporate clients. Other recent surveys such as those by New York-based consulting firm DBM confirm the growing importance of a firm's ethical reputation in recruitment.

Prof Montgomery concluded, "While no one is claiming that they are perfect, our study shows that MBAs are more moral across a number of dimensions than we thought." ■

Effects of Electronic Trading on the Hang Seng Index Futures Market



Professor Tse Yiu Kuen
Associate Dean
School of Economics and Social Sciences

On 6 June 2001, trading on the Hang Seng Index (HSI) in the Hong Kong stock market changed from the open-outcry system to the electronic trading system known as the Hong Kong Futures Automatic Trading System (HKATS). Given the prominence of HSI in the global financial market -- it ranked 7th worldwide in terms of total trading volume in 2000 - market participants are naturally interested in how the change will affect the quality and efficiency of the information conveyed by the HSI prices. This is the question that Prof Yiu Kuen Tse, together with Professors Joseph K.W. Fung, Donald Lien and Yiuman Tse tried to answer in a paper soon to be published in *International Review of Economics and Finance*.

A typical indicator of market quality is the transaction cost, which is usually measured by the bid-ask spread. Some researchers argue that the open-outcry system results in a liquid market which makes trading less expensive. On the other hand, since trading in an electronic system is anonymous, concerns for adverse selection may discourage trading and impede convergence during periods of high volatility. The delay in price convergence reduces the amount of information being conveyed. This could result in weaker correlation between the spot and futures prices in an electronic trading system.

Supporters for electronic trading, on the other hand, argue that when the market is inactive, floor traders have little to observe, while an electronic order book continues to inject information into the market, speeding up the process of price convergence. Thus, electronic trading in the futures market could enhance the role of the futures contract in revealing the true equilibrium spot price, commonly called the "price-discovery" role of the futures.

In their paper, the authors analyze minute-by-minute trading data of the HSI futures contracts for a six-month period before and after the change in trading system. The periods covered are November 1, 1999, through April, 30, 2000 (open-outcry period) and July 1, 2000, through December 30, 2000 (electronic-trading period). As it turns out, the daily average relative spread did decline, in a statistically significant way, from 0.038% in the open-outcry system. This suggests that the electronic trading did bring about a reduction in the transaction cost in HSI.

Supporters for electronic trading, on the other hand, argue that when the market is inactive, floor traders have little to observe, while an electronic order book continues to inject information into the market, speeding up the process of price convergence.

To see how the new trading system performs in terms of price discovery, the authors used a Vector Error Correction Model and estimated the proportion of efficient price variance called the information share, that can be attributed to each market. The higher the information share, the more the market contributes to the price-discovery process. It was found that in the open-outcry system, the information shares attributed to the spot and futures markets were 43.5% and 56.5%, respectively. The dominance of the futures in impounding information was more pronounced during the electronic-trading period, with a share of 65.6%.

"One reason for this could be that the new trading system might have attracted more informed orders than uninformed orders. Indeed, informed traders might be attracted by the anonymous nature and the facility of immediate execution offered by electronic trading," said Prof Tse.

Further confirming the view that the electronic trading system has attracted more informed traders is the finding of diminished asymmetric volatility coefficient in the futures market. As a result of the short-sale restrictions placed on spot market but not futures market transactions, the two markets have often reacted to news in an asymmetric way. For example, when bad news arrives, traders in the futures market could short the index, resulting in a greater impact on prices. According to a model developed by Sentana and Wadhvani, the extent of asymmetry may decline if there are more informed traders in the both markets. And this was exactly what Prof Tse and his colleagues found in their study.

Another way to gauge the informational efficiency of the new trading system is to look at how volatility in one market is affected by the other. Using a bivariate Exponential Generalized Autoregressive Conditional Heteroscedasticity model with t-errors, the authors found that there was a great deal of volatility spillover from the spot to the futures market and vice versa during the open-outcry period. With electronic trading, there has been less volatility spillover from the spot market to the futures market, although the spillover from the futures market to the spot market became more pronounced. To the extent that volatility is induced by trading in response to new information, this result is consistent with the hypothesis that electronic trading has enhanced the role of the futures contract as a source of information transmission. ■



New US Accounting Rule on Goodwill and Its Implications

Assistant Professor Yoonseok Zang, School of Accountancy

How a company accounts for the value of its goodwill and intangibles has always been a controversial matter. "Goodwill" is an accounting term referring to the difference between the cost of a company's acquisition and the net asset value of the acquired asset. Before 2001, the US accounting rule dictated that goodwill should be amortized, at a fixed amount each year, over a period where the acquired asset is expected to yield benefits, up to a maximum of 40 years. This

approach has long been criticized by many who argue that when goodwill loses value, it does so irregularly and in varying amounts.

To provide a more realistic evaluation of the changing economic value of goodwill, the US Financial Accounting Standard Board (FASB) adopted a new accounting rule in 2001 which eliminates the amortization of goodwill on corporate income statements and mandates annual

tests for goodwill impairment. Under this new rule, Statement of Financial Accounting Standards No. 142 (SFAS 142), *Goodwill and Other Intangible Assets*, goodwill is written down and expensed during the period when its recorded value exceeds its fair value.

"These changes have important implications for share prices as it directly affects a company's reported income and its management's decisions

about asset write-offs,” said Prof Yoonseok Zang at the School of Accountancy. His recent paper, “Discretionary Behavior with Respect to the Adoption of SFAS 142” was an attempt to assess such implications.

The paper tries to address two issues. The first is whether managers use their discretion over the determination of the initial goodwill impairment loss in a strategic manner. The second is whether and how the market reacts to a disclosed impairment loss and to the absence of any further goodwill amortization. The study was conducted using a sample of 870 firms that completed an initial goodwill impairment test in the year the new rule was adopted.

Prof Zang finds that more highly leveraged firms have lower goodwill impairment charges. This is consistent with the view that management usually reduces the goodwill impairment charge

With respect to stock prices, Prof Zang finds that investors react negatively to the initial impairment charges that are greater than expected.

strategically so as not to violate debt covenants. Firms with recent management changes, on the other hand, are more likely to report greater impairment charges, which is in line with the notion that new managers tend to take a big bath so as to report higher earnings in the future. The results reflect certain opportunistic behaviors of management in adopting the new rule.

With respect to stock prices, Prof Zang finds that investors react negatively to the initial impairment charges that are greater than expected. The reaction

is stronger for highly leveraged firms. In addition, it was found that following the impairment announcements, analysts often revise downward the earning forecast for the upcoming quarters in anticipation of a decline in earnings of the near future period. These findings suggest that the goodwill impairment has negative implications on a firm’s future profits and/or its debt contracts, even though the impairment charges are bookkeeping adjustments that do not typically coincide with changes in the value of the tangible assets or cash flows. In contrast, investors do not seem to react to the removal of goodwill amortization, reflecting certain rationality in market participants who recognize that the boost to earnings is without substance.

“I hope these findings, by providing the first insights into the impact of SFAS 142, will help contribute to a better accounting users’ understanding of goodwill,” said Prof Zang. ■

The Power of Demand Postponement

Assistant Professor Zhengping Wu
School of Business



Have you ever been bumped off a flight at the airport because it has been over-booked? Few passengers can be happy even if the airline offers compensation such as free hotel accommodation or some shopping vouchers. Such events could have adverse long term effects on the airline’s reputation far exceeding the cost of the short term compensation scheme.

Passengers would be less unhappy if they know that they would be bumped off before they make their way to the airport.

Passengers would be less unhappy if they know that they would be bumped off before they make their way to the airport. Some passengers are willing to accept a much lower compensation for an alternate flight if they haven’t set off. Both the long term and the short term costs could be considerably lower for the airlines if they can work out a way to inform the passengers earlier. While there is a certain statistical probability of “no-show” by passengers (and hence no cost for the airlines), the expected costs for the airline of waiting till the last minute and taking the risk

may be much higher than making an early offer of flight-switching to passengers. The situation is not unique to the airline industry. Others such as the utility industry, the fashion industry and the telecommunications industry etc face the same problem.

In a paper published in *Management Science* Vol. 49(8) (2003), “A Postponement Model for Demand Management”, Prof Zhengping Wu from the School of Business, together with Professors Ananth Iyer and Vinayak Deshpande from the Krannert School of Management at Purdue University, attempt to provide an optimal strategy to handle potential demand surges in general i.e. when demand exceeds short term capacity. “The basic idea is that by pre-empting stock-outs or backorders through demand postponement, we may reduce overall stock-out costs,” said Prof Wu.

Under demand postponement, a fraction of the demand from the regular period is deliberately postponed to be satisfied later. A reimbursement per unit of demand, which is lower than the stock-out cost, is paid to customers whose demand has been postponed. A key feature of demand postponement is that the postponement decision is made before the actual demand occurs. It makes sense as long as the unit cost of postponement is lower than the stock-out cost. But if the firm’s

A key feature of demand postponement is that the postponement decision is made before the actual demand occurs.

forecast of future demand turns out to be wrong and the actual demand falls short of capacity, the strategy could be costly.

The authors formulate a two-stage capacity planning problem to analyze the tradeoff mentioned above. Through extensive numerical examples, they find that the benefit of demand postponement can indeed be significant. For example, the percentage cost savings can be as high as 20% if the postponement cost (reimbursement per unit of postponed demand) is reasonably lower than the stock-out cost.

“In light of such findings, it would be unwise for managers to neglect the use of demand postponement strategy,” cautioned Prof Wu. “They should bear in mind that in many industries, the gross profit margin is only about 10%, half of what can potentially be saved from proper management of postponed demand.” ■



Moving towards a Pervasive Computing World?

Assistant Professor Zheng Baihua, *School of Information Systems*

In a seminal article a decade ago, Mark Weiser envisaged an ideal environment for computers and their human users. A “Pervasive Computing” environment is one which is saturated with computing and communication yet gracefully integrated with human users. As Weiser noted, “*The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.*”

More and more organizations now recognize “pervasiveness” as an integral part of the business environment.

A decade later, the vision is being turned into reality as more technologies become available. More and more organizations now recognize “pervasiveness” as an integral part of the business environment. With surging demands on mobility and increasing convergence of wireless communication and portable computing devices, advanced data management technologies such as data access and dissemination are now essential in build a pervasive computing environment.

¹ Indexing technology is a method to improve the efficiency of data lookup to rows of a table by keyed access retrieval, which is a traditional way to speed up the searching procedure.

For many years, satellite based broadcast has been used by many companies to provide broadband data services. With extremely low cost and almost unlimited scalability, broadcast is regarded as THE ideal channel for information dissemination in a pervasive computing era. Accessing information, especially location-dependent information in broadcast mode, however, poses unique challenges to both the consumers and services providers. In the traditional environment, for example, data are stored in disks or memories, which are resident storage mediums. In a mobile environment, on the other hand, data are literally stored “in the air”. In the latter, a particular data item disseminated by wireless broadcasting is only available to audience at the very moment it is broadcasted. If a user misses the desired data item, he may have to wait a whole broadcast cycle until the data is broadcasted again. Such delay could be significant if the population of users is sufficiently big. A major challenge in building a pervasive computing environment is thus to keep such misses to a minimum. Furthermore, the system should help avoid power-consuming tasks such as frequently connecting to the broadcasting channel for a long period of time since the portable mobile devices have limited capacity.

These are the issues tackled in a recent paper “Information Dissemination via Wireless Broadcast” by Prof Zheng Baihua and Prof. Dik Lun from Hong Kong University of Science and Technology. The authors propose several indexing strategies to facilitate efficient information dissemination via wireless broadcasting by intelligently scheduling data item¹. They went on to demonstrate the superiority of these proposed indexes over existing indexes through a number of simulation experiments.

Another issue the authors address is the retrieval of information based on some location-specific data. For instance, a user looking for the shortest travel route to a restaurant would have to take both his current position and the destination into consideration. In a traditional wired environment, a query is issued from one computer which has a fixed physical location. However, users with wireless devices may move constantly, changing the data on his current position. The authors propose schemes to incorporate such changing, real location information into the data set to facilitate pervasive information services. Again, they provide computer simulation results to demonstrate the validity and superiority of their technology. ■



A Fragile Watermarking Scheme to Detect Modifications to Database Relations

Assistant Professor Yingjiu Li, *School of Information Systems*

In a joint paper with professors Sushil Jajodia, Huiqing Guo and Anyi Liu from George Mason University, Prof Yingjiu Li provide a new scheme to protect database integrity using the so-called digital watermarking technology.

Digital data are widely distributed and extensively used these days. Since digital data can be easily duplicated and modified, there is a great concern about the integrity and intellectual property protection of these data. A new technology, digital watermarking, provides a promising method of protecting digital data from illegal copying and manipulation by embedding a secret code directly to the data. The embedded secret code, called watermark, can be used in various applications such as copyright protection, integrity checking, and fingerprinting.

Generally, the digital watermarking for integrity verification is called “fragile watermarking”. This contrasts with “robust watermarking” designed for the purpose of copyright protection. Recently attempts to use watermarking schemes to protect

database is mainly of a fragile variety. This is because owners of certain databases are more concerned about maintaining the authenticity and integrity of the databases than about preventing the data from being copied. This applies particularly to databases that are publicly available in the Internet such as those released by government and public institutions. In these cases, what is critical for the owner of the data is to make sure that the released data are not tampered with.

A fragile watermarking scheme for database relations allows any modifications to be detected and localized. Thus even if some part of a database relation has been altered, the modifications can be localized to keep the rest of the data authentic and useful. “Compared to the traditional digital signature method, fragile watermarking offers many advantages,” said Prof Li.

In the new fragile watermarking scheme that Prof Li and his colleagues design, all tuples in a database relation are first securely divided into groups. Watermarks are embedded and verified group by

A fragile watermarking scheme for database relations allows any modifications to be detected and localized.

group independently, according to some secure parameters. The embedded watermarks form a watermark grid which can not only detect, but also localize and characterize any modifications made to the database. In the worst scenario, the modifications can be narrowed down to tuples in a group. Security analysis has showed that it is very difficult for an attacker to modify the database without affecting the embedded watermarks.

In his next project, Prof Li hopes to be able to design a semi-fragile watermarking scheme that is robust to small modifications and yet fragile to severe modifications. Also in the pipeline is the design of a watermarking scheme that can embed watermarks to non-numeric attributes, data streams and XML data. ■

The Making of Knowledge Economies in Asia



Practice Associate Professor Thomas Menkhoff
School of Business



Professor Marshall W. Meyer
*Department of Management
The Wharton School
University of Pennsylvania*



Professor Hans-Dieter Evers
*Director, ZEF-Center for Development Research
University of Bonn*



Associate Professor Chay Yue Wah
School of Business

As management scholars, Associate Professor Chay and Practice Associate Professor Menkhoff (both at SMU) and Professor Hans-Dieter Evers (University of Bonn) and Professor Marshall Meyer (The Wharton School) are intrigued by the current efforts to transform Asian countries such as Singapore, Malaysia, Indonesia and China into knowledge-based economies. In a series of studies, they look at the nature of knowledge societies and their rise in Asia.

In their recent paper, “Towards Strategic Knowledge Management in Singapore’s SME Sector” published in the *International Quarterly of Asian Studies* Vol. 35, No. 1-2, pp. 85-99 (2004), Professors Menkhoff, Chay and Benjamin Loh argue that intelligent organizations which can leverage upon past experiences and intellectual capital assets can play a significant role in Singapore’s efforts to move into a knowledge-based economy. In particular, the small and medium enterprises can take advantage of the infrastructure in knowledge governance that the government has aggressively built up since the early 1990’s.

With the help of case study material and survey data, the authors show that the knowledge management (KM) concepts and tools can help enhance the profitability of small and medium-sized enterprises (SMEs).

With the help of case study material and survey data, the authors show that the knowledge management (KM) concepts and tools can help enhance the profitability of small and medium-sized enterprises (SMEs). “Economies and businesses are shifting towards a new world order of digital information and knowledge-based work. SME owners need to take on this challenge and find out how business intelligence and knowledge management solutions as well as assistance schemes offered by Singapore’s Infocomm Development

Authority (IDA) or SPRING can assist them” said Professor Menkhoff.

In “Building Science & Technology Parks with Knowledge Management”, Professors Menkhoff, Evers and Meyer (in collaboration with Lim Meng Huat) look at how knowledge management can help Science and Technology Parks (STP) to create an organic culture of knowledge production with the ‘right’ ingredients of innovation. There has been a proliferation of STPs across Asia over the years. They are expected to increase the wealth of its stakeholders by promoting a culture of innovation and competitiveness among the various businesses and knowledge-based institutions within the STPs. But this is not an easy task. “Ethnically and culturally diverse knowledge workers in STPs do not necessarily accept the modern architecture of STPs with their global corporate symbols as meaningful and relevant,” said Professor Evers.

In their paper, the authors introduce a framework that can be used by both STP management and tenant firms to ensure synergetic connectivity and knowledge generation within the park’s ecosystem. The framework focusing on enablers such as *leadership, culture, processes, knowledge flows and hubs, knowledge marketing, people, human capital management practices as well as ICT*. “By identifying the key cultural enablers of truly innovative knowledge work in different countries such as Singapore, China and Germany, as well as relevant facilitation and collaboration tools, we will be able to enlighten STP developers and their clients on how to maximize the ROI of such establishments,” said Professor Meyer.

The authors point to pre-existing, transnational social networks as playing a strategic role in facilitating knowledge flows and access to actionable knowledge as well as other resources, especially in Singapore and China. This could disadvantage small firms which often have to invest substantial resources in network-building before they can accumulate knowledge and do business successfully.

In a paper published in *Comparative Sociology*, Vol. 2, Issue 2, pp. 355-373 (2003) “Transition towards a Knowledge Society: Malaysia and

Indonesia in Comparative Perspective”, Professor Evers looks at the motives and strategies of policymakers in both countries to move towards a knowledge society. Compared with Indonesia, Malaysia has developed a clear vision (Wawasan 2020) on when and how to achieve such an objective.

There has been a proliferation of STPs across Asia over the years. They are expected to increase the wealth of its stakeholders by promoting a culture of innovation and competitiveness among the various businesses and knowledge-based institutions within the STPs.

Professor Evers argues that the transition in both countries is driven by the emergence of actionable knowledge, which can be used by entrepreneurs and government bodies to foster innovation and productivity growth. He found that both countries lag South-Korea, Germany, the Netherlands and other OECD countries in terms of general knowledge-society indicators such as the number of R&D researchers per million inhabitants and patents filed or expenditures on R&D. While progress has been made, Professor Evers argues that there remain numerous challenges such as the disparities in the distribution of knowledge both within and between Asian and non-Asian countries, rapidly changing occupational cultures or the rise of powerful mega-companies which increasingly determine what knowledge is created and who will have access to it.

“A key issue faced by Governments and civil society organizations in Asia is how to utilize ‘global’ knowledge flows and to gain a competitive advantage while maintaining their cultural identity,” said Professor Evers. ■

Special Research Events

Econometrics Program on Forecasting and High-Frequency Data Analysis

5 April - 22 May 2004

The School of Economics and Social Sciences (SESS) of SMU, together with the Institute of Mathematical Sciences (IMS) at the National University of Singapore, organized an Econometrics Program on Forecasting and High-Frequency Data Analysis from 5 April to 22 May 2004. Designed by Roberto S. Mariano (Dean of SESS) and Louis Chen (Director of IMS), the event was attended by more than 150 participants from Asia, North America, Europe and Australia.

The one-and-half-month program consisted of a series of seminar presentations and special lectures and tutorials by invited experts and a two-day symposium on 7-8 May 2004. The symposium featured 14 presentations by internationally renowned econometricians, including two Nobel Laureates. The highlight of the whole program was a Public Forum held on the afternoon of 8 May 2004. An impressive panel of speakers including Nobel Laureates Lawrence Klein (University of Pennsylvania) and Robert Engle (New York University) and a former editor of *Econometrica*, Kenneth Wallis (University of Warwick) led the Forum discussion on the past, present and future of econometric methodology and its impact on economic research. More than 120 researchers, public officials and private sector attended the Public Forum, reflecting the strong interest that the event had generated. The webcast of the Forum can be viewed at <http://www.sess.smu.edu.sg>

4th Asia Pacific Interdisciplinary Research in Accounting (APIRA) Conference

4-6 July 2004

The School of Accountancy at SMU, in conjunction with the Accounting, Auditing and Accountability Journal (AAAJ), hosted the 4th Asia Pacific Interdisciplinary Research in Accounting (APIRA) Conference on 4-6 July 2004. With its reputation for academic rigor, APIRA 2004 brought to Singapore some of accountancy's foremost thinkers. More than 250 accounting researchers from more than 30 countries spent 3 days discussing, debating, and deliberating on pressing issues affecting the accountancy discipline and the profession. Prior to APIRA 2004, an Emerging Scholars' Colloquium took place at SMU's Bukit Timah campus on 3 July 2004. The Colloquium attracted more than 50 emerging scholars who were mentored by 14 senior faculty, including SMU President Professor Ron Frank. Information on APIRA can be found at <http://www.accountancy.smu.edu.sg/Apira/index.htm>

Inaugural meeting, Singapore Econometrics Study Group (SESG)

24 July 2004

The School of Economics and Social Sciences (SESS) at SMU hosted the inaugural meeting of the Singapore Econometrics Study Group (SESG) on 24 July 2004. Organized by Professors Jun Yu and Yiu Kuen Tse of SESS, SESG aims to provide a forum for academics, research students, professional applied economists and others working in econometrics in Asia to meet and discuss their work and exchange ideas on current developments in the field. Professor David F Hendry (Oxford University) was the invited speaker. Fourteen papers were presented and discussed with representation from Academia Sinica, Australian National University, University of British Columbia, Griffith University, Hitotsubashi University, Hong Kong Institute for Monetary Research, National University of Singapore, Singapore Management University, University of Western Ontario, and University of Technology, Sydney. More information is available in <http://www.sess.smu.edu.sg>

Published by

Office of Research
Singapore Management University
469 Bukit Timah Road
Singapore 259756

Tel: (65) 6822 0197 Fax: (65) 6822 0810
www.research.smu.edu.sg/or

Editorial Board

Roberto S. Mariano • Steven Miller
David Montgomery • Pang Yang Hoong
Tan Chin Tiong

Editor

Tan Kim Song

Editorial Staff

Priscilla Cheng • Lim Lih Yeng

Working papers referenced in the newsletter can be accessed in their entirety through the electronic version of SMU Knowledge Hub at www.research.smu.edu.sg/or