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Unifying econometrics: can we bridge the gap between theory and practice?

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1. Introduction

Albert Einstein once said, "Science without religion is lame, religion without science is blind." The same is no doubt true of theory and practice in econometrics.[1] This book hopes to make a contribution to the discipline by focusing on the potential synergy between theory and practice; thereby demonstrating how economic quantification may both walk taller and see more clearly. We do not claim that the papers in this volume are in any way path-breaking in combining theory with practice. Indeed, all scientific articles in economics embody some mixture of theory and practice, including the extreme cases of 0 and 100%. The papers in this volume are, however, path-breaking in terms of either advanced techniques, unprecedented applications, or in some cases both. The volume is also organized by sub-theme in econometrics: theory, finance, development, marketing, tourism, and the environment. We invite the reader to study each set of articles as a bloc, the better to trace the linkages and complementarities among the papers and between the theory and practice within each sub-field.

What is also seldom stated (or even realized) is that econometrics involves a strong underpinning of "qualitative" research methods, including logical induction, reviews of literature, textual analysis of national plans, and hermeneutical interpretation of the implicit content of interviews. Through its experimental and game theory components, econometrics may even involve heavy interaction with human subjects, normally thought of as lying in the realm of sociology. Several articles in this volume illustrate these little-recognized qualitative and human components of economic metrics.

2. Region or country

This volume has been edited from several papers originally presented at the Fourth Conference of the Thailand Econometric Society held in Chiang Mai in January of 2011, so there is forcibly a strong Asian flavor to the empirical examples chosen. But considering that these are the meetings of a national-level econometrics association, readers may feel surprised to see the diversity of countries chosen as case studies (Table 1). Of the total of 22 original papers with empirical applications in this book,[2] 8 are from Thailand, 8 from Taiwan, 2 from Myanmar, 2 from China, one from Mongolia, and 1 with 95 countries!

Given the theme of this book, it is also informative to calculate the percentage theory vs. practice in each paper[3] and then to average them by sub-field within econometrics. Table 1 shows the degree of average abstractness on a continuum from 100% theory on the left to 100% practice on the right. Although admittedly the papers in this volume represent a small sample, it is remarkable that the most theoretical field in the papers turns out not to be econometric theory itself but financial econometrics, while the most applied is marketing econometrics rather than development econometrics.

[1] Indeed, Einstein (1879-1955) was probably paraphrasing the earlier thinker Immanuel Kant (1724-1804) who had said, "Experience without theory is blind, but theory without experience is mere intellectual play."

[2] The remaining two papers (by Schoch and Hodoshima) are 100% theoretical with no reference to a specific country.

[3] This exercise is forcibly somewhat subjective, but it does allow one to place the papers on a theory:practice continuum

Table 1. Position of each paper by country application, econometric field, and % theoretical content							
Country/Field:	Financial	Theory	Environmental	Tourism	Development	Marketing	*Total*
China	90% *(Li)*		30% *(He)*				2
Mongolia						20% *(J. Y. Lin)*	1
Myanmar					15% (*Ngu Wah Win) 10% (Nang Kham Nyo Oo)*		2
Taiwan	50% *(M.Y. Chen)* 75% *(T.F. Wu)*	55% *(B. Wu)*		*20% (H.S. Chen)*	50% *(K.S. Lin)*	*5%* (*Huang a),* 15% *(Huang b),* 25% *(Huang c)*	8
Thailand	75% *(Chaiboonsiri)*	80% *(Schoch et al),* 60% *(Wichitaksorn)*	80% *(Pastpipatkul)*	65% (*Sriboonchitta), 50%(Sribonchart) 50% (Suriya)*	40% *(Promprsert)*		8
95 LDCs					55% *(Chinnakum)*		1
None	100% (*Schoch)*	100% *(Hidoshima)*					2
Theoretical pole <--	**Avg = 78%**	**Avg = 74%**	**Avg = 55%**	**Avg = 46%**	**Avg = 34%**	**Avg = 16%**	.--> *Empirical pole*

Note: Percentages (%) indicates the approximate theoretical content of each paper. The name of the first author appears in parentheses.

3. The real-world problems

If we are to succeed in bridging the gap between theory and practice, the first logical step is to ask what real world problems have inspired the papers in this volume. We will sketch here those problems by sub-discipline within econometrics, beginning with theoretical econometrics and ending with environmental econometrics.

"Theoretical" econometrics

Not everything that counts can be counted, and not everything that can be counted counts. – Albert Einstein.

Even theoretical papers often originate in a real-world problem or intuition. For example, Schoch *et al*'s research on the ultimatum game is motivated by the fact that we know little about how people value and respond to fairness and unfairness in day-to-day economic behavior. Similarly, Wichitaksorn's[4] theoretical work is premised upon the real-world observation that household income may be even more skewed in Thailand because low earnings of the household head cannot be offset by the income of other family members. In complementary fashion, Berlin Wu has taken up the challenge of using fuzzy statistics to develop and test an efficiency evaluation tool that could more systematically gauge work performance to promote the profit of the enterprise.

Financial econometrics

As far as the laws of mathematics refer to reality, they are not certain. As far as they are certain, they do not refer to reality. – Albert Einstein

In the field of financial econometrics, Schoch notes that, although arbitrage possibilities may exist in real markets, we assume that traders are aware of this fact and try to avoid giving others the opportunity to write a Dutch book on their cost due to their diverging beliefs. Not wishing to expose bilateral belief differences to third parties, they have an interest in acting as if there were a unique market belief. For Thailand, Chaiboonsiri's research is inspired by the need for forecasting as an essential tool for investment on stock markets.

M. Y. Chen investigates the determinants of effective tax rates for the firms listed on Taiwan's stock market. T. F. Wu's preoccupation for Taiwan is, rather, to strengthen the customer's value contribution by meeting the different segments of customer individual needs, and at the critical moment. In China, the motivation for Li's highly theoretical research on angel investment is to improve China's capital market and effective allocation of social resources as a supplement to formal venture capital markets, especially since SMEs are having financing problems.

Development econometrics

In theory, theory and practice are the same. In practice, they are not. – Albert Einstein

We normally think of development economics as being the most applied branch of econometrics because of the urgent need for sustainable development strategies throughout the low income countries. The implicit notion is that a special subset of models and paradigms is required. But in a

[4] The actual paper is of course by Nuttanan Wichitaksorn and S.T. Boris Choy. To enhance readability throughout this introductory chapter, both single- and multiple-author papers will be referred to simply by the family name of the first author. Myanmar names will be given in their entirety, since family names do not exist. Since Schoch is first author on two papers, his paper co-authored with Liu Chang, and Songsak Sriboonchitta will be referred to as "Schoch *et al*." Since Huang is first author on three papers, Huang (a) will refer to *The Factors Considered by Fruit Consumers through Group-buying Channel in Taiwan*, Huang (b) to the *Interrelationships between Consumer Decision Making and Consumer Confidence for Domestic Fruit Group-buying in Taiwan*, and Huang (c) to *The influence on factors of choosing supermarket locations in Taiwan.*

study of 95 developing economies on three continents, Chinnakum evaluates whether politicians and international bodies may be erroneously imposing such development sub-models on planners when straightforward macro models would be more appropriate. This healthy sense of doubt also pervades K.S. Lin's work on Taiwan, who posits that we do not really know how democratic transitions affect the correlation in practice between savings and investment. Similarly for Thailand, Promprsert suspects that 5-year-plans have not really done any good. Finally for Myanmar, Nang Kham Nyo Oo researches a double development threat: Myanmar is not only the second largest and ever-expanding opium producer; and political instability has brought economic development, technology, and poverty alleviation to a virtual standstill. Against this long-term concern, Ngu Wah Win adds the short-term impacts of natural disaster: the 2008 cyclone Nargis. Since Myanmar is one of the lowest-income developing countries in the world, she carefully measures the cyclone's effects on physical well-being, income, income distribution, happiness and social networking.

Marketing econometrics

Taiwan has long been a functioning real world paradigm for the group and cooperative marketing of perishable commodities. This model has led Huang (a) to address the practical problem that fruit farmers in Taiwan have started to diversify away from wholesale markets to engage in voluntarily auctions and establish blogs to attract potential customers via the internet. At the other end of the marketing chain, the private and public sectors in Taiwan need to determine where to establish a supermarket (and of what type) in order to maximize profit and financial survival (Huang c). But these supermarkets are in competition at the retail level from consumer group-buying within the same marketing channel (Huang b).

While the Taiwanese case has long been the very model of the market-based economy, the Mongolian economy is undergoing a massive transition to markets which affects even the banking sector. J.Y. Lin explains that although seventeen commercial banks operate in Mongolia, the recent real-world global financial crisis has heavily disrupted activities of the commercial banks in Mongolia, forcing two banks to merge and two others to be taken under government control. Worried customers are reluctant either to deposit their money in banks, or take out loans. This has forced banks to "package" and "market" their services to increase customer satisfaction through strong customer relationship management. This tendency for modern econometrics to combine marketing and finance is a growing trend.

Tourism econometrics

At least theoretically, tourism is an economic sector that offers post-industrial society a steady source of service-based revenue with minimal environmental damage; but this possibility must be empirically verified in the real world. H.S. Chen notes that ecotourism in Taiwan often engenders negative impacts on the environment through traffic jams and over-exploration of natural resources. In Thailand as well, the twin challenge has been to maintain tourist numbers in the post-2008 recession period while shifting their interest and spending patterns toward more environment- and culture-rich tourism experiences. Sriboonchitta therefore attempts to help policy makers and the tourist industry to use the most accurate models for forecasting tourist arrivals. On this basis, Sriboonchart explores the possibilities of interesting tourists from various countries in a new type of tourism service called "Northern Thai intellectualities," which offers tourists the opportunity to learn real-world skills from rural experts in various types of craftsmanship, health and ecology. As part of this effort, the Thai government needs to

assist SMEs and community enterprises to properly select and design the most saleable souvenirs, helping to lift the poor above the poverty line. Suriya therefore analyses which souvenir attributes have the best hope of appealing to tourists.

Environmental econometrics

God does not play dice with the universe. – Albert Einstein

Yet eco-tourism is only one of many pathways to sustainable development. We may also use econometrics directly to measure and abate real-world environmental issues. According to the World Bank, 16 of the world's 20 cities with the worst air are in China; and the Chinese government estimates that a fifth of urban Chinese breathe heavily polluted air. He *et al.* therefore model the seasonal patterns of air pollution in Beijing to better inform policies to reduce pollution and warn vulnerable populations in certain periods. Similarly in Thailand, Pastpipatkul responds to public concern over environmental degradation by helping to identify, model and measure the causes of CO2 pollution.

4. Methods of data analysis

In addition to addressing such pressing empirical challenges, this volume also features several innovative technical applications in econometrics, the presence of qualitative and experimental applications, and many papers that combine two or more methods of analysis. Table 2 categorizes the 24 papers in this volume on a continuum between the more qualitative techniques on the left and more quantitative techniques on the right. The paper in the extreme Northwest corner is Schoch's *Belief aggregation in financial markets and the nature of price fluctuations.* There are no data at all in this paper, but rather a very careful mathematical exposition based on step-by-step logical deduction. Without such deductive papers, the applications of econometrics to real-world financial data would indeed be "blind."

At the other extreme, the three GARCH papers in the far Southeastern corner of Table 2 seek to make real empirical data speak in the most accurate, unbiased fashion to forecast air pollution under uncertainty in Beijing (He), the ideal form of incentive contract for diversification and angel investment in China (Li), and the ecological footprint in Taiwan (H.S. Chen). Without such applied papers, econometric theory would seem inapplicably "lame."

We also discover columns in Table 2 which deal with simulation and experimental economics. At times, real-world data do not afford us the experimental conditions necessary for unambiguously evaluating the performance and behaviour of theoretical models or new econometric formulations. This is why simulations are done by computer and with humans. As examples of the former, we find Hodoshima's simulation of the joint maximum likelihood function and Wichitaksorn's Bayesian Markov China Monte Carlo methods. Examples of the latter include Schoch *et al*'s use of the ultimatum game and Sriboonchart's and Suriya's experiments with tourist preference measurement.

The last set of columns in Table 2 have to do with several variants on econometric models. What strikes one in this section of the table is that each paper has chosen one or more analytical methods that differ from most of the others. For example, Chinnakum chooses panel co-integration with vector correction, Huang (a) simple ANOVA analysis, Huang (b) principal components analysis, M.Y. Chen panel data with two-side censored regression, Schoch *et al.* bivariate-probit, Pastpipatkul both classical and random parameters panel data models, and Sriboonchart conditional logit. Clearly, the toolkits of modern econometricians are virtually overflowing with specific modeling techniques.