Econometric Advances in the Service of Macroeconomic Prediction and Planning: An Overview

Peter Calkins[*]

Faculty of Economics, Chiang Mai University, Thailand

Songsak Sriboonchitta

Faculty of Economics, Chiang Mai University, Thailand

Aree Wiboonpongse

Department of Agricultural Economics, Chiang Mai University, Thailand

1   Introduction

The macroeconomic crisis which erupted in the United States economy in the second two quarters of 2008 and snowballed into a world-wide recession eloquently attests to the need for powerful tools of macroeconomic prediction and planning. Although the theory of macroeconomic behavior and its microeconomic roots has followed an upward, if nonlinear, expansion path over the 73 years since Keynes' **General Theory** (1936); macroeconomic planners are still grappling with how best to model and predict the relationships among inflation, unemployment, openness to trade, real exchange rate volatility, and financial shocks. In addition to such positive analyses, they must also formulate normative plans to best navigate the business cycles and unanticipated shocks that globalization has delivered to their very doorsteps. In an era that has transformed most nations into open macro-economies, macroeconomic modeling must more than ever provide up-to-date planning information based upon the most robust prediction tools available.

[*]Correspondence to: Faculty of Economics, Chiang Mai University, Thailand. E-mail: peter_calkins2004@yahoo.com.

2   Overview

This special issue of the **Journal of Economics and Management** is designed to bring to the attention of professional economists and policy planners world-wide a series of seven state-of-the-art contributions to the economic modeling literature on how to refine forecasts and inform policies. Taken together, the articles provide strong external validity by studying data from from 7 to 19 industrial economies (Yeh and Chi, Cheung and Lai), Asia in general (Tsong, Wongwachara and Minphimai); the 31 provinces of China (Ho and Huang); and Thailand (Calkins, Polsiri and Sookahaphibarn). They recognize that microeconomic prediction of firms in distress (Polsiri and Sookhaphibarn) and optimal bottom-up micro-planning of decentralized communities (Calkins) must lie at the heart of accurate and implementable macro policies. The time horizons analyzed range from 46 years in the past (Yeh and Chi) to five years into the future (Calkins). Data are taken from the International Monetary Fund's *International Financial Statistics* and other datasets (Wongwachara and Minphimai, Yeh and Chi, Cheung and Lai), non-financial companies listed on the Stock Exchange of Thailand (Polsiri and Sookhanphibarn), five other stock market indices (Tsong), the **China Statistical Yearbook** (Ho and Huang), and village-level household and firm surveys Calkins.

3   Methodological Innovations

Methods of analyzing such variegated data also call for innovative approaches to macroeconomic modeling. For example, Wongwachara and Minphimai apply univariate and bivariate unobserved component models to measure the output gap for ASEAN economies. They are the first to introduce the use of the Unobserved Component (UC) models in Phillips curve estimation. Yeh and Chi also deal with inflation by applying vector autoregression, ARDL-ECM models, and the confidence interval approach to point out the ambiguity of unit-root tests in estimating the dynamic co-movement between inflation and real-stock returns. By testing for the existence of I(0) and I(1) variables, they improve the description of

the dynamic relationship between inflation and real-stock returns over the unconditional correlation coefficient.

Cheung and Lai innovate regression models of the financial and trade determinants of exchange rate volatility by introducing a multiple-grid estimator of multi-period volatility. In contrast to earlier studies of RER volatility analysis, their approach is thus capable of differentiating the causes of macro volatility in the short and long runs.

Since such volatility has microeconomic roots, Polsiri and Sookhanaphibarn combine Logit regression predictions and neural network models of firms to detect corporate distress of the type that led to the 1997-8 East Asian economic crisis in established market economies like Thailand. Meanwhile, for emerging macroeconomies like China, Ho and Huang employ multivariate panel co-integration, panel unit root tests and error-correction models to determine whether governments should tax before spending, spend before taxing, or do both synchronously.

Both Tsong and Calkins diversify the tool-kit of macroeconomists by adding non-econometric approaches to policy prediction and planning. At the macro level, Tsong demonstrates that the popular market timing test truncates point forecasts, is subject to serial correlation, violates the independent identical distribution assumption, and has an inflated size that can lead to doubtful empirical results. He performs careful Monte Carlo simulations of empirical size and empirical power before conducting an empirical study to demonstrate the usefulness of the naïve block bootstrap when combined with the HAC robust test.

At the micro level, Calkins combines social accounting matrices, mathematical programming optimization of MOTAD models, parametric programming, and shadow prices to isolate the single optimal plan for a Northern Thai village under the ethical umbrella of sufficiency economics. If aggregated to the national level, his approach could be used as the basis for a nationwide system of sustainable micro-macro planning in developing economies.

4   Hypothesis Testing and Results

Of course, such methodological innovations will have no impact unless they are applied to the real-world challenges of macroeconomic prediction and planning. This volume does that. For example, Wongwachara and Minphimai confront the challenge that the Phillips curve inflation-output gap trade-off remains unconfirmed for the ASEAN economies, because assuming its existence without proof could lead to unnecessary compromises between inflation and unemployment. Using the IMF database quarterly data for real GDP, inflation, real investment, they tested the null hypothesis that the Phillips relation does not hold and found little evidence for it in four ASEAN countries.

Yeh and Chi provide planners with benchmarks for decision-making on asset allocation by testing whether and how inflation affects real stock returns. Using quarterly data from 12 OECD economies, they test the hypotheses that there is short-term co-movement and long-term equilibrium between real stock returns and inflation. They confirm the existence of short- and long-term relationships between inflation and real-stock returns, whether purely $I(0)$, $I(1)$ or co-integrated. This result is consistent with the inflation-illusion hypothesis.

Cheung and Lai help planners to decide whether the choice of a specific base currency (European Monetary System, dollar, yen) affects bilateral exchange rate volatility in both nominal and real terms, since such volatility is a major source of inefficiency and difficulty in macroeconomic planning. Using data from a carefully selected sample of 19 industrial countries with efficient goods and capital markets and clear structural variables for time horizons of up to 20 quarters, they test the hypothesis that the determinants of RER volatility differ between the short and long terms. Their results show that financial factors operate mainly in the short term, while trade determinants become more powerful in the long term. RER volatility increases with financial openness and transport costs, but decreases with trade openness and financial depth. Furthermore, the volatility of RERs increases with longer horizons, but at a slower rate than the volatility of NERs. Intra-EMS real rates are on average less volatile than other rates, while dollar- and yen-based regimes have higher volatility than other regimes.

To determine the most effective time sequence for planning fiscal levies and expenditures, Ho and Huang test the hypothesis that a tax-first-spend-later approach to macroeconomic fiscal management is the best strategy for large emerging economies like China. Using data from the **China Statistical Yearbook** for 31 Chinese provinces between 1999 and 2005, they find no significant causality in either direction between revenues and expenditures in the short run but bi-directional causality in the long run. Fiscal synchronization and harmonization across ministries are therefore the best approaches.

Polsiri and Sookhanaphibarn aim to help economies predict and forestall the financial stress of their firms, which recent events have shown may propagate to other countries. They test the hypothesis that corporate as well as financial variables must be combined into an overall model of distress predictors. Using non-financial companies listed on the Thai Stock Exchange that were ordered to de-list or rehabilitate themselves between 1998 and 2001 plus I-SIMS data, they confirm that corporate governance (ownership, board structures) significantly affects the likelihood of corporate distress.

Tsong responds to the need for governments and their private sectors to validate the accuracy and reliability of financial forecasts. Using 1980-2007 monthly data from five Asian stock exchanges, he tests the hypothesis that modeling heteroskedastic-autocorrelation (HAC) robustness with fixed-b asymptotics using the native block bootstrap can overcome the problems of the more popular market timing test.

Finally, Calkins addresses the need for localities and regions to supply national governments with better 5-year plans that accurately optimize across environmental, employment, value-added, social and spiritual trade-offs and complementarities. Using primary data collected from households and firms in a typical Northern Thai village, he tests for the existence of an optimal plan that can sustainably and ethically increase the value added of the village by more than 20% over current levels. His hypothesis is accepted when social protection (immunization) is low, but value added improvement falls to under 20% as immunization is parameterized upward.

5   Immediate Contributions and Suggestions for Further Research

Several direct contributions to forecasting and planning are embodied in this volume. Indeed, each paper takes a step in a new direction which we feel should be followed up and enriched by future research. For example, Wongwachara and Minphimai add to the active yet inconclusive literature on the Phillips curve for ASEAN countries. Their robust estimates and clear graphs for Indonesia, Malaysia, Philippines and Thailand may now be extended to the modeling of other countries in ASEAN, Asia, Latin America, and Africa. Similarly, Yeh and Chi's discovery of an inverse co-movement and long-term relationship between inflation and real stock returns in industrialized countries, as well as Tsong's techniques to evaluate financial forecasts, should probably be extended to non-OECD medium and low-income countries.

Cheung and Lai give pragmatic policy advice: If planners wish to reduce real exchange rate volatility, they should reduce financial openness and transport costs, and increase trade openness and financial depth among industrial countries. Future researchers can now extend the scope of multiple horizon models of RER volatility to medium and low income countries. Those countries may wish at the same time to test whether Ho and Huang's pragmatic advice – to conduct revenue and expenditure activities simultaneously and across branches – applies in non-Chinese transition and market economies.

Polsiri and Sookhanaphibarn advise Thailand to encourage business group affiliations to prevent corporate structure from becoming over-concentrated. They also recommend that over-concentrated corporate structures be used as an early warning system. It seems urgent to extend these models to other countries, including developed OECD economies, to help forestall another world recession.

Calkins innovates in creating a pragmatic tool for rendering economic modeling of service to local society; and in combining a moral concern for economic and environmental justice within an economic optimization model. In future, the approach should be tested in other socioeconomic contexts and countries, and rendered as 'user-friendly' as possible to local planners.

Acknowledgments

References

Calkins, P., (2009), "Sufficiency Economy Matrices: Multi-Period Optimization for Local Development Planners," *Journal of Economics and Management*, 5, 305-332.

Cheung, Y. W. and K. S. Lai, (2009), "A Multi-Horizon Search for the Role of Trade and Financial Factors in Bilateral Real Exchange Rate Volatility," *Journal of Economics and Management*, 5, 187-218.

Ho, Y. H. and C. J. Huang, (2009), "Tax-Spend, Spend-Tax, or Fiscal Synchronization: A Panel Analysis of the Chinese Provincial Real Data," *Journal of Economics and Management*, 5, 257-272.

Keynes, J. M., (1936), *The General Theory of Employment, Interest and Money*, London: Macmillan and Co.

Polsiri, P. and K. Sookhanaphibarn, (2009), "Corporate Distress Prediction Models Using Governance and Financial Variables: Evidence from Thai Listed Firms during the East Asian Economic Crisis," *Journal of Economics and Management*, 5, 273-304.

Tsong, C. C., (2009), "Assessing the accuracy of event forecasts," *Journal of Economics and Management*, 5, 219-240.

Wongwachara, W. and A. Minphimai, (2009), "Unobserved Component Models of the Phillips Relation in the ASEAN Economy," *Journal of Economics and Management*, 5, 241-256.

Yeh, C. C. and C. F. Chi, (2009), "The Co-Movement and Long-Run Relationship between Inflation and Stock Returns: Evidence from 12 OECD Countries," *Journal of Economics and Management*, 5, 167-186.