Comments

Econometrics: Retrospect and prospect

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The first issue of the Journal of Econometrics was published in the early 1970s, more than 25 years ago. Since then, econometrics has progressed remarkably. This occasion, publication of the 100th volume, provides a fine forum for discussing both retrospect and prospect.

I find the set of introductory essays remarkable insofar as, taken together, they illustrate beautifully what I consider to be three central themes in econometrics, perhaps *the* central themes, as we move into the new millennium. The first is the sweeping effect of improvements in information technology, broadly defined to include not only processing speed, but also data collection and storage capability, on both econometric theory and practice. The second is the distinct recognition that empirical finance and time-series econometrics are natural partners, and that the benefits from cross-fertilization are immense, resulting in a booming new area, financial econometrics. (As I write, the *Journal of Financial Econometrics* is being launched.) The third is the continued importance and rapid development of ideas and methods related to forecasting, whether in macroeconometrics, microeconometrics, or financial econometrics.

As regards information technology, consider first the pervasive effects of advances in processing speed, which have produced an irreversible and ongoing shift away from closed-form analytic methods and toward algorithmic numerical and simulation methods. This move is obvious in all of the essays, which bristle with computational technology, but those by Geweke (Bayesian econometrics using Markov chain Monte Carlo methods), Horowitz (bootstrap methods for inference), and Hendry (model selection via intensive data-based search) are particularly notable.

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Perhaps even more important, although more subtle, is the way information technology is changing the questions we ask. Here improvements in data collection and storage feature prominently. We are not simply producing faster or bigger implementations of old-style constructs; rather, the availability of high-frequency real-time data is creating new and exciting fields, ranging from the new empirical microeconomics of consumer choice facilitated by such developments as supermarket scanner data and web click pattern data, to the new financial econometrics of ultra high-frequency data stressed by Engle.

This brings us to our second theme: the emergence and blossoming of financial econometrics, and empirical finance more generally. It is telling – and entirely appropriate – that three of the 12 essays (Bollerslev, Engle, Tauchen) are explicitly and exclusively devoted to financial econometrics, and moreover, that several of the essays not explicitly devoted to financial econometrics are nevertheless closely related. Hendry, for example, is concerned with data-driven model selection and evaluation, which is crucial for trustworthy evaluation of trading rules and alleged market anomalies (see Sullivan et al., 1999), and both Geweke and Granger are concerned with the construction and evaluation of density forecasts, which is particularly relevant in financial risk management (see Diebold et al., 1999). In the coming decades econometricians will continue to make serious and substantive contributions to the three pillars of finance: asset pricing, portfolio allocation, and risk management, just as they have in recent years. Active areas will include market microstructure and liquidity, asset return volatility and correlation, and portfolio allocation and evaluation, among many others. Both classical and Bayesian econometric methods will prove useful.

We arrive, finally, at our third theme: forecasting. Almost all of the essays – one way or another, and again quite appropriately – are concerned with forecasting, from the financial econometrics essays such as Bollerslev's, with emphasis on nonstructural modeling and forecasting, to the macroeconometric essays such as Stock's, with emphasis on blending nonstructural and structural forecasting depending on the situation, to microeconometric essays such as Heckman's, with emphasis on structural forecasting.

Academic forecasting has evolved greatly since the large-scale econometric models prominent twentyfive years ago, but the reason for the attention paid to forecasting, particularly in finance and macroeconomics, remains unchanged: forecasting is central to dynamic economics, and hence it figures especially prominently in those inherently dynamic fields. Central to finance, for example, is the idea of expected present value of earnings streams, and central to macroeconomics is the idea of expectations and their effects on investment and consumption decisions. Moreover, predictive ideas in finance and macro-economics are very much intertwined. For example, modern asset pricing models attribute excess returns and return predictability in part to macro-economic factors such as recession risk.

On the finance side, recent years have featured extensive inquiry into issues such as long-horizon asset return forecastability, persistence in mutual fund performance, volatility and correlation forecasting with applications to financial risk management, and selection biases due to survival or data snooping. On the macroeconomics side, we have seen the development and application of new coincident and leading indicators and tracking portfolios, diffusion indexes, regime-switching models (with potentially time-varying transition probabilities), and new breeds of macroeconomic models that demand new tools for estimation and forecasting.

The upshot: financial econometrics has emerged as an explosive growth area in the last few years, and macroeconometrics is alive and well, even it it looks very different than it did 25 years ago (see also Diebold, 1998). In both fields the brisk pace of advance, and the implicit as well as explicit emphasis on prediction, will continue, facilitated by powerful information technology undreamed of when the *Journal of Econometrics* was founded.

References

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