Thirty-Five Years of Journal of Econometrics

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I. Introduction

I am pleased to announce that Elsevier has agreed to sponsor the Amemiya lecture series for the *Journal of Econometrics* to promote econometrics research in developing countries. It is my honor to give the first lecture of the series. This idea was proposed by Cheng Hsiao, who believes that despite the tremendous advancement of econometric methodology in the last two or three decades, it does not seem to have had much impact on scholars in the third world countries. At the same time, the research interests of scholars in the third world countries, which naturally reflect their unique situation, have not attracted the attention of scholars in developed countries. This makes the submissions from developing countries difficult to go through the refereeing process of the *Journal*. There is, however, tremendous interest in the subject and scholars and students are eager to learn. For example, when Yongmiao Hong, associate editor of the *Journal*, organized a summer econometrics workshop in 2006 in Xiamen, China, with the sponsorship of the *Journal of Econometrics*, Chinese Ministry of Education, and Chinese Academy of Sciences, it attracted 610 applicants, although in the end only 230 were allowed to enroll due to space constraints. We hope that through this lecture series, we can enhance the interactions between scholars in the third world countries and scholars in the developed countries. See Table A, which classifies published articles according to the countries in which the authors resided during 1981-1999, and Table B, the same data during 2000-2007. Note a big jump in the number of articles from the first period to the second by authors residing in South Korea, China, Taiwan, and Brazil. So we already see a promising trend.

For this inaugural lecture I think it appropriate to review the first thirty-five years of the *Journal of Econometrics*, how it started, how it has become a major journal in econometrics, and what lies ahead.

The first issue of the journal was published in March 1973. In issue 75-2 (1996) Aigner stated that ". . . the work leading up to that began before then. From North-Holland's side, it was Fekko Snater, then Economics Editor, and Bart von Tongeren, President of the Company, who, with the advice of Dale Jorgenson, encouraged me and Arnold Zellner to get involved in launching the new journal." Then, they asked Phoebus Dhrymes to join them as the co-editors. In the first issue of the *Journal*, the following editorial written by Dennis Aigner, Phoebus Dhrymes, and Arnold Zellner appeared:

> The past several years have witnessed a remarkable development in both theoretical and applied econometrics. The flow of research output has increased considerably, not only in volume but also in

[1] This paper is to be presented at the Far Eastern Meetings of Econometric Society in Singapore in July 16-18, 2008. I would like to thank Dennis Aigner, Arnold Zellner, Cheng Hsiao, Valerie Teng, Peter Hansen, Han Hong, and the fellows of the Journal of Econometrics for helpful comments. I also thank Haiqiu Guo for preparing the figures. The opinions expressed in this paper are my own and are not necessarily shared by the other members of the editorial board.

richness of content, beyond the capacity of existing journals. The Editors therefore are pleased to introduce the first issue of the Journal of Econometrics, which will concentrate in one vehicle the publication of important new research in both theoretical and applied econometrics. The journal is intended to be international in character, and its editorial board reflects this.

While produced under the auspices of a publishing firm, the journal's operation will strictly adhere to the principles of academic freedom. Its editorial board is completely free to solicit, review, and publish whatever papers it deems appropriate, without interference on the part of the publisher. The only criteria for publication will be the importance, soundness, originality and timeliness of the research results reported in submitted manuscripts.

Be its very nature as a specialized journal, Journal of Econometrics will publish only papers in econometrics. However, the term will be interpreted somewhat broadly. Thus, it is envisioned that papers dealing with estimation and other methodological aspects of the application of statistical inference to economic data fall within the scope of its coverage. In addition, papers dealing with the application of econometric techniques to substantive areas of economics are not only acceptable but are eagerly solicited. The journal does not intend to restrict its areas of substantive coverage. Econometrics research in the traditional divisions of the discipline or in the newly developing areas of social experimentation is firmly within the range of the journal's interests.

It is our hope that the Journal of Econometrics will provide a vital new forum for all members of the growing international community of econometricians.

In that issue, as well as in all the ensuing issues, the following Editorial Policy has appeared. The editorial policy has not changed in thirty-five years.

The Journal of Econometrics is designed to serve as an outlet for important new research in both theoretical and applied econometrics. Papers dealing with estimation and other methodological aspects of the application of statistical inference to economic data as well as papers dealing with the application of econometric techniques to substantive areas of economics fall within the scope of the Journal. Econometric research in the traditional divisions of the discipline or in the newly developing areas of social experimentation is decidedly within the range of the Journal's interests.

At the time the *Journal of Econometrics* started, the main journals to which econometricians submitted their papers were *Econometrica*, *International Economic Review*, and the *Journal of the American Statistical Association*. None of these journals specialized in econometrics. This point is stressed in the first editorial quoted above. Thus, the publication of the *Journal of Econometrics*, which specialized in econometrics, immediately received an enthusiastic response from the profession. If I may insert a personal note, my first article in the *Journal of Econometrics* was "The Nonlinear Two-Stage Least-Squares Estimator," which appeared in July 1974. The publication of the *Journal of Econometrics* was followed by the publication of the *Journal of Business and Economic Statistics* in 1983, *Econometric Theory* in 1985, and the *Journal of Applied Econometrics* in 1986. After the publication of these journals, however, the *Journal of Econometrics* enjoyed its acclaim as the only journal that published papers in both theoretical and applied econometrics. As the first editorial stated, "papers dealing with the application of econometric techniques to substantive areas of economics are not only acceptable but are eagerly solicited." Although the proportion of applied papers has somewhat declined over the years (see Table 1 and Figure 1), I believe the current editorial board shares the sentiment expressed in the first editorial.

II. Editorial Board and Fellows

The original three co-editors stayed on until issue 6-1 (1977), when Phoebus Dhrymes resigned. From issue 6-2 (1977) to 20-2 (1982), Dennis Aigner and Arnold Zellner were the only co-editors. I joined the editorial board in 1982. In the editorial of issue 50-3 (1991), Aigner announced his retirement from the editorial board and the joining of Richard Blundel, Ron Gallant, and Cheng Hsiao in the editorial board. In the same issue Zellner's tribute to Aigner appeared. In 1997 Blundel resigned from the editorial board and Peter Robinson joined. In 2003 John Geweke became a co-editor, so the present editorial board consists of Gallant, Geweke, Hsiao, Robinson, Zellner, and myself.

The associate editors and referees constitute the cornerstone of a journal, and we are fortunate that we have had an excellent board of associate editors from the beginning, representing a wide range of expertise as well as representing many countries making the Journal a truly international journal. It is noteworthy that two scholars who later won the Nobel prize in economics, Clive Granger and Jim Heckman, served as associate editors from 1977 to 1983. The names of the referees who served in each year are acknowledged usually in the first issue of the following year.

Some years ago Arnold Zellner suggested an interesting unique idea of the *Journal of Econometrics* fellows. Anyone who has published four articles in the *Journal* is to become a fellow, with a jointly written article counting as a fraction. This method of election is attractive because it is completely objective. The charter membership of the sixteen fellows was announced in issue 41-2 (1989). The membership now counts 114 fellows. The fellows are invited to a sumptuous dinner at the annual ASSA meetings hosted by Elsevier. Although the fellows' main duty is to enjoy a good dinner, they often suggest interesting ideas regarding the editorial policy.

III. Growth

The *Journal* grew considerably both in size and reputation in these thirty-five years. Table C gives the total number of pages and articles including both the regular issues and the Annals issues from 1973 to 2007 and the Institute for Scientific Information impact factor from 1997 to 2007. The impact factor is defined as the number of times articles were cited in indexed journals divided by the number of published articles. It is gratifying that the impact factor has steadily increased in the recent years.

One of the significant events in the history of the *Journal* was the decision to publish special issues called the *Annals of Applied Econometrics*, later simply called the *Annals*, in 1979, acting on Dennis Aigner's idea. The editorial appearing in issue 8-3 (1978) announces the creation of the *Annals*, stating that its purpose is to publish collections of papers on specific topics in applied econometrics, being derived from a conference or workshop, or otherwise organized. The first *Annals* issue appeared in issue 9-1/2 (1979) and was entitled "Modelling and forecasting time-of-day and seasonal electricity demands" edited by Anthony Lawrence and Dennis Aigner. Now the *Annals* contain both applied and theoretical papers and they are immensely popular because they represent the

state of the art in a specific area of research. Manfred Deistler, associate editor and fellow of the *Journal* writes, "In a time where the subject of econometrics undergoes a rapid development, the *Annals* are, in my opinion, the most important source of 'systematically' provided information about new methodological developments and new areas of application." The prospective editors of the *Annals* submit their proposal to the editorial board. The proposal should focus on a substantive topic, contain a brief description and motivation of the topic, and include a list of potential contributions, including author(s), title and abstract for each. Each proposal is accepted or rejected by the majority decision of the co-editors and a liaising co-editor will be assigned to oversee each *Annals* issue.

Leading researchers have contributed papers on topics such as welfare econometrics of peak-load pricing for electricity (9-1/2, 11-1, 26-1/2), discrete or censored variables (24-1/2, 32-1, 34-1/2), model specification (16-1, 20-1, 30-1/2, 143-1), econometric analysis of duration data (28-1), Bayesian analysis of econometric models (29-1/2, 123-2), structural change (19-1, 129-1/2), finance (94-1/2, 105-1, 116-1/2, 131-1/2, 135-1/2), causality (13-2), and semiparametric methods (141-1). In 2007 the *Journal* published seven volumes of the *Annals*.

The *Journal of Econometrics* went on line in 2000 as announced in issue 96-1 (2000). One can download all the articles from the site http://www.elsevier.com/locate/jeconom. The electronic submission started in November 2005.

IV. Influential Papers

I will give brief summaries of ten path-breaking papers which I believe have made great impact on the econometrics profession. The order of the papers below is not significant. The selection cannot completely avoid being subjective, but there is some objective basis partly because I have selected papers from the lists sent me from the fellows of the *Journal of Econometrics* who responded to my questionnaire, excluding the self-promoted papers, and partly because many of the papers are listed in the so-called "All Star Papers, " downloadable from the *Journal of Econometrics* website, listing the top fifty papers according to the number of citations in all economics journals in the period 1980-1999.

The following three papers are important as they were among the first batch of papers that opened up new areas of research in time series analysis, which have proved to be extremely useful in macro and financial applications and are still vigorously pursued, namely, cointegration, unit roots, and GARCH (Generalized Autoregressive Conditional Heteroscedasticity) models.

1. C. W. J. Granger, "Some properties of time series data and their use in econometric model specification," 16-1 (1981), 121-130. (#6 in the All Star list)

   This seminal paper introduced the notion of cointegration, a topic that would dominate time series econometrics for many years to come. The *Journal of*

Econometrics has published more than one hundred papers on cointegration with more being added every year. A key result in the paper is that a linear combination of two time series may be integrated of a smaller order than two original time series. An important implication is that a linear combination of two non-stationary variables may be stationary. The paper discusses how cointegrated series arise in economics.

2. P. C. B. Phillips, "Understanding spurious regressions in econometrics," 33-3 (1986), 311-340. (#7 in the All Star list)

   Granger and Newbold (2-2, 1974, 111-120) showed by Monte Carlo studies that in nonstationary ARIMA (Autoregressive Integrated Moving Average) process like random walk, conventional significance tests have a bias toward rejecting the null hypothesis of no relationship thereby creating spurious regression. This paper confirms it by asymptotic theory, proving that the t statistic does not possess a limit distribution in this case unless it is divided by the square root of the sample size. The result is extended to cointegrated regressions.

3. T. Bollerslev, "Generalized autoregressive conditional heteroskedasticity," 31-3 (1986), 307-327. (#2 in the All Star list)

   This paper generalizes ARCH (Autoregressive Conditional Heteroscedasticity) models of Engle (*Econometrica*, 1982, 987-1008). In ARCH the conditional variance of the error term depends on the past squared errors, whereas in GARCH it depends also on the past values of the conditional variance. In the GARCH model the conditional variance has a flexible ARMA representation that allows for more persistent volatility, and this has proved to be very important in empirical work. Due to its empirical success, the GARCH model has become the point of referfence in the vast family of ARCH-type models. The paper derives the asymptotic distribution of GARCH maximum likelihood estimator and proposes a Lagrange multiplier test of a GARCH specification.

The next five papers present semiparametric analysis, one of the most important areas of research in econometrics today. Each of these papers was a pioneer in their respective fields.

4. C. F. Manski, "Maximum score estimation of the stochastic utility model of choice," 3-3 (1975), 205-228.

   In this paper Manski proposed the first distribution-free estimator of the qualitative response model and proved its consistency. Kim and Pollard (*Annals of Statistics*, 1990, 191-219) showed that Manski's estimator converges at the rate of the cubic root of the sample size instead of the usual root-N rate, a feature shared by some other semiparametric estimators.

5. W. K. Newey, "Generalized method of moments specification testing," 29-3 (1985), 229-256. (#22 in the All Star list)

   In this paper Newey analyzed the asymptotic power properties of specification tests based on moment conditions using the method of the Pitman drift. The relationship of these tests to Hausman tests (*Econometrica*, 1978, 1251-1272) in testing overidentifying restrictions was explained. Newey pointed out that these tests are not consistent against general misspecification.

6. G. Chamberlain, "Asymptotic efficiency in semiparametric models with censoring," 32-2 (1986), 189-218. (#48 in the All Star list)

   Using the method of Begun, Hall, Huang, and Wellner (*Annals of Statistics*, 1983, 432-452), which utilized Stein's idea (*Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability*, Vol. 1, 1956), Chamberlain derived the semiparametric efficiency bound in qualitative response and censored regression models. Stein's idea was to reduce the maximization over a function space to the maximization over the collection of parameter subspaces. Chamberlain showed that the efficiency bound of a binary choice model under the assumption that the error distribution has zero median is zero. In such a model a semiparametric estimator like Manski's maximum score estimator is not root-N consistent.

7. J. L. Powell, "Least absolute deviations estimator for the censored regression model," 25-3 (1984), 303-325. (#23 in the All Star list)

   In this paper Powell proposed the Least Absolute Deviations (LAD) estimator for censored regression models, proved its consistency and derived the root-N asymptotic normality under general distributions and heteroscedasticity. The intuitive appeal for the LAD estimator in a censored regression model arises from the fact that in the i.i.d. sample case the median (of which the LAD estimator is a generalization) is not affected by censoring.

8. A. K. Han, "Non-parametric analysis of a generalized regression model: The maximum rank correlation estimator," 35-2/3 (1987), 303-316.

   Han proposed a pairwise comparison estimator called the maximum rank correlation estimator for a generalized regression model where the regression function is only assumed to be monotonic and the distribution of the independent error term is unknown. He proved the consistency of the estimator under certain regularity conditions. Sherman (*Econometrica*, 1993, 123-137) proved the root-N asymptotic normality of Han's estimator.

The idea of frontier production function was first introduced by Farrell (*Journal of the Royal Statistical Society*, A, 1957, 253-281) and one of the first attempts of estimating it was done by Aigner and Chu (*American Economic Review*, 1968, 826-839). Since the

publication of Aigner, Lovell, and Schmidt (*Journal of Econometrics*, 6-1, 1977, 21-37), this important topic has become one of the favorite topics of the *Journal of Econometrics*.

9. J. Jondrow, C. A. K. Lovell, I. S. Materov, and P. Schmidt, "On the estimation of technical inefficiency in the stochastic frontier production function model," 19-2/3 (1982), 233-238. (#5 in the All Star list)

   Aigner, Lovell, and Schmidt (see above) introduced a stochastic frontier production function model, in which the regression error term takes the form v – u, where v is a normal error term representing pure randomness, and u is a non-negative error term representing technical inefficiency. In this paper the authors suggested a way to separate u from v – u by considering the conditional distribution of u given v – u. This approach enables one to estimate the level of technical inefficiency for each observation in the sample.

The next paper combines errors in variables and panel data, two of the most important subjects in econometrics.

10. Z. Griliches and J. A. Hausman, "Errors in variables in panel data," 31-1 (1986), 93-118. (#23 in the All Star list)

    Errors-in-variables models are often not identifiable without extraneous information. In this paper the authors show that by using a special structure of panel data, errors-in-variables models can be estimable without the use of external instruments. The results are applied to the estimation of labor-demand relationships.

In order to assess the impact it was necessary for me to choose above only those papers for which some time had elapsed since publication. Thus, the most recent paper listed above was published in 1987. Below I will summarize the six papers that won either Zellner award or Aigner award. Arnold Zellner award and Dennis J. Aigner award were instituted in 2003 to be given in alternate years, Zellner award given to the best theoretical paper of a year and Aigner award to the best applied paper. Each year the co-editors nominate a list of potential articles as well as a selection committee consisting of five fellows and the selection committee makes the final decision. A prize of $ 5,000 is awarded the author(s) of a winning paper.

<u>Zellner award 2003</u>

T. Li, I. Perrigne, and Q. Vuong, "Conditionally independent private information in OCS wildcat auctions," 98-1 (2000), 129-161.

In this paper the authors consider the so-called conditionally independent private information (CIPI) model in which each bidder's private information is assumed to be the product of two independent components, one specific to the auctioned object and common to all bidders, the other specific to each bidder. The distributions of both

components are estimated non-parametrically by combining deconvolution techniques with the pseudo-value method pioneered by Guerre, Perrigne, and Vuong (Econometrica, 2000, 525-574), and the paper proves the consistency of the estimator. An application to the Outer Continental Shelf (OCS) wildcat auctions shows that the distribution of the common component is much more concentrated than the distribution of the idiosyncratic component.

Aigner award 2004

Y. Ait-Sahalia, Y. Wang, F. Yared, "Do option markets correctly price the probabilities of movement of the underlying asset?" 102-1 (2001), 67-110.

The authors answer this question by comparing the risk-neutral density estimated in complete markets from cross-section of S&P 500 option prices to the risk-neutral density inferred from the time series density of the S&P 500 index. They propose a new method to identify the risk-neutral density from the observed unadjusted index returns. If the two densities are reconciled, it means that the S&P 500 options are efficiently priced. The densities are estimated non-parametrically.The four different tests designed by the authors reject this hypothesis.

Zellner award 2005

V. Chernozhukov and H. Hong, "An MCMC approach to classical estimation," 115-2 (2003), 293-346.

This paper proposes Laplace type estimators (LTEs) as attractive alternatives to classical extremum estimation. The LTEs are motivated by the difficulty of finding the optimum of the criterion functions used in many extreme estimators, such as the elegant theoretical work of Powell (see Powell, 1984, above). Instead, the LTEs are computed using Markov Chain Monte Carlo (MCMC) methods, which help circumvent the computational curse of dimensionality. The paper shows that under general regularity conditions the LTEs are root-N asymptotically normal. The estimators are efficient as the extremum estimators and yield asymptotically valid confidence intervals. They can be applied to many important semiparametric problems, including censored and instrumental quantile regression models.

Aigner award 2006

K. T. Hansen, J. J. Heckman, and K. J. Mullen, "The effect of schooling and ability on achievement test scores," 121-1/2 (2004), 39-98.

The central econometric question addressed in this paper is how to characterize and solve the problem of joint causality: schooling causing test scores and test scores causing schooling. This paper develops two methods for estimating the effect of schooling on achievement test scores that control for the endogeneity of schooling by postulating that both schooling and test scores are generated by a common unobserved latent ability. A

non-parametric minimum distance estimator in a mixed discrete-continuous choice model is estimated by an MCMC method. Estimates from the two methods applied to the data from the National Longitudinal Survey of Youth are in close agreement. The previous literature is extended by estimating the impact of schooling on measured test scores at various quantiles of the latent ability distribution.

Zellner award 2007

D. Bhattacharya, "Asymptotic inference from multi-stage samples," 126-1 (2005), 145-171.

The author notes that large-scale household surveys are rarely random samples and have designs that involve stratification and clustering. Stratification means that the population is divided into subgroups based on criteria such as area of residence, race, age, etc. Clusters are physically contiguous groups of households, such as villages, blocks or neighborhoods, within a stratum. Previous papers dealt with stratification and clustering separately, but this paper develops a method that deals with both simultaneously. The paper derives the appropriate asymptotic theory and computes the asymptotic standard errors that are robust to sample-design effects under the assumption that the number of sampled clusters for every stratum goes to infinity at the same rate. The author presents both parametric and semiparametric analysis.

Aigner award 2008

A. Aakvik, J. J. Heckman, and E. J. Vytlacil, "Estimating treatment effects for discrete outcomes when responses to treatment vary: an application to Norwegian vocational rehabilitation programs," 125-1/2 (2005), 15-51.

This paper formulates and estimates an econometric model for evaluating social programs when outcomes are discrete and responses to treatment vary among observationally identical persons. The paper considers not only the usual average treatment effect but decomposes it into the so-called distributional treatment effects. The estimation of the distributional treatment effects enables one to determine, for example, the distributional effect of employment for people who will be employed after the training but who will not be employed without training. The authors apply the methods to the impact of Norwegian Vocational Rehabilitation Programs on employment for female applicants whose medical conditions resulted in reduced productivity.

V. Trend in the Subject

In this section I present tables and figures to show how the frequency of publication in different areas of econometrics has changed over the years. I have considered only regular volumes excluding the *Annals*. The years are grouped into seven periods each consisting of five years except that the first period contains six years.

I have classified all the papers into Theory, Applications, or Monte Carlo and the first three columns of Table 1 show their trend. For each row the sum of these three columns adds up to 1 as I forced each paper into one of the three categories. Some papers contain all three components. In such a case I chose the component that I judged to be most important. Figure 1 presents the graphs of the data given in Table 1. The reverse movement of Theory and Monte Carlo components from 1973 to 1998 probably reflects the advance of computer technology. The frequency of applied papers has slightly declined over the years but has remained fairly steady at the rate slightly below 20 %. Table 1 and Figure 1 also show the frequency of Bayesian papers. A Bayesian paper may be theoretical, applied, or Monte Carlo. The *Journal* has Bayesian co-editors and associate editors and has published a steady proportion of Bayesian papers over the years.

Table 2 and Figure 2 show the trend in microeconometrics, macroeconometrics, simultaneous equations model, and the classical regression model. The rows of this table do not add up to 1 because there are papers that do not belong to any of these classifications such as theoretical papers on probability and mathematical statistics. Microeconometrics includes papers on qualitative response, Tobit, duration, auction models, and experimental design. Macroeconometrics includes ARMA, ARCH-GARCH, unit roots, structural change, and financial applications. Classical regression model is somewhat of a misnomer because I include regression models with serial correlation and heteroscedasticity. Figure 2 shows a continuous decline in the interest in simultaneous equations model up to period 1999-2003 and a slight recovery in the last period because of an interest in the problem of weak instruments. The number of papers on regression models has also declined. To compensate for these declines, papers on microeconometrics and macroeconometrics increased in number. The increase in microeconometrics was due to a growing interest in qualitative response and Tobit models, which started in the early 1970's. The number of papers on macroeconometrics started to increase at a very rapid rate from the middle of 1980's spurred by the appearance of innovative models proposed by Granger, Engle, Phillips, and others. It overtook microeconometrics at around 1994 but beginning in 2000 it shows some sign of slowing down.

Table 3 and Figure 3 show the trend in semiparametric analysis and simulation methods in estimation and testing. Semiparametric analysis includes papers like those I discussed in section IV above as well as papers on GMM and empirical likelihood function. Simulation methods include MCMC and bootstrapping. An important component of the increase in the simulation method is the popularity of the MCMC method, which is now invariably used in Bayesian estimation though not exclusively so as you can see in the paper by Chernozhukov and Hong, who won the Zellner award in 2005.

VI. Future

The *Journal* is doing very well right now in spite of strong competition from other journals in econometrics. In recent years it has rapidly grown in size and reputation as one can see in Table C. At one time the *Journal* suffered from the long publication lag, but the situation has considerably improved due to the joint effort of the editorial staff

and Elsevier. In the last several years the co-editors have met with the representatives of Elsevier at the annual ASSA meetings and have engaged in discussions about the direction the *Journal* is to take in the future. These discussions have been very helpful.

There are challenges, however, which the *Journal of Econometrics*, as well as other econometric journals, face. One of them is the problem of a better communication between scholars of the developed countries and those of the third world, which I mentioned in the beginning of this paper. As globalization continues, economists, including econometricians, cannot be concerned only with the domestic economic problems. An *Annals* issue on this topic was published in issue 36-1/2 (1987) and another issue on the subject would be worthwhile.

I think everybody agrees that the two most important developments in the last decade that have affected econometricians are the advance of computer technology and the availability of large data sets. They have given impetus to semiparametric and simulation estimation. The efficacy of these powerful methods would be partly lost, however, if data were unreliable. The *Journal of Econometrics* has always emphasized the importance of sample design from the beginning as one can see in its editorial policy. It has published a few issues of the *Annals* on the subject in the early period, but more studies on the topic seem to me to be worthwhile. Another closely related area which needs to be further explored is a study of how to deal with no response or biased response in sample surveys, as was done, for example, by Horowitz and Manski, “Censoring of outcomes and regressors due to survey nonresponse: identification and estimation using weights and imputations” (84-1, 1996, 37-58).

Anther important area in econometrics which should interest both theoretical econometricians and applied researchers is model selection and specification. The *Journal* has published four *Annals* issues on this topic (see Section III above) and nearly fifty papers in the regular issues. This topic has always interested me from the beginning of my career. The title of my Ph. D. dissertation (Johns Hopkins, 1964) was “Specification Analysis in Econometrics.”

With these problems in mind, I will give some general thoughts on the direction the *Journal* should take in the future. Strength of the *Journal of Econometrics* has been from the beginning the symbiosis between theory and applications. I feel this point needs to be re-emphasized as we move on. I would like to quote from Jim Heckman (“Econometrics and empirical economics,” 100-1, 2001, 3-5), published in the special anniversary issue, because he expressed the point I wish to make more eloquently than I could possibly do myself. He begins his short paper by the following observation:

“In the past two decades, the gap between econometric theory and empirical practice has grown. There are two main reasons for this phenomenon. Theoretical econometrics has become more closely tied to mathematical statistics. Empirical economists as a whole have adopted more of a public policy focus in their research, emphasizing transparency and simplicity as hallmarks of good empirical research for communication in public policy forums.”

Heckman recognizes the importance of theoretical econometrics as he states,

“The development of a rigorous econometric theory strongly rooted in the latest advances in statistical theory is a major improvement in the field. Many confusions in the earlier literature have been clarified by using the tools of probability theory to make sharper definitions and distinctions.”

But he warns,

“There are, however, some risks in uncritically adopting the methods and the mind set of the statisticians. . . . A theorem-proof format is poorly suited for analyzing economic data which requires skills of synthesis, interpretation and empirical imagination. Command of statistical methods is only a part and sometimes a very small part, of what is required to do first-class empirical research.”

He concludes as follows:

“My forecast for the future is conditional. If knowledge transfer from mathematical statistics continues as the mainstream activity of theoretical econometrics, it will increasingly be perceived as irrelevant to economics and empirical work, and will be perceived as a branch of statistics. Econometricians will cease to respond to the economic problems that traditionally motivated theoretical work in the field and both econometrics and economics will be poorer for this. If, on the other hand, the limits of mathematical statistics as a guide to empirical analysis and interpretation of economic data are appreciated and economics is more closely integrated into the development of and justification for estimators, then the gap between econometric theory and applied work will diminish and econometrics will reassert itself as an important part of the corpus of economics.”

Heckman’s paper, quoted above, was published in 2001, but his advice is still cogent now. I wish to finish my paper, however, with a positive note. As I observe some of the leading young theoretical econometricians who have emerged in the last decade, I am impressed not only by their mastery of powerful mathematical techniques but also by their eagerness to apply the methods to important practical problems. Thus, I believe the future of econometrics is bright.

VII. Tables and Figures

Table A: 1981-1999

Rank	Country	No. Articles	Rank	Country	No. Articles
1	USA	839	15	Hong Kong	12
2	Canada	133	16	N. Zealand	11
3	UK	130	17	Austria	10
4	Netherlands	87	18	Switzerland	9
5	Australia	70	19	Finland	8
6	Germany	37	20	India	8
7	France	34	21	Poland	8
8	Japan	33	22	Sweden	7
9	Belgium	24	23	Mexico	5
10	Italy	19	24	Norway	5
11	Denmark	18	25	Taiwan	5
12	S. Korea	14	26	Greece	4
13	Spain	14	27	Singapore	4
14	Israel	13	28	Brazil	3

Table B: 2000-2007

Rank	Country	No. Articles	Rank	Country	No. Articles
1	USA	1078	15	Sweden	15
2	UK	231	16	Taiwan	14
3	Canada	118	17	N. Zealand	12
4	Netherlands	95	18	Japan	8
5	France	58	19	Austria	8
6	Germany	49	20	Brazil	7
7	Spain	41	21	Lithuania	6
8	Australia	36	22	Singapore	5
9	Italy	36	23	Greece	5
10	S. Korea	33	24	Cyprus	5
11	Belgium	26	25	Portugal	5
12	China	17	26	Norway	4
13	Denmark	17	27	Czech Rep.	4
14	Switzerland	16			

Table C

Year	#Pages	#Articles	Impact	Year	#Pages	#Articles	Impact
1973	410	30		1991	1618	68	
1974	398	30		1992	1612	72	
1975	410	38		1993	1619	99	
1976	403	29		1994	2006	83	
1977	804	55		1995	2031	94	
1978	800	64		1996	2428	98	
1979	1153	80		1997	2415	94	1.063
1980	1200	87		1998	2328	117	1.011
1981	1209	92		1999	2405	55	1.191
1982	1207	56		2000	2331	83	0.829
1983	1219	74		2001	2418	77	0.977
1984	1202	62		2002	2386	97	1.266
1985	1656	87		2003	2397	94	1.106
1986	1165	54		2004	2396	89	1.135
1987	1188	60		2005	2313	82	1.320
1988	1201	59		2006	3280	130	1.579
1989	1229	63		2007	4796	187	1.669
1990	1610	81					

Table 1

Period	Theory	Applications	Monte Carlo	Bayes
1973-1978	0.64	0.26	0.10	0.07
1979-1983	0.57	0.28	0.15	0.04
1984-1988	0.56	0.19	0.25	0.04
1989-1993	0.55	0.17	0.28	0.08
1994-1998	0.42	0.18	0.40	0.11
1999-2003	0.52	0.14	0.34	0.10
2004-2008	0.51	0.18	0.31	0.09

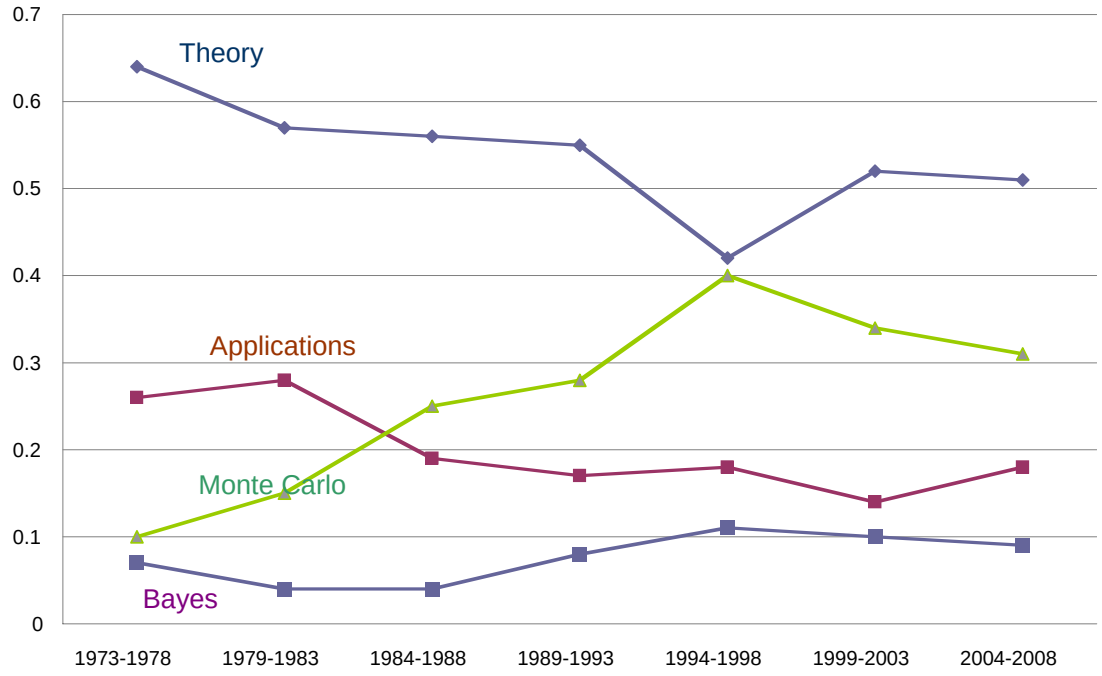
Table 2

Period	Micro	Macro	SEM	CRM
1973-1978	0.05	0.04	0.16	0.29
1979-1983	0.15	0.06	0.14	0.28
1984-1988	0.17	0.04	0.08	0.36
1989-1993	0.20	0.15	0.08	0.31
1994-1998	0.23	0.28	0.04	0.20
1999-2003	0.23	0.41	0.02	0.16
2004-2008	0.26	0.36	0.04	0.10

Table 3

Period	Semiparametric	Simulation Methods
1973-1978	0	0
1979-1983	0	0
1984-1988	0.04	0
1989-1993	0.08	0.03
1994-1998	0.17	0.10
1999-2003	0.29	0.16
2004-2008	0.24	0.17

Figure 1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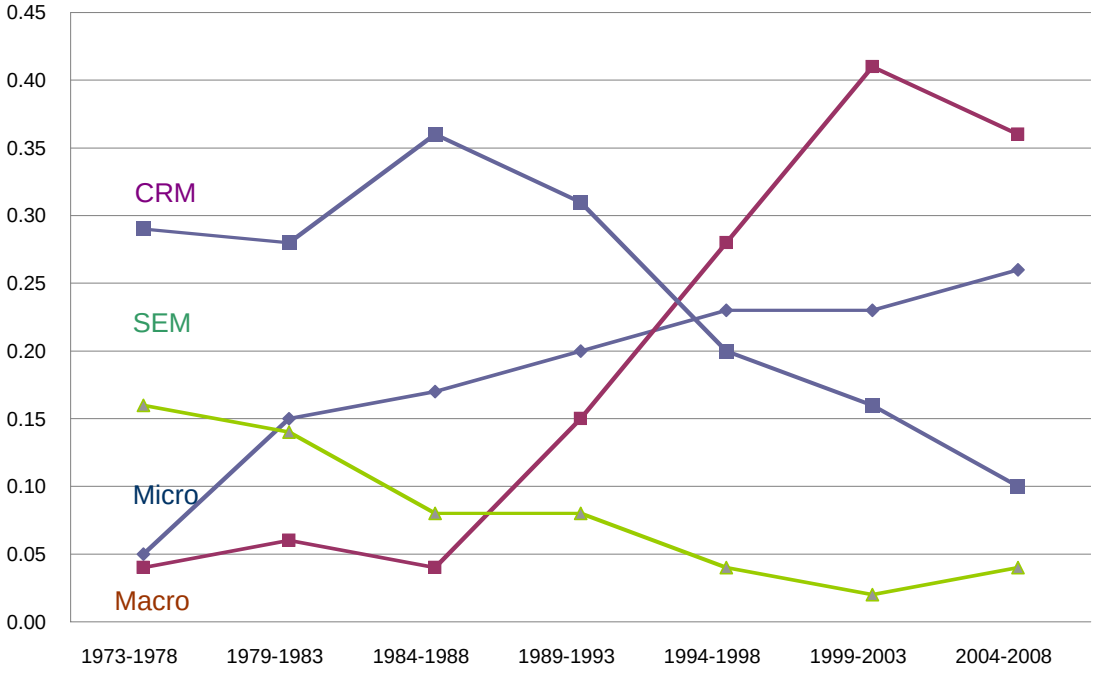
0.6
0.5
0.4
0.3
0.2
0.1
0
Theory
Applications
Monte Carlo
Bayes
1973-1978
1979-1983
1984-1988
1989-1993
1994-1998
1999-2003
2004-2008

Figure 2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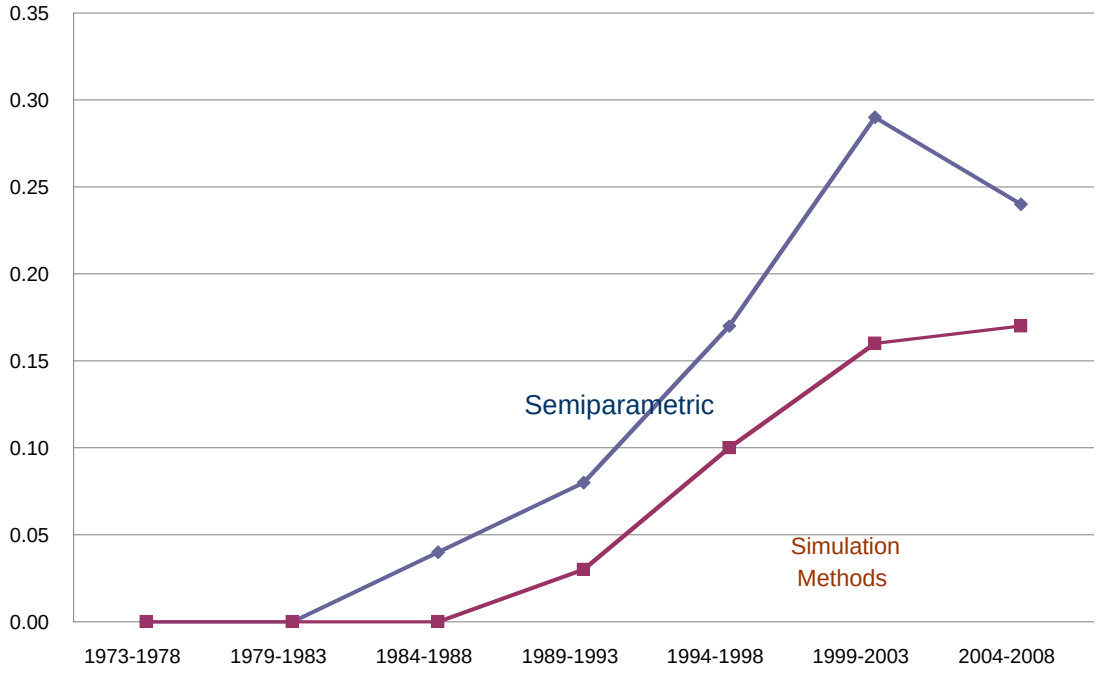
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
CRM
SEM
Micro
Macro
1973-1978
1979-1983
1984-1988
1989-1993
1994-1998
1999-2003
2004-2008

Figure 3


0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1973-1978
1979-1983
1984-1988
1989-1993
1994-1998
1999-2003
2004-2008
Semiparametric
Simulation Methods