

**Coeditors of Proposed Special Issue:
James Heckman (U. of Chicago) and Apostolos Serletis (U. of Calgary)**

Objectives

In this special issue we honor William Barnett's contributions in the field of economics. Barnett is an eminent economic scientist, who indeed did begin his career as a rocket scientist, working on the development of the booster rocket engines for Apollo. He is the inventor of the Divisia monetary aggregates, the minflex Laurent demand systems, and the asymptotically ideal model (AIM) demand system. He was the first to produce reliable evidence regarding the existence of chaotic processes in economic time series and to propose a number of tests for nonlinearity and chaos motivated by the dynamics of nonlinear dynamical systems. Recently, having shown that bifurcation boundaries for dynamical models often cross the parameter estimates' confidence regions, his research has drawn attention to the loss of dynamical inference robustness produced by the common convention of simulating macroeconometric policy models only at the parameters' point estimates. For the last thirty years, he has changed the way many economists think about microeconomics, macroeconomics, monetary economics, and monetary policy, with particular emphasis on conventional oversimplifications making research more convenient for economists, but having compromised theoretical or empirical support.

As in most of Barnett's work, this issue explores recent advances in the fully internally-consistent interface between econometrics, aggregation, and economic theory. This approach is in contrast with those which suppress some areas of economic theory and statistical theory, under the assumption that the econometric use of all relevant theory is beyond the state of the art, but more often largely to render research less difficult for economists. See, e.g., Evans and Honkapohja's (2005) interview of Thomas Sargent. That interview contains the following observation by Sargent: "The idea of calibration is to ignore some of the probabilistic implications of your model, but to retain others. Somehow, calibration was intended as a balanced response to professing that your model, though not correct, is still worthy as a vehicle for quantitative policy analysis." [see p. 313 of the 2007 reprint]. On p. 315, Sargent continues: "In the 1980s, there were occasions when it made sense to say, "It is too difficult to maximize the likelihood function, and besides, if we do, it will blow our model out of the water. In the 2000s, there are fewer occasions when you can get by saying this." Indeed, that is the position taken by this proposed special issue and made clear by its included papers, both in microeconometrics and macroeconometrics. We believe that recent advances in econometrics and economic theory, along with advances in computing technology, now render full use of economic and statistical theory both possible and advantageous.

Barnett's work has been highly influential in shaping academic and central-bank staff research on the econometrics of financial aggregation and policy in the last thirty years and seems to be even more topical today than it was then. Barnett's (1980) paper in the *Journal of Econometrics* argued that simple-sum monetary aggregates constructed by the Federal Reserve are inconsistent with neoclassical microeconomic aggregation theory and produce an internal inconsistency between the implicit aggregation theory and the theory relevant to the models and policy within which the resulting data are nested and used. That incoherence has sometimes been called the Barnett

Critique,¹ with emphasis on the resulting inference and policy errors and the induced appearances of function instability. Unfortunately, thirty years later, the Federal Reserve Board and most other central banks around the world continue officially to produce and supply low quality monetary statistics inconsistent with the relevant aggregation and index number theory, thereby misleading themselves, as well as financial firms, mortgage lenders, and mortgage borrowers, regarding the levels of systemic risk in the economy and the appearance of instability of policy-relevant functions in the economy.²

Over the years, under the misperception that the business cycle had permanently ended, economic agents, displaying an incorrect assessment of systemic risk, significantly increased their leverage and risk-taking activities. This led to the credit-driven, asset-price bubble in the U.S. housing market, with prices departing significantly from fundamental values. On Wall Street, this risk misperception was called the “Greenspan Put.” When the bubble burst, it brought down much of the financial system and not only led to an economic downturn in the United States, but also to a global recession and a subsequent increase of over \$5 trillion dollars in government spending around the world. Barnett and Chauvet (2009) have documented the relevancy of the Barnett Critique in understanding the sources of the risk misperceptions. Contrary to popular opinion, the best way to understand the financial crisis is not through the use of less economic theory, but rather by the internally consistent use of more economic and statistical theory.

In exploring aspects of the interface between econometrics and theory, the proposed special issue will follow and complement an earlier *Journal of Econometrics* special issue, *The Interface between Econometrics and Economic Theory*, edited by Charalambos D. Aliprantis, William A. Barnett, Bernard Cornet, and Steven Durlauf. That special issue, published in 2007, focused primarily on the relevant economic theory and econometric theory needed for internally consistent inference. Two of the coeditors, Cornet and Aliprantis, were mathematicians. The current proposed special issue focuses on subsequent advances in applied research, which, in the tradition of Barnett’s work, seek to advance the profession’s ability to make full use of the relevant economic theory and econometrics, in the interests of internal consistency between data, modeling, and inference; avoidance of misleading appearances of function instability; and avoidance of induced policy errors. A related special issue is in preparation by William Barnett, W. Erwin Diewert, and Arnold Zellner on “Measurement with Theory.” That special issue emphasized the use of economic theory in specifying and applying aggregator functions to measure aggregates, as opposed to this special issue, which focuses more on the internal consistency between the aggregator functions and the models within which the aggregated data is used, as emphasized by the “Barnett critique.”

In particular, much of Barnett’s research has concentrated on problems often overlooked in economic research for the purpose of simplification, such as nonlinearity of time series, global regularity of utility and production functions, global flexibility of approximating functions, existence of distributions effects, and internal consistency between data aggregation and the models within which the data is used. Such simplifying assumptions have become particularly common in the literature on real business cycle theory, which commonly introduces such assumptions as “stylized facts,” rather than upon axiomatic theoretical derivation or statistical hypothesis testing.

The objective of this proposed special issue is to promote more fruitful interaction between econometrics and economic theory and also to provide a policy perspective in areas in which oversimplifications have often been based upon convenience, rather than science, as by appeal to untested stylized facts. Internal consistency between models and their nested data, and application of uncompromised inference procedures and economic theory are in the public interest.

¹See, e.g., Chrystal and MacDonald (1994, p. 76).

²Exceptions include the St. Louis Federal Reserve Bank, the Bank of England, and various sources available only internally and unofficially within many central banks in Europe and Asia.

References

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- [3] Chrystal, A. K. and R. MacDonald. “Empirical Evidence on the Recent Behaviour and Usefulness of Simple-Sum and Weighted Measures of the Money Stock.” Federal Reserve Bank of St. Louis *Review* 76 (1994), 73-109.
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James Heckman and Apostolos Serletis, “Introduction to *Internally Consistent Modeling, Aggregation, Inference, and Policy: The Structural Approach*”

This Introduction will provide an overview of the special issue.

1 Robert Townsend, “An Evaluation of Financial Institutions using Theory and Panel Data”

(The author is at MIT)

The theory of the optimal allocation of risk and panel data on financial transactions can be used to assess the impact of both formal financial institutions and informal arrangements on households and/or firms. We derive both consumption and/or investment equations from a common core theory with both risk and productive activities. The empirical specification follows closely from this theory. In some settings this can be modified to allow private information and other exogenously incomplete financial regimes.

2 Jaroslav Borovicka, Lars Peter Hansen, and Mark Hendricks, “Growth, Information, and Pricing”

(The authors are at the University of Chicago)

We explore a dynamic stochastic model of growth under alternative specifications of investor information. We consider alternative models of investor preferences including ones in which investors care about the intertemporal composition of risk and ones in which investors are concerned about the potential misspecification of the stochastic environment. Under incomplete information, investors must estimate a hidden Markov state in order to forecast future investment opportunities. We explore pricing implications by characterizing price elasticities of exposure to shocks at alternative investment horizons.

3 Thomas Stoker and Roberto Rigobon, “Index Number Estimates of the U.S. Terms of Trade and the Value of Variety”

(The authors are at MIT)

One of the most important relative prices in international economics is the terms of trade, which computes the “average” price of exports relative to the “average” price of imports. For these relative prices to be meaningful, they should be based on consumer preferences via exact index number theory, which differs from standard practice. In this paper we offer a robust methodology to estimate preference parameters for appropriate construction of the U.S. terms of trade. We compare our estimates with official BLS figures. Furthermore, we apply our methodology to estimate the welfare value of increasing product variety in various sectors of the US economy.

4 Gabriella Conti, Philipp Eisenhauer, James J. Heckman, Hedibert F. Lopes, and Rémi Piatek, “Constructing Economically Justified Aggregates: An Application of the Early Origins of Health”

(The authors are at the University of Chicago, University of Mannheim, University of Chicago, University of Chicago, and University of Konstanz, respectively)

This paper presents novel Bayesian econometric methods for reducing high-dimensional data into low-dimensional aggregates using non-Gaussian factor models to examine the effect of early-life conditions and education on health. A burgeoning literature in Bayesian econometrics currently focuses on the estimation of factor models with an unknown number of latent factors. In this paper, we implement and compare the results of different reversible jump Markov chain Monte Carlo (RJMCMC) methods, both in standard normal factor models and in non-Gaussian factor models. These Bayesian methods go beyond traditional approaches like preliminary exploratory factor analysis or scree plots that are widely used in practice. They represent an important step forward in determining the latent structure of the model, with respect to the number of latent factors, but also to the shape of their distribution and to their correlation. In fact, the recent literature is rich on highly structured factor analysis, mostly due to increasing degree of complexity of data and/or applications in modern applied sciences.

These methods are applied to the 1970 British Cohort Study to analyze the effect of early-life cognition and personality on education and later-life health. These data are unusually rich in terms of both the quantity and the quality of measurements on early cognitive and personality traits. In this application, we focus on seven cognitive scales and five psychosocial scales administered to the cohort members when they were aged ten, to their mothers and to their teachers. The total number of items amounts to more than a hundred, and cover a wide range of cognitive abilities, personal attitudes, and behaviors. However, this richness has rarely been fully exploited, and the available measurements have been aggregated and used by different researchers in different ways. We provide methods for exploiting the available information in a systematic way which does not rely on arbitrary a priori decisions on model structure and sub-scale construction. Our methods have wide applicability to several other circumstances in which researchers face a data-rich environment but are agnostic as to the underlying latent structure.

We apply these methods within a lifecourse framework to analyze the effect of childhood cognitive ability and psychosocial traits on education and adult health. We revisit the causal effect of education on health in a model where individuals are allowed to select into education on the basis of their idiosyncratic gains, and we show the importance of properly accounting for multiple sources of selection. Previous work has established a significant role played by early-life conditions on adult health. We assess the sensitivity of these results to misspecification of the latent structure underlying the observable measurements used as proxies for early intelligence and personality traits. We show that not properly specifying the multiple common factors which drive the correlation between education and health might lead to an incorrect assessment of the importance of early-life conditions in influencing both education and later-life health.

Our work highlights the crucial role played by the early years in promoting health and the

importance of prevention in the reduction of health disparities, and refocuses the role of education policy as health policy.

5 Erwin Diewert, “Inflation Targeting and the Problem of Seasonality”

(The author is at the University of British Columbia)

Central banks generally have a target range for the inflation rate of 1 to 3 percent where the target rate is measured as the year over year growth in the monthly CPI. However, when there are seasonal commodities, a monthly CPI is not particularly reliable due to the presence of strongly seasonal commodities; i.e., commodities which are present in some but not all seasons. Obviously, it is impossible to construct a month to month price index if the set of available commodities changes every month (this is an extreme case!). The paper will discuss some problems with current CPI methodology and discuss how suitable inflation target indexes that deal with the seasonality problem can be constructed using centered rolling year indexes.

6 Peter Ireland and Michael Belongia, “The Price and Quantity of Money in the Transmission Mechanism”

(The authors are at Boston College and the University of Mississippi))

This paper highlights the implications of Barnett’s (1980) landmark study for work being done, almost three decades later, at the frontiers of theoretical research on the monetary business cycle. More specifically, by introducing an explicit financial sector into the popular New Keynesian model, it analyzes how the quantity and price (user-cost) of money, correctly measured, can serve together with the short-term interest rate as indicators of the stance of monetary policy. As a by-product, it also considers how monetary policy ought to be conducted in economies subject to recurring shocks to the financial sector.

7 Yu-chin Chen and Stephen J. Turnovsky, “The Role of Commodity Price Aggregates for Monetary Policy”

(The authors are at the University of Washington)

Barnett (1980) and subsequent research emphasize the importance of properly examining a monetary policy target, be it based on a monetary aggregate or a price index. This paper follows the spirit of this line of research to examine the role different world commodity price aggregates may and should play in inflation-targeting countries that rely heavily on primary commodity exports.

As the “commodity currency” literature demonstrates, world commodity prices play a key role in driving the currency value of major commodity-exporting countries such as Australia, Canada, New Zealand, and South Africa [see e.g. Amano and van Norden, 1993, Chen and Rogoff, 2003]. To the extent exchange rates pass through to consumer prices, world commodity price movements would thus have an effect on domestic inflation and on the

conduct of monetary policy for the aforementioned countries for example, which all have inflation targets. Commodity exporters such as these, however, specialize in different types of commodity products, ranging from agricultural, mineral, to energy-related goods. The literature so far has treated these countries' exports as one aggregate basket, without explicit recognition to the distinct trends and cycles the prices of different broad commodity categories follow [see e.g. Cashin, McDermott, and Scott, 1999].

Our paper provides a detailed empirical look at the linkage between world price movements of major commodity product groups, their induced exchange rate responses, and their ultimate impact on domestic inflation. Based on these findings, we then provide an analysis of the appropriate monetary policy response to price shocks in different commodity markets, or the construction of a proper "commodity price aggregate," as part of the monetary policy target. While the empirical analysis in the paper uses data for a few developed commodity exporters, our result provides insights into terms-of-trade management and inflation control, and has much wider implications for the vast number of developing economies that rely heavily on primary commodity production.

8 John Geweke and Lea Petrella, "Likelihood-Based Inference for Regular Functions"

(The authors are at the University of Technology Sydney and University of Colorado and the University of Rome La Sapienza)

Using Weirstrass approximation theory this paper shows that a Sobolev space of functions on a compact set is dense in the set of Muntz polynomials. For the subset of twice continuously differentiable, monotone increasing concave functions the coefficients of the Muntz polynomials form a convex set. Given a set of observations of values and first derivatives of the function contaminated by Gaussian disturbances the likelihood function for the coefficients coincides with that of the seemingly unrelated regressions model. Using this representation the paper develops practical methods for inference based on maximum likelihood and, alternatively, for Bayesian inference. Thus the methods developed in the paper impose exactly the constraints of neoclassical consumer and producer theory for a compact set of prices and Gaussian disturbances.

9 Helmut Lütkepohl, "Structural Vector Autoregressions with Markov Switching: The Causes of the Early Millennium Slowdown Revisited"

(The author is at the European University Institute)

In structural vector autoregressive (SVAR) analysis, a Markov regime switching (MS) property can be exploited to identify shocks if the reduced form error covariance matrix varies across regimes. This feature is used to investigate the causes of the early millennium slowdown based on US and Euro area VAR systems containing oil prices, output growth, consumer price inflation and a short term interest rate from Peersman (2005). The latter author compares a traditional identification strategy based on zero restrictions with sign restrictions. Both identification strategies are questionable in the current context. Therefore an identification

strategy for the structural shocks is used which was recently proposed by Lanne, Lütkepohl and Maciejowska (2009) and is based on MS features of the residuals.

10 Guohua Feng and Apostolos Serletis, “Assessing Biases in the Divisia Productivity Index in the Presence of Undesirable Outputs”

(The authors are at Monash University and the University of Calgary)

The conventional Divisia productivity index, proposed by Jorgenson and Griliches (1967), has widely been used to measure productivity growth. However, it has been criticized by recent studies as being biased in the presence of undesirable outputs and environmental regulations. The objective of this paper is to assess the biases in the conventional Divisia productivity index in the presence of undesirable outputs from both theoretical and empirical perspectives. To this end, we first derive a new Divisia index based on the directional output distance function, which credits the reduction of undesirable outputs, by solving a two-sector equilibrium model. This allows us to theoretically evaluate the magnitude and possible direction of biases inherent in the conventional Divisia productivity index. To empirically investigate the biases, we, for the first time in this literature, formulate the quadratic directional distance function within a Bayesian stochastic frontier framework. This allows us to impose all the theoretical regularity conditions possessed by the directional distance function. We finally apply the above framework to the investigation of the productivity growth in 15 OECD countries.

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