Huaming Peng

Home Address:
535 Prospect St, Apt 1
New Haven, CT 06511

Office:
Department of Economics
Yale University
Box 208268
New Haven, CT 06520-8268
Fax: (203) 436-2630

Telephone: (203) 8896697 (cell)
(203) 4323591 (office)

E-mail: huaming.peng@yale.edu

Web page: http://pantheon.yale.edu/~hp56

Citizenship: P. R. China

Fields of Concentration:

Econometric Theory
Applied Econometrics
Financial Economics

Desired Teaching:

Econometrics
Applied Econometrics
Financial Economics

Comprehensive Examinations Completed:

May 2003 (Oral) Econometrics, Financial Economics
May 2002 (Written) Macroeconomics, Microeconomics

Dissertation Title: *Model Selection in Factor Models and Asymptotic Inference*

Committee:

Professor Peter C. B. Phillips
Professor Donald W. K. Andrews
Professor Yuichi Kitamura

Expected Completion Date: May 2008

Degrees:

Ph.D., Economics, Yale University, 2008 (Expected)
M.Phil., Economics, Yale University, 2004
M.A., Economics, Yale University, 2002
M.Sc., Statistics, Macquarie University, 2001
Bachelor of Economics (Hon), Macquarie University, 2000

Fellowships, Honors and Awards:

Cowles Summer Prize, 2006
Cowles Summer Prize, 2005
Cowles Foundation Award, 2001-2005
Yale University Graduate Fellowship, 2001-2007
University Distinction Award, Macquarie University, 1999
University Distinction Award, Macquarie University, 1998

Teaching Experience:

Teaching Assistant, Econometrics II (Graduate), Yale University, Spring 2007
Teaching Assistant, Intermediate Microeconomics, Yale University, Fall 2006
Teaching Assistant, Econometrics and Data Analysis, Yale University, Spring 2006
Teaching Assistant, Introductory Macroeconomics, Yale University, Spring 2005
Teaching Assistant, Econometrics and Data Analysis, Yale University, Spring 2004
Teaching Assistant, Statistics and Econometrics, Yale University, Fall 2003

Research Experience:

Research Assistant to Dr. Roselyne Joyeux, Economics Department, Macquarie University 1999-2000

Papers:

"Factor Count Choice Using Posterior Information," November 2007, job market paper, mimeo.
"Asymptotic Inference for Large Factor Models with Grouped Structure," November 2007, mimeo.

Work in Progress

"Determining the number of factors in factor models with nonstationary factors" (with Phillips & Cheng)
"Estimation and Inference in Large Panel Models with GARCH Effect"

References:

Professor Peter C. B. Phillips
Department of Economics
Yale University
P.O. Box 208281
New Haven, CT 06520-8281
Phone: (203) 432-3695
Fax: (203) 432-6167
Email: peter.phillips@yale.edu

Professor Donald W.K. Andrews
Department of Economics
Yale University
P.O. Box 208281
New Haven, CT 06520-8281
Phone: (203) 432-3698
Fax: (203) 432-6167
Email: donald.andrews@yale.edu

Professor Yuichi Kitamura
Department of Economics
Yale University
P.O. Box 208281
New Haven, CT 06520-8281
Phone: (203) 432-3699
Fax: (203) 432-6167
Email: yuichi.kitamura@yale.edu

Dissertation Abstract

Empirical studies in macroeconomics and finance often give rise to large multidimensional systems in which the series may be well characterized by a few common factors and some idiosyncratic influences. Factor analysis provides a convenient mechanism for modeling such large systems. However, theories such as the arbitrage pricing theory, usually specify neither the number nor the nature of the factors. This lack of specification has raised two problems for empirical econometric research: how many factors are appropriate and which factors should be selected.

My dissertation seeks to address these two issues by providing a more general approach to model specification, estimation and selection in factor models with grouped structure. The first part of the dissertation considers determination of the number of factors in both small and large factor models. The second part of the dissertation investigates the asymptotic properties of the estimators of both the factor loadings and the factors themselves in these large models.

I. Factor Counting Choice Using Posterior Information (job market paper)

Empirical work with factor models involving a small number (usually 20 or less) of cross section units has long relied on a strict factor structure, where cross section correlation is not permitted in the idiosyncratic errors. However, there is little justification for such specification and in general some dependence among the idiosyncratic element may be expected and the nature of the dependence is, of course, generally unknown. In the presence of cross section dependence in the errors, model selection procedures which mis-specify the model in terms of a strict factor structure tend to over-estimate the number of factors, rendering inference inefficient.

To tackle this concern, I set up a factor structure by explicitly modeling the cross section dependence among the idiosyncratic errors under a group specification. Specifically, the covariance structure of the idiosyncratic errors is modeled explicitly to allow for cross section dependence within a group-wise specification. Thus, group-wide influences may be manifest in the system error covariances, while between group effects are assumed to be embodied in the common factors leading to a block diagonal system error covariance structure. This particular form of error dependence structure aims to capture potential correlations in the data that are unexplained by the common factors and that may be sourced in group effects such as spatial locality or specific economic characteristics. The model with grouped structure encompasses the exact factor model, which may therefore be tested as a special case.

Existing model selection procedures in the literature are designed exclusively for either small or large factor models. Empirical studies suggest that performance of these criteria is generally not satisfactory when the cross section size ranges between 20 and 40. To provide an alternative approach in such cases, this chapter extends the framework of Phillips and Ploberger (1994, 1996) on the Posterior Information Criteria (PIC) to factor models with grouped structure. It is found that the PIC criterion leads to consistent estimates of the number of factors in both small and large factor models. An approximation of PIC also helps explain why the information criteria proposed by Bai and Ng (2002) fails in picking the appropriate number of factors in small factor models. Simulation studies suggests that in general PIC and its variants outperforms AIC, BIC, and the information criteria proposed by Bai and Ng (2002) in all cases, especially when the cross section units in each group is moderately large. An empirical study on determining the number of factors in the growth of gross domestic product across OECD countries is presented to illustrate the use of the PIC criteria.

II. Asymptotic Inference for Large Factor Models

This chapter develops an asymptotic theory for large factor models with grouped structure. The (quasi-) maximum likelihood estimator is considered as it is more efficient than the principal components estimator in finite samples. We derive the rate of convergence and the limiting distributions of both estimated factor loadings and factors. The theory is developed within the framework of a large T dimension and a large cross section dimension under the rate restriction that N^2/T goes to zero.

We show that the estimated factor loadings are asymptotically normal with a convergence rate of $\sqrt{T}$. The common factors, which are approximated by their expected values under the estimated parameters of factor loadings and the covariance matrix of the idiosyncratic errors, are also asymptotically normal with a convergence rate of $\sqrt{N}$. Finally, a test based on the asymptotic distribution of the estimates of the factors is developed to measure the gap between the observed factors and unknown true factors. An empirical study assessing the departure of observed macro variables from true latent factors is presented to illustrate the use of our estimation and testing procedures using the Penn World Table 6.2.