

Economic Growth Center



Three Year Report
1991-1993

ECONOMIC GROWTH CENTER

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Dorothy M. Minkin, Business Manager

Professional Staff

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Adjunct Professors

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THREE YEAR REPORT

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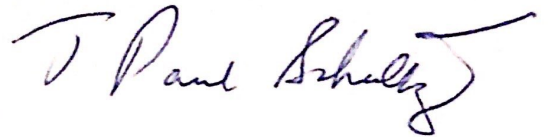
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PREFACE

The current political and economic environment is quite different from that which existed when the Economic Growth Center was established by the Yale Economics Department in 1961. Political boundaries have changed, population growth remains rapid but is subsiding in most countries, a majority of the developed countries have been experiencing a period of prolonged slow economic growth, continued inequalities in the distribution of income have caused tensions both within and between countries, and environmental issues within the context of development have come to the forefront. However, the central objective of the Center's research remains basically unchanged as the Center begins its fourth decade of work. The primary mission of the Center is to advance understanding, through both theoretical and empirical analysis, of the processes of economic development within the developing countries and of the relationships between these countries and the economically advanced nations.

Although the Center does not promote particular development policies, the results of most of the research carried out at the Center are designed to be relevant in the policy-making decisions of national governments, public and private organizations, and the like. The Center prides itself on the diversity of research interests among its faculty members and on the intellectual independence of these scholars. Many faculty members serve as advisers and consultants to international organizations such as the World Bank, the IMF, and the International Food Policy Research Institute, to governments, private foundations, and non-profit research organizations on various matters of development ranging from the effectiveness of extension programs in Africa to the effect of tax structure on the investment of foreign capital. The interests and skills of the Economic Growth Center faculty also make an important contribution to the education of both Yale students and foreign scholars who come to the Center for training and collaborative research.

This report outlines the structure and programs of the Center and summarizes the research and training activities of its members for the period of July 1990 through June 1993.

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DIRECTOR'S INTRODUCTION

What government should do to increase economic growth is still roundly debated. The pendulum of opinion appears, nonetheless, to have moved recently toward less reliance on the state to do what the private sector can do. Public investments in infrastructure continue to be defended on a case-by-case basis, relying on old and new externalities and market failure arguments (including those recently developed by game theorists and political economists). A new consensus has developed for the state to subsidize human capital investments in the pursuit of more rapid growth and equity. However, although the working assumptions of the new growth theory or efficiency wage theory are plausible (i.e., that education or nutrition generate significant social externalities that raise factor productivity and increase returns), these assumptions have only begun to attract empirical study, and few relevant facts are yet in hand. Even if it could be shown that the externalities that justify state interventions in support of more human capital investments do exist, the public finance issues as to how such assistance is to be extended and allocated equitably across groups and persons would still have to be sorted out.

The decade of the 1980s was marked by the adoption of structural adjustment and stabilization programs in lower income countries, financed in part by transfers from higher income countries and conditioned on far-reaching macroeconomic reforms and policies. Adoption of some of these policies has undoubtedly improved growth prospects in many of these countries for the 1990s. With the low-income countries growing more rapidly today, as a whole, than the industrially advanced countries, interest has now revived in improving the content, design, control, and sequencing of programs. This naturally involves the collection of appropriate data for evaluating programs and projects that are funded by development assistance or encouraged by international agencies. The issues of the design of social experiments and the statistical analysis of welfare and behavioral changes induced by such experimental or pilot programs are coming to the fore in the international community, just as they did in the United States during the 1960s and 1970s when variations in social programs were first being evaluated by econometricians.

Sample surveys of households and firms are essential tools to use not only for policy evaluation but also to check for consistency and to improve the quality of statistics gathered by official statistical agencies and used in the formulation of policy. Making these micro surveys and

statistical analyses of programs and policies part of the public record should improve data quality in the long run by subjecting the data to independent assessments and by allowing analysts to explore alternative interpretations of the data. Governments most often publish only aggregate summaries of their survey data and their documentation is often inadequate to evaluate the quality of the data or disaggregate it for many specific purposes. International agencies do not routinely publish or otherwise release the data they use in their program evaluation decisions. Neither governments nor international agencies have strong incentives to share their data with outside groups or researchers. There is also no reward structure that encourages them to analyze the shortcomings of their data or to invest in improving them. The international agencies and governments that base decisions on these data are thus essentially unaccountable. The task of ensuring dissemination of such data, which include potentially confidential information on individuals, firms, and governments, is a controversial and challenging responsibility that should not be shirked by the academic community. Substantial improvements in policy and advancements in knowledge are likely once data are shared and analyzed by the global scholarly community. Members of the Economic Growth Center hope to work in the future with all interested parties to improve the dissemination of these critical sources of micro data and to train researchers to use these data with state-of-the-art computers and software, for the purpose of both improving government policy making and undertaking important basic and applied research.

A critical ingredient in the Center's success in adding to the world's stock of useful knowledge is the appointment of good research faculty: they formulate new economic questions for study; develop and apply new analytical methods; guide the collection and interpretation of relevant data; and, not least important for a self-supporting research center, they are sufficiently entrepreneurial to raise the resources needed to pursue their ideas and support their students. New faculty also reduce the intellectual gaps left by the departure of Center faculty to other institutions and to retirement, or created by the emergence of a new field not adequately covered by existing staff. The Economic Growth Center is pleased to count among its new members in this three-year period Xavier Sala-i-Martin, Thomas Richardson, Jean Lanjouw, Timothy Guinnane, and Michael Boozar. The departure of several faculty is also greatly regretted: James Heckman and Raaj Sah

to the University of Chicago; Kenneth Kletzer to the University of California at Santa Cruz; Vittorio Grilli to the University of London; and Joosung Jun to the National Bureau of Economic Research. The retirement of John Fei and his return to Taiwan is also a major loss.

Research funds for the analysis of development problems have continued to be scarce, reflecting the downward trend in USAID funding to help low-income countries. Other sources of government research support have been valuable, however, including those from the National Institutes of Health, the National Science Foundation, and the U.S. Department of Agriculture. The World Bank, UNDP, and the Rockefeller, Ford, and Hewlett Foundations have all supported particular activities. The Center functions primarily to coordinate the research and post-graduate training initiatives of Yale faculty, but does not operate as an intermediary to provide consulting or administrative services to donor agencies. Individual faculty, however, are encouraged to gain experience by working with national and multinational development agencies in the application of economic theory and quantitative tools of analysis to policy issues throughout the world. The core of the Center's own activities has been to foster basic research. Recently this research has involved the effects of investments in human capital, trends in patenting and implications for invention potential, the impact of agricultural research and extension on farm productivity, the economic impact of political change in Eastern Europe, and the effects of taxation and other fiscal policies on growth and foreign investment.

In this three-year period the Center's program of research on the Japanese economy and its global relationships has continued to develop. Professors Koichi Hamada and Gustav Ranis have received funding for a number of projects. Sponsors of this work include the Japan Foundation, Research Institute of International Trade and Industry (MITI), Nomura Securities Co., Ltd., Daiwa Securities Co., Ltd., Taisho Marine and Fire Insurance Co., and Seiko Instruments, U.S.A., Inc.

A program of training and research on the economics of the family and gender differences in low-income countries has been supported by the Rockefeller Foundation. Directed by T. Paul Schultz, this grant primarily supports visiting scholars from low-income countries in their postdoctoral research, data collection, and training over a two-year period. The grant also funds periodic conferences and networking for Yale faculty and students and foreign scholars.

In 1986, the Economic Growth Center established the Simon Kuznets Memorial Lecture Series in honor of Professor Kuznets, the 1971 Nobel Prize recipient who participated in the founding of the Center in 1961 and served thereafter on its Executive Committee until his death in 1985. This lecture series has been endowed by gifts from friends and colleagues of Kuznets from many parts of the world and by contributions from the Economic Growth Center. New funding for the lectures has also been given by Chiang Ching-Kuo Foundation for International Scholarly Exchange and the Directorate General of Budget, Accounting and Statistics, Taiwan. The 1990 lectures were given by Mark Rosenzweig of the University of Pennsylvania, followed in 1991 by Robert Fogel, University of Chicago and Nobel Prize winner in 1993, and in 1992 by Michael Bruno, Hebrew University, subsequently appointed Vice President for Research at The World Bank.

Each year fifteen to twenty scholars visit the Center to pursue their own research priorities and to participate in related workshops. Those who expect to benefit from on-going faculty research projects are encouraged to apply to be a visiting scholar at the Center. Since the Center has no funding of its own for such visitors, external support must first be found by the applicant from such sources as the Fulbright program or the Ford or Rockefeller Foundations. Postdoctoral training grants are also occasionally awarded directly to the Center, in which case specific field fellowships may be available. As Appendix A indicates, the roster of visitors has been diverse and remains a strong point of the Center.

I want to acknowledge particularly the dedicated contribution made to the Center by staff. Their work is deeply appreciated by the Center faculty, visitors, and students. For coordination of this report, I thank Ann Judd, and for administrative management of the Center, Dorothy Nitshke and Debbie Rueb deserve special credit. The commitment to and involvement in the Center by members of the Advisory Committee, visitors, alumni, and, of course, Yale faculty have made the enterprise successful. With their continued cooperative efforts, the support of funding agencies, and the backing of Yale University, the Economic Growth Center is well positioned to remain at the forefront of the economic fields that seek to understand the puzzles and problems of modern economic growth.

T. Paul Schultz
September 1993

RESEARCH PROGRAM

The research program of the Economic Growth Center emphasizes the search for regularities in the process of growth and associated changes in economic structure, and how policies affect that process. Studies rely on cross-sectional and intertemporal data on micro decision-making units and aggregates such as nations, interpreted within suitable economic, demographic, and social frameworks. An increasing share of research involves study of the behavior of persons, households, and firms, as revealed in sample surveys, and applies the tools of microeconomic theory and associated statistical methods.

Research undertaken at the Center by faculty, post-doctoral fellows, and foreign scholars has covered a wide spectrum of economies from the developed countries of the OECD to some of the poorest countries in the world. Studies have focused on Brazil, Côte d'Ivoire, Burkina Faso, China, Pakistan, Ghana, the United States, and Zimbabwe, to name a few. Current research at the Center includes projects on the following topics: differences in returns to schooling for men and women; fertility issues including the relationship between fertility and family planning expenditures, determinants of fertility, and the effect of technology on fertility; education and women's time allocation, productivity and earnings; agricultural research and productivity; the effectiveness of agricultural extension; international finance and trade issues; and models of growth including regional growth and migration, growth with fluctuations, and public welfare and growth. Specific studies have examined topics ranging from the effect of disability on adult labor productivity in West Africa to the short-term and long-term impacts of public debt and policies to reduce this debt in the United States.

The first part of this section reports the grant support obtained for many of the research projects of the Center; the second part provides highlights of a sample of the Center's research; the third part summarizes some of the work that has been produced by post-doctoral fellows who have participated in the Rockefeller Foundation program, "Gender, the Family, and Technical Change in Low-Income Countries."

Research, Training, and Conference Grants

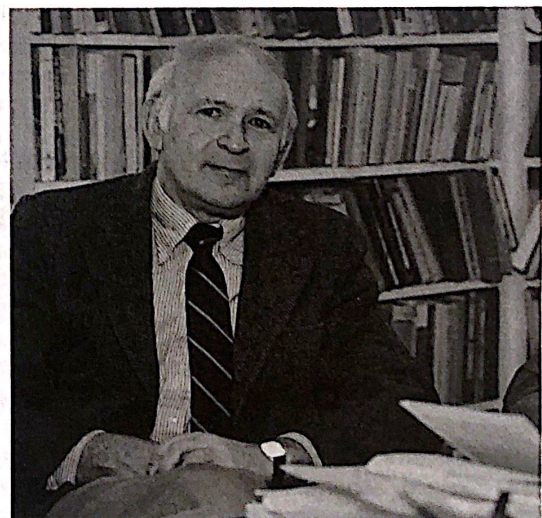
The quality of research carried out by the Economic Growth Center faculty, as well as its relevance to today's economic problems, has helped to attract grant support to a variety of research projects and training programs. Projects receiving funding during the 1990-93 period are listed below.

Economic Growth Center
"Research on the Korean Economy."
Kumho Research Foundation

Economic Growth Center
"Special Economic Growth Center Research Projects."
Exxon Education Foundation

Economic Growth Center
"Simon Kuznets Memorial Lectures."
Chiang Ching-Kuo Foundation for International Scholarly Exchange

Economic Growth Center
"Simon Kuznets Memorial Lecture Series Endowment Fund."
Directorate General of Budget, Accounting and Statistics, Taiwan



Professor Gustav Ranis (Marstrand photo)

John C.H. Fei and Gustav Ranis
"Economic Development in a Spatial Perspective."
Chiang Ching-Kuo Foundation for International Scholarly Exchange

Koichi Hamada
"Japanese Economy Studies."
Nomura Securities Co., Ltd.

Koichi Hamada
"Comparison of Japanese and American Stock Markets."
Daiwa Securities Co., Ltd.

Koichi Hamada
"Effects of Exchange Rates on Industrial Adjustment and Export-Import Prices."
Research Institute of International Trade and Industry (MITI)

Koichi Hamada and Gustav Ranis
"U.S. and Japan Relations with East and Southeast Asian Low-Income Countries" and fellowships for the study of "Economic Problems of the Asia-Pacific Region."
Taisho Marine and Fire Insurance Co., Ltd.

Koichi Hamada and Yujiro Hayami
"Agricultural Development in Japan."
The Japan Foundation

Deborah Levison and T. Paul Schultz
National Research Service Award
Institute of Aging

Gustav Ranis and Koichi Hamada
"Japan in the World Economy."
Seiko Instruments, U.S.A., Inc.

Gustav Ranis, Koichi Hamada, and T. Paul Schultz
"Japan and the U.S. in the Developing World."
The Japan Foundation, Center for Global Partnership

T. Paul Schultz
"Gender, the Family and Technical Change in Low-Income Countries."
Phases I, II, and III
The Rockefeller Foundation

T. Paul Schultz
"Yale Economic Demography Program."
William & Flora Hewlett Foundation

T.N. Srinivasan, Willem Buiter, and Gustav Ranis
"Economics, Politics, and Policies of Stabilization, Structural Adjustment and Long-term Development."
The Ford Foundation

T.N. Srinivasan
"Conference on Data Base of Development Analysis."
The Ford Foundation

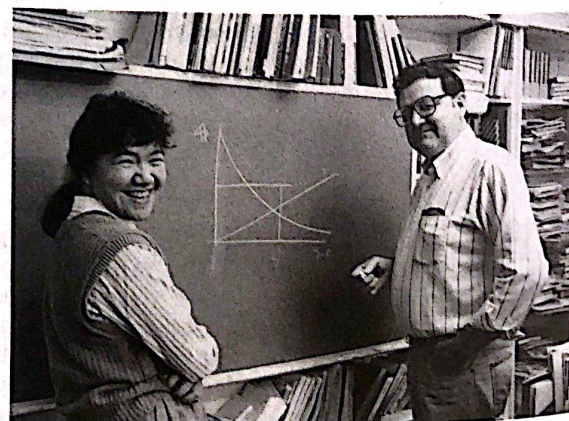
Duncan Thomas
"Income, Economic Shocks, Infrastructure and Child Growth."
Rand Corporation and National Institute of Child Health and Human Development

Selected Research Summaries

Much of the research "product" of the Economic Growth Center is originally reported in the form of discussion papers. These papers, which are preliminary in nature, are circulated to stimulate discussion and critical comment. Many of the papers are subsequently published or become parts of books. Almost 100 Discussion Papers were produced between July 1990 and June 1993 by Economic Growth Center faculty members, occasionally in collaboration with colleagues elsewhere at Yale or at other universities, and visitors. Appendix C provides a listing of all Discussion Papers for this period, as well as a listing of Center Papers (reprints of published articles). What follows are highlights from a selection of these papers in order to give an overview of some of the research that has been carried out at the Center since July 1990. Also included are highlights of a few research projects that are an important part of the Center's work, but have not yet produced Discussion Papers.

Technical Change and Science Policy

Data on patenting by industry for five developed countries were used by Professor Robert Evenson to examine the problem of the exhaustion of the potential for invention. In his paper, "Patent Data by Industry: Evidence for Invention



Rockefeller Post-Doc Agnes Quisumbing and Professor Robert Evenson (Marsland photo).

Potential Exhaustion?" (Discussion Paper No. 620), Evenson presents ratios of patented inventions to real R&D expenditures and to the number of scientists and engineers engaged in R&D for the period 1969 to 1987. He finds that not only have these ratios declined for the five countries studied (the United States, the United Kingdom, Germany, France, and Japan), but also that the declines have been quite large. For example, by 1985-86, patent/R&D ratios were only 55, 44, 42, 40, and 75 percent of the 1972-73 levels for the U.S., U.K., Germany, France, and Japan respectively. Evenson further examines these ratios for twenty-three industries in order to determine how much of the decline can be attributed to changes in the propensity to patent (i.e., to changes in the proportion of inventions that are patented) and how much can be attributed to invention potential exhaustion (i.e., to a real reduction in inventions made per unit of inventive effort). Evenson's analysis shows that a considerable part of the decline in the ratios is a common decline over all industrial fields within a country indicating changes in the propensity to patent. However, significant industry effects common to several countries were also found suggesting that invention potential exhaustion may be a feature of specific industries.

Robert Evenson and former student Douglas Gollin (currently at the University of Minnesota) have written a paper on "The Economic Impact of the International Rice Germplasm Center (IRGC) and the International Network for the Genetic Evaluation of Rice (INGER)." In this study, the authors analyze the economic role of these two programs, run by the International Rice Research Institute (IRRI), as well as the impact of IRRI's plant breeding programs (IRPB). Evenson and Gollin based their study on national-level data on varietal releases, area planted to different varieties, varietal characteristics, and on the breeding and development of new varieties. Evenson and Gollin estimated first that the IRGC, IRPB, and INGER programs have created a larger number of released varieties than would otherwise have occurred. They calculate that the approximate average value of a released variety is 2.5 million dollars per year and that this annual value continues into perpetuity because varietal improvements are considered to be additive. Evenson and Gollin compute the value of adding 1,000 accessions to IRGC which would, in turn, generate 5.8 added released varieties. These additional varieties would generate an annual 145 million dollar income stream (with a delay of ten years). The present value of this stream at a 10 percent discount rate would be 325 million dollars (1,450 million dollars at 5

percent). The authors also find that the value of an added "landrace" introduced by IRRI is quite high—50 million dollars discounted at 10 percent or 75 million dollars at 5 percent. When the benefits from these activities are compared to the costs involved in maintaining the system, it is clear that these are high-payoff investments. For example, the annual costs of INGER are less than ten million dollars; the costs of maintaining the IRGC are approximately one million dollars annually (other RGCs are probably about ten million dollars annually); and the costs of adding 1,000 accessions to IRGC are also low—around five million dollars.

Economic Demography and Labor

Several detailed household-level and *município*-level surveys for Brazil formed the basis for a number of research projects carried out by Center faculty and visitors. These surveys include: the *Estudo Nacional da Despesa Familiar* (ENDEF), a household survey containing information on income, nutrition, expenditures, anthropometry and household socio-demographic characteristics; the *Pesquisa Nacional por Amostra de Domicílios* (PNAD), an annual labor force survey similar to the Current Population Survey in the United States; and the *Informacoes Basicas Municipais* (IBM), a periodic survey of every *município* (county) in Brazil including data on the availability of infrastructure, health and education services. These research projects generated a number of discussion papers.

Professor Duncan Thomas and John Strauss (Rand Corporation, now at Michigan State University) collaborated on a study of the relationships among parental characteristics, community characteristics and child height in Brazil, where child height for age is analyzed as a proxy for child health and as a predictor of adult health capital. The authors used the ENDEF survey and merged it with community data from the IBM surveys. Their study is reported in "Prices, Infrastructure, Household Characteristics and Child Height" (Discussion Paper No. 602). Thomas and Strauss found that child height is significantly affected by local infrastructure; in particular, by the availability of modern sewage, piped water, and electricity. These effects were stronger for older children, for children of better educated mothers, and for children from higher expenditure households. Lower child height was associated with higher prices of sugar and dairy products; this association was significant for children of illiterate mothers. It was found that mothers with at least elementary schooling were able to counteract the deleterious impact of

prices on child height. Negative price effects, however, were largest for children in higher expenditure households. This finding suggests that the impact of mother's education on child height does not solely reflect the availability of resources. The study also found evidence that mother's and father's education are complementary determinants of child height. This paper was subsequently published in the October 1992 issue of the *Journal of Development Economics*.

John Strauss and Duncan Thomas collaborated on a second Brazilian study. In this work, "Wages, Schooling and Background: Investments in Men and Women in Urban Brazil" (Discussion Paper No. 649), Strauss and Thomas used data from the 1982 PNAD to analyze empirical regularities in the urban Brazilian labor market. The authors examined the shape of the relation between the wage and years of schooling and focused on heterogeneity in this relationship by gender, region, choice of sector of employment, age-cohort, and race. They also studied the role of family background in wage determination, both directly and through its influence on labor market participation choices. The main findings of their research are: the effect of education on the logarithm of both wage and sectoral choices is neither linear nor smooth; and returns to post-primary schooling tend to be higher than returns to less schooling (this gap exists for both market and self-employment work, is greater in the Northeast than in the South, and has been increasing over time). Family background factors are found to play an important role in wage determination, although this role is far smaller in magnitude than that of own education.

The 1985 PNAD survey provided the data analyzed by post-doctoral fellow Deborah Levison and David Lam (University of Michigan) in their paper "Declining Inequality in Schooling in Brazil and its Effects on Inequality in Earnings" (Discussion Paper No. 618). The authors' analysis of three-year age groups showed that cohorts of Brazilian males born in the four decades between 1925 and 1963 experienced steady increases in the mean level of schooling, with the mean doubling from the oldest to the youngest cohort. These increases were associated with steady declines in school inequality. Levison and Lam ran separate earnings equations for the three-year age groups to study the impact of changes in the distribution of schooling on the distribution of labor earnings. Earnings inequality fell dramatically from the 1946-48 cohort to the 1961-63 cohort. However, the authors found that other sources of inequality offset improvements in schooling inequality. Nevertheless, the

reduction in schooling inequality represents a fundamental improvement in the determinants of earnings inequality in Brazil that will have beneficial effects for decades.

Professor Ricardo Paes de Barros has concentrated much of his recent work on wage and earnings inequalities in Brazil. Two of his papers, both based on data from the PNAD surveys, report on this work. In a paper coauthored by José Guilherme Almeida dos Reis (Instituto Brasileiro de Geografia e Estatística, IBGE), "Wage Inequality and the Distribution of Education: A Study of the Evolution of Regional Differences in Inequality in Metropolitan Brazil" (Discussion Paper No. 606), the authors analyze the evolution of education and wage inequality from 1976 to 1986. The sample used for this work was limited to prime-age males. The authors show that education can explain almost 50 percent of the wage inequality in metropolitan Brazil. Results of simulations carried out by the authors indicate that wage inequality is much smaller in the South-Southeast metropolitan regions than in the Northeast metropolitan regions, not because the former regions have higher or better distributed levels of education, but because the wage-education profile is less steep in these regions than in the Northeast, or, in other words, because the private returns to education are lower in the more educated Southern region in Brazil.

The second study, "Aggregating Inequalities: The Equalizing Impact of the Earnings of Married Women in Metropolitan Brazil" (Discussion Paper No. 607), was coauthored by Barros and Rosane Silva Pinto de Mondonça (Pontifícia Universidade Católica, Rio de Janeiro). In this study, the authors analyze the impact that the rise in wives' labor force participation has had on income inequality. The basic conclusion of this study is that even though the average contribution of wives' earnings to the family budget is around 15 percent, the inclusion of their earnings has an insignificant effect on income inequality.

Brazil was one of three countries looked at by Duncan Thomas in his analysis of the relationship between parental education and child height, an indicator of health and nutritional status. In his study, "Like Father, Like Son: Gender Differences in Household Resource Allocations" (Discussion Paper No. 619), Thomas used household survey data from the United States, Ghana, and Brazil. In all three countries the education of the mother has a bigger effect on her daughter's height; paternal education, on the other hand, has a bigger impact on the son's height. There

are, apparently, differences in the allocations of household resources depending on the gender of the child and these differences vary with the gender of the parent. In Ghana, the education of a woman who is better educated, relative to other women, than her husband has a bigger impact on the height of her daughter than her son. In Brazil, women's non-labor income has a positive impact on the health of daughters but not of sons. If relative education of parents and non-labor income are indicators of power in a household bargaining game, then Thomas's results suggest that either gender differences in resource allocations reflect technological differences in child rearing or differences in the preferences of parents or both.

A paper by Professor T. Paul Schultz, "Testing the Neoclassical Model of Family Labor Supply and Fertility," was first presented at a conference at Yale sponsored by the Rockefeller Foundation, "Bargaining Models of the Family." The paper was then published in a conference symposium on the topic in the *Journal of Human Resources* and released as a Center Paper (No. 445). Schultz tests both the neoclassical model of family labor demand and the McElroy-Horney Nash-bargaining model of family demand behavior using data from the Socio Economic Survey of Thailand for 1980-81. The "bargaining" model relaxes the neoclassical model restriction that nonearned income of husband and wife have the identical effect on family labor supply and commodity demands. Schultz tests this restriction for the determination of husband and wife labor supply and fertility for the Thai data and finds that it is rejected for female labor supply and fertility. Schultz also uses alternative estimation strategies to empirically treat the unexplored limitation of family demand studies due to sample self selection of intact marriages.

Agnes Quisumbing, who was the first post-doctoral fellow to come to the Center under the Rockefeller Foundation program on the family, studied another aspect of gender differences in the allocation of household resources in her paper, "Intergenerational Transfers in Philippine Rice Villages: Gender Differences in Traditional Inheritance Customs" (Discussion Paper No. 632). Data from a retrospective survey of five rice-growing villages in the Philippines were used to examine parental gender preference in inheritance decisions. Quisumbing finds that daughters receive more education and total inheritance but less land. When family fixed effects are accounted for, however, education is gender neutral, non-land asset transfers weakly favor daughters, and sons receive higher values of land and total inheritance. Interactions of child gender with

parent endowments are found to be relatively unimportant determinants of educational levels, although they are significant in terms of bestowals of nonhuman capital. In addition, daughters of better educated mothers, land-owning fathers, and land-owning mothers received larger amounts of land and nonland assets. On the other hand, it was found that better educated fathers and parents cultivating larger areas tended to bestow land and nonland assets preferentially to sons.

The issue of gender preference was also explored by Hewlett post-doctoral fellow Namkee Ahn in "Measuring the Value of Children by Sex and Age using a Life Cycle Model of Fertility" (Discussion Paper No. 648). Ahn's model was estimated using the 1980 Korean Population Census and was designed to test the hypothesis that the observed fertility outcomes for any couple are the solutions to their life cycle optimization problem. The empirical results of this study indicate that parental valuation of children varies according to child's gender and age, and parental education levels. Although boys impose relatively higher costs at young ages, they are preferred to girls because of greater expected support in old age. In addition, the analysis suggests that better educated women not only expect higher costs of child rearing than do less educated women, but they also anticipate higher benefits from their children when they are grown. Overall, Ahn infers that the old-age support from mature sons appeared to be the most important factor influencing parental fertility choices.



Professor T. Paul Schultz (Marstrand photo)

T. Paul Schultz presents an assessment of the effectiveness of government subsidies to public and private family planning delivery systems in reducing fertility rates in Thailand in his paper "The Relationship Between Local Family Planning Expenditures and Fertility in Thailand, 1976-81" (Discussion Paper No. 662). Schultz

examined survey information on the income, education and fertility of couples for Thailand in 1981, a country in which total fertility rates declined by nearly half in the two decades before the survey. This survey information was combined with data on local expenditures on two forms of family planning activities: the programs run by the Public Health Ministry and subsidies to private, nonprofit family planning associations. This study found that the government family planning programs, while costly, have had a major impact on fertility, particularly for those living in municipal areas where most of these facilities are located and through the provision of sterilization that had become, by the 1980s, the most frequently used contraceptive method. In addition, although subsidies to private, nonprofit family planning associations represent only a small fraction of total public resources allocated to family planning programs, these subsidies have had a large relative effect on fertility rates especially in those provinces where the public program is small. Schultz's analysis also suggests that the rapid rise in female education has played a major role in accounting for the rapid decline in Thailand's fertility.

A theoretical approach to the issue of fertility was taken by Professor Raaj K. Sah in "The Effects of Mortality Changes on Fertility Choice and Individual Welfare: Some Theoretical Predictions" (Discussion Paper No. 599). Sah argued that although empirical studies have overwhelmingly shown that a lower mortality rate leads to lower fertility, even the simplest theoretical models of fertility choice do not make it possible to analyze this relationship satisfactorily. Sah attempted to reduce this gap between theory and the empirical literature by showing that a set of simple and plausible conditions was sufficient to yield the typically observed effect of mortality changes on fertility choice. Another concern discussed in this paper was the effect that mortality changes have on individual welfare.

Comparative data from Côte d'Ivoire and Ghana were used by T. Paul Schultz and Rockefeller fellow Aysit Tansel to measure returns to adult health. The results of this study are reported in "Measurement of Returns to Adult Health: Morbidity Effects on Wage Rates in Côte D'Ivoire and Ghana" (Discussion Paper No. 663). The basic premise of this analysis was that sickness should make individuals less productive by reducing their capacity to do work. However, measurement of the effect of morbidity on productivity can be problematic: there is no consensus on how to measure adult morbidity in a household survey of a low-income population;

if part of earnings is used to improve health, how is the impact of morbidity on productivity inferred? Schultz and Tansel deal first with these measurement problems and then assess the effect of morbidity on wages, hours worked, and probability of entering the wage labor force. Their estimates indicate that, in Côte d'Ivoire, a reduction of one day inactivity per month due to illness is associated with a 29 percent increase in male annual wage earnings (about two-thirds of this effect is associated with the worker's higher wage rate). In Ghana, on the other hand, the authors' analysis shows that a reduction of a day's inactivity is linked to a ten percent increase in hours, but has no statistically significant effect on wage rates for men. In both countries, men who are more likely to experience activity limitations are less likely to enter the wage labor force in the first place. Finally, among much smaller samples of wage-earning women, the authors' analysis indicates that patterns between morbidity and wage rates and time allocation are not uniform or statistically significant.

Professor T.N. Srinivasan and colleague Lakshmi Raut (University of California, San Diego) study the neoclassical growth theory as well as the "new" growth theory in their paper "Endogenous Fertility, Technical Change and Growth in a Model of Overlapping Generations" (Discussion Paper No. 628) and propose a model of their own. The authors characterize the "new" growth theory as being based on a misleading characterization of traditional neoclassical growth theory, namely that it shows the steady state growth rate of income to be exogenous and that it will equal the rate of growth in the labor force in the absence of exogenous technical change. Thus, in the steady state, per worker output and consumption are constant. A goal of the "new" theory is essentially to endogenize growth and to obtain sustained growth in per worker output and consumption. The perceived problems with the neoclassical growth model are not inherent features of the model, but are the consequence of assuming that the marginal product of capital diminishes to zero as the input of capital is increased indefinitely relative to labor. Srinivasan and Raut approach this problem by assuming fertility and savings to be endogenous so that the rate of growth in labor and capital, and hence aggregate growth, are also endogenous. They also assume that population density has an external effect on the production process, either through a negative congestion effect or through a positive innovation and technical change stimulation effect, so that the change in production possibilities is endogenous, determined by fertility decisions of individual agents. The authors' model is not necessarily

geared toward generating balanced growth steady states, and its non-linear dynamics generate a plethora of outcomes that include not only the steady state of the neoclassical model, but also growth paths that are without a steady state and that are even chaotic. Per capita output grows exponentially (and super exponentially) in some of their examples.

Agriculture

An extensive study of the effectiveness of the agricultural research system in Pakistan was undertaken by Robert Evenson with the assistance of Qazi Tauqir Azam (Pakistan Agricultural Research Council) and Ph.D. student Erik Bloom. Their study, "Agricultural Research Productivity in Pakistan (Discussion Paper No. 644)", was based on district-level agricultural data gathered for the provinces of Punjab, Sind, Baluchistan and the Northwest Frontier for the years 1955-56 to 1985-86. The authors present a detailed analysis of both overall returns to research as well as crop-specific returns. They find quite consistently that the agricultural research system in Pakistan has been highly productive. However, the Pakistani system was not as productive as it might have been. Among problems needing to be solved are inadequate levels for basic research support for scientists, lack of congruence between the economic importance of crops and the attention given them by researchers (especially in the case of rice), and worsening agricultural conditions such as soil salinity that will need to be given increased attention. The Pakistani results were compared with those for the Indian state of Punjab and with the internal rates of return calculated by other researchers for a number of developed and developing countries.

Rockefeller post-doctoral fellow Sudhin Mukhopadhyay approached the issue of improvements in agricultural technology from another angle. His interest was not in how improvements in agricultural technology have affected productivity, but rather in how these improvements have affected the allocation of resources among persons and activities within households. His paper, "Adapting Household Behavior to Agricultural Technology in West Bengal, India: Wage Labor, Fertility and Child Schooling Determinants" (Discussion Paper No. 631), uses data from 1,930 farm households in 60 villages in West Bengal. Mukhopadhyay shows that the new "green revolution" technology has changed time allocation patterns for men and women, promoting higher fertility and population growth. Some of the income gains of the new technology have

been invested in larger families rather than in increased schooling of children.

An unpublished paper by Robert Evenson, "A Note on the Contribution of Agricultural Extension and Research to Economic Growth with Evidence from Two Recent Studies in Africa (Kenya and Burkina Faso)," expands on work done by Evenson and World Bank colleague Vishva Bindlish. Evenson and Bindlish evaluated the Bank's Training and Visit (T&V) extension programs in Kenya and Burkina Faso. (Results of these evaluations were published by the Bank: "Evaluation of the Performance of T&V Extension in Kenya" and "Evaluation of the Performance of T&V Extension in Burkina Faso" (Technical Department, Africa Section, The World Bank)). Evenson and Bindlish found that the T&V-managed extension programs did have significant economic impacts on farmers—both studies found a statistically significant link between program staffing and farmer productivity. In his paper, Evenson indicates that many African countries have the potential to produce significant growth over the next decade. The source of this growth is related to the stage of development of markets and infrastructure and to farmers' schooling (a source that has already been exploited by most Asian countries). Evenson suggests that the exploitation of this growth source requires extension systems with greater discipline and competence than has characterized many African systems in the past. The T&V system, based on the evidence from Kenya and Burkina Faso, appears to be addressing these needs.

International Trade and Finance

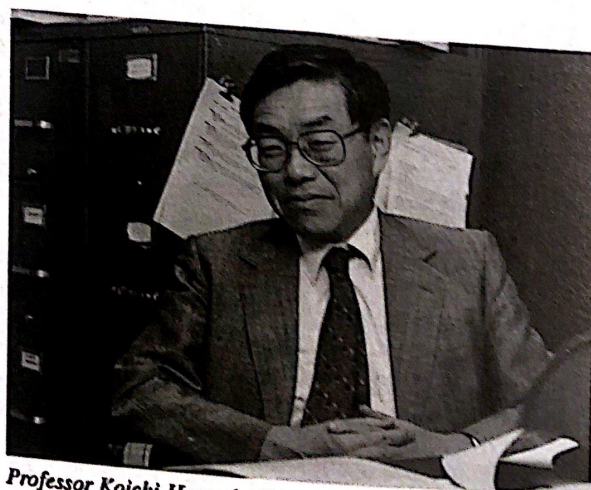
Professor Koichi Hamada collaborated with visitor Kyoji Fukao (Hitotsubashi University) on a study of trade theory. Specifically, their paper, "International Trade and Investment under Different Rates of Time Preference" (Discussion Paper No. 605), attempts to integrate the theory of trade with that of capital movements and studies a two-country world in which each nation has a different rate of time preference. The authors argue that complete specialization will be more likely to take place in the country with a higher rate of time preference, which specializes in the more labor-intensive sector. They also show that a single-commodity model exaggerates the amount of capital movements, but that the qualitative nature of asset accumulation patterns obtained in a single-commodity model of capital movements holds in the model that incorporates trade. Finally, the authors offer another explanation to the Feldstein-Horioka paradox that domestic investment responds more closely to

increasing savings than capital outflows do; if an economy is imperfectly specialized, increased savings will be absorbed in capital deepening rather than in capital outflow.

Visitor Yujiro Hayami (Aoyama Gakuin University) studied the question "along what axis of major confrontation will the world economic and political system be structured after the demise of the cold war?" in his paper, "Japan in the New World Confrontation: A Historical Perspective" (Discussion Paper No. 635). Professor Hayami posits that severe confrontations arise typically when a late-comer country is believed to have developed a model of economic development capable of catching up with or even surpassing the economic power of the early-comer countries. He examines rises and falls of the various catch-up models in modern history, and then, within this historical perspective, identifies this confrontation as occurring between the system of developmental market economies in Japan and East Asia and the system of liberal market economies in the Western countries. Hayami argues further that this confrontation need not be negative if the system of developmental market economies (which is a catch-up system) transforms itself to a system of liberal market economies when the goal of catching up has been realized. He suggests that such a transformation is long overdue in Japan and, as a result, that the country is now suffering from serious international economic frictions as well as a large gap between GNP and the quality of life.

The economies of Asia were also the focus of a paper by Koichi Hamada and Visiting Fellow Junichi Goto (Kobe University), "Economic Preconditions for the Asian Regional Integration" (Discussion Paper No. 685). Since recent developments in Europe and North America suggest that the world is now under a tide of new regionalism, Hamada and Goto felt it was valuable to ask whether conditions are favorable for regional economic integration in Asia. The authors present a number of statistical indicators (GNP per capita, growth rate, inflation rate, investment rate, etc.) and apply various statistical methods, including a principal component analysis, in order to reach the tentative conclusion that economic conditions for regional integration in Asia are at least as favorable as those in unifying Europe. The authors feel that the preconditions necessary for a free trade area in Asia are satisfied, but argue that since Asian countries depend so heavily on trade with the United States and Japan, a free trade area that hinders trade with these countries would not be practical. The authors also find that preconditions for a currency union in Asia are met.

Professors Willem Buiter and Nouriel Roubini collaborated with colleague Giancarlo Corsetti (Universita' di Roma III) on an analysis of the deficit limits contained in the Treaty of Maastricht, "Excessive Deficits: Sense and Nonsense in the Treaty of Maastricht" (Discussion Paper No. 674). Under the treaty, fiscal convergence criteria require that European Community countries have general government deficits that do not exceed 3% of GDP and that the gross debt of the general government should not be above 60% of GDP as a precondition for membership in the European Monetary Union (EMU). The authors argue that these requirements, especially the debt criterion, are much more stringent than what is required to ensure public sector solvency and that their implementation would require an excessive degree of fiscal retrenchment that would have negative consequences on the level of economic activity. They also argue that the deficit guideline is not sensible because the numerical criterion refers to the nominal interest-payments-inclusive financial deficit, with no corrections for inflation and real output growth, no cyclical adjustment, and no appropriate allowance for future revenue-producing public sector investment. The authors conclude that the fiscal convergence criteria should either be disregarded or applied quite loosely in order to avoid the risk of serious fiscal overkill. This paper has been published in *Economic Policy* (1993).



Professor Koichi Hamada (Marsland photo)

In a project supported by the Mitsui Marine and Fire Insurance Company, Koichi Hamada and visitor Masaya Sakuragawa (Nagoya City University) study the question of why capital does not necessarily flow from capital-rich countries to capital-poor countries as is predicted by conventional international trade theory. In their paper, "Capital Flight, North-South Lending, and Stages of Economic Development" (Discussion Paper No.

682), the authors develop a dynamic model that incorporates an asymmetric information structure. As long as the degree of asymmetric information in the capital market is identical between the North and the South, then both regions will converge to a steady state with the same capital intensity, and the income gap between them will eventually be eliminated. However, if the asymmetric information exists only in the South, the income discrepancy between the North and the South will be magnified by international capital movements. The authors feel that this requires that the timing of capital market liberalization in the South be decided with extreme caution.

A paper by Willem Buiter and Professor Kenneth M. Kletzer develops a role for differences in household tastes and policies that influence household behavior as sources of persistent or permanent differences between national or regional productivity growth rates, under perfect international financial capital mobility. In this paper, "Permanent International Productivity Growth Differentials in an Integrated Global Economy. The Role of Households, Non-Tradedness, Self-Financing and Fiscal Policy" (Discussion Paper No. 664), Buiter and Kletzer show that when households are constrained in the trade of some essential input into the production of non-traded human capital, productivity growth differentials arise even with common technologies and industrial structures and with constant returns from scale. Two alternative sources of non-tradedness are discussed: 1) that there are essential "home-grown" inputs to human capital augmentation (represented by time spent in education); and 2) that households cannot borrow against future labor income to finance education and training. In a two-country overlapping generations model, the authors show that intergenerational redistributions (using either balanced-budget policies or the issuing of public debt) that reduce private financial saving, as conventionally defined, tend to increase human capital formation. The authors also analyze the effects of residence-based taxes on savings, subsidies to borrowing for human capital formation, and public provision of inputs into education and training. This paper is forthcoming in the *Scandinavian Journal of Economics*.

The Public Sector, Taxation, and Growth

A simple model to investigate the effects of the intergenerational distribution of rents on saving, growth and fiscal policy is constructed by Kenneth Kletzer and colleague Charles Engel (University of Washington). This model is presented in "Distribution of Rents and Growth" (Discussion Paper No. 656). Rents in the authors'

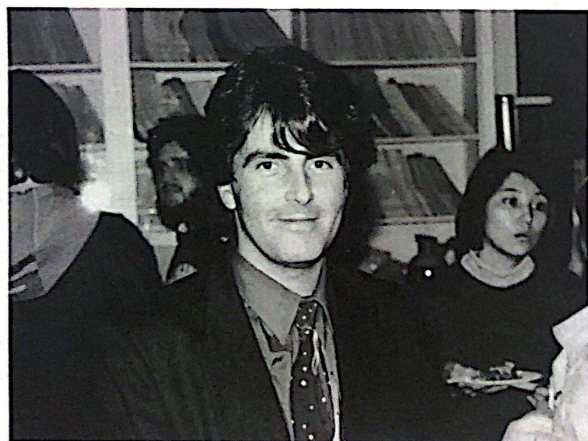
model are generated from an investment externality, population grows at a constant rate, with new generations unrelated to previous ones, and the model can have sustained growth in output per capita or can converge to a steady-state depending on parameter values. Using this model, the authors find that as a lower fraction of the rents are captured by workers, and more by firm-owners, current consumption will be greater and saving will be lower. The growth rate will be lower and long-run output and consumption are also lower. In the economy used by the authors as an example, a policy of subsidizing capital will lead to a Pareto improvement in welfare. However, since the government may also be interested in distributional policies that allow it to increase the value of social welfare, Kletzer and Engel argue that the fiscal policies that are chosen should depend on the distribution of rents.

Existing tax structures can have important effects on the relative attractiveness to individuals of buying foreign equity directly vs. having a domestic firm they own buy these shares instead. This issue is studied by Professor Joosung Jun and Roger H. Gordon (University of Michigan) in their paper, "Taxes and the Form of Ownership of Foreign Corporate Equity" (Discussion Paper No. 652). The authors use time-series cross-section data from eleven developed countries in order to see to what degree patterns of ownership of foreign equity respond to tax distortions. Jun and Gordon do find some tax effects, but estimated coefficients are small. Nontax factors seem to dominate in the choice of form of ownership of foreign corporate equity. The authors argue that, in principle, the increasing international integration of financial markets and the steady reduction of capital controls should lead to increasing responsiveness of the composition of international capital flows to tax distortions. As a result, countries will be under increasing pressure to reduce these tax distortions, and past behavior suggests that they will in fact respond to this pressure.

Much of the debate on the macroeconomic implications of fiscal policy has focused on the question of whether the timing of taxes matters but has neglected to study the relevance of the timing of public spending. Professor Xavier Sala-i-Martin presents a model that attempts to fill that void. In "The Timing of Government Spending in a Dynamic Model of Imperfect Competition" (Discussion Paper No. 641), Sala-i-Martin develops a model of dynamic fiscal policy where firms behave noncompetitively and households have finite horizons. He shows that the existence of monopoly rents makes the timing of future

government spending relevant. In particular, contrary to the predictions of most other models of fiscal policy, an anticipated increase in public spending financed by subsequent tax increase may have expansionary effects as the positive wealth effect associated with monopoly rents outweighs the negative wealth effect of anticipated higher taxes. In addition, Sala-i-Martin shows that if the public spending expansion is financed by subsequent public spending contraction, the experiment had unambiguous expansionary effects.

Nouriel Roubini and Xavier Sala-i-Martin develop a model of financial repression, tax evasion, inflation, and growth in their paper, "A Growth Model of Inflation, Tax Evasion and Financial Repression" (Discussion Paper No. 658). The authors use their model to examine the effects of policies of financial repression on long-term growth. Roubini and Sala-i-Martin conclude first that because policies of financial repression tend to reduce aggregate investment for given levels of savings, financial repression will have an adverse effect on long-term growth. Second, in order to increase the revenue from money creation, governments of countries with inefficient tax systems (high tax evasion) may optimally choose to increase per capital real money demand by repressing the financial sector and may choose high rates of money growth. Finally, high financial repression will be associated with high monetary growth, high inflation rates, high seigniorage, and low economic growth. This will tend to generate a spurious negative correlation between inflation and growth.



Professor Xavier Sala-i-Martin

The importance of the federal budget deficit as a campaign issue in the 1992 U.S. Presidential election campaign prompted an extensive review and evaluation of the current U.S. budgetary situation by Willem Buiter. In his paper, "Public Debt in the USA: How Much, How Bad and Who Pays?" (Discussion Paper No. 684), Buiter

first puts the U.S. debt/deficit into historical and international perspective. A simple accounting framework is provided for tracing the evolution of the debt over time. Buiter then states four reasons to care about public debt: 1) a larger stock of public debt makes default or debt repudiation more likely; 2) a larger debt and/or a larger deficit imply eventually higher monetary growth and inflation; 3) deficit financing leads to "financial crowding out," i.e., reduces national saving and thus domestic capital formation and/or net foreign investment; and 4) the ability of governments to run unbalanced budgets may be useful. He also considers a number of issues related to the financing of public sector investment. Among the conclusions reached by Buiter is that solving the immediate budgetary problems will still leave the much more serious macroeconomic problems of an undersized U.S. federal government sector and an inadequate U.S. national savings rate.

In his paper, "Pensions" (Discussion Paper No. 657), Xavier Sala-i-Martin develops a positive theory of intergenerational transfers. He suggests that such transfers are a way to induce retirement, i.e., to buy the elderly out of the labor force. An economy should choose to do this because aggregate output is higher if the elderly do not work. Sala-i-Martin models this idea through externalities in the average stock of human capital. Because skills depreciate with age, one implication of these externalities is that the elderly have a negative effect of the productivity of the young. When the difference between the skill level of the young and that of the old is large enough, aggregate output in an economy where the elderly do not work will be higher. Retirement in this case would be a good thing to have; pensions are just the means by which such retirement can be induced. One key prediction of Sala-i-Martin's model is when the dependency ratio increases, the desirability of the Social Security system decreases, indicating that movement toward the progressive elimination of Social Security may be a reasonable thing.

Other Issues in Development

A lecture given by T.N. Srinivasan at Macalaster College, St. Paul, Minnesota as part of the college's 'Cargill Distinguished Visitor Program examined the areas of the environment and sustainable development. Srinivasan's lecture was published as a Center Paper, "Environment, Economic Development and International Trade: Some Issues" (Center Paper No. 477). In this work, Srinivasan first discusses the difficulty of defining sustainability in an operational way. He cites definitions that have been put forward by

organizations, such as The World Commission on Environment and Development and UNESCO, and by individual scholars and points out the shortcomings of these definitions. He states further that even if sustainability could be defined in some operational way, its implementation would be problematic. He does feel that there are two areas in which progress can be made: poverty and the environment and the environment and international trade. In the case of poverty and the environment, for example, Srinivasan discusses the role of children in poor subsistence economies. Children are essential in household production activities such as fetching potable water and collecting 'free' fuel such as animal waste and wood from forests. Under these circumstances, high fertility and rapid population growth degrade environmental resources to which access is free; this in turn increases the time cost of their use so that a household would need more child-hours to collect the same quantity of water, animal waste and fuel wood. This creates private incentives to have more children which further degrades the environment. The dynamics of this situation reflect the unequal distribution of income and wealth, and, more importantly, an institutional failure in not creating appropriate property rights to a socially costly resource in place of free private access to it and the absence of social safety nets and transfers to the poor. A long-term solution to resource degradation, therefore, lies in the creation of a suitable institutional framework including rules of access to common property resources. In the short run, providing couples with knowledge and incentives to reduce their fertility voluntarily might be appropriate from an environmental perspective.

Rural development is the theme of a study by Professor Gustav Ranis and colleague Frances Stewart (Oxford University). In their paper, "The Dynamics of Rural Development: Theory and Application" (Discussion Paper No. 608), the authors demonstrate the potentially important role of rural non-agricultural activity in the development process. The Hymer/Resnick Z-goods model is used by the authors as a point of departure for their theoretical discussion. Ranis and Stewart first show that the pessimistic conclusions of this model are based on rather restrictive assumptions as applied to the colonial period. Relaxing these assumptions indicates the theoretical possibility of a substantially more positive scenario for the pre-independence era. The authors then conceptualize the role of Z goods, traditional and non-traditional, in the post-independence era, again distinguishing between archetypal pessimistic and optimistic cases. Finally, empirical work on the comparative

experience of the Philippines and Taiwan is used to demonstrate the theory.

Another study by Gustav Ranis focuses on human resources as a factor in the development of East Asia since the 1950s, with an emphasis on the economies of Taiwan and South Korea. Ranis's paper, "Labor Markets, Human Capital, and Development Performance in East Asia" (Discussion Paper No. 697), analyzes the relationship between labor markets and human capital formation as well as the changing interplay between domestic and international forces. Ranis first examines the initial conditions existing in each economy in the 1950s and then goes on to consider the nature of the import substitution phases in both countries. These phases were unusually short and were also characterized by an unusual emphasis on agriculture—early attention was paid to linkages between agriculture and rural industry. Ranis then analyzes the importance of labor market conditions along with the contributions of the agricultural sector to the booming industrial effort of the 60s and early 70s. During this period both systems undertook major policy reforms, shifting to labor-intensive, industrial, export-oriented economies. Finally, as labor surpluses became exhausted, emphasis on human capital became even more important as both Taiwan and South Korea entered the technological era of the 70s and 80s. Ranis shows that the human resource and technology policies of these countries with respect to vocational education, higher education, R&D, etc. accommodated rather than obstructed the needs of the economies over time.

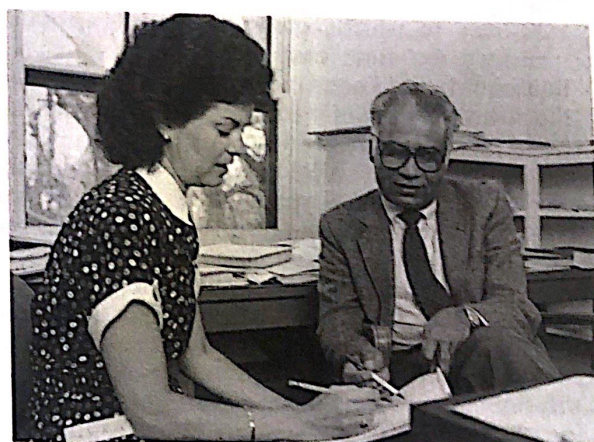
Christopher Udry (currently at Northwestern University), a former graduate student, spent a year in Nigeria collecting the survey data used in his study "Risk, Insurance and Default in a Rural Credit Market: An Empirical Investigation in Northern Nigeria" (Discussion Paper No. 636). In his paper, Udry examines the role played by credit transactions in permitting households to cope with risk in an environment characterized by incomplete markets and imperfect information. Within small communities in northern Nigeria, Udry argues that credit transactions play a direct role in pooling risk between households through the use of contracts that make debt repayments depend on the realization of random shocks by both borrowers and lenders. A model of a bilateral credit relationship is developed which can accommodate a wide range of informational environments and which explicitly incorporates the contractual enforcement mechanisms available in these villages. The terms of the loan contract are negotiated with each household taking into account the fact that, depending on

the realized state of nature, the other may default on its obligations. The structure of Udry's econometric model is derived from the Nash bargaining solution. His statistical results support the hypothesis that loan repayments include state-contingent payments that serve to pool risk between the borrower and the lender.

Gustav Ranis has done extensive research in the area of development policy. A recent paper, "The Political Economy of Development Policy Change" (Chapter 4 in Gerald A. Meier, ed., *Politics and Policy Making in Developing Countries: Perspectives on the New Political Economy*, San Francisco: International Center for Economic Growth, 1991), examines the experiences of the less developed countries (LDCs) during the postwar period, a time during which they were attempting to make the transition from colonial agrarianism to modern economic growth. These countries faced a wide variety of initial conditions, had very different natural endowments, and used a broad range of macroeconomic policy instruments to promote growth. Success of their efforts varied enormously from the highly successful economies of East Asia to the more modestly successful economies in other parts of the developing world. Ranis discusses the powers a developing country's government can use to exercise political control over its economy: the power to block trade; the power to transfer income to itself and other favored parties; and the power to decide on the specific allocation of expenditures. Major development policy instruments deployed over time (e.g., interest rates, foreign exchange rates, tax rates, etc.) are political instruments that can control growth. In this work, Ranis proposes an approach to the endogenization of development policy based on differential initial conditions and tests this approach against the postwar empirical experience of six countries—Colombia, Mexico, Taiwan, South Korea, the Philippines, and Thailand. A subsequent work by Ranis and Syed Mahmood (*The Political Economy of Development Policy Change*, Cambridge, MA: Blackwell, 1992) expands on this research.

The role of information in explaining institutional features of village markets has received growing attention in recent years. Using detailed panel data from Palanpur, a village in north India, current work by Professor Jean Olson Lanjouw examines the extent of villagers' information about farming skill differentials within a village by considering the impact of such information on the land leasing market. This work also investigates whether the rigidity of the 50/50 output share contract observed for all leasing transactions (in Palanpur and elsewhere) is offset

by flexibility in other contract dimensions such as cost sharing rules. In a paper entitled "Sharecropping, Rationing and Information in a North Indian Village" (released as a discussion paper by the Development Economics Research Programme, ST/ICERD, London School of Economics) Lanjouw models equilibrium leasing as determined by the extent of information about productivity, the flexibility of contract terms as well as imperfections in input markets. The panel nature of the data is exploited to derive a proxy for farming skill. Preliminary results suggest that information about skill differentials is widespread and that both skill and other agricultural inputs are imperfectly marketable. Further, contracts do not appear to be flexible—the mystery of the 50/50 crop share remains.



Administrative Assistant Louise Danishevsky and Professor T.N. Srinivasan (Marsland photo)

Although the problems of hunger and undernutrition in developing countries have attracted much deserved research attention, the underlying concepts and the difficulties that arise in quantifying the extent of undernutrition appear to be poorly understood. These issues are the focus of a paper by T.N. Srinivasan, "Undernutrition: Concepts, Measurements, and Policy Implications" (Center Paper No. 471). Srinivasan asserts that the most appropriate conceptualization of the complex system of health and nutrition in humans is to view it as an ongoing process in which the internal metabolic processes and acts of volition by the individual interact, with the effects of such interactions being spread over time. The concepts of homeostasis and adaptation are defined, and it is argued that energy intakes of an individual can vary within the homeostatic range without impairing the person's health and activities and without changes in body mass. Therefore, it would be misleading to compare the average intake of an individual over a relatively short period (as most empirical studies have done) with a long-term average requirement to

determine whether the individual is adequately nourished. Srinivasan proposes a model for implementing the process approach. This model draws on recent work on 'error correction' models of economic time series in which short-run dynamics and the process of adjustment in moving from one long-run equilibrium to another are consistently formulated. However, estimation of these models requires longitudinal data which are not usually available in the nutrition field. Srinivasan discusses some of the statistical problems that arise in moving from an individual to a population of individuals, in inferring properties of a long-run equilibrium from data relating to short periods, in assessing energy intakes and their distribution across individuals from data on expenditures on food, and in allowing for measurement errors in the data. The policy issues relating to nutrition intervention are discussed, and Srinivasan concludes that, from a long-run perspective, rapid economic development that succeeds in lifting the poor out of their poverty, rather than food subsidies or nutrition supplements, would be the surest way of eradicating undernutrition.

Rockefeller Family and Gender Differences Post-Doctoral Program

The Rockefeller Foundation program of training and research on the economics of the family and gender differences in low-income families was begun in 1988 and has brought visiting scholars to Yale from Argentina, Brazil, China, India, Kenya, the Philippines, Sudan, and Turkey. Work completed under this program has been reported in a number of Economic Growth Center Discussion Papers. Some of this work is reviewed here; some was summarized in the previous section.

Two papers by Zeng Yi, visiting scholar from Peking University where he is director of the Population Research Institute, analyze aspects of marriage and divorce in China. "The Trend and the Model Schedule of Leaving the Parental Home After Marriage in China" (Discussion Paper No. 616) was coauthored by Li Xiaoli (Peking University) and Ma Zhongdong (McMaster University). In this paper the authors examine changes in the pattern of leaving the parental home and link these changes to changes in the patterns of marriage, child bearing, labor force participation, and the number, size, and structure of the family/household. This study was based on survey data from twelve Chinese provinces/municipalities and used a life table analysis approach. Although the percentage of couples living with either the husband's or the wife's parents at the time of marriage has been

increasing in almost all of the surveyed mainland provinces, couples left the parental home earlier and the length of co-residence was shorter in the 1970s compared with the 1950s and 1960s. The proportion of couples living with their parents-in-law or parents five and seven years after marriages was generally smaller in provinces with higher levels of economic development. Guangdong and Taiwan were exceptions.

In a second paper, "An Event History Analysis of Divorce in China" (Discussion Paper No. 675), Zeng Yi, with T. Paul Schultz and Wang Deming (University of Minnesota), analyze the large In-Depth-Fertility-Surveys. They show that the level of divorce in China is extremely low in comparison with other developed and developing countries. The risk of divorce for women who married before age 18 is higher than those married after age 20, controlling for several other socio-demographic factors. Arranged marriages have a risk of divorce approximately 2.5 times as high as for non-arranged marriages. Urban areas have a higher divorce rate than rural areas. Education and occupation were not found to be statistically significant determinants of divorce when age at marriage was controlled. The authors' estimates show that, holding other things equal, women with 1, 2, and 3 or more children have only about 43.7, 27.3, and 22.5 percent the risk of divorce that women with no children do. Son-preference appears to have an effect on marriage dissolution as well as on fertility. Women with no son have a significantly higher risk of divorce than those with at least one son.

Palanigounder Duraisamy, visiting scholar from the University of Madras, utilized data from the forty-second round of the National Sample Survey (NSS), "Participation in Education," to analyze gender differences in the determinants of child schooling. Duraisamy's work is presented in "Gender, Intrafamily Allocation of Resources and Child Schooling in South India" (Discussion Paper No. 667). Two measures of child schooling are used—school enrollment status and grade attainment. His findings suggest that the education of the father and mother are significant determinants of their sons and daughters schooling. Parents' education has a bigger effect on daughter's than on son's schooling in rural areas. Distance to primary and secondary schools reduces both the enrollment rate and grade attainment. Fixed community effects estimates suggest that unobserved community-specific heterogeneity in school availability and school quality are important, and failure to control for such factors can lead to bias in the cross-section parameter estimates of grade attainment equations.

Jeemol Unni, post-doctoral visitor from the Gujarat Institute of Development Research in India, focused her research work on multiple job holdings in rural Gujarat. Multiple job holding is uncommon in developed countries (only 5.4 percent of all employed persons in the United States held multiple jobs in 1985). In developing countries, this percentage is much higher (50 percent in rural Gujarat in 1987-88). In her paper "Occupational Choice and Multiple Job Holding in Rural Gujarat, India" (Discussion Paper No. 677), Ms. Unni suggests that multiple job holding could be the result of the seasonality of work or uncertainties and fluctuating incomes from a single agricultural or non-agricultural job. Her analysis indicates that persons who undertake multiple jobs are younger, less educated, face lower wage rates, and live further away from towns. Ms. Unni also examines the influence of the value of physical capital and the type of employment (self versus wage) on the probability of multiple job holding.

Another visiting scholar from India, Ramakrishnan Malathy, Indian Institute of Technology in Madras, studied the determinants of women's time allocation to different categories of work at home using household data from an urban center in India (Madras City in Tamil Nadu). Her work, reported in "Education and Women's Time Allocation to Non-Market Work in an Urban Setting of India" (Discussion Paper No. 683), focuses on the effects of wages, income, and education on time allocations and the problem of endogeneity of children and hired help variables. The empirical results suggest that women would spend less time in home production as their wage increases by withdrawing time spent in teaching children. An increase in a household's assets would lead to an increase in time spent in teaching children at the expense of other nonmarket activities. In addition, it was found that higher female education reduces the amount of time spent in all nonmarket activities except teaching children.

Nour Eldin Maglad, Gezira University, Sudan, analyzed the response of fertility to landholding and child mortality ("Fertility in Rural Sudan: The Effect of Landholding and Child Mortality," Discussion Paper No. 604). Some of the findings of this study include: women experiencing high child mortality tend to replace those who die at a rate of .71; the elasticity of fertility with respect to landholding (0.15) indicated that raising the mean size of an operational holding by 50 percent would raise mean fertility from 7.16 to 7.7; the elasticity with respect to child mortality implied that halving the number of child deaths from 1.54 to .77 would reduce mean fertility to 6.26; and finally, father's education had an inverse effect on fertility (mother's education was not investigated due to data limitations).

A nationwide survey of household income and expenditures for Turkey provided data used by Aysit Tansel, Middle East Technical University, Turkey, in her study of returns to schooling for men and women. This study is reported in "Wage Employment, Earnings and Returns to Schooling for Men and Women in Turkey" (Discussion Paper No. 661). Ms. Tansel's basic findings were that returns to education increase with the level of schooling for both men and women wage earners, although returns to women are somewhat smaller than those to men. However, education increases wage earner participation more significantly for women than for men. A university diploma increases by 50 percent the probability of wage employment for women. The highest returns observed were for the younger cohort of men. Returns to schooling were significantly higher for men who graduated from vocational and technical high school than for men who were general high school graduates. Vocational and technical high school graduates also had a higher probability of working as wage earners. For women, on the other hand, the probability of working as a wage earner was the same for vocational and general high school graduates, and the return to vocational high school was smaller than the return to general high school.

CONFERENCES AND LECTURES

Conferences

Over the last three years, the Economic Growth Center has organized or co-sponsored several conferences. Two of these were held in May 1992. The first, held at the Center between May 15–16, 1992, was a workshop on "Data Base of Development Analysis." Professor T.N. Srinivasan organized the workshop, the purpose of which was: 1) to take stock of the conceptual basis, coverage, reliability, international and temporal comparability, as well as the timeliness of published data on a few indicators of development that are vital for policy making and analysis; and 2) to arrive at a set of feasible recommendations to improve these data. Papers presented at the conference discussed a variety of data: National Income Accounts; Poverty and Income Distribution; International Trade; Population, Life Expectancy and Infant Mortality; Labor Force, Employment and Human Capital Investments; and Food Production and Consumption. The papers presented at the workshop suggested that there are serious problems associated with even the most basic data series (national income, for example). Further, workshop participants felt that greater resources for improving data gathering and analytical capability have to be provided internationally and nationally for most developing countries. A special symposium issue covering this workshop will be published by the *Journal of Development Economics* in June 1994.



Business Manager Dorothy Nütshke and Professor Koichi Hamada (Marland photo)

The second conference was organized by T. Paul Schultz. The Conference on Women's Human Capital and Development, sponsored by the Rockefeller Foundation, was held in Bellagio, Italy, May 18–22, 1992. Among the topics covered by conference papers were: the historical experience of high-income countries; women's roles in the family and economy during development; child health, nutrition, and mortality; adult health, stature, and productivity; education, mobility, and productivity; and regional perspectives on fertility, labor force activity, and education of women. Specific papers dealt with these topics for a wide range of countries—the United States, Sweden, Brazil, Kenya, Jamaica, and Taiwan, for example. In the fall of 1993, the *Journal of Human Resources* is publishing a selection of the papers presented at the conference in a special symposium issue. A complete compilation of revised conference papers is scheduled for publication as a book in 1994.

In October 1994, the Center will once again host the annual conference of the Northeast Universities Development Consortia. Conference participants come both from the four original Consortia member institutions (Williams College and Yale, Harvard, and Boston Universities) and from a growing number of other universities and organizations. Topics covered at the one and one-half day conference will include the gamut of micro and macro issues. The conference is open to faculty, graduate students, and researchers in the field.

Lectures

In 1986, the Economic Growth Center instituted a lecture series in honor of the late Simon Kuznets, who founded the Center in 1961 and received the Nobel Prize in economics in 1971. This lecture series was dedicated to "Quantitative Aspects of the Economic Growth of Nations," the title Simon Kuznets selected for his pioneering series of ten short monographs that were published by *Economic Development and Cultural Change* from 1956 to 1967.

The fifth lectures in this series were presented by Mark Rosenzweig of the University of Pennsylvania in April 1991. Under the general title of "Agricultural Risk and Economic Development," Professor Rosenzweig gave three lectures: "Are Small Farmers Too Poor to be Efficient: Risk,

Inequality, and Agricultural Production"; "Risk-Coping and the Rural Family"; and "Taking on New Risk: The Consequences of Agricultural Technical Change." Robert W. Fogel, University of Chicago, spoke on the topic of "Egalitarianism: The Economic Revolution of the Twentieth Century" in the sixth series of lectures, April 1992. Professor Fogel's talks covered "The Foundation of Modern Egalitarianism," "Institutional Paradoxes and Policy Dilemmas," and "The Unfinished Agenda." The speaker for the seventh series

of lectures was Michael Bruno, Hebrew University. Professor Bruno's lectures, given in April 1993, covered "Short-Term Adjustment and Long-Run Growth: An Integrated View." His three lectures were "Recent Growth and Inflation in the Industrial Countries: What Trends or Cycles?", "Shocks and Growth Crises in Middle-Income Countries: Idiosyncrasies and Common Patterns," and "Sequencing Stabilization and Structural Reform: Are There Lessons for Eastern Europe?"



International Development Economics Students with Professors Koichi Hamada, T.N. Srinivasan, Robert Evenson, and John Fei (Marsland photo)

SPECIAL PROGRAMS

International and Development Economics

With the cooperation and administration of the Economic Growth Center, the Yale Department of Economics offers a one-year program of study in International and Development Economics (IDE) leading to the Master of Arts degree. (The IDE program can also be combined with a year of study at Yale's School of Forestry and Environmental Studies as part of a joint degree program. Students who pursue this option earn both the M.A. degree and the Master of Forest Studies degree.) The IDE program, instituted in 1953 as the Foreign Economic Administration Program, provides an intensive course of study for students from developing and developed countries with a professional interest in international economics and development. The curriculum of the program is intended to help students develop a solid core of analytic skills that will be of value in subsequent work. Graduates of the program serve in government ministries, planning agencies, central banks, private firms, international agencies, and academic institutions. Most students entering the program are early career professionals in the public or private sectors in foreign countries.

Since the program was begun in 1953, over 360 students from 69 different countries have earned degrees. Between 1990-91 and 1992-93, an average of sixteen students per year have participated in the program. These students represented a total of sixteen different countries. The breakdown for each of the three academic years was: 1990-91, thirteen students from Colombia, Egypt, Japan, Indonesia, Korea, Switzerland, and the United States; 1991-92, sixteen students from Bangladesh, Colombia, India, Japan, Korea, the United Kingdom, and the United States; and 1992-93, eighteen students from Bolivia, Japan, Korea, Mexico, Philippines, Russia, Taiwan, the United Kingdom, the United States, and Venezuela.

Visiting Scholars

Visiting scholars have always made important contributions to the intellectual environment and research output of the Economic Growth Center. The 1990-93 period was no exception. An average of eighteen visitors per year,

including Rockefeller and Hewlett post-doctoral fellows, came to the Center from private institutions, government agencies, and other universities in both the United States and foreign countries to work with Center faculty members on a range of research projects, from the effect of agricultural technology on household behavior in India to fertility determinants in Togo and Uganda. Appendix A lists visitors who were at the Center between July 1990 and June 1993.

Hewlett Foundation Population Program Grant

The William and Flora Hewlett Foundation has provided continuing support for core activities of the Economic Demography Program at the Center. Hewlett funds have allowed post-doctoral fellows from countries such as Nigeria, China, and Korea to work at the Center, and they have encouraged work by graduate students, undergraduates, and faculty in the field of population studies focused primarily on developing countries. One Hewlett postdoctoral fellow analyzed the relationships between migration and fertility in China while another from Korea studied the consequences of sex preference for the sex ratio of births by parity in Korea and China. Recent faculty research under the Hewlett grant estimated the cost effectiveness of public and nonprofit private family planning programs in Thailand and scrutinized the evidence from recent Zimbabwe surveys of a substantial fertility decline. The weekly workshop on Applied Microeconomics of Population and Labor has remained an active forum at Yale, due in part to the recognition by the Hewlett Foundation of the value of economic studies of population changes. (Workshops held between September 1990 and June 1993 are listed in Appendix B.) Most centers for population studies in the United States and abroad are based in sociology departments or in schools of public health and public policy, and consequently involve economists only peripherally. The program at the Economic Growth Center is the inverse.

Economics of the Family in Low-Income Countries

In 1988, the Rockefeller Foundation funded a research and training program on the economics of the family. This program is designed

to use the tools of microeconomics and household economics to study gender differences in low-income countries. In particular, the program emphasizes the differences in wages and productivity, labor supply, time allocation, health, and schooling between men and women and analyzes the ways in which these differences are influenced by technical change and development policy. The program includes funding for predoctoral and postdoctoral fellows whose research interests are in these areas. Much of the research generated under this program is presented in the Research Program section of this report.

Japanese Studies Program

Several members of the Economic Growth Center have traditionally been engaged in research on the Japanese economy, its neighboring countries, and its relationship to the United States. Currently Koichi Hamada and Gustav Ranis, among others, are involved in the Center's Japanese Studies Program. In a series of projects funded by the Research Institute of International Trade and Industry (MITI), Hamada has studied the effect of exchange rates on industry adjustment in terms both of factor price movement and effects on the Japanese current account. A joint project by Hamada, Ranis, and T. Paul Schultz, funded by the Japan Foundation, Center for Global Partnership, analyzed the pattern of Japanese foreign investment abroad and capital movement, overseas development assistance, and immigration growth as a factor in the Japanese labor force. The Japan Foundation also funded a project on agricultural development in Japan. This project was carried out by Hamada and visitor Yujiro Hayami. The Nomura Securities Co., Ltd., has funded Hamada's historical study of financial crises and the recovery process from postwar reconstruction. This study serves as a source of possible lessons for the post-socialist economies. Hamada has also done a comparison of the Japanese and American stock markets funded by Daiwa Securities Co., Ltd. Taisho Marine and Fire Insurance Co. and Seiko Instruments, U.S.A., Inc. have supported Hamada and Ranis to undertake a theoretical analysis of the information-oriented approach to capital movements and trade. The generosity of these funding sources has enabled the Center to engage in broad historical and contemporary analyses of this rapidly growing part of the world and to extend visiting fellowships to distinguished scholars working in this field.

Study of Stabilization, Structural Adjustment and Long-Term Development

A recent grant to the Center from the Ford Foundation will fund a three-year study on "The Economics, Politics, and Policies of Stabilization, Structural Adjustment, and Long-Term Development." The principal investigators for the project are Professors Srinivasan, Buitier, and Ranis. In addition, contributors to the research effort will include Yale faculty members in the departments of economics and political science who are involved in research and teaching in international economics and economic development. Visiting researchers from the Indira Gandhi Institute of Development Research in Bombay, India will also collaborate in this work. The main purpose of this project is to analyze the interplay between politics and economics in the design and implementation of national development strategies in general and policies of structural adjustment in particular. This interplay will be analyzed at several levels: formal modeling; generation and econometric testing of hypotheses; and the analytical history of policy and performance in one specific country, India.

Patent-Based Technology Indicators by Industry

Funding from the National Science Foundation supported the development of an important patent-based data set, the Yale-Canada Concordance. Professor Robert Evenson and graduate students Jonathan Putnam and Samuel Kortum created the concordance which utilizes data from the Canadian Patent Office to compute probability distributions to map inventions from an international patent class to two-, three-, or four-digit standard industrial class industries of manufacture and industries of use. The concordance is based on an aggregate set of approximately 6,000 patent classes. Among the projects at the Center that have used this data base is one by Evenson, published in the *American Journal of Agricultural Economics*: "Inventions Intended for Use in Agriculture and Related Industries: International Comparisons" (Center Paper No. 455). In this work, Evenson reports estimates of inventions intended for use in U.S. agricultural production sectors as well as in the input supply and agricultural service sectors for the period of the 1920s through the 1980s. In addition, data for Great Britain, France, and Germany provide international comparisons and estimates of technology flows among the countries for the 1969 to 1987 period.

CENTER RESOURCES

The Library

The holdings of the Economic Growth Center Collection, housed in Yale's Social Science Library, focus on materials relating to statistics, economics, and planning in over 100 developing countries. Particular strength resides in the holdings of over 3,900 serially issued government publications and others from research institutions and intergovernmental organizations.

The Center's library is one of the most comprehensive collections of its kind in the United States, and it is widely used within and outside of the Yale community. Specialized reference services, provided by the Social Science Library, facilitate the use of the entire collection.

The collection is particularly valuable because of informed and consistent acquisition policies, comprehensive scope, and up-to-date materials. Rigorous attention continues to be given to the review of serial files, to fill gaps that emerge before missing issues go out of print. Gifts and exchanges for Economic Growth Center Discussion Papers and Center Papers continue to bring in a significant share of the material received.

Access to the library is extended to those doing research from outside of Yale. Visiting scholars have full use of the collection. Internships are available for librarians from developing countries. Inter-library loans are transacted with other universities and institutions, notably through the Research Libraries Group.

Data Archives

Another resource at the Social Science Library is the Social Science Data Archive, a collection used for statistical analysis of survey and numeric data. The collection contains data distributed by the Inter-university Consortium for Political and Social Research, the U.S. Government, the International Monetary Fund, Standard & Poor's Compustat Services, the Center for Research on Security Prices and other data collecting groups. Most of these data are stored on computer tapes and must be accessed through Academic Information Services at the Yale Computer Center. The Archive does contain several databases stored on CD-ROMs (Compact Disk-Read Only Memory); these databases can be accessed using microcomputers at the library itself. ECONLIT, journal articles and some books in economics

published since 1969, and INTERNATIONAL FINANCIAL STATISTICS, macroeconomic statistics for world economies since 1948, are two of the fourteen databases available on CD-ROM.

Computational Support

Economic Growth Center researchers have a number of options from which to choose in terms of computational support. The Yale Computer Center's (YCC) mainframe computers run both the VM/CMS and MVS/ESA operating systems. The MVS system provides batch processing capabilities and is used to handle large computer tapes. The Yale Economics Department maintains a system of SUN workstations, two of which are located at the Center. These workstations operate on the UNIX system and are networked over a high-speed "ETHERNET" connection to each other as well as to a gateway at YCC. In addition, numerous microcomputers are available both at the Center and at other locations around the Yale campus (YCC, the Statistical Laboratory, etc.). Many of these microcomputers can connect to the YCC mainframes either through ETHERNET or via a Gandalf box. Statistical software packages available include SAS (both mainframe and PC), LIMDEP, RATS, and STATA. The Center's programmer, Paul McGuire, provides technical and programming assistance to Center faculty, staff, and visiting researchers. The department also provides assistance with computer software and hardware problems to faculty and staff as does the Statistical Laboratory administered by the Statistics Department. Both the Statistics and Economics Departments (including the Economic Growth Center), the Social Science Library and YCC are within two blocks of each other in the central Yale campus.



Programmer Analyst Paul McGuire with Visitors Luo Mao-Chu and Syed Akhtar Mahmood (Marsland photo)

APPENDIX A

VISITING SCHOLARS AND POSTDOCTORAL FELLOWS, 1990/91-1992/93

1990-91

Namkee Ahn, State University of New York at
Stony Brook
Zong-Sheng Chen, Nankai University, Tianjin,
P.R.C.
Palanigounder Duraisamy, University of Madras,
India
Sung Keun Ha, Yonsei University, Korea
Yujiro Hayami, Aoyama Gakuin University,
Tokyo, Japan
Munehisa Kasuya, The Bank of Japan, Tokyo,
Japan
Deborah Levison, University of Michigan
Syed Aktar Mahmood, Oxford University,
England
Ramakrishnan Malathy, Indian Institute of
Technology, Madras, India
Sudin K. Mukhopadhyay, University of Kalyani,
West Bengal, India
Fumio Ohtake, University of Osaka, Japan
Carola Pessino, Duke University
Agnes Quisumbing, University of the Philippines,
Quezon City
Pablo Sierra, University of Chile, Santiago
JinJun Xue, Wuhan University, Wuhan, P.R.C.
Zeng Yi, Peking University, Beijing, P.R.C.

1991-92

Namkee Ahn, State University of New York at
Stony Brook
Rakesh Basant, Gujarat Institute of Area Plan-
ning, Ahmadabad, India
Lori Bollinger, University of Pennsylvania
Yu-Hsia Chen, Soochow University, Taipei,
Taiwan, R.O.C.
Zong-Sheng Chen, Nankai University, Tianjin,
P.R.C.
Palanigounder Duraisamy, University of Madras,
India
Michael Henry, Oxford University, England
Angang Hu, Peking University, Beijing, P.R.C.
Munehisa Kasuya, The Bank of Japan, Tokyo,
Japan
Deborah Levison, University of Michigan
N.A.M. Maglad, Gezira University, Gezira, The
Sudan
Sudin K. Mukhopadhyay, University of Kalyani,
West Bengal, India
Carola Pessino, Duke University

Ren Ruo-en, Beijing University of Aeronautics
and Astronautics, Beijing, P.R.C.
Abusaleh Shariff, The Gujarat Institute of Area
Planning, Ahmadabad, India
Aysit Tansel, Middle East Technical University,
Ankara, Turkey
Pan-Long Tsai, National Tsing Hua University,
Hsin Chu, Taiwan, R.O.C.
Jeemol Unni, Gujarat Institute of Area Planning,
Ahmadabad, India
Zeng Yi, Peking University, Beijing, P.R.C.

1992-93

Antonio Flavio Avila, EMBRAPA, Brasilia, Brazil
Rakesh Basant, Gujarat Institute of Development
Research, Ahmadabad, India
Lori Bollinger, The Population Council
Mahendra Dev, Indira Gandhi Institute of
Development Research, Bombay, India
Malathy Duraisamy, Indian Institute of
Technology, Madras, India
Palanigounder Duraisamy, University of Madras,
Madras, India
Junichi Goto, Kobe University, Kobe, Japan
Tohru Inoue, Yokohama National University,
Yokohama, Japan
Jorge Jatoba, Universidade Federal de
Pernambuco, Recife-Pernambuco, Brazil
Atul Kohli, Woodrow Wilson School of Public &
International Affairs, Princeton, N.J.
Nour Eldin Maglad, Gezira University, Wad
Medani, The Sudan
Sudin Mukhopadhyay, University of Kalyani,
West Bengal, India
Carl Pray, Rutgers University, New Brunswick,
N.J.
Assaf Razin, Tel Aviv University, Tel Aviv, Israel
Jean-Laurent Rosenthal, University of California
at Los Angeles
Masaya Sakuragawa, Nagoya City University,
Nagoya, Japan
M.H. Suryanarayana, Indira Gandhi Institute of
Development Research, Bombay, India
Aysit Tansel, Middle East Technical University,
Ankara, Turkey
Jeemol Unni, Gujarat Institute of Area Planning,
Ahmadabad, India
Junji Yano, Hiroshima University, Hiroshima,
Japan

APPENDIX B

SEMINARS AND WORKSHOPS JULY 1990-JUNE 1993

Microeconomics Workshop in Labor and Population

1990

- September 25 Namkee Ahn, Yale University, "Measuring the Value of Children Using a Life Cycle Fertility Model."
- October 5 Dan Hammermesh, Michigan State University, "Macroeconomic Inferences of Dynamic Factor Demand."
- October 16 Joel Waldfogel, Yale University, "(Some Preliminary Ideas About) What Do Judges Do?"
- October 23 Robert Townsend, University of Chicago, "Risk and Insurance in Village India."
- October 30 Hanan Jacoby, University of Rochester, "Borrowing Constraints and School Attendance: Theory and Evidence from a Low-Income Country."
- November 6 Jonathan Skinner, University of Virginia, "Risk and Duration of Catastrophic Health Expenditures."
- November 27 James Heckman, Yale University, "Continuous Versus Episodic Change: The Impact of Civil Rights Policy on the Economic Status of Blacks."
- December 4 Robert Topel, University of Chicago, "Unemployment, Non-employment, and Wages: Why Has the Natural Rate Increased Through Time?"

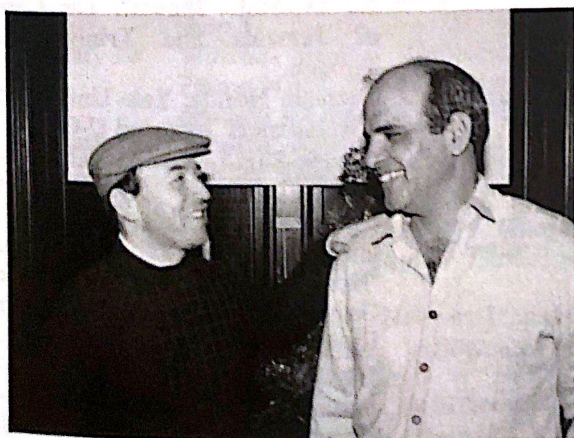
1991

- January 25 Joseph Ferrie, University of Chicago, "Settlement Patterns, Occupational Mobility, and Wealth Accumulation Among European Immigrants to the U.S., 1840-60."
- February 1 Agnes Quisumbing, Yale University, "Intergenerational Wealth Transfers in Philippine Rice Villages: Gender Differences in Traditional Inheritance Customs."

- February 8 Martin Browning, McMaster University, "Allocation with the Household: Some Canadian and French Numbers."
- February 19 Joe Tracy and Peter Crampton, Yale University, "Holdouts and Strike Activity."
- March 1 Donald Cox, Boston College, "Motives for Private Transfers Over the Life Cycle: An Analytical Framework and Evidence for Peru."
- March 8 Anne Beeson Royalty, Yale University, "Worker-Firm Matching and Human Capital Investment: Evidence on the Importance of Tenure Training and Learning in Wage Determination."
- April 5 Yujiro Hayami, Aoyama Gakuin University and Yale University, "Farm Mechanization, Scale Economies and Structural Change in Japan."
- April 12 Rachel Connelly, Bowdoin College, Deborah S. DeGraff, Carolina Population Center, and Deborah Levison, Yale University, "Women's Labor Force Activity and Child Care in Brazil."
- April 19 Yale-Brown Applied Microeconomics Conference
Robert Moffitt, Brown University, "Cohort Profiles of Earnings Distribution."
Duncan Thomas, Yale University, "Like Father, Like Son: Gender Differences in Household Resource Allocations."
Wilbert Van der Klaauw, Brown University, "Female Labor Supply and Marital Status Decisions: A Life Cycle Model."
- April 30 Kang-Shik Choi, Yale University, "Returns to Schooling in Korea: The Worker Effect and the Allocative Effect."
- May 10 Fumio Ohtake, Yale University, "Bequest Motives of Aged Households in Japan."

- May 16 Ricardo Barros and Diana Sawyer, Yale University, "Unequal Opportunity to Survive, Education and Regional Disparities in Brazil."
- May 23 Carola Pessino, Yale University, "Argentina 1974-1989. From Aggregate Fluctuations to Distributional Responses in the Labor Market: An Entrance into the Labyrinth of Causes and Effects." Peter Schochet, Yale University, "Alternatives to College Education: Incidence and Returns for Young Males."
- May 31 T. Paul Schultz, Yale University, "Economic Aspects of Marriage and Fertility in the United States."
- June 14 Aysit Tansel, Yale University, "Earnings and Occupational Choice for Male and Female Wage-Earners in Turkey."
- July 12 P. Duraisamy, Yale University, "Child Survival, Preventive Health Care, and Schooling in Rural Households of Tamil Nadu, India."
- July 19 R. Malathy, Yale University, "Women's Fertility and Labor Force Behavior in Urban Tamil Nadu, India."
- July 25 Joel Waldfogel, Yale University, "The Use of Fines and Imprisonment to Punish Federal Fraud Offenders: Theory and Evidence."
- September 13 Gerwin Bell, Yale University, "Unionization and Right to Work Legislation."
- September 20 T. Paul Schultz, Yale University, and Zeng Yi, Peking University, "The Association Between Community and Individual Characteristics and Fertility in Rural China."
- September 23 Greg Duncan, University of Michigan, "Do Neighborhoods Influence Child and Adolescent Behavior?"
- September 27 Ricardo Barros, Yale University, "The Temporal Evolution of the Relationship Between Wages and Education Among Brazilian Prime-Age Males: 1976-1989."
- October 11 Brown-Yale Mini-Conference on Microeconomics
Tony Lancaster, Brown University, and Guido Imbens, Harvard University, "Optimal Stock/Flow Panels."
- October 18 Joel Waldfogel, Yale University, "The Use of Fines and Imprisonment to Punish Federal Fraud Offenders: Theory and Evidence." David R. Weir, Yale University, "Labor Market Performance and Demographic Change in Nineteenth Century France."
- October 25 Amanda Bayer, Yale University, "Testing Game Theoretical Models of Labor Negotiations."
- November 13 Nancy Folbre, University of Massachusetts, "Married Women and Market Work in Massachusetts, 1880-1910." (Joint with Workshop in Economic History and History of Economic Thought.)
- November 8 Anil Deolalikar, University of Washington, "The Demand for Dowries and Bride Characteristics in Marriage: Empirical Estimates for Rural South-Central India."
- November 15 Joel Waldfogel, Yale University, "Variation, Disparity, and Sentencing Guidelines."
- November 22 Reuben Gronau, Hebrew University, "The Allocation of Time of Israeli Women—Revisited."
- 1992
- January 31 Jonathan Morduch, Harvard University, "Risk, Production and Saving: Theory and Evidence from Indian Households." (Joint with Workshop on Trade and Development.)
- March 6 Anne Royalty, Yale University, "Can Differences in Matching and Search Behavior Help Explain the Male-Female Wage Gap?"
- March 31 Moshe Buchinsky, University of Chicago, "Quantile Regression, Box-Cox Transformation Model and Changes in the Returns to Schooling and Experience: U.S. 1963-1987."
- April 3 Kang-Shik Choi, Yale University, "Changes in Wage Profiles in Korea During the 1980's: Supply and Demand Factors."
- April 10 Andrew Foster, University of Pennsylvania, "Information Flows and Discrimination in Labor Markets in Low-Income Countries."
- April 17 Susan Parker, Yale University, "Marriage and Welfare in the U.S."

- September 25 Brendan O'Flaherty, Columbia University, "What's Homelessness? Comparing New York and London."
- October 2 Todd Idson, Columbia University, "The Effects of Sectoral Decline on the Employment Relationship."
- October 9 David Neumark, University of Pennsylvania, "Sex, Wages and Productivity: An Empirical Analysis of Israeli Firm-Level Data." (Co-authored with Judy Hellerstein, Harvard University.)
- October 23 Kang-Shik Choi, Yale University, "Changes in Wage Profiles in Korea During the 1980's."
- October 30 Anne Beeson Royalty, Yale University, "Matchmaker, Matchmaker, Make Me a Match: Does Job Matching Differ by Sex?"
- November 6 Moshe Buchinsky, Yale University, "Changes in the U.S. Wage Structure 1963-1987."
- November 13 Susan Parker, Yale University, "Single Mothers and Absent Fathers: The Effect of the Welfare System on Women's Marital Decisions, 1970-1985."
- November 20 Daniel Feenberg, NBER, and James Poterba, M.I.T., "Income Inequality and the Incomes of Very-High Income Households: Evidence from Tax Returns."
- December 4 Alan Krueger, Princeton University, "A Comparative Analysis of East and West German Labor Markets: Before and After Unification."



Visitors Hossein Pirasteh and Antonio Flavio Avila

1993

- February 5 Janet Currie, M.I.T. and NBER, "Medicaid and Medical Care of Children."
- February 8 Jorge Jatoba, Yale and Federal University of Pernambuco, Brazil, "The Brazilian Family in the Labor Force 1978-1988: A Study of Labor Supply." (Joint with Workshop on Trade and Development.)
- February 12 Brown, NYU, Yale Workshop
Mark Pitt, Brown University, "The Determinants and Consequences of the Placement of Government Programs in Indonesia."
Chris Flinn, NYU, "Equilibrium Wage and Dismissal Processes."
Moshe Buchinsky, Yale University, "Quantile Regression, Box-Cox Transformation Model, and the U.S. Wage Structure, 1963-87."
- February 19 Robert Gibbons, Cornell University, "Subjective Performance Measures in Optimal Incentive Contracts."
- February 26 Rachel Friedberg, Brown University, "The Labor Market Assimilation of Immigrants in the United States: The Role of Age at Arrival."
- March 5 Vassilis Hajivassiliou, Yale University, "Unemployment and Liquidity Constraints."
- March 26 Joel Waldfogel, Yale University, "The Selection Hypothesis and the Relationship between Trial and Plaintiff Victory."
- April 9 Richard Freeman, Harvard University, "An Economic Analysis of Works Councils," and "Who Speaks for Us? Employee Representation in a Non-Union Labor Market."
- April 23 Lori Bollinger, Yale University, "The Search for Fertility in Malaysia."
- April 26 John Strauss, Michigan State University, "Gender and Life-Cycle Differentials in the Patterns and Determinants of Adult Health." (Joint with Workshop on Trade and Development.)

Workshop on Trade and Development

1990

- September 10 M. Ali Khan, Johns Hopkins University, "The Economics of the Atlantic Slave Trade."
- September 17 Xiao Kai Yang, Monash University, "Economic Growth, Commercialization and Institutional Changes in Rural China, 1979-1987."
- September 24 Nouriel Roubini, Yale University, "Economic and Political Determinants of Budget Deficits in Developing Countries."
- October 1 Kenneth Kletzer, Yale University, "Renegotiation of Sovereign Debt in a Consumption Smoothing Model."
- October 8 Syed Akhtar Mahmood, Yale University, "Inter-firm Differences in Technical Efficiency: Evidence from the Public Manufacturing Sector of Bangladesh."
- October 22 Reiichi Shimamoto, Japan Research Institute, "Japan's Financial Role in the World Economy." (Joint workshop with East Asian Council and EPE Program.)
- October 29 Dani Roderick, Harvard University, "Why is Trade Reform So Unpopular?"
- November 1 Vincent Benziger, Yale University, "Urban Access and Rural Productivity in China."
- November 5 Paul Collier, Oxford University, "African Trade Shocks."
- November 12 David Carbon, Yale University, "Two Aspects of Infant Industry Promotion: Domestic Content Legislation and Technology Diffusion in the Korean Automobile Industry."
- November 26 Kala Krishna, Harvard University, "Rent-Sharing in the MFA."
- December 3 Maurice Scott, Oxford University, "Some Aspects of Economic Growth."

1991

- January 28 Marc Nerlove, University of Pennsylvania, "Endogenous Fertility and the Environment: A Parable of Firewood."
- February 4 Mancur Olson, University of Maryland, "Why Are International Differences in Per Capita Income So Huge and Persistent?"

- February 11 Jonathan Eaton, Boston University, "Sanctions."
- February 18 Uma Lele, University of Florida, "Population Pressure and Agricultural Intensification: Exploration of the Boserup Hypothesis."
- February 25 Steve McGee, University of Texas, Austin, "Cross-National Estimates of Rent Seeking."
- March 4 Yujiro Hayami, Aoyama Gakuin and Yale Universities, "Product Innovation and Institutional Innovation: The Case of Commercial Vegetables in Indonesia."
- March 25 Mark Gersovitz, University of Michigan, "Transportation Policy and Pan-Territorial Pricing in Africa."
- April 1 Ricardo Barros, Yale University, "Income Inequality, Inequality in Education and the Demand for Schooling in Brazil."
- April 8 Akira Takayami, Southern Illinois University, "Variable Returns to Scale and Dynamic Adjustments: The Marshall-Lerner Condition Revisited."
- April 15 John Fei and Deborah Reed, Yale University, "Growth with Fluctuations."
- April 22 Jere Behrman, University of Pennsylvania and Williams College, "The Gender Gap in Cognitive Achievement in a Poor Rural Economy."
- September 5 Jinjun Xue, Wuhan and Yale Universities, "Can the Export-led Growth Model Be Applied to Large Developing Countries?—The Case of China."
- September 16 Michael Henry, Yale University, "Are Imported Inputs a Substitute for Domestic Inputs?: The Case of Jamaica and Trinidad & Tobago."
- September 23 Tetsushi Honda, Yale University, "On Kuznets' Inverted U-Curve."
- September 30 Xavier Sala-i-Martin, Yale University, "Capital Mobility in Neoclassical Models of Growth."
- October 7 Yunjong Wang, Yale University, "North-South Trade in a Dynamic General Equilibrium Model with Endogenous Technological Progress."
- October 14 James Rauch, University of California at San Diego, "Balanced and Unbalanced Growth."

- October 21 Nora Lustig, Colegio de Mexico and Brookings Institute, "Mexico: The Social Impact of Adjustment."
- November 4 Robert E. Evenson, Yale University, "Analyzing the Transfer Of Agricultural Technology."
- November 11 Julie Anderson, Stanford and Cornell Universities, "Capitalist Development and the Proletarianization of Agricultural Labor."
- November 18 Terry Sicular, Harvard University, "The Dual Price System and Inflation in China."
- December 2 John Williamson, Institute for International Economics, "The Economics of the Soviet Break-up."
- December 9 Avinash Dixit, Princeton University, "Risk-Sharing, Adjustment and Trade."



Administrative Assistant Carol Copeland

1992

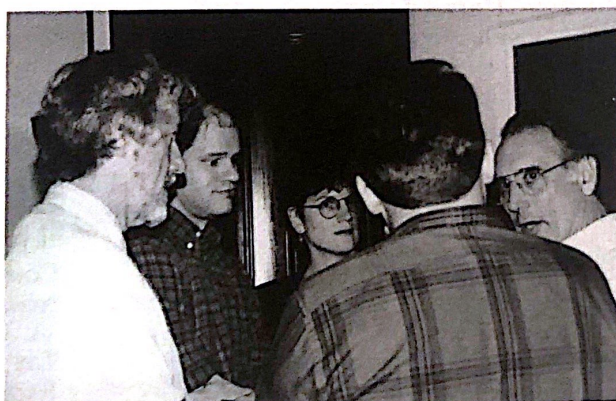
- January 31 Jonathan Morduch, Harvard University, "Risk, Production and Saving: Theory and Evidence from Indian Households." (Joint with Labor and Population Workshop.)
- February 10 Wilfred Ethier, University of Pennsylvania, "Modern Mercantilism and a Liberal Trade Order."
- February 13 Alberto Alesina, Harvard University, "Distributive Politics and Economic Growth."
- February 17 Mahbub ul Haq, UNDP, "Global Markets and Human Development."
- February 24 Michael Bruno, Hebrew University and M.I.T., "Aftermath of Sharp Stabilization."
- March 2 Paul Krugman, M.I.T., "First Nature, Second Nature, and Metropolitan Location."
- March 23 Samuel Morley, Vanderbilt University and International Development Bank, "Poverty and Adjustment in Latin America."
- March 26 Kori Udovicki, Yale University, "Interregional Trade Flows in Yugoslavia: 1970-1987."
- March 30 Xavier Sala-i-Martin, Yale University, "Pensions."
- April 6 John Williamson, Institute for International Economics, "The Economics of the Soviet Break-up."
- April 9 Pietro Peretto, Yale University, "An Intertemporal Model of Market Structure, Innovation, and Growth."
- April 13 Guillermo Calvo, I.M.F., "Stabilizing a Previously Centrally Planned Economy: Poland 1990."
- April 20 Brian Fikkert, Yale University, "Technological Openness or Closedness: The Impacts of Foreign Technology, Foreign Direct Investment, and the Domestic Patent Regime on the R&D Behavior of Indian Industrial Sector Firms."
- April 27 Ricardo Barros, Yale University and IPEA/Brazil, "Informal Labor Contracts: A Solution or a Problem? An Investigation of Labor Market Conditions in Metropolitan Brazil."
- September 14 Junichi Goto, Kobe University, "The Impact of Migrant Workers on the Japanese Economy."
- September 21 Koichi Hamada, Yale University, and Masaya Sakuragawa, Nagoya City and Yale Universities, "Imperfect Information and North-South Lending in a Dynamic Context."
- September 28 Yunjong Wang, Yale University, "A Theory of Producer Service Multinationals."
- October 5 David Porteous, Yale University, "Regional Bank Lending in Three Countries."
- October 12 Nouriel Roubini, Yale University, "A Growth Model of Inflation, Tax Evasion, and Financial Repression."
- October 19 Brian Fikkert, Yale University, "Technology Purchase, Spillovers, and R&D in Indian Firms."
- October 26 Michael Kremer, M.I.T., "Population Growth and Technological Change: One Million B.C. to 1990."

- November 2 Hong Chen, Yale University, "Entrepreneurship, Wealth Distribution and Growth."
 November 9 Assaf Razin, Tel Aviv and Yale Universities, "International Migration and International Trade."
 November 30 Joel Mokyr, Northwestern University, "Mortality, Technology and Economic Growth 1750-1914: A Suggested Reinterpretation."
 December 7 Joosung Jun, Yale University, "Does Home Country Taxation Matter for Foreign Direct Investment?"

1993

- January 18 John A. James, University of Virginia, "Reconstructing the Pattern of American Unemployment Before World War I."
 February 8 Jorge Jatoba, Federal University of Pernambuco, Brazil, and Yale University, "The Brazilian Family in the Labor Force 1978-1988: A Study of Labor Supply."
 February 15 R.A. Berry, University of Toronto, "Recession, Economic Adjustment and Income Distribution Funds in Latin America."
 February 16 Larry Westphal, Swarthmore College and UNU-Intech, and Robert Evenson, Yale University, "Technology and Development: A Review."

- February 22 H. Uzawa, University of Tokyo, "Tragedy of the Commons."
 March 3 Justin Lin, Visiting at UCLA, "Rice Technology and Income Distribution in China."
 March 22 Gary Fields, Cornell University, "New Evidence on the Kuznets Curve."
 April 5 Karla Hoff, University of Maryland, "A Theory of Imperfect Competitors in Rural Credit Markets in Developing Countries."
 April 12 T. Besley, Princeton University, "Property Rights and Investment Incentives in Ghana."
 April 19 Linsu Kim, Korea University and visiting at Columbia University, "Technology Policy for Industrialization: An Integrated Framework. Korea Experience."
 April 26 John Strauss, Michigan State University, "Gender and Life-Cycle Differentials in the Patterns and Determinants of Adult Health."
 May 3 Koichi Hamada and Masaya Sakuragawa, Yale University, "Costly State Verification and a Theory of International Capital Movements."
 May 11 Sudir Anand, Oxford University and visiting at Harvard University, "On the Concept of Ultra-poverty."



Professors T. Paul Schultz, Michael Booser, Jean Lanjouw, and William Brainard

APPENDIX C

CENTER PAPERS AND DISCUSSION PAPERS 1990-1993

Center papers, reprints of journal articles by Economic Growth Center members, are distributed to a large number of academic and research libraries in the United States and abroad. Both reprints and discussion papers may be ordered directly from the Economic Growth Center by writing to the Publications Officer, Economic Growth Center, Yale University, 27 Hillhouse Avenue, P.O. Box 208269, New Haven, Connecticut 06520-8269. Subscriptions to Center publications are also available. The following is a list of the Center Papers and Discussion Papers that have been produced at the Center since the end of 1989.

Center Papers

432. Raaj K. Sah, "Comparative Properties of Sums of Independent Binomials with Different Parameters," *Economics Letters*, 31, 1989, pp. 27-30.
433. Raaj K. Sah and Joseph E. Stiglitz, "Technological Learning, Social Learning and Technological Change," in *The Balance Between Industry and Agriculture in Economic Development*, Vol. 3 of *Manpower and Transfers*, edited by Sukhamoy Chakravarty, International Economic Association, 1989, pp. 285-298.
434. Burton Singer, "Social Science and the Improvement of Tropical Disease Control Programs," *Biomedical Science and the Third World: Under the Volcano*, Vol. 569 of the *Annals of the New York Academy of Sciences*, December 8, 1989, pp. 275-287.
435. Raaj K. Sah and Joseph E. Stiglitz, "Sources of Technological Divergence Between Developed and Less Developed Economies," in *Debt, Stabilization and Development*, edited by Guillermo Calvo, Ronald Findlay, Pentti Kouri and Jorge Braga de Macedo, United Nations University, 1989, pp. 423-446.
436. T. Paul Schultz, "Investment in Women, Economic Development, and Improvements in Health in Low-Income Countries," *Biomedical Science and the Third World: Under the Volcano*, Vol. 569 of the *Annals of the New York Academy of Sciences*, December 8, 1989, pp. 288-310.
437. T.N. Srinivasan, "External Sector in Development: China and India, 1950-89," *Lessons for Development from the Experience in Asia*, *American Economic Review*, Vol. 80, No. 2, May 1989, pp. 113-117.
438. Albino Barrera, "The Role of Maternal Schooling and Its Interaction with Public Health Programs in Child Health Production," *Journal of Development Economics*, Vol. 32, 1990, pp. 69-91.
439. T. Paul Schultz, "Women's Changing Participation in the Labor Force: A World Perspective," *Economic Development and Cultural Change*, Vol. 38, No. 3, 1990, pp. 457-488.
440. Gustav Ranis, "Science and Technology Policy: Lessons from Japan and the East Asian NICs," in *Science and Technology: Lessons for Development Policy*, edited by Robert E. Evenson and Gustav Ranis, Westview Press, 1990, pp. 157-178.
441. Robert E. Evenson, "Intellectual Property Rights, R&D, Inventions, Technology Purchase, and Piracy in Economic Development: An International Comparative Study," in *Science and Technology: Lessons for Development Policy*, edited by Robert E. Evenson and Gustav Ranis, Westview Press, 1990, pp. 325-355.
442. Anil B. Deolalikar and Robert E. Evenson, "Private Inventive Activity in Indian Manufacturing: Its Extent and Determinants," in *Science and Technology: Lessons for Development Policy*, edited by Robert E. Evenson and Gustav Ranis, Westview Press, 1990, pp. 233-253.
443. Charles Engel and Kenneth M. Kletzer, "Tariffs and Saving in a Model with New Generations," *Journal of International Economics*, Vol. 28, 1990, pp. 71-91.
444. Duncan Thomas, "Intra-Household Resource Allocation: An Inferential Approach," *Journal of Human Resources*, Vol. 25, No. 4, 1990, pp. 635-664.
445. T. Paul Schultz, "Testing the Neoclassical Model of Family Labor Supply and Fertility," *Journal of Human Resources*, Vol. 25, No. 4, 1990, pp. 599-634.
446. Duncan Thomas, John Strauss, and Maria-Helena Henriques, "Child Survival, Height for Age and Household Characteristics in Brazil," *Journal of Development Economics*, Vol. 33, 1990, pp. 197-234.

447. Willem H. Buiter and Kenneth M. Kletzer, "The Welfare Economics of Cooperative and Fiscal Policy," *Journal of Economic Dynamics and Control*, Vol. 15, 1991, pp. 215-244.
448. Raaj K. Sah and Joseph E. Stiglitz, "The Quality of Managers in Centralized Versus Decentralized Organizations," *Quarterly Journal of Economics*, February 1991, pp. 289-295.
449. Raaj K. Sah, "An Explicit Closed-Form Formula for Profit-Maximizing k -out-of- n Systems Subject to Two Kinds of Failures," *Microelectronic Reliability*, Vol. 30, No. 6, 1990, pp. 1123-1130.
450. Raaj K. Sah, "Fallibility in Human Organizations and Political Systems," *Journal of Economic Perspectives*, Vol. 5, No. 2, Spring 1991, pp. 66-88.
451. Dean Birkhaeuser, Robert E. Evenson, and Gershon Feder, "The Economic Impact of Agricultural Extension: A Review," *Economic Development and Cultural Change*, Vol. 39, No. 3, April 1991, pp. 607-650.
452. Raaj K. Sah, "The Effects of Child Mortality Changes on Fertility Choice and Parental Welfare," *Journal of Political Economy*, Vol. 99, No. 3, 1991, pp. 582-606.
453. Duncan Thomas, John Strauss, and Maria-Helena Henriques, "How Does Mother's Education Affect Child Height?" *Journal of Human Resources*, Vol. 26, No. 2, Spring 1991, pp. 183-211.
454. Raaj K. Sah, "A Useful Statement of Some Schur-Cohn Stability Criteria for Higher Order Discrete Dynamic Systems" *IEEE Transactions on Automatic Control*, Vol. 36, No. 8, August 1991, pp. 988-989.
455. Robert E. Evenson, "Inventions Intended for Use in Agriculture and Related Industries: International Comparisons," *American Journal of Agricultural Economics*, August 1991, pp. 887-891.
456. John Strauss, Mariza Barbosa, Sonia Teixeira, Duncan Thomas, and Raimundo Gomes, Jr., "Role of Education and Extension in the Adoption of Technology: A Study of Upland Rice and Soybean Farmers in Central-West Brazil" *Agricultural Economics*, Vol. 5, 1991, pp. 341-359.
457. Raaj K. Sah and Martin L. Weitzman, "A Proposal for Using Incentive Precommitments in Public Enterprise Funding," *World Development*, Vol. 19, No. 6, 1991, pp. 595-605.
458. Mark R. Rosenzweig and T. Paul Schultz, "Who Receives Medical Care? Income, Implicit Prices, and the Distribution of Medical Services Among Pregnant Women in the United States" *Journal of Human Resources*, Vol. 26, No. 3, Summer 1991, pp. 473-508.
459. Xiaokai Yang and Jeff Borland, "A Microeconomic Mechanism for Economic Growth," *Journal of Political Economy*, Vol. 99, No. 3, 1991, pp. 460-482.
460. Raaj K. Sah, "Social Osmosis and Patterns of Crime," *Journal of Political Economy*, Vol. 99, No. 6, 1991, pp. 1272-1295.
461. Charles Engel and Kenneth M. Kletzer, "Trade Policy Under Endogenous Credibility," *Journal of Development Economics*, Vol. 36, 1991, pp. 213-228.
462. Willem H. Buiter and Kenneth M. Kletzer, "Persistent Differences in National Productivity Growth Rates with a Common Technology and Free Capital Mobility: The Roles of Private Thrift, Public Debt, Capital Taxation, and Policy Toward Human Capital Formation," *Journal of the Japanese and International Economies*, Vol. 5, 1991, pp. 325-353.
463. Hideki Takayasu, Hitoshi Miura, Tadashi Hirabayashi, and Koichi Hamada, "Statistical Properties of Deterministic Threshold Elements—the Case of Market Price" *Physica A*, Vol. 184, 1992, pp. 127-134.
464. Willem H. Buiter and Kenneth M. Kletzer, "Fiscal Policy Coordination as Fiscal Federalism: Economic Integration, Public Goods and Efficiency in Growing Economies," *European Economic Review*, Vol. 36, 1992, pp. 647-653.
465. Wallace E. Huffman and Robert E. Evenson, "Contributions of Public and Private Science and Technology to U.S. Agricultural Productivity," *American Journal of Agricultural Economics*, Vol. 74, No. 3, August 1992, pp. 751-756.
466. Mark W. Rosegrant and Robert E. Evenson, "Agricultural Productivity and Sources of Growth in South Asia," *American Journal of Agricultural Economics*, Vol. 74, No. 3, August 1992, pp. 757-761.
467. Duncan Thomas and John Strauss, "Prices, Infrastructure, Household Characteristics and Child Height," *Journal of Development Economics*, Vol. 39, 1992, pp. 301-331.
468. Duncan Thomas, "Testing for Sectoral Differences in Child Anthropometric Status in Zimbabwe: A Comment," *Health Policy and Planning*, Vol. 7, No. 2, 1992, pp. 181-185.

469. Gustav Ranis and Frances Stewart, "Rural Nonagricultural Activities in Development: Theory and Application," *Journal of Development Economics*, Vol. 40, 1993, pp. 75-101.
470. T.N. Srinivasan, "Saving in the Development Process," in *The Economics of Saving*, edited by James H. Gapinski, Kluwer Academic Publishers, 1993, pp. 279-311.)
471. T.N. Srinivasan, "Undernutrition: Concepts, Measurements, and Policy Implications," in *Nutrition and Poverty*, edited by S.R. Osmani, The United Nations University, 1992, pp. 97-120.
472. Koichi Hamada and Munuhisa Kasuya, "The Reconstruction and Stabilization of the Postwar Japanese Economy: Possible Lessons for Eastern Europe?" in *Postwar Economic Reconstruction and Lessons for the East Today*, edited by Rudiger Dornbusch, Wilhelm Nölling, and Richard Layard, Massachusetts Institute of Technology, pp. 155-187, 1993.
473. Robert E. Evenson, "Agricultural Technology: International Dimensions (with Emphasis on Rice)," *Technological Forecasting and Social Change*, Vol. 43, 1993, pp. 337-351.
474. T. Paul Schultz, "Mortality Decline in the Low-Income World: Causes and Consequences," *The American Economic Review*, Vol. 83, No. 2, May 1993, pp. 337-342.
475. Duncan Thomas, "The Distribution of Income and Expenditure Within the Household," *Annales D'Economie Et De Statistique*, Vol. 29, January/March 1993, pp. 109-135.
476. Robert E. Evenson, "Patents, R&D, and Invention Potential: International Evidence," *The American Economic Review*, Vol. 83, No. 2, May 1993, pp. 463-468.
477. T.N. Srinivasan, "Environment, Economic Development and International Trade: Some Issues," Macalester College Bureau of Economic Studies Occasional Paper, No. 13, 1993.
601. T. Paul Schultz, "Testing the Neoclassical Model of Family Labor Supply and Fertility," May 1990. (31 pp.)
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671. Casey B. Mulligan and Xavier Sala-i-Martin, "U.S. Money Demand: Surprising Cross-Sectional Estimates," September 1992. (60 pp.)
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675. Zeng Yi, T. Paul Schultz, and Wang Deming, "An Event History Analysis of Divorce in China," November 1992. (34 pp.)
676. T.N. Srinivasan and Lakshmi K. Raut, "Theories of Long-Run Growth: Old and New," September 1992. (38 pp.)
677. Jeemol Unni, "Occupational Choice and Multiple Job Holding in Rural Gujarat, India," December 1992. (40 pp.)
678. Giancarlo Corsetti, "A Portfolio Approach to Endogenous Growth: Eaton's Model Revisited," December 1992. (29 pp.)
679. Giancarlo Corsetti, "Taxation and Risk-Taking Once Again (With and Without Tax Revenue Disposal)," December 1992. (25 pp.)
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691. Jeemol Unni, "Labor Supply Decisions of Married Women in Rural India," June 1993. (29 pp.)
692. Aysit Tansel, "School Attainment, Parental Education and Gender in Côte d'Ivoire and Ghana," March 1993. (38 pp.)
693. Jorge Jatobá, "The Brazilian Family in the Labor Force, 1978-1988: A Study of Labor Supply," May 1993. (34 pp.)
694. Duncan Thomas and Janet Currie, "Does Head Start Make A Difference?" May 1993. (45 pp.)
695. Malathy Duraisamy, "Women's Choice of Work and Fertility in Urban Tamil Nadu, India," June 1993. (28 pp.)
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699. Timothy W. Guinnane, "Cooperatives as Information Machines: The Lending Practices of German Agricultural Credit Cooperatives, 1883-1914," August 1993. (35 pp.)



Sr. Administrative Assistant Debra Rueb

APPENDIX D

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Ricardo Paes de Barros (with Guilherme Sedlacek and Simone Varandas), "Segmentação e Mobilidade no Mercado de Trabalho Brasileiro: A Carteira de Trabalho em São Paulo" (Segmentation and Mobility in the Brazilian Labor Market: The Role of the Working Card in São Paulo), *Pesquisa e Planejamento Econômico*, Vol. 20, No. 1, April 1990.

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Ricardo Paes de Barros (with Eleonora Santos), "O Papel da Cor na Inserção do Menor no Mercado de Trabalho Metropolitano Brasileiro" (The Role of Skin Color in the Insertion of Children in Brazilian Metropolitan Labor Markets), in A. Fausto and R. Cervini, eds., *O Trabalho e a Rua: Crianças e Adolescentes no Brasil Urbano dos Anos 80* (The Work and the Streets: Children and Youth in Urban Brazil during the 1980s), Editora Cortez and UNICEF, 1991.

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APPENDIX E

YALE ECONOMIC GROWTH CENTER FACULTY Teaching Fields and Research Interests

RICARDO PAES DE BARROS, University of Chicago 1987

Teaching Fields: Latin America; labor economics.
Current Research Interests: Income distribution in Brazil and Latin America; measurement and explanations through labor markets, education, time allocation of women and family composition; determinants of investments in child health; econometric methods for household survey analysis.

MICHAEL BOOZER, Princeton University 1993

Teaching Fields: Microeconomic theory; econometrics; labor economics.

WILLEM BUITER, Yale University 1975

Teaching Fields: International finance; macroeconomics.

Current Research Interests: Monetary, fiscal and financial policy in open, interdependent economies; stabilization policy and structural adjustment in developing countries; stabilization policy, public finance and capital market failure.

ROBERT E. EVENSON, University of Chicago 1968

Teaching Fields: Microeconomics; economic development; economics of technology; agricultural development.

Current Research Interests: Agricultural households in developing countries; economics of invention; technical change.

JOHN C.H. FEI (Emeritus), Massachusetts Institute of Technology 1952

Current Research Interests: Economic policies; Chinese economy.

TIMOTHY GUINNANE, Stanford University 1987

Teaching Fields: Economic history.

Current Research Interests: Demographic and financial history of Western Europe.

KOICHI HAMADA, Yale University 1965

Teaching Fields: International economics; the Japanese economy.

Current Research Interests: Strategic analysis of international interdependence; study of the development of financial markets, international capital movements and financial development utilizing the theory of asymmetric information; historical and comparative studies of Japan's financial development and crisis management.

JEAN LANJOUW, London School of Economics 1992

Teaching Fields: Econometrics; development economics.

Current Research Interests: Technology, intellectual property rights and development.

ARIEL PAKES, Harvard University 1979

Teaching Fields: Applied econometrics; industrial organization; growth and technical change.

Current Research Interests: Dynamic models of firm behavior; causes and effects of technical change; structural econometric modelling; simulation estimators.

GUSTAV RANIS, Yale University 1956

Teaching Fields: Developmental economics; interdependence between rich and poor countries.

Current Research Interests: Debt, agriculture and liberalization sequences; balanced growth; the political economy of LDC policy change.

THOMAS RICHARDSON, Columbia University 1990

Teaching Fields: Applied microeconomics; theory of economic planning; economy of the USSR.

Current Research Interests: Information and incentives in planning, reform of socialist economies.

NOURIEL ROUBINI, Harvard University 1988
Teaching Fields: International economics.
Current Research Interests: Open-economy macroeconomics.

XAVIER SALA-I-MARTIN, Harvard University 1990

Teaching Fields: Macroeconomics.
Current Research Interests: Growth theory and empirical growth; macroeconomics.

T. PAUL SCHULTZ, Massachusetts Institute of Technology 1966

Teaching Fields: Economic demography; labor; health and development.
Current Research Interests: Behavioral-biological models of fertility and health; schooling and development.

BURTON SINGER, Stanford University 1967

Teaching Fields: Econometrics; demography; epidemiology.
Current Research Interests: Economic development and public health; epidemiology of tropical diseases.

T.N. SRINIVASAN, Yale University 1962

Teaching Fields: International trade; economic development; economic theory.

Current Research Interests: Theory of lobbying and rent-seeking; non-market contractual arrangements; resource allocation in developing countries with incomplete markets.

DUNCAN THOMAS, Princeton University 1986

Teaching Fields: Applied econometrics; labor economics; economic development.

Current Research Interests: Applied econometrics; economic development.



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