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# Literature Report

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## Abstract

### Probabilistic Expectations in Developing Countries

- Annual Review of Economics---2014---Adeline Delavande

Many decisions are made under uncertainty, and individuals are likely to form subjective expectations about the probabilities of events that are relevant to their decisions. I review here a recent and growing literature that uses probabilistic expectations elicited from survey respondents in developing countries. I first present an illustrative model of one particular decision under uncertainty—the choice of a college—to exemplify the importance of subjective expectations data for identification purposes. I then review existing evidence emphasizing that it is feasible to elicit probabilities from survey respondents in low-literacy settings and describe common patterns of answers. Finally, I describe existing applications, many of which seek to assess how expectations influence behavior, in various domains, including health, education, agricultural production, and migration.

### Ill-Posed Inverse Problems in Economics

- Annual Review of Economics---2014---Joel L. Horowitz

A parameter of an econometric model is identified if there is a one-to-one or many-to-one mapping from the population distribution of the available data to the parameter. Often, this mapping is obtained by inverting a mapping from the parameter to the population distribution. If the inverse mapping is discontinuous, then estimation of the parameter usually presents an ill-posed inverse problem. Such problems arise in many settings in economics and other fields in which the parameter of interest is a function. This article explains how ill-posedness arises and why it causes problems for estimation. The need to modify or regularize the identifying mapping is explained, and methods for regularization and estimation are discussed. Methods for forming confidence intervals and testing hypotheses are summarized. It is shown that a hypothesis test can be more precise in a certain sense than an estimator. An empirical example illustrates estimation in an ill-posed setting in economics.

### Financing Old Age Dependency

- Annual Review of Economics---2014---Shinichi Nishiyama, Kent Smetters

Baby boomers are now retiring in large numbers, and most do not have enough assets of their own to finance retirement. Social insurance programs help baby boomers afford retirement, but these programs are sub-

stantially underfunded. Reforming these institutions earlier will produce fewer distortions than continued delays. Several options also exist for helping households prepare for their own retirement: improving financial literacy, more opt-out defaults, better guidance about the value of delaying retirement, better guidance about delaying the claiming of social security benefits, improved estimation of out-of-pocket medical costs, and understanding the incentives facing their financial advisors. Some of these options are likely to be more effective than others.

### **Recent Developments in Empirical Likelihood and Related Methods**

- Annual Review of Economics---2014---Paulo Parante,Richard Smith

This article reviews a number of recent contributions to estimation and inference for models defined by moment condition restrictions. The particular emphasis is on the generalized empirical likelihood class of estimators as an alternative to the generalized method of moments. Estimation methods for parameters defined through moment restrictions and their properties are described with tests of overidentifying moment restrictions and parametric hypotheses. Computational issues are discussed together with some proposals for their amelioration. Higher-order and other properties are also addressed in some detail. Models specified by conditional moment restriction models are considered, and the adaptation of these methods to weakly dependent data is discussed.

### **Belief Elicitation in the Laboratory**

- Annual Review of Economics---2014---Andrew Schotter,Isabel Trevino

One constraint we face as economists is not being able to observe all the relevant variables required to test our theories or make policy prescriptions. Laboratory techniques allow us to convert many variables (such as beliefs) that are unobservable in the field into observables. This article presents a survey of the literature on belief elicitation in laboratory experimental economics.

We discuss several techniques available to elicit beliefs in an incentive-compatible manner and the problems involved in their use. We then look at how successful these techniques have been when employed in laboratory studies. We find that despite some problems, beliefs elicited in the laboratory are meaningful (i.e., they are generally used as the basis for behavior), and the process of eliciting beliefs seems not to be too intrusive. One hope for the future is that by eliciting beliefs, we may be able to develop better theories of belief formation.

### **Models of Caring, or Acting as if One Cared, About the Welfare of Others**

- Annual Review of Economics---2014---Julio Rotemberg

This article surveys the theoretical literature in which people are modeled as taking other people' s payoffs into account either because this affects their utility directly or because they wish to impress others with their social-mindedness. Key experimental results that bear on the relevance of these theories are discussed as well. Five types of models are considered. In the first, an individual' s utility function is increasing in the payoffs of other people. The more standard version of these preferences supposes that only consumption leads to payoffs and has trouble explaining prosocial actions such as voting and charitable contributions by poor individuals. If one lets other variables determine happiness as well, this model can explain a much wider set of observations. The second type of model surveyed involves people trying to demonstrate to others that they have prosocial (or altruistic) preferences. In these models, altruistic acts need not have a direct effect on utility. The third class of models includes those of reciprocity in which people' s altruism depends on whether others act kindly or unkindly toward them. In the fourth type of model, inequality has a profound effect on altruism, with individuals being spiteful toward people whose resources exceed their own. Finally, I discuss the fifth type of model, in which specifications of altruism might have to be modified to take into account how people behave when they are able to

transfer lotteries to others.

## Exchange Rate Stabilization and Welfare

- Annual Review of Economics---2014---Charles Engel

This article considers recent literature on optimal monetary policy in simple open-economy models. The presence of pricing to market, incomplete financial markets, and differences in preferences among households (in different countries) introduces some fundamental differences between closed- and open-economy New Keynesian models. In addition to the goals of stabilizing inflation and the output gap, policy makers may target currency misalignments and global imbalances. Optimal policies may involve targeting the exchange rate both directly, because of currency misalignments, and indirectly, because of the effects of exchange rates on imbalances, inflation, and output gaps.

## Copulas in Econometrics

- Annual Review of Economics---2014---Yanqin Fan,Andrew Patton

Copulas are functions that describe the dependence between two or more random variables. This article provides a brief review of copula theory and two areas of economics in which copulas have played important roles: multivariate modeling and partial identification of parameters that depend on the joint distribution of two random variables with fixed or known marginal distributions. We focus on bivariate copulas but provide references on recent advances in constructing higher-dimensional copulas.

## Firm Performance in a Global Market

- Annual Review of Economics---2014---Jan De Loecker,Pinelopi Goldberg

In this article, we introduce an empirical framework to analyze how firm performance is affected by increased globalization. Using this framework, we discuss recent work on measuring the impact of various shocks firms face in the global marketplace, such as reductions in

trade costs (through lowering tariffs and abolishing quotas). Our analytical framework nests most empirical approaches to estimating the impact of trade and industrial policies on firms active in international markets. We identify outstanding issues surrounding the identification of the underlying mechanisms and conclude with suggestions for future research.

## Applications of Random Set Theory in Econometrics

- Annual Review of Economics---2014---Ilya Molchanov,Francesca Molinari

In recent years, the econometrics literature has shown a growing interest in the study of partially identified models, in which the object of economic and statistical interest is a set rather than a point. The characterization of this set and the development of consistent estimators and inference procedures for it with desirable properties are the main goals of partial identification analysis. This review introduces the fundamental tools of the theory of random sets, which brings together elements of topology, convex geometry, and probability theory to develop a coherent mathematical framework to analyze random elements whose realizations are sets. It then elucidates how these tools have been fruitfully applied in econometrics to reach the goals of partial identification analysis.

## Experimental and Quasi-Experimental Analysis of Peer Effects: Two Steps Forward?

- Annual Review of Economics---2014---Bruce Sacerdote

In the past 10 years, there has been an explosion of well-identified studies that measure peer effects across many settings and for many outcomes. The emphasis on natural experiments and randomization is a highly useful one; in more standard observational studies, the self-selection of people into peer groups can make the measurement of peer effects extremely difficult. In the absence of exogenous variation, knowing that people have similar outcomes as their friends, classmates, and

coworkers may tell us little about peer effects. I examine the successes, failures, and findings of experimental analyses of peer effects. I draw three broad conclusions. First, even more than in other areas of social science, the size and nature of peer effects estimated are highly context specific; peer effects in student test scores and grades are prominent in some cases and absent in others. That said, there is a pattern across studies suggesting that social outcomes (e.g., crime, drinking behavior) and career choices show larger peer influences than do test scores. Second, researchers have shown that the linear-in-means model of peer effects is often not a good description of the world, although we do not yet have an agreed-upon model to replace it. Third, despite potential temptation, we have not reached the point at which we can reliably use knowledge of peer effects to implement policies that improve outcomes for students and other human subjects.

### **Coordination of Expectations: The Eductive Stability Viewpoint**

- Annual Review of Economics---2014---Gabriel Desgranges

The eductive approach consists of finding solutions consistent with common knowledge of individual rationality and the model. An equilibrium is stable whenever it is the unique outcome consistent with these assumptions. This is a strong stability criterion as it relies on no assumption of prior knowledge of others' expectations. This review presents various (in)stability results. It focuses on the following method: Rewrite the model as a temporary equilibrium map in which the current economic outcome is determined by expectations and characterize stability by contracting properties of this map. The main insight suggested by these results is due to Guesnerie (2002): Stability is obtained when the actual outcome is not very sensitive to expectations. Additional insights include that agents' heterogeneity is a source of instability; the ability of prices to transmit information is limited by the quality of private information; and coordination when agents are infinitely lived is difficult because of the large effect of long-run expectations.

### **From Sudden Stops to Fisherian Deflation: Quantitative Theory and Policy**

- Annual Review of Economics---2014---Anton Korinek, Enrique Mendoza

In the 1990s, Sudden Stops in emerging markets were a harbinger of the 2008 global financial crisis. During these Sudden Stops, countries lost access to credit, which caused abrupt current account reversals, and suffered severe recessions. This article reviews a class of models that yield quantitative predictions consistent with these observations, based on an occasionally binding credit constraint that limits debt to a fraction of the market value of incomes or assets used as collateral. Sudden Stops are infrequent events nested within regular business cycles and occur in response to standard shocks after periods of expansion increase leverage ratios sufficiently. When this happens, the Fisherian debt-deflation mechanism is set in motion, as lower asset or goods prices tighten the constraint further, causing further deflation. This framework also embodies a pecuniary externality with important implications for macroprudential policy because agents do not internalize how current borrowing decisions affect collateral values during future financial crises.

### **China's Great Convergence and Beyond**

- Annual Review of Economics---2014---Kjetil Storesletten, Fabrizio Zilibotti

A recent wave of economic research has studied the transformation of China from a poor country in the 1970s to a middle-income economy today. Based on this literature, we discuss the factors driving China's development process. We provide a historical account of China's rise, fall, and resurgence. We then discuss the stylized facts associated with China's growth process and review a comprehensive theory of its economic transition. Finally, we discuss China's future. In particular, we review some recent studies about technological and politico-economic factors that may foster or hinder its future economic performance.

## **Precocious Albion: A New Interpretation of the British Industrial Revolution**

- Annual Review of Economics---2014---Morgan Kelly,Joel Mokyr,Cormac Ó Gráda

Many explanations have been offered for the British Industrial Revolution. This article points to the importance of human capital (broadly defined) and the quality of the British labor force on the eve of the Industrial Revolution. It shows that in terms of both physical quality and mechanical skills, British workers around 1750 were at a much higher level than their continental counterparts. As a result, new inventions—no matter where they originated—were adopted earlier, faster, and on a larger scale in Britain than elsewhere. The gap in labor quality is consistent with the higher wages paid in eighteenth-century Britain. The causes for the higher labor quality are explored and found to be associated with a higher level of nutrition and better institutions, especially England's Poor Law and the superior functioning of its apprenticeship system.

## **Disclosure: Psychology Changes Everything**

- Annual Review of Economics---2014---George Loewenstein,Cass Sunstein,Russell Golman

We review literature examining the effects of laws and regulations that require public disclosure of information. These requirements are most sensibly imposed in situations characterized by misaligned incentives and asymmetric information between, for example, a buyer and seller or an advisor and advisee. We review the economic literature relevant to such disclosure and then discuss how different psychological factors complicate, and in some cases radically change, the economic predictions. For example, limited attention, motivated attention, and biased assessments of probability on the part of information recipients can significantly diminish, or even reverse, the intended effects of disclosure requirements. In many cases, disclosure does not much affect the recipients of the information but does significantly affect the behavior of the providers, sometimes for the better and sometimes for the worse. We review

research suggesting that simplified disclosure, standardized disclosure, vivid disclosure, and social comparison information can all be used to enhance the effectiveness of disclosure policies.

## **Expectations in Experiments**

- Annual Review of Economics---2014---Florian Wagener

The rational expectations hypothesis is one of the cornerstones of current economic theorizing. This review discusses a number of experiments that focus on expectation formation by human subjects in a number of learning-to-forecast experiments and analyzes the implications for the rational expectations hypothesis. In these experiments, most agents are rational in an operational sense, and their expectations coordinate quickly, but not necessarily on the rational expectations value. In several situations, the homogeneous rational expectations hypothesis of Lucas and Prescott poorly describes the expectational dynamics and is outperformed by other hypotheses. But even in those situations in which the hypothesis gives a good description, it is more likely that coordination on rational values is brought about by the institutional structure of the market rather than the rationality of the agents.

## **Optimal Design of Funded Pension Schemes**

- Annual Review of Economics---2014---Lans Bovenberg,Roel Mehlkopf

This article reviews the literature on the optimal design and regulation of funded pension schemes. We first characterize optimal saving and investment over an individual's life cycle. Within a stylized modeling framework, we explore optimal individual saving and investing behavior. Subsequently, various extensions of the model are considered, such as additional financial risk factors, stochastic human capital, and more elaborate individual preferences. We then turn to the literature on intergenerational risk sharing, which suggests that a long-lived entity such as a pension fund or the government can yield ex ante welfare gains by allowing nonoverlapping generations to trade risk. The scope

for this type of intergenerational risk sharing, however, is limited by the ability to commit generations to the contract. These commitment problems raise concerns with respect to sustainability and intergenerational fairness. We explore the role of solvency regulations to address these concerns about intergenerational fairness and discontinuity risk.

### **The Measurement of Household Consumption Expenditures**

- Annual Review of Economics---2014---Martin Browning,Thomas Crossley,Joachim Winter

Household-level data on consumer expenditures underpin a wide range of empirical research in modern economics, spanning micro- and macroeconomics. This research includes work on consumption and saving, on poverty and inequality, and on risk sharing and insurance. We review different ways in which such data can be collected or captured: traditional detailed budget surveys, less onerous survey procedures that might be included in more general surveys, and administrative or process data. We discuss the advantages and difficulties of each approach and suggest directions for future investigation.

### **Empirical Revealed Preference**

- Annual Review of Economics---2014---Ian Crawford,Bram De Rock

This article aims to provide an introduction to empirical revealed preference (RP) and an overview of the current state of the field. We hope to give a sense of how RP methods work and the types of questions they can address and to assess the strengths and drawbacks of the approach. After briefly recapping the basics of RP theory, we review and critically assess the literature in two main areas representing the principal fields in which recent research has made significant advances: broadening the scope of RP methods and dealing with empirical issues related to bringing RP to the data. We conclude with a discussion of some future directions.

### **Quality of Primary Care in Low-Income Countries: Facts and Economics**

- Annual Review of Economics---2014---Jishnu Das,Jeffrey Hammer

New research on the quality of care in public and private primary care facilities has significantly enriched our understanding of how health care is delivered in low- and middle-income countries. First, this article summarizes recent advances in the measurement of quality, distinguishing between measurements of provider knowledge and provider effort. Second, it looks at the determinants of practice quality variation in low-income settings, highlighting the limited role of structural constraints such as infrastructure, the supply of materials including drugs, and provider training—the mainstay of much of global health policy today. In contrast, practice quality variation is clearly linked to provider effort, an aspect of provider behavior that can be altered through a variety of means. Third, it provides a broad economic framework to interpret the findings. We look for evidence of specific market failures in the provision of primary care and emphasize that the key difficulty is (and always was) the transaction-specific nature of medical advice. Providers can do too much or too little (or both), and the extent of either depends on the specific patient and the specific disease. We document specific ways in which it is difficult for both consumers and governments to monitor every transaction to detect potentially errant behavior.

### **The Endowment Effect**

- Annual Review of Economics---2014---Keith Ericson,Andreas Fuster

The endowment effect is among the best known findings in behavioral economics and has been used as evidence for theories of reference-dependent preferences and loss aversion. However, a recent literature has questioned the robustness of the effect in the laboratory, as well as its relevance in the field. In this review, we provide a summary of the evidence and describe recent theoretical developments that can potentially reconcile the different findings, with a focus on expectation-based

reference points. We also survey recent work from psychology that provides either alternatives to or refinements of the usual loss-aversion explanation. We argue that loss aversion is still the leading paradigm for understanding the endowment effect, but given the rich psychology behind the effect, a version of the theory that encompasses multiple reference points may be required.

### **Decentralization in Developing Economies**

- Annual Review of Economics---2014---Lucie Gadenne, Monica Singhal

Standard models of fiscal federalism suggest many benefits of decentralization in developing economies, and there has been a recent push toward decentralization around the world. However, developing countries presently still have less decentralization, particularly on the revenue side, than both developed countries today and the United States and Europe historically. We consider how the trade-offs associated with fiscal federalism apply in developing countries and discuss reasons for their relatively low levels of decentralization. We also consider additional features relevant to federalism in developing economies, such as the prevalence of nongovernmental organizations and the role of social incentives in policy design.

### **Local Labor Markets and the Evolution of Inequality**

- Annual Review of Economics---2014---Dan Black, Natalia Kolesnikova, Lowell J. Taylor

US labor markets have experienced rising inequality over the past 30 years—as evidenced by an increased gap in wages earned by high-skill workers (e.g., college graduates) and low-skill workers (e.g., high school graduates). Empirical evidence documenting this evolution of inequality comes from studies that assess wage-education gradients at the national level. But of course people work in local labor markets that differ in important ways. We provide a theoretical framework for evaluating inequality changes when individuals work

in local labor markets, and we give an empirical reassessment of inequality changes in light of the insights that emerge from our framework.

### **People, Places, and Public Policy: Some Simple Welfare Economics of Local Economic Development Programs**

- Annual Review of Economics---2014---Patrick Kline, Enrico Moretti

Most countries exhibit large and persistent geographical differences in wages, income, and unemployment rates. A growing class of place-based policies attempts to address these differences through public investments and subsidies that target disadvantaged neighborhoods, cities, or regions. Place-based policies have the potential to profoundly affect the location of economic activity, along with the wages, employment, and industry mix of communities. These programs are widespread in the United States and throughout the world but have only recently been studied closely by economists. We consider the following questions: Who benefits from place-based interventions? Do the national benefits outweigh the costs? What sorts of interventions are most likely to be effective? To study these questions, we develop a simple spatial equilibrium model designed to characterize the welfare effects of place-based policies on the local and the national economy. Using this model, we critically evaluate the economic rationales for place-based policies and assess the latest evidence on their effects. We conclude with some lessons for policy and directions for future research.

### **Applying Insights from Behavioral Economics to Policy Design**

- Annual Review of Economics---2014---Brigitte Madrian

The premise of this article is that an understanding of psychology and other social science disciplines can inform the effectiveness of the economic tools traditionally deployed in carrying out the functions of government, which include remedying market failures, redistributing income, and collecting tax revenue. An

understanding of psychology can also lead to the development of different policy tools that better motivate desired behavior change or that are more cost-effective than traditional policy tools. The article outlines a framework for thinking about the psychology of behavior change in the context of market failures. It then describes the research on the effects of a variety of interventions rooted in an understanding of psychology that have policy-relevant applications. The article concludes by discussing how an understanding of psychology can also inform the use and design of traditional policy tools for behavior change, such as financial incentives.

### **The Economics of Human Development and Social Mobility**

- Annual Review of Economics---2014---James Heckman,Stefano Mosso

This article distills and extends recent research on the economics of human development and social mobility. It summarizes the evidence from diverse literatures on the importance of early life conditions in shaping multiple life skills and the evidence on critical and sensitive investment periods for shaping different skills. It presents economic models that rationalize the evidence and unify the treatment effect and family influence literatures. The evidence on the empirical and policy importance of credit constraints in forming skills is examined. There is little support for the claim that untargeted income transfer policies to poor families significantly boost child outcomes. Mentoring, parenting, and attachment are essential features of successful families and interventions that shape skills at all stages of childhood. The next wave of family studies will better capture the active role of the emerging autonomous child in learning and responding to the actions of parents, mentors, and teachers.

### **Firms, Misallocation, and Aggregate Productivity: A Review**

- Annual Review of Economics---2014---Hugo A. Hopenhayn

Firm heterogeneity and the allocation of resources across firms play a key role in determining aggregate productivity. Entry barriers and misallocation can substantially impact productivity, as evidenced in recent work. This article provides a unifying theoretical framework and a review of this literature.

### **Endogenous Collateral Constraints and the Leverage Cycle**

- Annual Review of Economics---2014---Ana Fostel,John Geanakoplos

We review the theory of leverage developed in collateral equilibrium models with incomplete markets. We explain how leverage tends to boost asset prices and create bubbles. We show how leverage can be endogenously determined in equilibrium and how it depends on volatility. We describe the dynamic feedback properties of leverage, volatility, and asset prices, in what we call the leverage cycle, and show how it differs from a credit cycle. We also describe some cross-sectional implications of multiple leverage cycles, including contagion, flight to collateral, and swings in the issuance volume of the highest-quality debt.

### **Teacher Effects and Teacher-Related Policies**

- Annual Review of Economics---2014---C. Kirabo Jackson,Jonah E. Rockoff,Doug Staiger

The emergence of large longitudinal data sets linking students to teachers has led to rapid growth in the study of teacher effects on student outcomes by economists over the past decade. One large literature has documented wide variation in teacher effectiveness that is not well explained by observable student or teacher characteristics. A second literature has investigated how educational outcomes might be improved by leveraging teacher effectiveness through processes of recruitment, assignment, compensation, evaluation, promotion, and retention. These two lines of inquiry are closely tied; the first tells us about the importance of individual teachers, and the second tells us how this information can be used in policy and practice. We review the most recent findings in economics on the



importance of teachers and on teacher-related policies aimed at improving educational production.

## **Social Learning in Economics**

- Annual Review of Economics---2014---Markus Moebius,Tanya Rosenblat

Social learning is a rapidly growing field for empirical and theoretical research in economics. We encounter social learning in many economically important phenomena, such as the adoption of new products and technologies or job search in labor markets. We review the existing empirical and theoretical literatures and argue that they have evolved largely independently of each other. This suggests several directions for future research that can help bridge the gap between both literatures. For example, the theory literature has come up with several models of social learning, ranging from naïve DeGroot models to sophisticated Bayesian models whose assumptions and predictions need to be empirically tested. Alternatively, empiricists have often observed that social learning is more localized than existing theory models assume, and that information can decay along a transmission path. Incorporating these findings into our models might require theorists to look beyond asymptotic convergence in social learning.

## **Rethinking Reciprocity**

- Annual Review of Economics---2014---Ulrike Malmendier,Vera te Velde,Roberto Weber

Reciprocal behavioral has been found to play a significant role in many economic domains, including labor supply, tax compliance, voting behavior, and fundraising. What explains individuals' tendency to respond to the kindness of others? Existing theories posit internal preferences for the welfare of others, inequality aversion, or utility from repaying others' kindness. However, recent evidence on the determinants of (unilateral) sharing decisions suggests that external factors such as social pressure are equally important. So far, this second wave of social preference theories has had little spillover to two-sided reciprocity environments, in which one individual responds to the actions of

another. We present a novel laboratory reciprocity experiment (the double-dictator game with sorting) and show that failure to account for external motives leads to a significant overestimation of internal motives such as fairness and altruism. The experimental data illustrate the importance of combining reduced-form and structural analyses to disentangle internal and external determinants of prosocial behavior.

## **Institutions, Human Capital, and Development \***

- Annual Review of Economics---2014---Daron Acemoglu,Francisco Gallego,James Robinson

In this article, we revisit the relationship among institutions, human capital, and development. We argue that empirical models that treat institutions and human capital as exogenous are misspecified, both because of the usual omitted variable bias problems and because of differential measurement error in these variables, and that this misspecification is at the root of the very large returns of human capital, about four to five times greater than that implied by micro (Mincerian) estimates, found in the previous literature. Using cross-country and cross-regional regressions, we show that when we focus on historically determined differences in human capital and control for the effect of institutions, the impact of institutions on long-run development is robust, whereas the estimates of the effect of human capital are much diminished and become consistent with micro estimates. Using historical and cross-country regression evidence, we also show that there is no support for the view that differences in the human capital endowments of early European colonists have been a major factor in the subsequent institutional development of former colonies.

## **Growth and the Smart State**

- Annual Review of Economics---2014---Philippe Aghion,Alexandra Roulet

As countries develop, the main driver of economic growth shifts from imitation to innovation. These two sources of growth require different policies and institutions. In particular, in this article we argue that the

transition from an imitation-based to an innovation-based economy calls the old welfare state model into question. It is not so much the size of the state that is at stake but rather its governance. What we need to foster economic growth in developed economies is not a reduced state but a strategic state, which acts as a catalyst using selective and properly governed support to the market-driven innovation process. This idea of a strategic state that targets its investments to maximize growth in the face of hard budget constraints departs both from the Keynesian view of a state sustaining growth through demand-driven policies and from the neoliberal view of a minimal state confined to its regalian functions.

### **The Causes and Consequences of Development Clusters: State Capacity, Peace, and Income**

- Annual Review of Economics---2014---Timothy Besley,Torsten Persson

Three important aspects of development—per capita income, state capabilities, and (the absence of) political violence—are correlated with each other at the country level. This article discusses the causes of such development clusters and highlights two explanations: common economic, political, and social drivers and complementarities (two-way positive feedbacks). It also draws out preliminary policy implications of these patterns of development and proposes topics for further research.

### **Under the Thumb of History? Political Institutions and the Scope for Action**

- Annual Review of Economics---2014---Abhijit V. Banerjee,Esther Duflo

This article discusses the two leading views of history and political institutions. For some scholars, institutions are mainly products of historical logic, whereas for others, accidents, leaders, and decisions have a significant impact. We argue that although there is clear evidence that history matters and has long-term effects, there are not enough data to help us distinguish between the two views. Faced with this uncertainty,

what is a social scientist to do? We argue that given the possibility that policy decisions indeed make a difference, it makes sense to assume they do and to try to improve policy making.

### **Early-Life Health and Adult Circumstance in Developing Countries**

- Annual Review of Economics---2013---Janet Currie,Tom Vogl

A growing literature documents the links between long-term outcomes and health in the fetal period, infancy, and early childhood. Much of this literature focuses on rich countries, but researchers are increasingly taking advantage of new sources of data and identification to study the long reach of childhood health in developing countries. Health in early life may be a more significant determinant of adult outcomes in these countries because health insults are more frequent, the capacity to remediate is more limited, and multiple shocks may interact. However, the underlying relationships may also be more difficult to measure, given significant mortality selection. We survey recent evidence on the adult correlates of early-life health and the long-term effects of shocks resulting from disease, famine, malnutrition, pollution, and war.

### **Fetal Origins and Parental Responses**

- Annual Review of Economics---2013---Douglas Almond,Bhashkar Mazumder

How do parental investments respond to health endowments at birth? Recent studies have combined insights from an earlier theoretical literature on household resource allocation with improved identification strategies to capture causal effects of early life health shocks. We describe empirical challenges in identifying behavioral responses and how recent studies have sought to address these. We then discuss the emerging literature on dynamic complementarities in parental investments arising from the staged, developmental nature of capability production and how capabilities may have multiple dimensions. The bulk of the empirical

evidence to date suggests that parental investments reinforce initial endowment differences.

### **Quantile Models with Endogeneity**

- Annual Review of Economics---2013---Victor Chernozhukov, Christian Hansen

In this article, we review quantile models with endogeneity. We focus on models that achieve identification through the use of instrumental variables and discuss conditions under which partial and point identification are obtained. We discuss key conditions, which include monotonicity and full-rank-type conditions, in detail. In providing this review, we update the identification results of Chernozhukov & Hansen (2005). We illustrate the modeling assumptions through economically motivated examples. We also briefly review the literature on estimation and inference.

### **Deterrence: A Review of the Evidence by a Criminologist for Economists**

- Annual Review of Economics---2013---Daniel S. Nagin

This article reviews the evidence on the deterrent effect of police, imprisonment, and capital punishment and additionally summarizes knowledge of sanction risk perceptions. Studies of changes in police presence, whether achieved by changes in police numbers or in their strategic deployment, consistently find evidence of deterrent effects. Studies of the deterrent effect of increases in already long prison sentences find at most a modest deterrent effect. Studies of the deterrent effect of capital punishment provide no useful information on the topic. Four high-priority areas for future research are identified: developing and testing an integrated model of the effects of the threat and experience of punishment, measuring perceptions of sanction regimes, developing and testing a theory of criminal opportunities, and estimating the deterrent effect of shorter prison sentences and identifying high-deterrence policies.

### **Econometric Analysis of Games with Multiple Equilibria**

- Annual Review of Economics---2013---Aureo de Paula

This article reviews the recent literature on the econometric analysis of games in which multiple solutions are possible. Multiplicity does not necessarily preclude the estimation of a particular model (and, in certain cases, even improves its identification), but ignoring it can lead to misspecifications. The review starts with a general characterization of structural models that highlights how multiplicity affects the classical paradigm. Because the information structure is an important guide to identification and estimation strategies, I discuss games of complete and incomplete information separately. Although many of the techniques discussed here can be transported across different information environments, some are specific to particular models. Models of social interactions are also surveyed. I close with a brief discussion of postestimation issues and research prospects.

### **Price Rigidity: Microeconomic Evidence and Macroeconomic Implications**

- Annual Review of Economics---2013---Emi Nakamura, Jon Steinsson

We review recent evidence on price rigidity from the macroeconomics literature and discuss how this evidence is used to inform macroeconomic modeling. sluggish price adjustment is a leading explanation for the large effects of demand shocks on output and, in particular, the effects of monetary policy on output. A recent influx of data on individual prices has greatly deepened macroeconomists' understanding of individual price dynamics. However, the analysis of these new data raises a host of new empirical issues that have not traditionally been confronted by parsimonious macroeconomic models of price setting. Simple statistics such as the frequency of price change may be misleading guides to the flexibility of the aggregate price level in a setting in which temporary sales, product churning, cross-sectional heterogeneity, and large idiosyncratic

price movements play an important role. We discuss empirical evidence on these and other important features of micro price adjustment and ask how they affect the sluggishness of aggregate price adjustment and the economy's response to demand shocks.

## Immigration and Production Technology

- Annual Review of Economics---2013---Ethan Lewis

Research on the labor market impact of immigration typically relies on a single-good model of production with separable capital. This article discusses theory and evidence that suggest that this standard model is too simple to capture the long-run labor market impact of immigration. A level of capital-skill complementarity supported in studies both involving and not involving immigration alone reduces the relative wage impact of immigration by 40% compared to simulations with separable capital. Other models in which the production structure responds to skill-mix changes, including models with endogenous choice of technique, directed technical change, or human capital spillovers, also imply that the long-run impact of immigration on wages is smaller than predicted by the standard model. This article discusses new research that tries to credibly evaluate such models using immigration-induced variation in the skill mix, an approach with further potential, and evidence that immigration impacts innovation and firm formation.

## The Multinational Firm

- Annual Review of Economics---2013---Stephen Yeaple

This article documents the recent advances in the international trade literature toward understanding the role of multinational firms in the conduct of international commerce. Over the past 10 years, we have developed a better understanding of the incentives firms face in their choice of production location, and we know more about the incentives that induce firms to vertically integrate. Furthermore, the theory literature has progressed from two-country models that cannot

capture the richness of multinational firms' activities to multicountry models that do. The empirics have advanced as well but at a slower pace. Progress has been slowed by the lack of comprehensive data and the difficulties of distinguishing between the various mechanisms proposed by theory.

## Heterogeneity in the Dynamics of Labor Earnings

- Annual Review of Economics---2013---Martin Browning,Mette Ejrnæs

In this article, we survey the literature on individual earnings dynamics with a particular focus on allowing for pervasive heterogeneity across individuals. We structure the discussion around ARMA processes with nonlinear trends for each individual. We show that allowing for pervasive and codependent heterogeneity in individual parameters has a major impact on econometric modeling, estimation, and substantive conclusions. We describe an econometric method that is suitable for models with pervasive heterogeneity. We develop a long list of statistics that describe any earnings panel in great detail and provide a demanding set of features of the data for fitting. This list encompasses most moments used in the literature and provides novel statistics based on individual regressions. Finally, we present an empirical illustration using a long Danish panel. Based on this, we provide some conclusions concerning earnings dynamics but emphasize that details will vary according to the sample.

## Empirical Research on Sovereign Debt and Default

- Annual Review of Economics---2013---Michael Tomz,Mark Wright

In this article, we review the empirical literature about sovereign debt and default. As we survey the work of economists, historians, and political scientists, we also emphasize parallel developments by theorists and recommend steps to improve the correspondence between theory and data.

## Measuring Inflation Expectations

- Annual Review of Economics---2013---Olivier Armantier,Wändi Bruine de Bruin,Simon Potter,Giorgio Topa,Wilbert van der Klaauw,Basit Zafar

To conduct monetary policy, central banks around the world increasingly rely on measures of public inflation expectations. In this article, we review findings from an ongoing initiative at the Federal Reserve Bank of New York aimed at improving the measurement and our understanding of household inflation expectations through surveys. We discuss the importance of question wording and the usefulness of new questions to elicit an individual's distribution of inflation beliefs. We present evidence suggesting that consumers update their inflation expectations in response to new information and that information dissemination may lead to more informed and reliable reporting of inflation expectations. Finally, we report on a financially incentivized experiment suggesting that expectations surveys are informative and that respondents generally act on their stated beliefs in a way consistent with expected utility theory.

## Macroeconomic Analysis Without the Rational Expectations Hypothesis

- Annual Review of Economics---2013---Michael Woodford

The article presents a temporary equilibrium framework for macroeconomic analysis that allows for a wide range of possible specifications of expectations but reduces to a standard new Keynesian model in the limiting case of rational expectations. This common framework is then used to contrast the assumptions and implications of several different ways of relaxing the assumption of rational expectations. As an illustration of the method, the implications of alternative assumptions for the selection of a monetary policy rule are discussed. Other issues treated include the conditions required for Ricardian equivalence and for existence of a deflation trap.

## Financial Literacy, Financial Education, and Economic Outcomes

- Annual Review of Economics---2013---Justine Hastings,Brigitte Madrian,William Skimmyhorn

In this article, we review the literature on financial literacy, financial education, and consumer financial outcomes. We consider how financial literacy is measured in the current literature and examine how well the existing literature addresses whether financial education improves financial literacy or personal financial outcomes. We discuss the extent to which a competitive market provides incentives for firms to educate consumers or to offer products that facilitate informed choice. We review the literature on alternative policies to improve financial outcomes and compare the evidence with that on the efficacy and cost of financial education. Finally, we discuss directions for future research.

## The Great Trade Collapse

- Annual Review of Economics---2013---Rudolfs Bems,Robert Johnson,Kei-Mu Yi

We survey recent literature on the causes of the collapse in international trade during the 2008–2009 global recession. We argue that the evidence points to the collapse in aggregate expenditure, concentrated on trade-intensive durable goods, as the main driver of the trade collapse. Inventory adjustment likely amplified the impact of these expenditure changes on trade. In addition, shocks to credit supply constrained export supply, further exacerbating the decline in trade. Most evidence suggests that changes in trade policy did not play a large role. We conclude that one benefit of the trade collapse is that it has stimulated research in neglected areas at the intersection of trade and macroeconomics.

## Biological Measures of Economic History

- Annual Review of Economics---2013---Richard Steckel

This review discusses the methodology and some findings underlying four types of biological measures used by economic historians: mortality rates, stature, body mass index, and skeletal remains. Economic historians examine a variety of sources to learn when, why, and where modern industrial societies became rich and healthy. Monetary measures, such as income and wages, are highly desirable but usually unavailable to cover the time periods and countries over which modern societies evolved. Donning interdisciplinary lenses, these historians search archives, libraries, and archaeological sources for scraps of information, often assembled for other purposes, to construct a story of the evolution of humanity's well-being. Biological measures have the advantage of comparability across time and culture; life expectancy, for example, means about the same today as in ancient Egypt, but the same cannot be said for the purchasing power of income, wages, or wealth.

### **Goals, Methods, and Progress in Neuroeconomics**

- Annual Review of Economics---2013---Colin F. Camerer

Neuroeconomics shares the main goals of microeconomics: to understand what causes choices, and the welfare properties of choice. The novel goal is linking mathematical constructs and observable behavior to mechanistic details of neural circuitry. Several complementary methods are used. An initial insight from neuroscience is that distinct systems guide choice: Pavlovian and instrumental conditioning (learning) of state-value and response-value associations, overlearned habits, and model- (or goal-) directed value that requires deliberation. These systems can differ economically from rational choice—for example, habitual choices have low utility and price elasticities, whereas model-directed values are often constructed preferences. Neuroeconomics also provides evidence of situations in which utility maximization either works well (in simple binary choice) or benefits from the introduction of behavioral constructs. Neuroeconomics is well equipped to guide the theory of how choices depend on mental states, such as fear or cognitive load.

Examples include extensive studies of risk and time preference, finance, and neural decoding of private information.

### **Nonparametric Identification in Structural Economic Models**

- Annual Review of Economics---2013---Rosa Matzkin

Structural economic models allow one to analyze counterfactuals when economic systems change and to evaluate the well-being of economic agents. A key element in such analysis is the ability to identify the primitive functions and distributions of the economic models that are employed to describe the economic phenomena under study. Recent developments have provided ways to achieve identification of these primitive functions and distributions without imposing parametric restrictions. In this article, I consider a small set of stylized models and provide insight into some of the approaches that have been taken to develop nonparametric identification results in those models.

### **Microcredit Under the Microscope: What Have We Learned in the Past Two Decades, and What Do We Need to Know?**

- Annual Review of Economics---2013---Abhijit Vinayak Banerjee

Research on microcredit is now two decades old. There has been enormous progress in understanding both what microcredit does and how. Yet a lot of what we have learned has raised new and often quite fundamental questions about its nature: Is microcredit primarily about investment, consumption, or savings? Why is it that the investments financed by microcredit do not always lead to income growth, and does this have to do with the structure of microlending? What are the roles of social capital, reputation, and group lending? This article attempts to take stock of this significant body of work and tries to identify the most important questions for future research.

## Trust and Growth

- Annual Review of Economics---2013---Yann Algan,Pierre Cahuc

This article surveys recent research on the relationship between trust and growth. It documents the strong international and interregional heterogeneity of trust. The theoretical mechanisms that explain the influence of trust on economic performance and the empirical methods used to identify the causal impact of trust on economic performance are reviewed.

## Paul Samuelson's Legacy

- Annual Review of Economics---2012---Avinash Dixit

Paul Samuelson is probably the most important economist of the second half of the twentieth century. His research publications; his introductory textbook; his articles on topical questions of economic policy; and his interactions with numerous students, colleagues, policy makers, and the wider public have all contributed to fundamental changes in economics as a science and as a profession. This article attempts to give a brief overview of his career spanning eight decades and to recapitulate and celebrate his legacy.

## Saving Money or Just Saving Lives? Improving the Productivity of US Health Care Spending

- Annual Review of Economics---2012---Katherine Baicker,Amitabh Chandra,Jonathan Skinner

There is growing concern over the rising share of the US economy devoted to health care spending. Fueled in part by demographic transitions, unchecked increases in entitlement spending will necessitate some combination of substantial tax increases, elimination of other public spending, or unsustainable public debt. This massive increase in health spending might be warranted if each dollar devoted to the health care sector yielded real health benefits, but this does not seem to be the case. Although we have seen remarkable gains in life expectancy and functioning over the past several decades, there is substantial variation in the

health benefits associated with different types of spending. Some treatments, such as aspirin, beta blockers, and flu shots, produce a large health benefit per dollar spent. Other more expensive treatments, such as stents for cardiovascular disease, are high value for some patients but poor value for others. Finally, a large and expanding set of treatments, such as proton-beam therapy or robotic surgery, contributes to rapid increases in spending despite questionable health benefits. Moving resources toward more productive uses requires encouraging providers to deliver and patients to consume high-value care, a daunting task in the current political landscape. But widespread inefficiency also offers hope: Given the current distribution of resources in the US health care system, there is tremendous potential to improve the productivity of health care spending and the fiscal health of the United States.

## International Comparisons in Health Economics: Evidence from Aging Studies

- Annual Review of Economics---2012---James Banks,James Smith

We provide an overview of the growing literature that uses microlevel data from multiple countries to investigate health outcomes, and their link to socioeconomic factors, at older ages. Because the data are at a comparatively young stage, much of the analysis is at an early stage and limited to a handful of countries, with analysis for the United States and England being the most common. What is immediately apparent as we get better measures is that, between countries, health differences amongst those at older ages are real and large. Countries are ranked differently according to whether one considers life expectancy, prevalence, or the incidence of a specific condition. Moreover, the magnitude of international disparities may vary according to whether measures utilize doctor-diagnosed conditions or biomarker-based indicators of disease and poor health. But one key finding emerges—the United States ranks poorly on all indicators, with the exception of self-reported subjective health status.

## Rare Macroeconomic Disasters

- Annual Review of Economics---2012---Robert Barro,José F. Ursúa

The potential for rare macroeconomic disasters may explain an array of asset-pricing puzzles. Our empirical studies of these extreme events rely on long-term data now covering 28 countries for consumption and 40 for GDP. A baseline model calibrated with observed peak-to-trough disaster sizes accords with the average equity premium with a reasonable coefficient of relative risk aversion. High stock-price volatility can be explained by incorporating time-varying long-run growth rates and disaster probabilities. Business-cycle models with shocks to disaster probability have implications for the cyclical behavior of asset returns and corporate leverage, and international versions may explain the uncovered-interest-parity puzzle. Richer models of disaster dynamics allow for transitions between normalcy and disaster, bring in postcrisis recoveries, and use the full time series on consumption. Potential future research includes applications to long-term economic growth and environmental economics, and the use of stock-index options prices and other variables to gauge time-varying disaster probabilities.

## Endogenous Extreme Events and the Dual Role of Prices

- Annual Review of Economics---2012---Jon Danielsson,Hyun Song Shin,Jean-Pierre Zigrand

Extreme events in financial markets are often generated by shocks that come from within the system, rather than those that arrive from outside the system. The combination of risk-sensitive behavior rules and the coordinated actions implied by market-to-market accounting can result in outcome distributions with fat tails, even if the fundamental shocks are Gaussian. We illustrate such endogenous extreme events through the pricing density resulting from dynamic hedging of options and the flash crash of May 2010.

## The Distribution of Teacher Quality and Implications for Policy

- Annual Review of Economics---2012---Eric Hanushek,Steven G. Rivkin

It has become commonplace to measure teacher quality in terms of teacher value-added. Operationally, this means evaluating teachers according to the learning gains of students on various achievement tests. Existing research consistently shows large variations in teacher effectiveness, much of which is within schools as opposed to between schools. The policy implications of these variations are dramatic. But the underlying statistical modeling has become the subject of intense research, in part because of this direct use of value-added measures in policy discussions.

## Economic Modeling and Analysis of Educational Vouchers

- Annual Review of Economics---2012---Dennis Epple,Richard Romano

The analysis of educational vouchers has evolved from market-based analogies to models that incorporate distinctive features of the educational environment. These distinctive features include peer effects, scope for private school pricing and admissions based on student characteristics, the linkage of household residential and school choices in multidistrict settings, the potential for rent seeking in public and private schools, the role of school reputations, incentives for student effort, and the intergenerational dynamics of human capital accumulation. Research has also elucidated features of voucher design, including income and ability targeting, restrictions on private school pricing and admissions, and the potential for garnering political support. We review these research advances.

## Heterogeneity in Human Capital Investments: High School Curriculum, College Major, and Careers

- Annual Review of Economics---2012---Joseph Altonji,Erica Blom,Costas Meghir



Motivated by the large differences in labor market outcomes across college majors, we survey the literature on the demand for and return to high school and post-secondary education by field of study. We combine elements from several papers to provide a dynamic model of education and occupation choice that stresses the roles of the specificity of human capital and uncertainty about preferences, ability, education outcomes, and labor market returns. The model implies an important distinction between the ex ante and ex post returns to education decisions. We also discuss some of the econometric difficulties in estimating the causal effects of field of study on wages in the context of a sequential choice model with learning. Finally, we review the empirical literature on the choice of curriculum and the effects of high school courses and college major on labor market outcomes.

### **Credit Constraints in Education**

- Annual Review of Economics---2012---Lance Lochner,Alexander Monge-Naranjo

We review studies of the impact of credit constraints on the accumulation of human capital. Evidence suggests that credit constraints have recently become important for schooling and other aspects of households' behavior. We highlight the importance of early childhood investments, as their response largely determines the impact of credit constraints on the overall lifetime acquisition of human capital. We also review the intergenerational literature and examine the macroeconomic impacts of credit constraints on social mobility and the income distribution. A common limitation across all areas of the human capital literature is the imposition of ad hoc constraints on credit. We propose a more careful treatment of the structure of government student loan programs and the incentive problems underlying private credit. We show that endogenizing constraints on credit for human capital helps explain observed borrowing, schooling, and default patterns and offers new insights about the design of government policy.

### **New Perspectives on Statistical Decisions Under Ambiguity**

- Annual Review of Economics---2012---Jörg Stoye

This review summarizes and connects recent work on the foundations and applications of statistical decision theory. Minimax models of decisions making under ambiguity are identified as a thread running through several literatures. In axiomatic decision theory, these models motivated a large literature on modeling ambiguity aversion. Some findings of this literature are reported in a way that should be directly accessible to statisticians and econometricians. In statistical decision theory, the models inform a rich theory of estimation and treatment choice, which was recently extended to account for partial identification and thereby ambiguity that does not vanish with sample size. This literature is illustrated by discussing global, finite-sample admissible, and minimax decision rules for a number of stylized decision problems with point and partial identification.

### **The Empirics of Firm Heterogeneity and International Trade**

- Annual Review of Economics---2012---Andrew Bernard,J. Jensen,Stephen Redding,Peter Schott

This article reviews the empirical evidence on firm heterogeneity in international trade. A first wave of empirical findings from microdata on plants and firms proposed challenges for existing models of international trade and inspired the development of new theories emphasizing firm heterogeneity. Subsequent empirical research has examined additional predictions of these theories and explored other dimensions of the data not originally captured by them. These other dimensions include multiproduct firms, offshoring, intrafirm trade and firm export market dynamics.

### **Natural Resource Wealth: The Challenge of Managing a Windfall**

- Annual Review of Economics---2012---Frederick (Rick) van der Ploeg,Anthony Venables

Many countries have failed to use natural resource wealth to promote growth and development. They have been damaged by the volatility of revenues and have failed to save a sufficiently high proportion of their resource revenues and failed to make high-return investments to support diversification of their economies. This review explores the reasons for these failures and discusses policies to improve performance.

### **The Economics and Politics of Women's Rights**

- Annual Review of Economics---2012---Matthias Doepke,Michele Tertilt,Alessandra Voena

Women's rights and economic development are highly correlated. Today, the discrepancy between the legal rights of women and men is much larger in developing compared with developed countries. Historically, even in countries that are now rich, women had few rights before economic development took off. Is development the cause of expanding women's rights, or conversely, do women's rights facilitate development? We argue that there is truth to both hypotheses. The literature on the economic consequences of women's rights documents that more rights for women lead to more spending on health and children, which should benefit development. The political-economy literature on the evolution of women's rights finds that technological change increased the costs of patriarchy for men and thus contributed to the expansion of women's rights. Combining these perspectives, we discuss the theory of Doepke & Tertilt (2009), who find that an increase in the return to human capital induces men to vote for women's rights, which in turn promotes growth in human capital and income per capita.

### **Recent Developments in the Economics of Time Use**

- Annual Review of Economics---2012---Mark Aguiar,Erik Hurst,Loukas Karabarbounis

The proliferation of new data sets and their harmonization with the older data sets have allowed researchers to make significant progress in our understanding of how individuals allocate their time away from market

work. We highlight how these new data can be used to test theories of time use and we review recent developments in long-run trends in time use, life-cycle patterns of expenditures and labor supply, and the allocation of time over the business cycle.

### **Life-Cycle Wage Growth and Heterogeneous Human Capital**

- Annual Review of Economics---2012---Carl Sanders,Christopher Taber

Wages grow rapidly for young workers, and the human capital investment model is the classic framework to explain this growth. While estimation and the theory of human capital have traditionally focused on general human capital, both have evolved toward models of heterogeneous human capital. In this article, we review and evaluate the current state of this literature. We exposit the classic model of general human capital investment and extend it to show how a model of heterogeneous human capital can nest previous models. We then summarize the empirical literature on firm-specific human capital, industry- and occupation-specific human capital, and task-specific human capital and discuss how these concepts can explain a wide variety of labor market phenomena that traditional models cannot.

### **Behavioral Economics and Psychology of Incentives**

- Annual Review of Economics---2012---Emir Kamenica

Monetary incentives can backfire while nonstandard interventions, such as framing, can be effective in influencing behavior. I review the empirical evidence on these two sets of anomalies. Paying for inherently interesting tasks, paying for prosocial behavior, paying too much, paying too little, and providing too many options can all be counterproductive. At the same time, proper design of the decision-making environment can be a potent way to induce certain behaviors. After presenting the empirical evidence, I discuss the relative role of beliefs, preferences, and technology in

the anomalous impacts of incentives. I argue that inference, signaling, loss aversion, dynamic inconsistency, and choking are the primary factors that explain the data.

### **The Relationship Between Economic Preferences and Psychological Personality Measures**

- Annual Review of Economics---2012---Anke Becker,Thomas Deckers,Thomas Dohmen,Armin Falk,Fabian Kosse

Although both economists and psychologists seek to identify determinants of heterogeneity in behavior, they use different concepts to capture them. In this review, we first analyze the extent to which economic preferences and psychological concepts of personality, such as the Big Five and locus of control, are related. We analyze data from incentivized laboratory experiments and representative samples and find only low degrees of association between economic preferences and personality. We then regress life outcomes (such as labor market success, health status, and life satisfaction) simultaneously on preference and personality measures. The analysis reveals that the two concepts are rather complementary when it comes to explaining heterogeneity in important life outcomes and behavior.

### **Corruption in Developing Countries**

- Annual Review of Economics---2012---Benjamin Olken,Rohini Pande

Recent years have seen a remarkable expansion in economists' ability to measure corruption. This in turn has led to a new generation of well-identified, microeconomic studies. We review the evidence on corruption in developing countries in light of these recent advances, focusing on three questions: how much corruption is there, what are the efficiency consequences of corruption, and what determines the level of corruption? We find robust evidence that corruption responds to standard economic incentive theory but also that the effects of anticorruption policies often attenuate as officials find alternate strategies to pursue rents.

### **A Reduced-Form Approach to Behavioral Public Finance**

- Annual Review of Economics---2012---Sendhil Mullainathan,Joshua Schwartzstein,William J. Congdon

Research in behavioral public finance has blossomed in recent years, producing diverse empirical and theoretical insights. This article develops a single framework with which to understand these advances. Rather than drawing out the consequences of specific psychological assumptions, the framework takes a reduced-form approach to behavioral modeling. It emphasizes the difference between decision and experienced utility that underlies most behavioral models. We use this framework to examine the behavioral implications for canonical public finance problems involving the provision of social insurance, commodity taxation, and correcting externalities. We show how deeper principles undergird much work in this area and that many insights are not specific to a single psychological assumption.

### **Recent Research on the Economics of Patents**

- Annual Review of Economics---2012---Bronwyn Hall,Dietmar Harhoff

This review surveys recent research on the economics of patents. The topics covered include theoretical and empirical evidence on patents as incentives for innovation, the effectiveness of patents for invention disclosure, patent valuation, and the design of patent systems. We also look at some current policy areas, including software and business method patents, university patenting, and the growth in patent litigation.

### **Probability and Risk: Foundations and Economic Implications of Probability-Dependent Risk Preferences**

- Annual Review of Economics---2012---Helga Fehr-Duda,Thomas Epper

A large body of evidence has documented that risk preferences depend nonlinearly on outcome probabilities. We discuss the foundations and economic consequences

of probability-dependent risk preferences and offer a practitioner's guide to understanding and modeling probability dependence. We argue that probability dependence provides a unifying framework for explaining many real-world phenomena, such as the equity premium puzzle, the long-shot bias in betting markets, and households' underdiversification and their willingness to buy small-scale insurance at exorbitant prices. Recent findings indicate that probability dependence is not just a feature of laboratory data, but is indeed manifest in financial, insurance, and betting markets. The neglect of probability dependence may prevent researchers from understanding and predicting important phenomena.

### **The Theory of Clubs and Competitive Coalitions**

- Annual Review of Economics---2012---Myrna Wooders

This review discusses research demonstrating that club economies and coalition economies with many participants and relatively small effective groups (clubs, jurisdictions, or coalitions) are competitive. Small groups are effective if all or almost all gains to collective activities can be realized by cooperation restricted to them. At this point, there are many papers in the literature demonstrating the competitiveness of club and coalition economies in a variety of contexts. To facilitate the exposition, I treat economies with quasi-linear utilities and games with side payments. The main concepts and results for this framework are discussed. Additionally, relationships are established with regard to broader models of club and coalition economies, including very recent contributions to the literature.

### **The Promises and Pitfalls of Genoeconomics**

- Annual Review of Economics---2012---Daniel Benjamin,David Cesarini,Christopher F. Chabris,Edward L. Glaeser,David Laibson,Vilmundur Guðnason,Tamara B. Harris,Lenore J. Launer,Shaun Purcell,Albert Vernon Smith,Magnus Johannesson,Patrik K.E. Magnusson,Jonathan P. Beauchamp,Nicholas

A. Christakis,Craig S. Atwood,Benjamin Hebert,Jeremy Freese,Robert M. Hauser,Taissa S. Hauser,Alexander Grankvist,Christina M. Hultman,Paul Lichtenstein

This article reviews existing research at the intersection of genetics and economics, presents some new findings that illustrate the state of genoeconomics research, and surveys the prospects of this emerging field. Twin studies suggest that economic outcomes and preferences, once corrected for measurement error, appear to be about as heritable as many medical conditions and personality traits. Consistent with this pattern, we present new evidence on the heritability of permanent income and wealth. Turning to genetic association studies, we survey the main ways that the direct measurement of genetic variation across individuals is likely to contribute to economics, and we outline the challenges that have slowed progress in making these contributions. The most urgent problem facing researchers in this field is that most existing efforts to find associations between genetic variation and economic behavior are based on samples that are too small to ensure adequate statistical power. This has led to many false positives in the literature. We suggest a number of possible strategies to improve and remedy this problem: ( a) pooling data sets, ( b) using statistical techniques that exploit the greater information content of many genes considered jointly, and ( c) focusing on economically relevant traits that are most proximate to known biological mechanisms.

### **Robustness and Macroeconomic Policy**

- Annual Review of Economics---2011---Gadi Barlevy

This review considers the design of macroeconomic policies in the face of uncertainty. In recent years, several economists have advocated that, when policy makers are uncertain about the environment they face and find it difficult to assign precise probabilities to the alternative scenarios that may characterize this environment, they should design policies to be robust in the sense that they minimize the worst-case loss

these policies could ever impose. I review and evaluate the objections cited by critics of this approach. I argue further that, contrary to what some have inferred, concern about worst-case scenarios does not always lead to policies that respond more aggressively to incoming news than the optimal policy would respond absent any uncertainty.

### **Choosing Treatment Policies Under Ambiguity**

- Annual Review of Economics---2011---Charles Manski

Economists studying choice with partial knowledge typically assume that the decision maker places a subjective distribution on unknown quantities and maximizes expected utility. Someone lacking a subjective distribution faces a problem of choice under ambiguity. This article reviews recent research on policy choice under ambiguity, when the task is to choose treatments for a population. Ambiguity arises when a planner has partial knowledge of treatment response and does not feel able to place a subjective distribution on the unknowns. I first discuss dominance and alternative criteria for choice among undominated policies. I then illustrate with the choice of a vaccination policy by a planner who has partial knowledge of the effect of vaccination on illness. I next study a class of problems in which a planner may want to cope with ambiguity by diversification, assigning observationally identical persons to different treatments. Lastly, I consider a setting in which a planner should not diversify treatment.

### **Empirical Models of Consumer Behavior**

- Annual Review of Economics---2011---Aviv Nevo

Models of consumer behavior play a key role in modern empirical industrial organization. In this review, I survey some of the models used in this literature. In particular, I discuss two commonly used demand systems: multistage budgeting approaches and discrete choice models. I motivate their use and highlight some key modeling assumptions. I next briefly discuss key issues of estimation and conclude by summarizing some extensions.

### **Theories of Heterogeneous Firms and Trade**

- Annual Review of Economics---2011---Stephen Redding

This article reviews the recent theoretical literature on heterogeneous firms and trade, which emphasizes firm selection into international markets and reallocations of resources across firms. We discuss the empirical challenges that motivated this research and its relationship to traditional trade theories. We examine the implications of firm heterogeneity for comparative advantage, market size, aggregate trade, the welfare gains from trade, and the relationship between trade and income distribution. Although a number of studies examine the endogenous response of firm productivity to trade liberalization, modeling internal firm organization and the origins of firm heterogeneity remain interesting areas of ongoing research.

### **Confronting Prior Convictions: On Issues of Prior Sensitivity and Likelihood Robustness in Bayesian Analysis**

- Annual Review of Economics---2011---Hedibert F. Lopes, Justin L. Tobias

In this review we explore issues of the sensitivity of Bayes estimates to the prior and form of the likelihood. With respect to the prior, we argue that non-Bayesian analyses also incorporate prior information, illustrate that the Bayes posterior mean and the frequentist maximum likelihood estimator are often asymptotically equivalent, review a simple computational strategy for analyzing sensitivity to the prior in practice, and finally document the potentially important role of the prior in Bayesian model comparison. With respect to issues of likelihood robustness, we review a variety of computational strategies for significantly expanding the maintained sampling model, including the use of finite Gaussian mixture models and models based on Dirichlet process priors.

### **The Gravity Model**

- Annual Review of Economics---2011---James Anderson

Gravity has long been one of the most successful empirical models in economics. Incorporating deeper theoretical foundations of gravity into recent practice has led to a richer and more accurate estimation and interpretation of the spatial relations described by gravity. Wider acceptance has followed. Recent developments are reviewed here, and suggestions are made for promising future research.

### **The Political Economy of Public Debt**

- Annual Review of Economics---2011---Marco Battaglini

We survey recent theories of public debt that incorporate political decision making in rich dynamic environments. These theories provide a new framework with which to interpret empirical evidence and to assess institutional reforms that may help control political inefficiencies. We discuss the inefficiencies that lead to overaccumulation of debt and their implications for the long-run distribution of debt.

### **International Trade, Foreign Direct Investment, and Security**

- Annual Review of Economics---2011---Avinash Dixit

The main focus of this review is on international trade and foreign direct investment when the institutions that provide the security of property rights and enforcement of contracts are imperfect. Some issues of national security related to poor governance of international transactions are also considered. The discussion organizes a selective overview of the literature and offers some suggestions for future research.

### **Can Informed Voters Enforce Better Governance? Experiments in Low-Income Democracies**

- Annual Review of Economics---2011---Rohini Pande

This article evaluates a body of recent work that uses field and natural experiments to answer the question of whether informed voters can enforce better governance.

A common finding in the literature is that voter behavior is malleable and that information about the political process and politician performance improves electoral accountability. Limited availability of information thus provides one explanation for the persistence of low-quality politicians and the existence of identity politics and electoral malpractices in low-income democracies. Understanding how voters can gain access to credible sources of information and understanding how politicians react to improved information about their performance are promising avenues for future research.

### **Social Norms and Social Assets**

- Annual Review of Economics---2011---Andrew Postlewaite

Social norms are often posited as an explanation of differences in the economic behavior and performance of societies that are difficult to explain by differences in endowments and technology. The successful integration of social norms into economic models requires an understanding of the basis of the differences in preferences that lead to different behaviors. I explore the difference between deep and reduced-form preferences and how both can differ across societies.

### **Recent Perspectives on Trade and Inequality**

- Annual Review of Economics---2011---Ann Harrison, John McLaren, Margaret McMillan

The 1990s dealt a blow to traditional Heckscher-Ohlin analysis of the relationship between trade and income inequality, as it became clear that rising inequality in low-income countries and other features of the data were inconsistent with that model. As a result, economists moved away from trade as a plausible explanation for rising income inequality. In recent years, however, a number of new mechanisms have been explored through which trade can affect (and usually increase) income inequality. These include within-industry effects due to heterogeneous firms, the effects of offshoring of tasks, effects on incomplete contracting, and the effects of labor-market frictions. A number of

these mechanisms have received substantial empirical support.

### **Sparse High-Dimensional Models in Economics**

- Annual Review of Economics---2011---Jianqing Fan,Jinchi Lv,Lei Qi

This article reviews the literature on sparse high-dimensional models and discusses some applications in economics and finance. Recent developments in theory, methods, and implementations in penalized least-squares and penalized likelihood methods are highlighted. These variable selection methods are effective in sparse high-dimensional modeling. The limits of dimensionality that regularization methods can handle, the role of penalty functions, and their statistical properties are detailed. Some recent advances in sparse ultra-high-dimensional modeling are also briefly discussed.

### **Frictional Matching Models**

- Annual Review of Economics---2011---Lones Smith

This article reviews the developments in frictional matching models from 1990 to 2010, exploring how search frictions skew the matches that occur. This research succeeded by exploiting new tools from monotone methods under uncertainty. Seeing how this journey plays out is instructive in itself for economic theory. The article also describes in detail the different attacks on the existence of equilibrium required for these search and matching models.

### **Imperfect Credit Markets, Household Wealth Distribution, and Development**

- Annual Review of Economics---2011---Kiminori Matsuyama

This article discusses some key results in the theoretical literature on credit market imperfections, household wealth distribution, and development by conducting three types of analysis, which progressively build on

one another. The first, a single dynasty model, explains how a household may be caught in a poverty trap because of credit market imperfections but says little about the effects of distribution on development. The second, a model of interacting dynasties with a fixed threshold, explains a collective poverty trap, with path dependence in the wealth distribution dynamics, but says little about the effects of inequality on development, owing to its absolute notion of the rich and the poor. The third, models of interacting dynasties with variable thresholds, offers a richer framework for understanding the dynamics of inequality and development under credit market imperfections, owing to its relative notion of the rich and poor.

### **Practical Methods for Estimation of Dynamic Discrete Choice Models**

- Annual Review of Economics---2011---Peter Arcidiacono,Paul B. Ellickson

Many discrete decisions are made with an eye toward how they will affect future outcomes. Formulating and estimating the underlying models that generate these decisions is difficult. Conditional choice probability (CCP) estimators often provide simpler ways to estimate dynamic discrete choice problems. Recent work shows how to frame dynamic discrete choice problems in a way that is conducive to CCP estimation and demonstrates that CCP estimators can be adapted to handle rich patterns of unobserved state variables.

### **Nonlinear Panel Data Analysis**

- Annual Review of Economics---2011---Manuel Arellano,Stéphane Bonhomme

Nonlinear panel data models arise naturally in economic applications, yet their analysis is challenging. Here we provide a progress report on some recent advances in the area. We start by reviewing the properties of random-effects likelihood approaches. We emphasize a link with Bayesian computation and Markov chain Monte Carlo, which provides a convenient approach to estimation and inference. The relaxation of parametric assumptions on the distribution of individual effects

raises serious identification problems. In discrete choice models, common parameters and average marginal effects are generally set identified. The availability of continuous outcomes, however, provides opportunities for point identification. We end by reviewing recent progress on non-fixed-T approaches. In panel applications in which the time dimension is not negligible relative to the size of the cross section, it makes sense to view the estimation problem as a time-series finite-sample bias. Several perspectives to bias reduction are now available. We review their properties, with a special emphasis on random-effects methods.

### Health Behavior in Developing Countries

- Annual Review of Economics---2011---Pascaline Dupas

The disease burden in low-income countries is extremely high. Malaria, respiratory infections, diarrhea, AIDS, and other diseases are estimated to kill more than 15 million people each year, most of them children. Yet the great majority of these diseases can be prevented or treated. This article reviews microeconomic studies of health-seeking behavior in low-income countries. Factors examined include information, peers, liquidity constraints, and nonrational preferences, such as present bias. I then discuss the implications for policy, including the scope for mandates, subsidies, and incentives.

### Bargaining with Optimism

- Annual Review of Economics---2011---Muhamet Yildiz

Excessive optimism is a prominent explanation for bargaining delays. Recent results demonstrate that optimism plays a subtle role in bargaining, and its careful analysis may shed valuable insights into negotiation behavior. This article reviews some of these results, focusing on the following findings. First, when there is a nearby deadline, optimistic players delay the agreement to the last period before the deadline, replicating a broad empirical regularity known as the deadline effect. Second, there cannot be a substantial delay

under persistent optimism; i.e., excessive optimism alone cannot explain delays. Third, when optimistic players are expected to learn during the negotiation, they delay the agreement in order to persuade their opponents. The delays in these results can be quite costly, Pareto inefficient, and common knowledge at the beginning of the game.

### Studying Discrimination: Fundamental Challenges and Recent Progress

- Annual Review of Economics---2011---Kerwin Kofi Charles,Jonathan Guryan

We discuss research on discrimination against blacks and other racial minorities in labor market outcomes, highlighting fundamental challenges faced by empirical work in this area. Specifically, for work devoted to measuring whether and how much discrimination exists, we discuss how the absence of relevant data, the potential noncomparability of blacks and whites, and various conceptual concerns peculiar to race may frustrate or render impossible the application of empirical methods used in other areas of study. For work seeking to arbitrate empirically between the two main alternative theoretical explanations for such discrimination as it exists, we distinguish between indirect analyses, which do not directly study the variation in prejudice or the variation in information, the mechanisms at the heart of the two types of models we review, and direct analyses, which are more recent and much less common. We highlight problems with both approaches. Throughout, we discuss recent work, which, the various challenges notwithstanding, permits tentative conclusions about discrimination. We conclude by pointing to areas that might be fruitful avenues for future investigation.

### The Mechanism Design Approach to Student Assignment

- Annual Review of Economics---2011---Parag Pathak

The mechanism design approach to student assignment involves the theoretical, empirical, and experimental study of systems used to allocate students into schools



around the world. Recent practical experience designing systems for student assignment has raised new theoretical questions for the theory of matching and assignment. This article reviews some of this recent literature, highlighting how issues from the field motivated theoretical developments and emphasizing how the dialogue may be a road map for other areas of applied mechanism design. Finally, it concludes with some open questions.

### **News and Aggregate Demand Shocks**

- Annual Review of Economics---2011---Guido Lorenzoni

In this review, I look at the recent literature on news as a source of economic fluctuations. The main question in this literature is: how does the aggregate economy respond to a shock that raises consumers' and firms' expectations about future productivity growth? I discuss how different papers have addressed this question, emphasizing the mechanisms at work under different specifications of preferences and technology, under different assumptions about nominal and real rigidities, and under different assumptions about the agents' information structure. I also briefly discuss some challenges faced by the empirical literature on the topic.

### **Housing Bubbles: A Survey**

- Annual Review of Economics---2011---Christopher Mayer

The past 25 years have represented two periods of extreme movements in U.S. and global house prices that appear to be much larger than can be easily explained by changes in fundamentals. These episodes spurred research on housing bubbles that focused attention on the role of outsized expectations in excessive house price appreciation. By contrast, some economists pointed to alternative explanations for excess volatility, including liquidity constraints, lending cycles, search externalities, and zoning delays. Empirical work supports the role of these factors in explaining at least some of the cyclical variation of house prices and inventories of homes for sale. Existing research does not yet provide

a crisp definition of a housing bubble nor does it allow researchers to predict where or when bubbles can occur.

### **Rent Seeking and Corruption in Financial Markets**

- Annual Review of Economics---2011---Asim Khwaja,Atif Mian

We describe recent advances in the study of rent seeking and corruption in financial markets. We outline three areas of inquiry: (a) conceptualizing rent seeking, (b) identifying rent-provision channels and their general equilibrium impact, and (c) designing feasible remedial mechanisms. We provide suggestions for making further progress in these areas and review a variety of approaches taken in the recent literature.

### **Gender and Competition**

- Annual Review of Economics---2011---Muriel Niederle,Lise Vesterlund

Laboratory studies have documented that women often respond less favorably to competition than men. Conditional on performance, men are often more eager to compete, and the performance of men tends to respond more positively to an increase in competition. This means that few women enter and win competitions. We review studies that examine the robustness of these differences as well the factors that may give rise to them. Both laboratory and field studies largely confirm these initial findings, showing that gender differences in competitiveness tend to result from differences in overconfidence and in attitudes toward competition. Gender differences in risk aversion, however, seem to play a smaller and less robust role. We conclude by asking what could and should be done to encourage qualified males and females to compete.

### **New Developments in Aggregation Economics**

- Annual Review of Economics---2011---Pierre Chiappori,Ivar Ekeland

The goal of this article is to provide a general characterization of the aggregate behavior of a group in a market environment. We allow for public and private consumption, intragroup production, and consumption externalities within a group; we only assume that the group always reaches Pareto-efficient decisions. We show that aggregation problems involve a simple mathematical structure: The aggregate demand of the group, considered as a vector field, can be decomposed into a sum of gradients. We briefly introduce exterior differential calculus as a tool to study this structure. We analyze two main issues. One is testability: What restrictions (if any) on the aggregate demand function characterize the efficient behavior of the group? The second issue relates to identifiability; we investigate the conditions under which it is possible to recover the underlying structure—namely, individual preferences, the decision process, and the resulting intragroup transfers—from the group's aggregate behavior.

### Questions in Decision Theory

- Annual Review of Economics---2010---Itzhak Gilboa

This review surveys a few major questions in the field of decision theory. It is argued that a re-examination of some of the fundamental concepts in decision theory may have important implications to theoretical and even empirical research in economics and related fields.

### Structural Estimation and Policy Evaluation in Developing Countries

- Annual Review of Economics---2010---Petra Todd,Kenneth I. Wolpin

This review discusses the use of discrete choice dynamic programming (DCDP) methods for evaluating policies of particular relevance to developing countries, such as policies to reduce child labor and increase school attendance, improve school quality, affect immigration flows, expand old-age pension benefits, or foster small-business investment through microfinance. We describe the DCDP framework and how it relates to static models, illustrate its application with an example related to

conditional cash transfer programs, consider numerous empirical applications from the literature of how the DCDP methodology has been used to address substantively important policy issues, and discuss methods for model validation.

### Currency Unions in Prospect and Retrospect

- Annual Review of Economics---2010---João Santos Silva,Silvana Tenreiro

We critically review the recent literature on currency unions and discuss the methodological challenges posed by the empirical assessment of their costs and benefits. In the process, we provide evidence on the economic effects of the euro. In particular, and in contrast with estimates of the trade effect of other currency unions, we find that the euro's impact on trade has been close to zero. After reviewing the costs and benefits of joining a currency union, we conclude with some open questions on normative and positive aspects of the theory of currency unions, emphasizing the need for a unified welfare-based framework to weigh their costs and gains.

### Hypothesis Testing in Econometrics

- Annual Review of Economics---2010---Joseph P. Romano,Azeem Shaikh,Michael Wolf

This article reviews important concepts and methods that are useful for hypothesis testing. First, we discuss the Neyman-Pearson framework. Various approaches to optimality are presented, including finite-sample and large-sample optimality. Then, we summarize some of the most important methods, as well as resampling methodology, which is useful to set critical values. Finally, we consider the problem of multiple testing, which has witnessed a burgeoning literature in recent years. Along the way, we incorporate some examples that are current in the econometrics literature. While many problems with well-known successful solutions are included, we also address open problems that are not easily handled with current technology, stemming from such issues as lack of optimality or poor asymptotic approximations.

## Recent Advances in the Empirics of Organizational Economics

- Annual Review of Economics---2010---Nicholas Bloom,Raffaella Sadun,John van Reenen

We present a survey of recent contributions in empirical organizational economics, focusing on management practices and decentralization. Productivity dispersion between firms and countries has motivated the improved measurement of firm organization across industries and countries. There appears to be substantial variation in management practices and decentralization not only between countries, but also especially within countries. Much of the poorer average management quality in countries like Brazil and India seems to result from a long tail of poorly managed firms, which barely exist in the United States. Some stylized facts include the following: (a) Competition seems to foster improved management and decentralization; (b) larger firms, skill-intensive plants, and foreign multinationals appear better managed and are more decentralized; (c) firms that are both family owned and managed appear to have worse management and are more centralized; and (d) firms facing an environment of lighter labor market regulations and more human capital specialize relatively more in people management. There is evidence for complementarities between information and communication technology, decentralization, and management, but the relationship is complex, and identification of the productivity effects of organizational practices remains a challenge for future research.

## Regional Trade Agreements

- Annual Review of Economics---2010---Caroline Freund,Emanuel Ornelas

This article reviews the theoretical and the empirical literature on regionalism. The formation of regional trade agreements has been, by far, the most popular form of reciprocal trade liberalization in the past 15 years. The discriminatory character of these agreements has raised three main concerns: that trade diversion would be rampant, because special interest groups would induce governments to form the most

distortionary agreements; that broader external trade liberalization would stall or reverse; and that multilateralism could be undermined. Theoretically, all these concerns are legitimate, although there are also several theoretical arguments that oppose them. Empirically, neither widespread trade diversion nor stalled external liberalization has materialized, whereas the undermining of multilateralism has not been properly tested. There are also several aspects of regionalism that have received too little attention from researchers, but which are central to understanding its causes and consequences.

## Partial Identification in Econometrics

- Annual Review of Economics---2010---Elie Tamer

Identification in econometric models maps prior assumptions and the data to information about a parameter of interest. The partial identification approach to inference recognizes that this process should not result in a binary answer that consists of whether the parameter is point identified. Rather, given the data, the partial identification approach characterizes the informational content of various assumptions by providing a menu of estimates, each based on different sets of assumptions, some of which are plausible and some of which are not. Of course, more assumptions beget more information, so stronger conclusions can be made at the expense of more assumptions. The partial identification approach advocates a more fluid view of identification and hence provides the empirical researcher with methods to help study the spectrum of information that we can harness about a parameter of interest using a menu of assumptions. This approach links conclusions drawn from various empirical models to sets of assumptions made in a transparent way. It allows researchers to examine the informational content of their assumptions and their impacts on the inferences made. Naturally, with finite sample sizes, this approach leads to statistical complications, as one needs to deal with characterizing sampling uncertainty in models that do not point identify a parameter. Therefore, new methods for inference are developed. These methods construct confidence sets for partially

identified parameters, and confidence regions for sets of parameters, or identifiable sets.

## **Intergenerational Equity**

- Annual Review of Economics---2010---Geir Asheim

Axiomatic analysis of intergenerational social preferences over infinite streams of well-being faces the following dilemma. Equal treatment of generations combined with sensitivity for the interests of each generation rules out explicitly defined preferences that can rank any pair of infinite well-being streams. Hence, either intergenerational social preferences must be incomplete or equal treatment and sensitivity must be compromised. This critical review of axiomatic analyses of preferences over infinite streams evaluates different kinds of intergenerational social preferences by comparing their axiomatic basis as well as their performance in simple present-future conflicts. The scope for application is discussed, using real-world intergenerational conflicts (such as global warming) as a backdrop.

## **The World Trade Organization: Theory and Practice**

- Annual Review of Economics---2010---Kyle Bagwell, Robert Staiger

We consider the purpose and design of the World Trade Organization (WTO) and its predecessor, the General Agreement on Tariffs and Trade (GATT), and review recent developments in the relevant theoretical and empirical literature. We describe the GATT/WTO architecture and briefly trace its historical antecedents. We suggest that the existing literature provides a useful framework for understanding and interpreting central features of the design and practice of the GATT/WTO, and we identify key unresolved issues.

## **How (Not) to Do Decision Theory**

- Annual Review of Economics---2010---Eddie Dekel, Barton Lipman

We discuss the goals and means of positive decision theory and the implications for how to do decision theory. We argue that the goal of positive economic theory generally is to provide predictions and understanding and that representation theorems and other results of decision theory should be seen as ways to achieve these goals. We also argue that the interpretation of a model is relevant to whether and how we use the model, that psychological considerations are not necessary for useful decision theory but can be helpful, and that nonchoice data, interpreted properly, can be valuable in predicting choice and therefore should not be ignored.

## **Health, Human Capital, and Development**

- Annual Review of Economics---2010---Hoyt Bleakley

How much does disease depress development in human capital and income around the world? I discuss a range of micro evidence, which finds that health is both human capital itself and an input to producing other forms of human capital. I use a standard model to integrate these results and suggest a reinterpretation of much of the micro literature. I then discuss the aggregate implications of micro estimates but note the complications in extrapolating to general equilibrium, especially because of health's effect on population size. I also review the macro evidence on this topic, which consists of either cross-country comparisons or measuring responses to health shocks. Micro estimates are one to two orders of magnitude smaller than the cross-country relationship but nevertheless imply high benefit-to-cost ratios from improving certain forms of health.

## **Beyond Testing: Empirical Models of Insurance Markets**

- Annual Review of Economics---2010---Liran Einav, Amy Finkelstein, Jonathan Levin

We describe recent advances in the empirical analysis of insurance markets. This new research proposes ways to estimate individual demand for insurance and the

relationship between prices and insurer costs in the presence of adverse and advantageous selection. We discuss how these models permit the measurement of welfare distortions arising from asymmetric information and the welfare consequences of potential government policy responses. We also discuss some challenges in modeling imperfect competition between insurers and outline a series of open research questions.

### **Inside Organizations: Pricing, Politics, and Path Dependence**

- Annual Review of Economics---2010---Robert Gibbons

When economists have considered organizations, much attention has focused on the boundary of the firm, rather than its internal structures and processes. In contrast, this review sketches three approaches to the economic theory of internal organization—one substantially developed, another rapidly emerging, and a third on the horizon. The first approach (pricing) applies Pigou's prescription: If markets get prices wrong, then the economist's job is to fix the prices. The second approach (politics) considers environments where important actions inside organizations simply cannot be priced, so power and control become central. Finally, the third approach (path dependence) complements the first two by shifting attention from the between variance to the within. That is, rather than asking how organizations confronting different circumstances should choose different structures and processes, the focus here is on how path dependence can cause persistent performance differences among seemingly similar enterprises.

### **Identification of Dynamic Discrete Choice Models**

- Annual Review of Economics---2010---Jaap Abbring

Econometric models of dynamic discrete choice processes are applied to a wide variety of economic problems. Recent research on their empirical content has brought important new insights. It has clarified the

conditions for their identification from choice and covariate panel data in the absence of dynamic selection on unobservables. It has provided important new identification results for discrete-time models with unobserved heterogeneity and unobserved states. Finally, it has enhanced the attractiveness of continuous-time models, by developing new insights on the identification of continuous-time optimal stopping models. Current developments in the literature promise to shed further light on the specification and identification of models with unobserved state variables, theory-based nonproportional hazard models, continuous-time optimal stopping models with time-varying covariates, and dynamic games in discrete and continuous time.

### **Microeconomics of Technology Adoption**

- Annual Review of Economics---2010---Andrew Foster, Mark Rosenzweig

Differences in technology levels across countries account for a large component of the differences in wages and per-capita GDP across countries worldwide. This article reviews micro studies of the adoption of new technologies and the use of inputs complementary with new technologies to shed light on the barriers to technology diffusion in low-income countries. Among the factors examined affecting decisions pertaining to technology choice and input allocations are the financial and nonfinancial returns to adoption, one's own learning and social learning, technological externalities, scale economies, schooling, credit constraints, risk and incomplete insurance, and departures from behavioral rules implied by simple models of rationality.

### **Heterogeneity, Selection, and Wealth Dynamics**

- Annual Review of Economics---2010---Lawrence Blume, David Easley

The market selection hypothesis states that, among expected utility maximizers, competitive markets select for agents with correct beliefs. In some economies this hypothesis holds, whereas in others it fails. It holds in complete-markets economies with a common discount factor and bounded aggregate consumption. It can

fail when markets are incomplete, when consumption grows too quickly, or when discount factors and beliefs are correlated. These insights have implications for the general equilibrium modeling of asset prices and macroeconomic phenomena.

### **Social Interactions**

- Annual Review of Economics---2010---Steven Durlauf, Yannis Ioannides

The study of social interactions has enriched both the domain of inquiry of economists and the way economists conceptualize individual decision making. The review aims to introduce the classes of models that accommodate estimation of social interactions and to examine the key areas where significant advances have been made in the identification of social effects. It surveys linear and nonlinear models and their applications, including results regarding partial identification. The review also examines conceptual and methodological links with the spatial econometrics and the social networks literatures. It considers empirical applications in the context of our methodological overview.

### **The Consumption Response to Income Changes**

- Annual Review of Economics---2010---Tullio Jappelli, Luigi Pistaferri

We review different empirical approaches that researchers have taken to estimate how consumption responds to income changes. We critically evaluate the empirical evidence on the sensitivity of consumption to predicted income changes, distinguishing between the traditional excess sensitivity tests and the effect of predicted income increases and income declines. We also review studies that attempt to estimate the marginal propensity to consume out of income shocks, distinguishing between three different approaches: identifying episodes in which income changes unexpectedly, relying on the covariance restrictions that the theory imposes on the joint behavior of consumption and income growth, and combining realizations and expectations of income or consumption in surveys in which data on subjective expectations are available.

### **Financial Structure and Economic Welfare: Applied General Equilibrium Development Economics**

- Annual Review of Economics---2010---Robert Townsend

This review provides a common framework for researchers thinking about the next generation of micro-founded macro models of growth, inequality, and financial deepening, as well as direction for policy makers targeting microfinance programs to alleviate poverty. Topics include treatment of financial structure general equilibrium models: testing for as-if-complete markets or other financial underpinnings; examining dual-sector models with both a perfectly intermediated sector and a sector in financial autarky, as well as a second generation of these models that embeds information problems and other obstacles to trade; designing surveys to capture measures of income, investment/savings, and flow of funds; and aggregating individuals and households to the level of network, village, or national economy. The review concludes with new directions that overcome conceptual and computational limitations.

### **Models of Growth and Firm Heterogeneity**

- Annual Review of Economics---2010---Erzo Luttmer

Although employment at individual firms tends to be highly nonstationary, the employment size distribution of all firms in the United States appears to be stationary. It closely resembles a Pareto distribution. There is a lot of entry and exit, mostly of small firms. This review surveys general equilibrium models that can be used to interpret these facts and explores the role of innovation by new and incumbent firms in determining aggregate growth. The existence of a balanced growth path with a stationary employment size distribution depends crucially on assumptions made about the cost of entry. Some type of labor must be an essential input in setting up new firms.

## **Labor Market Models of Worker and Firm Heterogeneity**

- Annual Review of Economics---2010---Rasmus Lentz,Dale Mortensen

Microeconomic data on individual firms and employer-employee matches reveal substantial and persistent dispersion in firm size, productivity, and average wage paid and a positive correlation between each pair. To the extent that intrinsic differences in firm productivity explain these facts, there are several important consequences. First, the reallocation of employment from less to more productive firms will yield efficiency gains. Second, workers will find it in their interest to seek out higher-paying employers. Recent research has provided support for both hypotheses. Third, the existence of worker and employer heterogeneity offers possible gains from sorting. However, because the problem of identifying the presence of sorting is model dependent, it is too early for conclusions about its significance.

## **The Changing Nature of Financial Intermediation and the Financial Crisis of 2007–2009**

- Annual Review of Economics---2010---Tobias Adrian,Hyun Song Shin

The current financial crisis has highlighted the changing role of financial institutions and the growing importance of the shadow banking system, which grew on the back of the securitization of assets and the integration of banking with capital market developments. This trend has been most pronounced in the United States but has had a profound influence on the global financial system as a whole. In a market-based financial system, banking and capital market developments are inseparable, and funding conditions are closely tied to the fluctuations in leverage of market-based financial intermediaries. Balance-sheet growth of market-based financial intermediaries provides a window on liquidity in the sense of the availability of credit, whereas financial crises tend to be associated with contractions of balance sheets. We describe the changing nature of financial intermediation in the market-based financial system, chart the course of the recent financial crisis,

and outline the policy responses that have been implemented by the Federal Reserve and other central banks to counter it.

## **Competition and Productivity: A Review of Evidence**

- Annual Review of Economics---2010---Thomas J. Holmes,James Schmitz

Does competition spur productivity? And if so, how does it accomplish this? These have long been regarded as central questions in economics. This article reviews the literature that makes progress toward answering both questions.

## **Persuasion: Empirical Evidence**

- Annual Review of Economics---2010---Stefano DellaVigna,Matthew Gentzkow

We provide a selective survey of empirical evidence on the effects as well as the drivers of persuasive communication. We consider persuasion directed at consumers, voters, donors, and investors. We organize our review around four questions. First, to what extent does persuasion affect the behavior of each of these groups? Second, what models best capture the response to persuasive communication? Third, what are persuaders' incentives, and what limits their ability to distort communications? Finally, what evidence exists on the way persuasion affects equilibrium outcomes in economics and politics?

## **Commitment Devices**

- Annual Review of Economics---2010---Gharad Bryan,Dean Karlan,Scott Nelson

We review the recent evidence on commitment devices and discuss how this evidence relates to theoretical questions about the demand for, and effectiveness of, commitment. Several important distinctions emerge. First, we distinguish between what we call hard and soft commitments and identify how soft commitments, in particular, can help with various dilemmas, both

in explaining empirical behavior and in designing effective commitment devices. Second, we highlight the importance of certain modeling assumptions in predicting when commitment devices will be demanded and examine the laboratory and field evidence on the demand for commitment devices. Third, we present the evidence on both informal and formal commitment devices, and we conclude with a discussion of policy implications, including sin taxes, consumer protection, and commitment device design.