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Program Report

Health Economics

Michael Grossman*

In the five years since my last report on the NBER's Program in Health Economics, the program has changed from one based mainly in the Bureau's New York office to one with a national presence. The number of program members has increased dramatically. The first group meeting at the Summer Institute was in 2001 and the first spring meeting was held in 2003; these two events now take place on an annual basis. The Program's growth has resulted in a more diversified research portfolio. In my last report, I emphasized studies on the economics of substance use. While I report here on a good deal of new research in this important area, I also summarize studies focusing on the economics of obesity; the roles of such basic economic forces as years of formal schooling completed, unemployment, and welfare reform in health outcomes; and the determinants of the cost of medical care. This research has been supported by grants from the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, the National Institute on Mental Health, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Child Health and Human Development, the National Institute on Aging, the Agency for Health Care Research and Quality, and the Robert Wood Johnson Foundation.

The Economics of Substance Use

The economics of substance use considers the determinants and consequences of the consumption of such harmfully addictive substances as cigarettes, alcohol, and illegal drugs. The program continues to provide estimates of the effects of control policies on substance use on consumption and related outcomes.

Cigarettes

Cigarette excise tax hikes, which result in higher cigarette prices, are one possible tool to discourage smoking. This is particularly important

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in the case of smoking by pregnant women, since this behavior accounts for one in five low weight babies and is the most important modifiable risk factor for poor pregnancy outcomes. Greg Colman, Ted Joyce, and I find that pregnant women living in states that raised cigarette taxes between 1993 and 1999 were more likely to quit smoking once they became pregnant than women residing in other states.[1] The magnitude of the effect at issue is substantial. If a penny increase in taxes increases price by one cent, then a 10 percent increase in price would increase the probability that a pregnant woman quits smoking by 10 percent. Over one-quarter of the 9 percentage point increase in quit rates that occurred over the sample period can be explained by increases in cigarette taxes during that period. Colman, Joyce, and I estimate that a 30-cent increase in taxes in constant dollars would have the same effect on quit rates as enrolling women in prenatal smoking cessation programs.

John A. Tauras and Frank J. Chaloupka[2]; Tauras, Patrick M. O'Malley, and Lloyd D. Johnston[3]; Henry Saffer and Dhaval Dave[4]; and Tauras and Chaloupka[5] confirm the importance of price as a determinant of a variety of smoking outcomes in different populations. Tauras and Chaloupka report that price hikes encourage young adult smokers to quit smoking, and Tauras, O'Malley, and Johnston report that price hikes discourage teenagers from starting to smoke. Saffer and Dave find that smoking participation by adults with mental illness is as sensitive to price as participation by adults who are not mentally ill. This is an important finding, because a history of mental illness increases smoking participation (relative to participation in the overall population) by 94 percent. It suggests that tobacco taxes are a valuable policy tool to discourage smoking, even in populations with high participation rates. Tauras and Chaloupka show that decreases in the price of nicotine replacement therapies and increases in the price of cigarettes lead to substantial increases in per capita sales of nicotine replacement therapy products. Hence, the decision to quit depends not only on the cost of cigarettes but also on the cost of techniques that enable smokers to quit.

Alcohol Abuse and Related Outcomes

Unlike the case with cigarettes, many persons regularly consume small quantities of alcohol without harming themselves or others; indeed, moderate alcohol consumption has

been shown to lower the risk of coronary heart disease. Instead, the adverse effects of alcohol spring from the overuse or misuse of this substance. Therefore, Program members have investigated the impacts of alcohol taxes or prices and other regulations on binge drinking (consuming five or more drinks on a typical drinking occasion at least once in the past month or past two weeks), cirrhosis of the liver, various forms of violent behavior, and risky sexual behavior by teenagers.

Jenny Williams, Frank Chaloupka, and Henry Wechsler report that in the period between 1997 and 1999, college students faced with a $1 increase above the $2.17 average real price of a drink would have been 33 percent less likely to make the transition from being a moderate drinker to a binge drinker.[6] On the other hand, binge drinking is no less prevalent on college campuses that ban alcohol consumption by staff and students regardless of age compared to campuses that do not ban consumption except for those under 21. Saffer and Dave find that a 10 percent increase in the price of beer reduces the number of high school students who engage in binge drinking by between 2 and 5 percent.[7] They also examine the responsiveness of this behavior to increases in alcohol advertising in all media in local market areas. Advertising has a positive effect on whether youth drink at all and on participation in binge drinking; that is, it encourages underage drinking. The relationship is especially pronounced for underage female drinkers. Saffer and Dave do not claim that the alcohol industry has deliberately targeted young people. They simply report that regardless of intent, advertising appears to have influenced underage drinking habits. Their estimates reveal that its complete elimination would lower binge participation from about 12 percent to about 7 percent.

The 18th Amendment to the Constitution banned alcohol consumption in the United States from 1920 to 1933. Angela K. Dillon and Jeffrey A. Miron examine the effect of Prohibition on mortality from cirrhosis of the liver in a long time series of state cross sections for the period 1900-97.[8] They find that it reduced mortality by between 10 and 20 percent. This reduction may not be as modest as it appears because they argue that black market suppliers may have faced low marginal costs of evasion. Hence, the net effect of Prohibition on the price of alcohol may have been small.

Sara Markowitz considers the effects of alcohol control policies on criminal violence and violence by youths. Her studies in the former area employ victimizations as outcomes. In U.S. cross sections for the period from 1992-4, she finds that increasing the tax on beer decreases the probability of assault, but it has no effect on robbery and rapes and sexual assaults.[9] A 10 percent increase in the beer tax decreases the probability of assault by 4.5 percent. Moreover, a 10 percent increase in the number of outlets that sell alcohol decreases the probability of rape by almost 20 percent. In a second study she examines crimes worldwide in large samples of respondents from 16 countries for the years 1989 and 1992.[10] Respondents were asked whether they were victims of robbery, assault, or sexual assault. Higher taxes on alcohol lead to lower incidences of all three types of violent crime. A 10 percent increase in the tax leads to a 2 percent decrease in the probability of each type of victimization. In a third study she finds that higher beer taxes lower the probability that U.S. high school students will engage in physical fights but have no impact on the probability of carrying a gun or another type of weapon.[11]

Markowitz and I examine the effects of beer taxes on risky sexual behavior by teenagers.[12] The tax has no impact on the probability of having sex in the past 3 months or on the number of partners for either males or females. Higher beer taxes, however, raise the probability of using any birth control and condoms for males.

Illegal Drug Use

Illegal drug prices vary over time and at a moment in time among areas of the United States in part because of variations in the certainty and severity of punishment for the sale of these drugs. Rosalie Liccardo Pacula, Chaloupka, O'Malley, Johnston, Matthew C. Farrelly, and I take advantage of these variations to estimate the sensitivity of marijuana participation by high school seniors to marijuana prices and other variables during the period from 1982 through 1998.[13] My colleagues and I estimate that a 10 percent increase in price lowers the number of youths who used marijuana in the past year by approximately 2 percent. Our results imply that the sharp increase in price from 1982 to 1992 contributed significantly to the contraction in use in that period. Similarly, the reduction in price after 1992 played an important role in the steady expansion in use through 1998. During those same two periods, adolescent marijuana use seems to have been influenced by perceptions of the harm that marijuana may cause. These perceptions correlate, in part, with the rise and fall of media campaigns designed to illustrate to youths the potential harm of marijuana use. Our study concludes that it is useful to consider price, in addition to the more traditional determinants, in any analysis of marijuana use by youths.

If alcohol and marijuana are substitutes, some of the more than 20 percent increase in marijuana use by college students between 1993 and 1999 may have been attributable to the enactment and more stringent enforcement of anti-alcohol policies by colleges in that period. Williams, Pacula, Chaloupka, and Wechsler report, however, that the two substances are complements in the sense that an increase in the price of alcohol reduces the use of both.[14] In particular, beer excise tax hikes and restrictions on access to alcohol through campus bans or state laws that curtail happy hours cause alcohol and marijuana consumption by college students to fall.

Effects of Alcohol and Illegal Drug Use

Causal effects of substance abuse are well established for such outcomes as motor vehicle accident mortality and deaths attributable to drug overdoses. For other outcomes including suicide attempts, children's behavior problems, risky sexual behavior, cognitive development, and years of formal

schooling completed, positive associations have been documented. It is not clear, however, whether these findings reflect causality from substance abuse or an omitted "third variable" that causes substance abuse and the outcome at issue to vary in the same direction. Program members have addressed this issue by employing a variety of techniques that attempt to establish causality. These include instrumental variables, family and sibling fixed effects, and comparisons between treatment and control groups.

Markowitz and Pinka Chatterji indicate that maternal marijuana and cocaine use are positively related to children's behavior problems, while alcohol use has a less consistent impact.[15] Chatterji, Dave, Markowitz, and Robert Kaestner obtain a causal relationship between clinically defined alcohol use disorders and suicide attempts among girls.[16] Chatterji reports that marijuana and cocaine use in high school lead to reductions in the number of years of formal schooling completed.[17] Pacula, Jeanne Ringel, and Karen Ross report a similar finding with regard to the relationship between marijuana use and cognitive development in panel data.[18] Markowitz and I find that binge drinking lowers the probability of using birth control and condoms among sexually active teens when substance use regulatory variables are used as instruments.[19] However, Kaestner, Markowitz, and I are not able to confirm this result using an estimation technique that assumes that unmeasurable differences between teenagers who do and do not abuse alcohol are similar to measurable differences between these two groups.[20]

The results of the studies just summarized reflect the difficulty of establishing causality in the social sciences, where natural experiments rarely can be conducted. For that reason, they should be regarded as preliminary. Undoubtedly, program members will continue to study this issue in future research.

The Economics of Obesity

Hardly a day goes by when we do not read in the media about the dire consequences of the increase in obesity. The percentage of adults who are obese has doubled since the late 1970s and tripled for children. From increases in the size of coffins, to increases in the size of pets, and to the appearance of new diets and new surgical techniques to lose weight, the evidence is everywhere. Obesity is now the second leading cause of death in the United States, and it is rapidly outpacing smoking in being the first. Attributable to approximately 300,000 deaths per year, compared to 400,000 from cigarette smoking, obesity has increased so quickly in the past two decades that the rise cannot be explained by genetic changes because these changes occur very slowly over long periods of time. This suggests that a focus on economic factors in weight outcomes is appropriate.

Shin-Yi Chou, Saffer, and I find that as much as two-thirds of the increase in adult obesity between 1984 and 1999 can be explained by the rapid growth in the per capita number of fast-food and full-service restaurants, especially the former, in the period at issue.[21] Food served in fast food and in many full service restaurants has extremely high caloric density and almost certainly has contributed to the obesity epidemic. My colleagues and I, however, caution that a good deal of care must be exercised before restaurants are labeled as culprits in undesirable weight outcomes. The growth in restaurants and in the consumption of meals prepared away from home is to a large extent a response to the increasing scarcity and increasing value of nonmarket time, reflected in part by the increases in rates of labor force participation and hours worked by women. Indeed, Patricia M. Anderson, Kristin F. Butcher, and Phillip B. Levine find that the rise in average hours worked by mothers can account for as much as one-third of the growth in obesity among children in certain families.[22]

Darius Lakdawalla and Tomas Philipson attribute a significant increase in obesity to reductions in real food prices over time.[23] David M. Cutler, Edward L. Glaeser, and Jessie M. Shapiro present evidence that reductions in the time costs of preparing meals at home for certain groups in the population contribute to an increase in weight for those groups.[24] They attribute the reductions in the daily time allocated to meal preparation (their measure of the time cost) to technological advances. The studies just mentioned do not consider all factors simultaneously, suggesting that more research on obesity would be valuable. They do highlight that the upward trend in obesity may be an unintended consequence of economic progress.

Determinants of Health

Schooling

Many studies suggest that years of formal schooling completed is the most important correlate of good health. This finding emerges whether health levels are measured by mortality rates, morbidity rates, self-evaluation of health status, or physiological indicators of health, and whether the units of observation are individuals or groups.[25] The interpretation of this finding as reflecting causality from more schooling to better health has been challenged on the grounds that there may be omitted "third variables." For example, Victor R. Fuchs argues that persons who are more future oriented (who have a high degree of time preference for the future) attend school for longer periods of time and make larger investments in health.[26] Thus, the effect of schooling on health is biased if one fails to control for time preference.

Adriana Lleras-Muney addresses the causality issue by employing compulsory education laws in effect from 1915 to 1939 to obtain consistent estimates of the effect of education on mortality in synthetic cohorts of successive U.S. Censuses of Population for 1960, 1970, and 1980.[27] This instrument is positively correlated with schooling but highly unlikely to be correlated with unobserved determinants of health, especially because she controls for state of birth and other state characteristics at age 14. Her ordinary least squares estimates suggest that an additional year of schooling lowers the probability of dying in the next ten years by 1.3 percentage points. Her instrumental variables estimate is much larger: 3.6 percentage points.

Janet Currie and Enrico Moretti present similar findings when they use information on college openings between 1940 and 1990 to construct an availability measure of college in a woman's 17th year as an instrument for maternal schooling in the estimation of birthweight production functions.[28] These results certainly suggest causality from more schooling to better health.

Dana Goldman and Darius Lakdawalla[29] and Sherry Glied and Lleras-Muney[30] provide evidence of plausible mechanisms via which schooling affects health. Both studies show that the more educated respond more rapidly to situations in which new information becomes available or new medical technologies are introduced. Goldman and Lakdawalla consider self-reported CD4 T-lymphocyte cell counts as an outcome in three rounds of a panel survey. A depletion in these cells correlates strongly with the worsening of HIV disease and raises the probability of developing AIDS. They find negative and significant schooling effects on this outcome in the second and third waves of the survey, but not on the baseline wave, with insurance status, self-reported baseline health, and the number of years since the individual had been diagnosed with HIV held constant. Glied and Lleras-Muney find that the negative effects of schooling on mortality are largest for diseases and cancer sites in which the most rapid progress has been made during the 30-year period ending in 1999.

Unemployment

In two related papers Christopher J. Ruhm[31] and Ulf-G. Gerdham and Ruhm[32] contradict the conventional wisdom by showing that a variety of health indicators improve in recessions. The first study presents evidence for several physical health measures in microdata. The second study replicates the finding for mortality and deaths from several common causes in aggregate data for 23 OECD countries for the 1960-97 period. A single percentage point decrease in the national unemployment rate is associated with a 0.4 percent rise in total mortality. In another study Ruhm shows that these findings may be traced to increases in physical exercise and reductions in obesity and in cigarette smoking during recessions.[33] One interpretation of some of these findings is that the consumer's time is an important input into the production of his or her health and that the price of this input falls in a recession.

Welfare Reform

The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 enacted sweeping changes in the welfare program. These changes included work requirements, lifetime limits on participation, and a family cap, which permits states to deny or reduce cash assistance for additional births to current recipients. Welfare reform has the potential to influence health outcomes in a variety of ways. Joyce, Kaestner, Sanders Korenman, and Stanley Henshaw point out that work requirements, time limits on benefits, and the family cap increase the cost of childbearing among welfare recipients or potential recipients.[34] Thus, births to unmarried low-educated women, who have high rates of welfare receipt and are likely to be affected by reform, should fall. In turn, infant health outcomes should improve because infants born to unmarried women and women with low levels of education weigh less than those born to other women.

Kaestner and Won Chan Lee indicate that welfare reform also can influence health by increasing the number of families without health insurance.[35] Under the Aid to Families with Dependent Children (AFDC) Program in effect before PRWORA, families on welfare were automatically enrolled in Medicaid. After welfare reform, women transitioning from welfare to work may have taken jobs that did not offer private health insurance benefits. While many of these women remained eligible for Medicaid at least on a one-year transitional basis, they now must go through a separate, unfamiliar application process to enroll. The loss in health insurance may translate into less use of health care and worse health outcomes. Finally, Kaestner and Elizabeth Tarlov note that reform can affect health via employment stress, organizational stress, and financial stress.[36]

Many states obtained AFDC waivers in the early 1990s to implement aspects of welfare reform prior to the 1996 legislation. This source of variation and the gradual adoption of Temporary Assistance to Needy Families (TANF) — the new welfare program created by (PRWORA) — has enabled program members to explore the hypotheses listed above in the decade of the 1990s, a period during which the number of welfare recipients fell by approximately 60 percent. Joyce, Kaestner, and Korenman find no consistent evidence that welfare reform, measured in a general manner by whether a state had implemented an AFDC waiver or TANF, reduced rates of non-marital childbearing among women aged 19 to 39 at highest risk of welfare use, relative to women at lower risk.[37] This finding is similar to the literature that found little or mixed evidence for an effect of AFDC benefits. Joyce, Kaestner, Korenman, and Henshaw focus on the family cap and consider abortion rates as well as birth rates as outcomes.[38] In family cap states, birth rates fell more and abortion rates rose more among high-risk women with at least one previous live birth compared to similar childless women, consistent with an effect of the family cap. This parity-specific pattern of births and abortions, however, also occurred in states that implemented welfare reform with no family cap. Thus, the effects of reform may have differed between mothers and childless women, but there is little evidence of an independent effect of the family cap.

Kaestner and Lee find that welfare reform had relatively small effects on the prenatal care use and infant health of less-educated unmarried women.[39] For single mothers with less than 12 years of education, their upper-bound estimates of the impact of reform are a 2 percent decrease in first trimester care, a 10 percent increase in last trimester care, a 1 percent decrease in the number of prenatal care visits, and virtually no change in birthweight. Kaestner and Tarlov indicate that reform had little impact

on measures of physical and mental health reported by low-educated single mothers.[40] The probability that these women engaged in binge drinking fell, however, and the probability that they engaged in regular and sustained physical exercise rose.

Taken together, the studies just summarized suggest that welfare reform did not reduce fertility among women at risk of poor birth outcomes, but it also did not reduce infant or adult health and may have improved certain healthy behaviors.

The Cost of Medical Care

Determinants of Interest Rates on Tax-Exempt Hospital Bonds

The United States spent $1.55 trillion on medical care in 2002. At 35 percent, hospital services accounted for the largest component of this spending. Consequently, the prices of inputs used by hospitals play a major role in determining the total cost of medical care. Hospitals obtain most of their capital from the proceeds of bonds issued on their behalf by quasi-governmental state, county, and city finance authorities in the tax-exempt municipal bond market. These bonds are backed by hospital revenue, and the hospital rather than the issuer is responsible for interest and principal payments. Their interest rates are the primary factor influencing the price of hospital capital and have the potential to have significant impacts on total medical spending. Yet the tax-exempt hospital bond market and the determinants of interest rates on these bonds has received little attention in the ongoing debate on health care reform.

Alec Ian Gershberg, Fred Goldman, and I try to address this imbalance by exploring the effects of two kinds of competition on the cost of hospital capital in the tax-exempt bond market.[41] The first is competition among underwriters. A hospital can select an underwriter either by soliciting competitive sealed bids or by negotiating directly with an investment banker. The second is competition among issuers. This arises because authorities that issue bonds charge for their services and because some states allow more competition among them than others.

With regard to competition among issuers, my colleagues and I find that departures from equality in market shares among issuers raise interest rates by 22 basis points (1 basis point equals 1/100 of 1 percent). With regard to competition among underwriters, interest rates would fall by 54 basis points if competitive bidding procedures to select underwriters completely replaced negotiated procedures. To give some perspective and sense of scale, a 76 basis point reduction for all 1,152 bonds issued in 1993 would have yielded $1.52 billion in terms of the present value of interest cost savings in 1993 dollars and almost $2 billion in 2002 dollars. This translates into a savings of approximately 5 percent of the total real par value of bonds issued in a typical year in the 1990s.

Managed Care and Hospital Prices

In the past three decades the rapid growth of managed care has dramatically changed the way in which medical care services are financed and delivered. Thirty years ago patients and providers determined the type and quantity of services to be delivered. Insurers reimbursed providers on a fee-for-service-basis. Today, the majority of patients are enrolled in managed care plans that restrict provider choices by patients, limit services, and bargain with provider networks to obtain lower prices. In a widely cited study David M. Cutler, Mark McClellan, and Joseph P. Newhouse show that managed care plans have 30 to 40 percent lower expenditures than traditional health insurance plans in the case of treatment for heart disease.[42] They also show that both actual treatments and health outcomes differ little and that almost all the difference in spending comes from lower unit prices. They point out that their findings suggest that medical care costs can be substantially reduced with little or no effect on the quality of care but are careful to question whether their findings generalize to the medical care system as a whole. In particular, they pertain to a small sample of heart disease patients who are employees of a single firm in Massachusetts. Moreover, they do not estimate separate price discounts for specific treatments received by heart attack victims.

In two related studies, Avi Dor, Siran M. Koroukian, and I extend the research just described by considering managed care discounting of hospital transactions prices for bypass surgery and for angioplasty in a large national sample of patients employed by 80 large firms.[43] For bypass surgery, managed care price discounts range from 9 to 24 percent, and for angioplasty, they range from 8 to 24 percent. These results control for patient and provider heterogeneity. In a qualitative sense they buttress the findings by Cutler, McClellan, and Newhouse although the magnitudes of the discounts are somewhat smaller.

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Life Annuities and Uncertain Lifetimes

Jeffrey R. Brown*

As the baby boom generation begins the transition into retirement, concerns about retirement income security are rising in importance on the agenda of policymakers and academic researchers across the globe. Recent decades have witnessed many changes to the retirement income landscape, including the shift from defined benefit to defined contribution pension plans in the United States and the introduction of personal accounts as part of public pensions systems in dozens of other countries. A common theme in these changes has been a shift toward increased individual self-reliance in retirement planning.

While researchers and policymakers have placed enormous attention on the accumulation phase of retirement accounts, such as how individuals save and invest, they are becoming increasingly aware that asset accumulation is only part of the retirement security equation. The other part is how individuals convert their accumulated savings into a retirement consumption stream, particularly when most of us do not know how long we will live. Indeed, uncertainty about length-of-life is one of the most significant sources of financial risk facing today's retirees.

Dramatic advances in life expectancy over the last century mean that today's typical 65-year old man and woman can expect to live to age 81 and 85 respectively. Perhaps even more striking is the fact that almost a fifth of 65-year-old men and nearly one-third of 65-year-old women will live to age 90 or beyond. Without appropriate financial planning during retirement, increased longevity means that individuals face a greater risk of being forced to substantially reduce their living standards at advanced ages.

Life annuities are financial instruments that allow an individual to exchange a stock of wealth for a stream of income that continues for life. An annuity provider, such as an insurance company or the government, pools the resources of annuitants and uses the resources of those who die young to fund increased consumption for those who live a long time. Because of their ability to insure against the consumption uncertainty that arises from longevity risk, life annuities have played an important role in economic models of consumption for at least four decades, and recently have begun to attract considerable policy attention as well. This article provides a brief summary of the rapidly growing body of research dedicated to better understanding annuity markets in the United States and abroad.

Annuities in Economic Theory

In a seminal article published over four decades ago, Menachem Yaari incorporated lifespan uncertainty into a standard life-cycle consumption model.[1] He showed that a rational consumer with no bequest motives ideally would place all of his wealth into actuarially-fair life annuities instead of conventional bonds. My recent work with Tom Davidoff and Peter A. Diamond[2] extends this result by showing that, with complete markets, this full annuitization result holds in a much more general set of circumstances than originally believed. Indeed, many of the usual assumptions imposed on consumer preferences in standard economic models (exponential discounting, adherence to expected utility axioms, lack of habit formation) are unnecessary. Neither must annuities be actuarially fair, nor longevity risk the only source of consumption uncertainty. We further show that this result holds for annuities backed by risky assets as well as bonds, including variable annuities offered by private insurers such TIAA-CREF. All that is required is that consumers have no bequest motive and that annuities pay a rate of return for survivors greater than those of otherwise-matching conventional assets, net of administrative costs. While the addition of a bequest motive makes complete annuitization less than optimal, some annuitization is still desired under standard parameterizations.

Given these theoretical results, the natural "jumping off point" for economists studying retirement income is that annuities ought to play an important role in the portfolios of elderly households.

So Why is the Annuity Market So Small?

If ever there were a prediction of economic theory that was blatantly violated by the empirical evidence, it is that of full annuitization. Indeed, outside of Social Security and traditional defined benefit pension plans, very few assets in the United States are converted into life annuities. As I have documented in various papers with Olivia S.

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Mitchell, James M. Poterba, and Mark Warshawsky[3], the market for privately purchased individual annuities in the United States is very small. Furthermore, few individuals avail themselves of the opportunity to "purchase" a higher level of annuitized income through Social Security, which can be done by delaying the claiming of benefits.[4]

Given the remarkable disconnect between theory and practice, it is natural to ask why more individual do not purchase life annuities. A large body of work has examined various explanations for this phenomenon, with somewhat mixed results. In order to test the empirical validity of the standard economic model itself, I studied the annuitization intentions of near-retirees in the Health and Retirement Survey.[5] I found that a measure of annuity value, derived from a life-cycle model with mortality uncertainty, is significantly correlated with intentions to annuitize assets in defined contribution plans. However, I also found that most of the variation in annuity decisions is unexplained by the standard model. In fact, for the approximately one-fifth of the population that have very short time horizons, the standard model has virtually no predictive power. One key factor that did not have empirical power to explain annuitization decisions is a bequest motive, that is, a desire to leave wealth to one's children.

Given the rich focus in the economics literature of the past few decades on the role of asymmetric information in insurance markets, a natural hypothesis to consider is the role of pricing. In particular, is it the case that private market annuities are just too expensive, either because of high industry costs and/or profits, or because of adverse selection? Mitchell, Poterba, Warshawsky, and I[6] find that mortality differences between annuitants and the general population reduce annuity payouts by about 10 percent, and that other cost factors reduce payouts by an additional 5 percent. Similar findings hold in other private annuity markets around the world, for example the United Kingdom.[7] However, using a standard life-cycle consumption model, we also find that risk averse consumers ought to be willing to pay even more for these annuities than current market prices require. This finding remains true even after accounting for the presence of pre-existing annuities such as Social Security.

In later work[8], we explore how inflation uncertainty and asset market risk interact with longevity risk, a particularly relevant concern given that most annuity contracts offered in the United States are fixed in nominal terms. Our research underscores the fact that inflation-indexed annuities serve an important role as a core holding in the portfolio of retirees, but that some exposure to equity-linked annuity products can further improve individual welfare. However, this research also finds that the lack of privately available inflation-indexed annuity products, driven at least in part by the pre-1998 lack of inflation-indexed government bonds that are desired by insurers to hedge the inflation risk, was probably not the cause of the limited consumer demand.

A more promising result, from the perspective of attempting to solve the "annuity puzzle," came from the recognition that families can serve as partial substitutes for private annuity markets, a point first recognized by Laurence J. Kotlikoff and Avia Spivak[9]. Poterba and I[10] find that married couples who pool their retirement resources using a common budget constraint are able to pool mortality risk fairly effectively. As a result, couples should value annuities significantly less than single individuals. And, when combined with existing market-based pricing loads, this may be enough to explain the lack of annuity demand by a large segment of the population. It also suggests that it may be worthwhile for a survivor to annuitize upon the death of a spouse.

In recent work, Davidoff, Diamond, and I explain in a theoretical model how market incompleteness can "undo" the full annuitization result. One interesting implication of this work is that it may be the incompleteness of other markets that ultimately may limit the purchase of life annuities. This is because most standard annuity contracts impose liquidity constraints on individuals, constraints that can be costly in welfare terms if they cannot be undone through the use of other asset markets.

A brief summary of the literature suggests that, within the standard economic framework of a rational life cycle decisionmaker, the most promising explanations for limited demand are risk sharing within couples and families and the imposition of liquidity constraints. The evidence does not support a major role for pricing, inflation risk, or bequest motives.

Annuities and Public Policy

Aside from theoretical interest in the question of who annuitizes and why, annuitization has become an increasingly visible issue within retirement policy circles. The policy debate has been ignited by two issues. First, one result of the shift from defined benefit to defined contribution plans has been a reduction in opportunities for annuitization, for example, because few 401(k) plans even offer an annuity option.[11] Second, the debate about the role of personal accounts in Social Security has elevated the issue of how best to structure payout rules to provide for lifelong financial security of participants.

A central question in regulating withdrawals from public or private pension systems is the extent to which life annuitization should be required or encouraged. The standard economic models provide one rationale for compulsory annuitization, namely that many individuals would find it welfare enhancing. And in the absence of compulsion, adverse selection might limit the market and lead to unfavorable pricing. Furthermore, in the presence of means-tested anti-poverty programs, policymakers may wish to guard against allowing individuals to deplete their retirement savings rapidly and then become reliant on these programs. However, compulsory annuitization may over-annuitize some individuals because of bequest motives or liquidity constraints. Furthermore, compulsory annuitization has the potential to lead to significant financial redistribution from poorer to richer families.

An influential paper on over-annuitization previously had suggested

that significant life insurance holdings among the elderly were evidence of over-annuitization by Social Security.[12] Using a more recent and richer set of data on retirees, I re-examined the implications of this "annuity offset" hypothesis and found little evidence to support the idea that retirees are trying to sell annuities by purchasing life insurance.[13] Instead, a substantial portion of life insurance ownership among the elderly appears to be a residual of decisions made earlier in life to insure against the loss of human capital.

Concerns about redistribution arise from the fact that life annuities, by their very design, transfer resources from individuals who die young to individuals who live a long time. The policy issue arises from the fact that not all individuals face the same mortality probability distribution. Numerous studies have documented the negative correlation between mortality rates and various measures of socioeconomic status, such as income, wealth, education, race, and ethnicity.[14] Using mortality rates that differ by age, gender, education and race/ethnicity, I have examined distributional issues in two papers. The first documents how a system of mandatory annuitization at a uniform price leads to substantial expected transfers from high mortality risk individuals (for example, low education groups)[15] to low mortality risk individuals (for example, high education groups). A second paper embeds this analysis into a life-cycle valuation framework, and finds that the extent of redistribution is significantly mitigated when viewed from a utility-based perspective.[16] This is because high mortality-risk individuals have more to gain from access to annuity markets: in the absence of such markets, they would have to set aside resources to provide consumption for an old age that they are highly unlikely to reach.

Conclusions

Taken as a whole, the growing literature on annuities underscores the importance of considering how individual consumers treat mortality risk when making portfolio decisions. Despite important advances in this area, however, there is much that we still do not understand. It is important that research in this area continue to improve our understanding of how retirees make retirement portfolio decisions and thus inform the design of retirement income policies.

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Housing Supply

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In 1981, Lawrence Summers noted the 35 percent increase in real housing prices between 1965 and 1980 and argued that this increase could be explained by inflation. Summers[1] and Poterba[2] persuasively showed that higher levels of inflation increase the interest rate subsidy on home mortgages and essentially shift out the demand curve for housing. Ten years later, Mankiw and Weil[3] argued that demographics drive housing demand and, because of falling demand, housing prices will experience painfully slow growth by the year 2000.

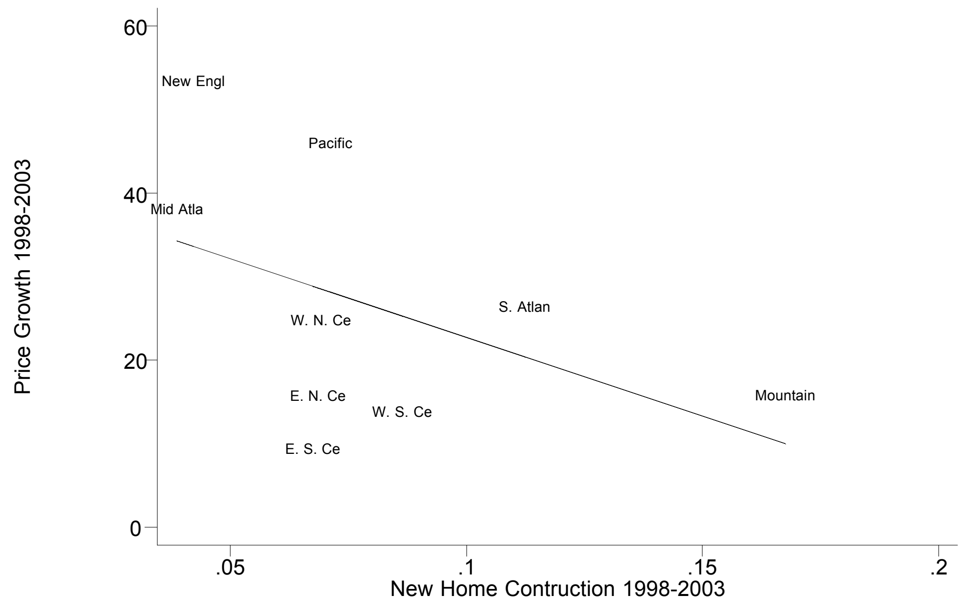
The appropriate renown of these papers indicates the degree to which demand-side analysis has dominated the housing literature, but an increasing body of facts is beginning to challenge this orientation. It is becoming increasingly obvious that we must understand housing supply if we are to understand booms and busts in housing prices. Over the past five years (1998-2003), despite low inflation and the baby bust, real housing prices increased by 25 percent, according to the Freddie Mac Repeat Sales Index. During the 1975 to 1980 period, when inflation was soaring and baby boom children were moving out of their parents' homes, the same index showed real housing price increases of less than 20 percent.

Rising housing prices over the past ten years can always be explained by another omitted shifter of demand. However, evidence on construction suggests that demand alone cannot provide the answer. For example, in Manhattan, before 1975, housing price growth was modest, and there was abundant new construction. Since 1980, housing prices have soared and there have been few new units.[4] The physical character of Manhattan has not changed between 1960 and today. If the rise in housing prices during the 1990s were the result of demand pushing along a stable supply curve, then surely we would see an explosion in new construction as we did in the past. The increasingly common combination of rising prices and tiny amounts of construction pushes us to focus on housing supply.

Differences across regions confirm the need for supply-side analysis. If the heterogeneity in price growth with the United States were the result of different patterns of demand, then we would expect to see quantities and prices move together. Places with high price growth would be places with new construction. Figure 1 graphs the rate of housing price growth (again using to the Freddie Mac Repeat Sales Index) and permits for new housing units (divided by the stock of housing units in 1990) between 1998 and 2003 across census divisions. There is a negative 50 percent correlation between price growth and new construction.

The places that are building have little housing price appreciation and

Figure 1: Rising Home Prices and New Construction



High housing prices are not ubiquitous. The median housing value in the median **county** in America in the 2000 census is $75,300. More than 95 percent of countries have median housing values below $160,000. Soaring home prices are primarily coastal phenomena that have left the growing states of the American interior untouched.

the places that have housing price appreciation are not building. Demand alone can't explain the difference in housing price growth between New England and the South Atlantic. Florida alone permitted almost as many homes in 2002 as all of New England did over the entire five-year period. If we want to understand why housing is so expensive, then we must

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understand why housing supply in New England, the Middle Atlantic States, and California has become so inelastic. Housing supply research is also necessary because regional growth rates depend on the rate at which these regions build homes.

Certain aspects of housing supply are straightforward. The construction market is competitive. According to the 2001 County Business Patterns, there are almost 215,000 establishments engaged in building, developing, and general contracting and 146,000 engaged in building single-family homes. Small contractors often thrive, so it is hard to imagine meaningful technological barriers to entry.

The physical costs of building homes are better understood than the costs of supplying most other commodities. Firms like R. S. Means have long surveyed contractors and provide extensive data on the average physical costs of building new units. While custom and high quality work costs more, many coastal professionals are surprised to learn that most single-family detached homes appear to cost around 80 dollars per square foot to build. In much of the country, $160,000 would be a reasonable price for a new 2,000 square foot home, so this shouldn't surprise us too much. Building taller buildings costs more and can reach as high as 250 dollars per square foot.[5] The time-series evidence suggests that these physical construction costs don't vary much over space, they don't vary much with short-term fluctuation in aggregate construction, and they have been declining secularly since the 1970s. Raw ingredients (for example, lumber) have been getting cheaper in real terms and firms have become more efficient.

Housing requires both land and structure, but there is an overwhelming quantity of cheap land in America. The Department of Agriculture assesses land values throughout the United States and the values of farmland range from about $200 per acre in New Mexico to $7,000 per acre in New Jersey. The U.S. average is $1,000 per acre, and even in California the average value of farmland is only $2,000 per acre. Even at $7,000 per acre, the cost of supplying a half-acre lot is quite small, both in absolute terms and relative to the physical costs of building.

These simple facts explain why housing remains and will remain inexpensive in most areas of the country. In the expanding cities of most of America, the automobile and other changes in transportation technologies have enabled firms and workers to decentralize and move factories and homes together into one-time farmland.[6] When employment was constrained to stay at the city center, housing with access to the center became expensive as the city grew. But in decentralized cities, there is no advantage to being in the center and as a result, rent gradients within the city disappear.[7]

Because the development of edge cities involves endless conversion of farmland into homes, the costs of construction remain tied to the physical costs of construction. Housing supply in the growing edge cities of the Sunbelt is almost perfectly elastic. It doesn't really matter whether the demand for housing in Las Vegas rises even more (it was America's fastest growing large city in the 1990s[8]), housing prices will remain low because prices remain tied to construction costs.

Of course, even where housing supply is perfectly elastic with respect to positive shocks, housing supply is inelastic with respect to sufficiently negative shocks. Because housing is fixed and durable, a major drop in housing demand can always cause prices to fall. This explains why cities decline so slowly and why declines show up in falling housing prices long before they show up in falling population levels.[9] Indeed, the growth in housing prices in New England has been so spectacular in part because 20 years ago New England was declining and housing cost less than the physical costs of replacing the buildings.

So, if America has so much land, and if the physical costs of construction don't increase much with the amount of new construction, why is so much housing so expensive? In Manhattan, the average price for condominiums has topped 600 dollars per square foot. In San Francisco suburbs like Marin or San Mateo counties, median housing values hover around $500,000. The physical costs of new construction do not explain these high prices. Something else must be making supply inelastic.

There are two primary hypotheses about why housing supply has become so inelastic in some areas. The first is that these places are high density and they are simply running out of land. This suggests that the heterogeneity in Figure 1 could be explained if we only controlled for the initial density in the area (it can't). The second hypothesis is that high housing prices are the result of land use regulation, which deters new construction, not the absence of land. This suggests that cross-space and cross-time variation in housing prices are best understood as the result of increasingly tough regulation of developers. This regulation of course may be a good thing. Developers do not naturally internalize every externality. Still, according to this hypothesis, regulation — not land shortage — lies at the roots of high housing costs.

Joseph Gyourko and I have conducted a series of tests trying to distinguish between these two hypotheses. We looked at whether home prices are higher in metropolitan areas with less land per capita. This is not the case. Many of the most expensive California areas are actually quite low density. Conversely, measures of the regulatory environment (such as the time it takes to get a building permit) do correlate well with high housing costs across metropolitan areas.[10]

A second test of the land shortages hypothesis is whether a law of one price for land holds in a given area. In the absence of regulation, the price of a quarter acre of land should be the same whether it increases the lot size of one homeowner from .25 to .5 acres or if whether it provides the lot for a new home. In a free market, if the land was worth more sitting under a new home, then the half acre lot would be subdivided, but in a regulated market, a .25 acre lot (that include the right to have one house on that lot) may be worth almost as much as a .5 acre lot (that also includes that same right).

To test this hypothesis, we meas-

ure the value of land in two ways. We use traditional hedonic regressions that compare the value of supposedly otherwise identical homes with different size lots. These regressions estimate the value of extra land surrounding a house. We then measure the value of land by subtracting the construction costs of a home from its value and then treating the residual as the value of land. Other things, like site preparation, go into this residual, but we can estimate these costs by looking at the residuals across the country.

If high costs of housing are driven by land shortages and regulation is irrelevant, then these two different ways of estimating land prices should yield the same result, and in the less regulated, growing areas of the country, the estimates aren't far off. However, in the high cost areas — California and the Northeast — the hedonic price of land is about one-tenth of the value of land estimated by subtracting construction costs from housing values. As any developer knows, you could make a fortune buying homes in suburban Boston or San Francisco, subdividing the lots, and building new homes. These results support the regulation hypothesis.

In a recent paper[11], we turn to Manhattan. Manhattan certainly lacks land and historically, its high costs have come from the high cost of building up. However, without regulation, the cost of an apartment should not be much more than the cost of building up. Manhattan had many 15 and 20 story apartment buildings erected during the 1990s. In the absence of regulation, these buildings could have had 30 or 40 stories instead and if construction costs and apartment prices diverge, developers would want to build up. Without regulation, the price of an apartment in Manhattan should stay close to the marginal cost of supply, which is always the cost of building one more story. The fixed costs of an apartment building, including land, do not increase as you raise the building another story.

Using a variety of different sources, we measure the costs of building up. We look at the R.S. Means data and data from their competitors. We look at costs for high rise apartments outside of New York, which can't be below construction costs in those cities, and then try to adjust these costs to reflect higher labor and material costs in New York. We talked to developers. All in all, most estimates of the marginal cost of building up are below 200 dollars per square foot. Yet Manhattan apartments are selling for more than 600 dollars a square foot. There is no technological barrier to making Manhattan even taller. We are driven to believe that high housing costs in Manhattan are not the result of lack of land but rather the result of regulatory barriers to new construction. This conclusion is buttressed by the time-series evidence discussed earlier. Before 1980, despite high density levels, there was a lot of new building in Manhattan. During that era, apartment costs were close to the price of new construction. Since 1980, new construction has fallen and prices have soared.

Increasingly inelastic housing helps to explain high housing prices on the American coasts. This inelasticity is itself the result of an increasingly tough regulatory environment that deters new construction. The big question that remains is: what are the causes of these regulatory changes? Why is San Francisco so toughly regulated, but not Las Vegas? Why was Los Angeles a developer's dream in the 1960s, but not today? To understand the rise in housing prices, we must understand how local homeowners have become increasingly interested in blocking new construction and increasingly able to do so.

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Taxes, Competition, and the Information Economy

Austan Goolsbee*

The growth of the information economy — the Internet, computers, media, and the like — has generated massive amounts of debate in popular and policy circles. More than that, though, it has raised many interesting subjects for economic research. My work in the area has focused on two general topics: the impact of tax and other government policies in the information economy, and the nature of industrial competition on the Internet and in other information-based industries. In general, the findings have tended to suggest that the responsiveness to price, tax, and other types of shocks in these industries is surprisingly high.

Taxes and the Information Economy

The rapid rise of the Internet certainly has made policymakers nervous about how online retail sales may serve to undermine the sales tax base of the states. Internet sales are treated the same way as catalog sales for tax purposes, which is to say that sales tax applies to all transactions, in principle, but cannot be enforced, in practice, because of legal restrictions. States are not allowed to require out-of-state merchants to collect sales tax on their citizens, so Amazon.com in Washington is not required to collect sales tax on sales to customers in Illinois, for example, where it has no employees or physical presence. As almost no private citizens are voluntarily paying the taxes on such transactions, it's as if they were tax-free.

Using a large dataset on the online purchase behavior of consumers around the country, I examined how much this tax break matters for the probability of buying online.[1] The idea is that living in a place with a sales tax of 5 percent raises the relative price of buying in a store relative to the Internet by 5 percent so should make buying online more likely. The equivalent of charging sales tax online would be moving to a state like Delaware that has no sales tax at all (so the relative prices are unaffected). The data show that customers' online buying is quite sensitive to local sales tax rates. Controlling for individual observables and for MSA effects, people living in higher sales tax places are more likely to buy online and this effect is largest for goods like books and computers (where sales tax definitely would apply) and non-existent for things like mutual funds and stocks (where there is no sales tax). The data suggest enforcing sales taxes online, at the time of the sample, would have reduced the likelihood of buying by almost 25 percent.

In a follow-up piece, I used later data to reexamine the elasticity and to determine if consumers had become less tax sensitive as a greater share of the country went online.[2] The interesting thing was that in both the older and the newer cross-sections, only Internet veterans, those online for two or more years, were responsive to taxes. New users were not sensitive to tax rates at all. Since the Internet had been growing something like 100 percent per year at that point, it suggested that the tax problem might diminish over time. The problem was, the follow-up data showed that with the passing of time, the formerly new users had become just as sensitive to tax rates as the Internet veterans. People, evidently, learn how to use the Internet to avoid sales taxes the longer they are on line.

In work with Jonathan Guryan, I look at the issue of tax subsidies for Internet adoption in public schools through the e-rate program.[3] This subsidy of $2.25 billion per year amounted to as much as 35-40 percent of the entire computer budget of U.S. public schools combined and is funded through a tax on long-distance telephone service (which is not without controversy in itself for being a tax with a particularly high deadweight loss.[4]) The program subsidizes Internet access and communications technology up to 90 percent (poorer schools get higher subsidies) but following a formula with several discrete jumps. We use the step-function nature of the subsidy to identify the impact of the subsidy on Internet investment while controlling for the characteristics of the schools. The evidence suggests that schools are quite responsive to the subsidy rate in their decisions about investing in Internet technology and that the program increased connections by more than 60 percent. When we use the increased connection to the Internet to examine the impact of the technology on student outcomes, the results are not so encouraging. We could find no evidence that the increased Internet connections in classrooms improved measured educational outcomes like test scores, graduation rates, or the share of people choosing to take more advanced classes in any way.

I also have looked at the role of taxes on executive compensation in high-tech and information-based industries.[5] I find that the extensive use of stock options in those industries, and the ease with which executives can use stock options to change the timing of their compensation for tax purposes, implies that the short-run sensitivity of reported income to marginal tax rates is extremely high there, even larger than for executives overall.[6] Also,

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predicting the revenue effects of tax changes is difficult because of the blurring of the distinction between capital and labor income on tax returns for people in such industries. Because changing capital gains tax rates can lead executives to exercise options (which are typically treated as ordinary income on a tax return), for example, the tax rate on capital gains can lead to large unanticipated fluctuations in labor income in the tax data.

Competition and the Industrial Organization of the Information Economy

Competition between firms in information-based industries also has become a topic of academic interest in the last few years. Motivated by the work on sales taxes that seemed to imply significant competition between online and offline sellers, I have examined the competition between Internet and retail merchants directly.

One paper uses individual-level purchase data on personal computers to examine the competition between online sellers like Dell with traditional retail brands like HP.[7] Using a hedonic regression for computer prices with city dummies, I compute a cross-city retail price index for computers. I then look at the likelihood of buying online as a function of the retail price of computers in the individual's city. People living in places where retail store prices are higher are more likely to buy their computers online. Conditional on buying a computer, the elasticity of buying a computer remotely with respect to local retail prices is around 1.5.

In a second paper, Jeffrey R. Brown and I look at the impact of the Internet as a source of information on offline prices that may reduce search costs.[8] In the case of term life insurance, we show that insurance prices, even for policies with identical policy characteristics, have fallen substantially since Internet comparison sites began listing multiple price quotes, and the price declines have been correlated directly with the states and the years in which Internet usage grew most. We show that this cannot be explained by falling mortality or other standard explanations. Further, we show that the relationship between price changes and Internet growth does not hold for whole-life policies, which have not been covered by most of the web search engines. The relationship did not start to hold until the search engines actually began (that is, internet growth before there were insurance sites was not correlated with price declines). Overall, the rise of the Internet may have reduced term life prices by as much as 10-15 percent.

In joint work, Judy Chevalier and I examine the competition between online booksellers Amazon.com and Barnes and Noble (BN.com).[9] We use the stated sales ranks for books on each site to derive a measure of quantities sold (after first showing that sales can be approximated well by a Pareto distribution). Using information over time and across sites, we show that both sites have significant own- and cross-price elasticities but that demand differs substantially across the two sellers. The own- and cross-price terms at Barnes and Noble indicate that the customers there are extremely price sensitive. Amazon customers are dramatically less so.

In another paper, Amil Petrin and I examine the competition between Direct Broadcast Satellites (DBS) and cable television.[10] With micro data on the television choices of thousands of individuals, we are able to estimate a discrete choice model of demand but we do so in a way that allows for correlation of unobserved tastes across products; this means that people who, after controlling for observable characteristics, like Satellite also may be the kind of people who like premium cable. This correlation ends up being quite important. The results show that the demand for satellite and premium cable are more closely tied than satellite is to expanded basic or antenna-only reception, despite the small market share of premium cable. A more standard logit model yields very different results. We find that demand for premium and for DBS are fairly elastic while demand for expanded basic is relatively less so. We also address the issue of how cable companies responded to the rise of DBS in their pricing and quality decisions, showing that if there were no satellite competition, prices would be about 15 percent higher than they are and the quality of cable would be lower. The total consumer welfare gain (combining the gains to the DBS adopters and the price and quality improvements to cable for the DBS non-adopters) likely exceeds $5 billion per year.

Peter J. Klenow and I have examined the spread of home PCs and the role of spillovers and network externalities, looking at how the adoption decision of people in nearby geographic areas influences the future adoption of novice users.[11] We find that people are more likely to buy their first home computer in areas where a high fraction of households already own computers, or when a large share of their friends and family own computers. Further results suggest that these patterns are unlikely to be explained by city-specific unobserved traits. When we look at the spillovers in detail, they appear to derive only from the proximity to a small group of experienced and intensive computer users. The spillovers are not associated with the use of any particular type of software, but do seem to be highly tied to the use of e-mail and the Internet, consistent with computers being part of a local information and communications network.

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Taxation and Household Portfolio Behavior

James M. Poterba*

The personal income tax has a critical effect on the rate of return that households earn on their investments. Taxes reduce the rate of return, and they do so to different degrees for different assets. Assets that generate mostly capital gains, for example, historically have faced lower tax burdens than those that generate either interest or dividend income. Assets that are held in tax-deferred retirement savings accounts, such as Individual Retirement Accounts or 401(k) plans, face lower tax burdens than assets that are held outside such accounts.

Much of my recent research has explored the impact of income tax rules on household portfolio behavior. Investigating whether households recognize the incentives that are built into the income tax code, and then studying whether they change their behavior in response to these incentives, is one of the perennial research missions of empirical public economics. Investigating these issues in the portfolio choice setting is particularly attractive because the tax rules are reasonably clear and subject to frequent change. Many of the behavioral changes that one might expect in response to capital income taxes, such as selling assets with accrued losses or holding tax-exempt rather than taxable bonds, are also easier to implement than the behavioral changes that might be associated with tax incentives for labor supply or homeownership.

Households may choose to invest in a wide array of financial assets, and there are often asset-specific tax rules that determine the relationship between pretax and aftertax returns. Part of my research has focused on taxpayer response to specific tax rules on particular classes of assets, while another part has explored more broadly how the structure of household portfolios, and the allocation of portfolio assets between taxable and tax-deferred accounts, is affected by taxation.

Capital Gains Taxation and Investor Behavior

The capital gains tax is one of the most widely-studied components of the U.S. tax code. Because gains are taxed only when they are realized, investors have some control over their tax burden. By delaying the sale of an asset that has increased in value, investors can defer their capital gains tax and thereby reduce the present discounted value of their tax liability. Conversely, by realizing a loss as soon as it accrues, an investor can benefit immediately from any tax relief that may be provided on loss realizations. A critical issue in the design of the capital gains tax is the extent to which capital gains taxation distorts trading behavior by taxable investors.

Zoran Ivkovich, Scott Weisbenner, and I[1] have investigated capital gains lock-in using data on individual brokerage account transactions. We compare the trading decisions of individuals who own both taxable and tax-deferred accounts. Since the capital gains tax affects gains and losses realized in the taxable account, but not those in tax-deferred accounts such as IRAs and Keogh plans, we can test whether taxes affect trading behavior. We find pronounced differences in trading between the two accounts. While there is a high degree of turnover in both accounts in the first few months after a stock is purchased, we find that by six months after purchase, realization probabilities for gains in the taxable account are substantially below those for tax-deferred accounts. We also find that losses are more likely to be realized if they occur in a taxable account rather than a tax-deferred account.

"Basis step-up at death" is an aspect of the current capital gains tax that figures prominently in the estate planning and asset trading decisions of many investors, particularly those at advanced ages. The tax on capital gains that accrue during an investor's lifetime, but are never realized, are not taxed if the assets are bequeathed to another individual. The tax basis in such assets is "stepped up" to the market value at the time of death. Current proposals for estate tax reform call for reducing the basis-step up provision of the capital gains tax with a carry-over basis rule that would make the recipient of a bequest taxable on the appreciated value of inherited assets. Weisbenner and I compare the current estate tax burden with the capital gains tax burden under this alternative tax regime.[2] We find that the shift to a carry-over basis would substantially reduce the total tax burden on assets that generate capital gains. I also have studied whether taxpayers whose wealth consists largely of appreciated assets are less likely to make inter vivos transfers than taxpayers with similar wealth but smaller accrued gains.[3] My findings suggest that households recognize the potential value of basis step-up, and that they defer gifts and leave larger bequests when the tax benefits are substantial.

Researchers in both public finance and financial economics have studied whether tax rules have a pronounced effect on asset pricing and the pretax returns on various financial assets. In an example of such research, Weisbenner and I explored whether realization of capital losses at the end of each calendar year contributes to

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the widely documented "January effect" in stock market returns.[4] On average, stocks that have performed poorly in a given calendar year have earned above-average returns in the first few days of the next year. This is often attributed to prices rebounding from selling pressure associated with year-end tax loss harvesting. We tested this hypothesis by analyzing whether changes in the short-term capital gains tax holding period affected the relationship between monthly returns in the previous two calendar years and subsequent January returns. Our findings confirm the importance of tax considerations in year-end trading and in subsequent returns. When the holding period for long-term capital gains begins after six months, returns in the second half of the calendar year have a particularly important impact on January returns. This is consistent with investors in such stocks being particularly eager to realize such losses before year-end, and thereby to claim their associated income tax relief. Loss realizations are more valuable when the losses are short-term than when they are long-term. We interpret our evidence linking changes in the tax law appear with changes in the relationship between past and future returns as showing that the tax law has an important effect on loss realization decisions and in turn on market returns.

Taxation and Mutual Fund Investment

Mutual funds were one of the most rapidly growing asset classes of the 1990s. They are also governed by special tax rules. Under the terms of the Investment Company Act of 1940, funds must "pass through" their capital gain realizations to their investors. A buy-and-hold mutual fund investor therefore can face capital gains tax liabilities if a mutual fund manager sells appreciated assets, even if the fund investor does not sell his shares. There are substantial differences across mutual funds in the turnover rate for underlying assets, and consequently in the tax burdens that are passed through to investors. Daniel Bergstresser and I investigated whether mutual funds that imposed smaller tax burdens on their shareholders, conditional on their pretax returns, attracted larger flows of new investment than comparable funds with similar pretax but lower aftertax returns.[5] Our results, based on a large sample of equity mutual funds between 1993 and 2001, suggest a clear relationship between tax burdens and inflows. Because our analysis focused on the aggregate flows into different mutual funds, our findings only show that some investors appear to be sensitive to taxes. They cannot calibrate the fraction of taxable investors who are tax-conscious, nor distinguish tax-conscious from tax-oblivious investors.

A related project on mutual funds with John Shoven examined the tax treatment of a new class of mutual fund known as exchange-traded funds (ETFs).[6] These funds use a strategy known as "redemption in kind" to avoid making large taxable distributions to taxable buy-and-hold investors. We compared the aftertax returns on one of the largest ETFs, the SPDR fund that holds the stocks in the Standard and Poor's 500 Index, with the aftertax returns on large index funds. We found that the aftertax returns differed by very little for the two types of funds. The tax advantage associated with the ETFs was roughly offset by a higher pretax return for the traditional index fund during our sample period. Our results suggest that going forward, ETFs that hold broad and diversified baskets of equity securities are likely to generate returns and tax burdens that are similar to those on low-cost equity index funds.

Taxation and Asset Selection

My research on capital gains taxation and on mutual funds focuses on a specific investment option or financial asset class, but the income tax system has more systematic effects on household financial behavior. I summarize these potential effects, and the empirical evidence on their magnitudes, in two overview papers.[7] Andrew Samwick and I also develop new empirical evidence on how the tax code affects the structure of household portfolios, and in particular the likelihood that a household will own a particular asset.[8] We use data from the 1998 Survey of Consumer Finances, and we focus on the decision to invest in broad asset categories such as taxable equity, taxable bonds, tax-exempt bonds, and equity mutual funds. Our findings suggest that income tax rates are significant determinants of household portfolio decisions. Those with higher marginal tax rates are more likely to hold tax-exempt assets, either by investing in tax-exempt bonds or by channeling a high fraction of assets into tax-deferred accounts.

Investment in Tax-Deferred Accounts

One of the most striking financial market developments of the last two decades is the rapid rise in the value of assets held in tax-deferred retirement saving accounts, such as IRAs and 401(k) plans.[9] Steven Venti, David Wise, and I have studied the saving and investment decisions of households who contribute to tax-deferred accounts such as 401(k) plans. Our findings suggest that most of the assets accumulated in these accounts represents a net increment to household wealth, and that these plans, which owe their existence to specific provisions of the income tax laws, will play a central role in providing retirement income for future cohorts of retirees.

The rise of tax-deferred retirement saving accounts, such as 401(k)s and IRAs, has transformed the set of choices confronting taxable investors. For example, rather than simply deciding how much of a portfolio to invest in stocks and how much to invest in bonds, many investors now must decide whether to hold their bonds in a taxable or a tax-deferred account. The choice of where to hold a given asset is known as the "asset location" problem. Some insights on this problem can be drawn from previous research on the optimal investment behavior of corporations with defined benefit pension plans. Conventional wisdom in that setting is that firms should hold heavily taxed assets such

as corporate bonds in their pension accounts, and hold their lightly taxed assets such as equities in their taxable portfolio.

Bergstresser and I have examined the asset location decisions of households in the 2001 Survey of Consumer Finances.[10] We find that many households face substantively important asset location choices. In 2001, eleven million households had at least $25,000 in both a tax-deferred account and in a taxable investment account. For these households, the choice of whether to hold a given asset in a taxable or a tax-deferred account is potentially an important determinant of long-term wealth accumulation. Roughly two thirds of the households with financial assets in both taxable and tax-deferred accounts hold portfolios that are tax efficient, in the sense that their heavily taxed assets are located in their tax-deferred account. Most of the other third could reduce their taxes by relocating heavily taxed fixed income assets to their tax-deferred account. For more than half of the households that hold apparently tax-inefficient portfolios, however, a shift of less than $10,000 in financial assets would eliminate the tax inefficiency.

One potentially important aspect of the asset location problem, which makes this problem even more complicated for taxable investors, is that the set of investment options in tax-deferred accounts may be restricted by design features of 401(k) plans and other retirement vehicles. When the options in tax-deferred accounts are limited to mutual funds, and when investors can choose to invest in tax-exempt bonds, the standard wisdom that bonds are heavily taxed assets may be overturned. Clemens Sialm, Shoven, and I show that the tax burden on many assets is greater when they are held through a mutual fund than when they are held directly, primarily because some mutual fund managers trade assets frequently and thereby trigger capital gains tax liability on appreciated securities.[11] We compute the returns earned by taxable investors in a sample of equity mutual funds that were continuously available between 1962 and 1998. We compare the aftertax wealth that they would have accumulated if they held their equity funds in their tax-deferred accounts and if they held them in their taxable account. The results suggest that investors who are not holding index funds, but who invest through actively managed equity funds, may improve their aftertax return by holding equity mutual funds in their tax-deferred account rather than in a taxable account. We also show that optimal asset allocation can be sensitive to the availability of assets such as tax-exempt bonds, which may offer a higher aftertax return than taxable bonds held through the tax-deferred account.

Summary

Taken together, the studies just described suggest that current income tax rules have an important effect on household investment decisions and portfolio management behavior. Documenting these behavioral effects is the first step in a longer-term research program that aims to develop measures of the efficiency cost of such taxes, and to use such evidence to inform the design of tax policy.

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Jeffrey R. Brown is a Faculty Research Fellow in the NBER's Programs on Public Economics and the Economics of Aging and an Assistant Professor of Finance at the University of Illinois at Urbana-Champaign. He received his B.A. from Miami University (Ohio), his M.P.P. in Public Policy from the John F. Kennedy School of Government at Harvard University, and his Ph.D. in economics from MIT.

Brown joined the University of Illinois finance faculty in 2001 after serving as Senior Economist at the President's Council of Economic Advisers and as an economist for the President's Commission to Strengthen Social Security. Prior to his government service, he had been an Assistant Professor of Public Policy at Harvard University's John F. Kennedy School of Government.

Brown's primary research interests are in the realm of insurance, including the study of annuity markets, life insurance, pensions, Social Security, long-term care insurance, and terrorism risk insurance. His work has been published in several academic journals and he is co-author of the book *The Role of Annuities in Financing Retirement*.

Brown also has served as a consultant to the World Bank, the Executive Office of the President, and the U.S. Treasury, a member of a NASI expert panel studying the design and administration of personal accounts in Social Security, and co-editor of the *Journal of Pension Economics and Finance*.

Brown, his wife Lisa, and their family live in Champaign, IL. When not working, he spends nearly all of his time being "Daddy" to his two young daughters and infant son.

NBER Profile: *Austan Goolsbee*

Austan Goolsbee is an NBER Research Associate and a Professor of Economics at the University of Chicago's Graduate School of Business where he has taught since 1995. He is also the lead editor of the *Journal of Law and Economics* and a Senior Research Fellow at the American Bar Foundation.

Goolsbee received his B.A. and M.A. in Economics from Yale University and his Ph.D. in Economics from MIT. He has been the recipient of an Alfred P. Sloan Foundation Research Fellowship. He is a member of the U.S. Census Advisory Commission and previously served as a special consultant to the U.S. Department of Justice Antitrust Division and on the staff of former Senator David Boren.

Goolsbee's research focuses on public finance and industrial organization. Some recent areas of interest include the impact of taxes on individuals and small businesses, the spread of technology and new goods, the way online competition affects offline industrial structure, and the recent behavior of capital investment.

Goolsbee lives in Chicago with his wife, Robin, their daughter Aden and son Addison. When he has free-time (and they can find a baby-sitter), you will find him at the movies with his wife.

NBER Profile: *Michael Grossman*

Michael Grossman is a "child" of the NBER. He has been affiliated with the Bureau since 1966 when Victor Fuchs hired him as a research assistant. Currently, he directs the NBER's Health Economics Program and is Distinguished Professor of Economics at the City University of New York Graduate Center, where he has taught since 1972. He also is an associate editor of the *Journal of Health Economics* and the *Review of Economics of the Household* and a member of the Institute of Medicine of the National Academy of Sciences.

Grossman received his Ph.D. in economics from Columbia University in 1970. His research has focused on economic models of the determinants of health; the economics of substance use and abuse; and the determinants of interest rates on tax-exempt hospital bonds. His recently completed studies deal with the effects of excise taxes on cigarette smoking by pregnant women, the relationship between substance use and risky sexual behavior by teenagers, the economics of obesity, and the effects of managed care on hospital prices for bypass surgery and for angioplasty. He is beginning new projects on the effects of the introduction of national health insurance and compulsory school reform in Taiwan on child health outcomes in that country.

Grossman lives in Manhattan with his wife, Ilene, a managing principal at Capco, a financial services consulting company. They have two grown daughters, Sandy, a free-lance marketing consultant in television and other media, and Barri, an account manager for Inviva, an insurance holding company. His hobbies include tennis, skiing (despite an infamous wipe-out on a double black diamond), piloting his boat, the "NBER South," docked in Ophelia on the Northern Neck of Virginia, playing with his fraternal twin grandsons, Zack and Ben, and supervising Ph.D. dissertations (86 and counting).

NBER Profile: *Jeffrey M. Perloff*

Jeffrey M. Perloff joined the NBER's Board of Directors last fall as the representative of the American Agricultural Economics Association. He is a Fellow of that organization, and a Professor of Agricultural and Resource Economics at the University of California, Berkeley.

Perloff holds a B.A. from the University of Chicago and a Ph.D. in economics from MIT. He was an Assistant Professor of Economics at the University of Pennsylvania from 1976-80 before joining the Berkeley agricultural economics faculty. He was promoted to full professor in 1989.

Perloff's research on industrial organization, labor, trade, marketing, law and economics, psychology, and other topics has been widely published in professional journals. He is the author of a textbook on microeconomics and the coauthor (with Dennis Carlton) of another textbook on industrial organization. He has consulted with the Federal Trade Commission; U.S. Departments of Agriculture, Labor, Justice; the California Attorney General's Office; and other government agencies. He is a former editor of *Industrial Relations*, a former association editor of the *American Journal of Agricultural Economics*, and is an associate editor of the *Journal of Productivity Analysis*.

He lives in Oakland, California with his wife, Jackie, and daughter, Lisa. He and his wife are interested in painting and sculpture and enjoy hiking and traveling.

Conferences

Organizational Economics

The NBER's Working Group on Organizational Economics, directed by Robert Gibbons of MIT, met in Cambridge on December 12 and 13. This Working Group studies governed transactions (that is, those that do not occur in frictionless markets). Naturally, the group's main focus is on transactions within firms. As a result, many of the group's members are drawn from other NBER Programs and Working Groups — such as Corporate Finance, Personnel Economics, and Productivity — that study resource allocation and other processes within firms. The group is also pursuing a significant interest in governed transactions *between* firms, including contracts, hybrid governance structures (for example, alliances, joint ventures, networks, and so on), and activities that change firms' boundaries (for example, start-ups, spin-offs, mergers, and so on). As a result, some of the group's members come from these NBER Programs and Working Groups: Entrepreneurship, Industrial Organization, and International Trade and Organization. Finally, many of the principles that apply to governed transactions within and between firms also apply to other kinds of organizations and institutions, so the group is also pursuing a subsidiary interest in organizations such as schools, hospitals, government agencies, and beyond. The group was formed in Fall 2002. So far, they have convened annually for a two-day meeting involving about 15 papers, with comments by discussants.

The December conference program was:

Nicolae Garleanu, University of Pennsylvania, and **Jeffrey Zwiebel**, Stanford University, "Design and Renegotiation of Debt Covenants"
Birger Wernerfelt, MIT, "Governance of Adjustments"
Joshua Lerner, NBER and Harvard University, and **Ulrike Malmendier**, Stanford University, "Contractibility and Contract Design in Strategic Alliances"
Discussants: George Baker, NBER and Harvard University, and Rebecca Henderson, NBER and MIT

Edward Lazear, NBER and Stanford University, "Entrepreneurship"
Thomas Hellman, Stanford University, "When Do Employees become Entrepreneurs?"
Discussant: Fiona Scott Morton, NBER and Yale University

Pol Antras and **Elhanan Helpman**, NBER and Harvard University, "Global Sourcing"
Daron Acemoglu, NBER and MIT; **Philippe Aghion**, NBER and Harvard University; **Rachel Griffith**, Institute for Fiscal Studies; and **Fabrizio Zilibotti**, Stockholm University, "Vertical Integration and Technology: Theory and Evidence"
Discussant: Robert Gertner, NBER and University of Chicago

Marianne Bertrand, NBER and University of Chicago, and **Sendhil Mullainathan**, NBER and MIT, "Cash Flow and Investment Project Outcomes: Evidence from Bidding on Oil and Gas Leases"
Marianne Bertrand; **Antoinette Schoar**, NBER and MIT; and **David Thesmar**, ENSAE-CREST, "Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985"
Oguzhan Ozbas, University of Southern California, "Integration, Organizational Process, and Allocation of Resources"
Discussants: Jeremy Stein, NBER and Harvard University, and Steve Tadelis, Stanford University

Benjamin E. Hermalin, University of California, Berkeley, "Trends in Corporate Governance"
Kevin J. Murphy and **Jan Zabojnik**, University of Southern California, "Managerial Capital and the Market for CEOs"
Discussant: Nancy Beaulieu, NBER and Harvard University

Colin Camerer, California Institute of Technology; and **Roberto Weber** and **Scott Rick**, Carnegie Mellon University, "Organizational Codes in the Lab"
Jacques Cremer, Universite des Sciences Sociales de Toulouse; **Luis Garicano**, University of Chicago; and **Andrea Prat**, London School of Economics, "Codes in Organizations"
Discussant: John Roberts, Stanford University

Garleanu and **Zwiebel** analyze the design and renegotiation of covenants in debt contracts as a particular example of the contractual assignment of property rights under asymmetric information. In particular, they consider a setting in which future firm investments are efficient in some states, but also involve a transfer from the lender(s) to shareholders. While there is symmetric information regarding investment efficiency, managers are better informed about any potential transfer than the lender. The lender can learn this information, but at a cost. In this setting,

the authors show that the simple adverse selection problem leads to the allocation of greater ex ante decision rights to the uninformed party than would follow under symmetric (in particular, full) information. Consequently, ex-post renegotiation in turn is biased towards the uninformed party giving up these excessive rights. In many settings, this result yields the opposite implication from standard Property Rights results on contracting under incomplete contracts and ex-ante investments, whereby rights should be allocated to minimize inefficiencies attributable to distortions in ex-ante investments. Indeed, for debt contracts as well as other settings, the uninformed party, who receives strong decision rights in this setting, is likely to have few significant ex-ante investments to undertake relative to the informed party.

Wernerfelt proposes a research program to compare game forms in terms of their ability to govern ex post adjustments to ex ante contracts. The comparisons can be based on direct implementation costs or on the extent to which desirable adjustments are not implemented. In several examples of the program, he compares three game forms: negotiation over each adjustment; ex ante price lists; and implicit contracts leaving the stipulation of adjustments to one player. If the latter game form is defined as an employment relationship, then the theory of the firm becomes a special case of the program. Wernerfelt starts with a discussion of the nature and magnitude of adjustment costs, then follows with an exposition of four examples. He then discusses the role of asset ownership, reviews some empirical evidence, and looks at broader implications.

The widespread use of strategic alliances between pharmaceutical and biotechnology companies is puzzling, since it is hard to contract on the exact nature of the research activities. A major concern of pharmaceutical companies entering strategic alliances is that the biotechnology firm will use the pharmaceutical company's funds to subsidize other projects or substitute one project for another. Using a new dataset on 584 biotechnology strategic alliance contracts, **Lerner** and **Malmendier** find that the parties respond to this contracting problem by assigning the unconditional right to terminate the alliance, including the reversion of intellectual property rights, to the pharmaceutical company. The authors develop a model based on the property-rights theory of the firm that allows for biotechnology firm researchers to pursue multiple tasks. They show that it is optimal for the pharmaceutical company to obtain the right to terminate the alliance and to receive the property rights to the terminated project when research activities are non-contractible. This right will induce the biotechnology firm researchers not to deviate from the proposed research activities. The contract prevents opportunistic exercise of this termination right by specifying payments triggered by the termination of the agreement. Testing the model empirically, the authors find that the assignment of termination and product reversion rights to the financing firm occurs in contractually difficult environments in which the parties are unlikely to be able to specify the lead product candidate. They use empirical tests to distinguish the property-rights explanation from alternative stories, based on uncertainty and asymmetric information about the project quality or research abilities.

Lazear proposes that entrepreneurship consists of team-building and assembling resources. As such, entrepreneurs must be jacks-of-all-trades who need not excel in any one skill, but are competent in many. A model of the choice to become an entrepreneur, which he presents, primarily implies that individuals with balanced skills are more likely than others to become entrepreneurs. Those who want to start businesses acquire their general backgrounds through a varied course curriculum and by taking on a broad range of roles when they enter the labor force. Using a dataset of Stanford alumni, Lazear tests the predictions and finds that they hold. Entrepreneurs are not technical innovators. By far the most important prediction of entrepreneurship is having a varied work background.

Entrepreneurs often get their ideas from working as employees in established firms. However, employees with ideas also can become intrapreneurs, or even managers of corporate spin-offs. **Hellman** shows how innovation and entrepreneurship are influenced by company policies towards employees. Using a multi-task incentives model, he identifies a trade-off between focusing employees on their assigned tasks and encouraging their exploration of new ideas. He shows how the rate of innovation, and the organizational structure of new ventures (start-ups, spin-offs, internal ventures), depend on factors such as the entrepreneurial environment and the allocation of intellectual property rights.

Antras and **Helpman** present a North-South model of international trade in which differentiated products are developed in the North. Sectors are populated by final-good producers who differ in productivity levels. Based on productivity and sectoral characteristics, firms decide whether to integrate into the production of intermediate inputs or outsource them. In either case they have to decide from which country to source the inputs. Final-good producers and their suppliers must make relationship-specific investments, both in an integrated firm and in an arm's-length relationship. The authors describe an equilibrium in which firms with different productivity levels choose different ownership structures and supplier locations, that is, they choose different organizational forms. Then they study the effects of within-sectoral heterogeneity and variations in industry characteristics on the relative prevalence of these organizational forms. The analysis sheds light on the structure of foreign trade within and across industries.

Acemoglu, **Aghion**, **Griffith**, and **Zilibotti** investigate the determinants of vertical integration and confront some of the predictions of the leading approach to the internal organization of the firm with data from the U.K. manufacturing sector. Consistent with the theory, the authors show that an upstream and downstream activity pair are more likely to be vertically integrated when the downstream (the producer) is more technology intensive and the upstream (the supplier) is less technology intensive. Also consistent

with the theory, the magnitude of both effects are substantially amplified when the upstream inputs are an important fraction of the total costs of the downstream producer. These results are generally robust and hold with a variety of alternative measures of technology intensity, with alternative estimation strategies, and with or without controlling for a number of firm and industry-level characteristics.

How does firm investment change with cash flow? **Bertrand** and **Mullainathan** examine this question for auctions of oil and gas leases because detailed data on specific investment projects are publicly available in this context. All bids, including losing ones, as well as the eventual outcome of the leases can be measured. The authors find that as cash flow rises, firms do spend more on purchasing leases. Interestingly, though, they do not buy more or bigger leases; instead, they simply pay more for each lease. This effect is strongest as firms approach the end of their fiscal year. Leases bought when cash flow is high are not more productive; in face, they are often *less* productive. In short, when cash flow is high, bidders appear to over-pay for less productive leases without expanding the scale of operations. These results are most consistent with a free cash-flow view of investment in which managers use cash flow to simplify their job (or live a "quiet life") rather than empire build. The authors also find that the productivity effects are strongest earlier in their sample, consistent with the view that governance in this industry has improved over time.

Bertrand, **Schoar**, and **Thesmar** investigate the effects of banking deregulation on changes in banks' lending behavior and the ensuing incentives for firms to improve operations. Most importantly, they analyze the implication of these changes on exit and entry decisions of firms and overall product market structure in the non-financial sectors. They use the deregulation of the French banking industry in 1985 as an economy-wide shock to the banking sector that affected all industries, but in particular those that relied most heavily on external finance and bank loans. The deregulation eliminated government interference in lending decisions, allowed French banks to compete more freely against each other in the credit market and did away with implicit and explicit government subsidies for most bank loans. Post-deregulation, banks seem to tie their lending decisions more closely to firm performance. Low quality firms that suffer negative shocks do not receive large increases in bank credit anymore. Instead, these firms display a much higher propensity to undertake restructuring measures post-reform, for example to reduce wages and outsource production. The authors also observe a strong increase in performance mean reversion post-1985, especially for firms that were hit by negative shocks. Moreover, they find that poorly performing firms experience a steeper increase in the cost of capital after the reforms than good firms. All these results are particularly strong for firms in more bank-dependent industries. On the product market side, the authors observe a strong increase in asset reallocation in more-bank-dependent industries, mostly coming from higher entry and exit rates in these sectors. They also find an increase in allocative efficiency across firms in these sectors, as well as a decline in concentration ratios.

Does the level of integration of a firm affect the quality of information available to its top decisionmakers responsible for allocating resources? Motivated by the pervasiveness of specific knowledge in large multi-division firms, **Ozbas** develops a model of internal competition for corporate resources among specialist managers and shows that: 1) managers of integrated firms exaggerate the payoffs of their projects to obtain resources despite potentially adverse career consequences; and 2) the exaggeration problem worsens with increased integration and reduces the allocative efficiency of an integrated firm. Control rights based on asset ownership enable the firm to set "the rules of the game" and to improve managerial behavior through organizational processes such as rigid capital budgets, job rotation, centralization, and hierarchies.

The popular press and scholarly studies have noted a number of trends in corporate governance. **Hermalin** addresses, from a theoretical perspective, whether these trends are linked and if so, how? He finds that a trend toward greater board diligence will lead, sometimes through subtle or indirect mechanisms, to trends toward more external candidates becoming CEO, shorter tenures for CEOs, more effort/less perquisite consumption by CEOs (even though such behavior is *not* directly monitored), and greater CEO compensation. Also, under plausible conditions, externally hired CEOs should have shorter tenures on average than internally hired CEOs.

Murphy and **Zabojnik** reconcile two pronounced trends in U.S. corporate governance: the increase in pay levels for top executives, and the increasing prevalence of appointing CEOs through external hiring rather than internal promotions. They propose that these trends reflect a shift in the relative importance of "managerial ability" (transferable across companies) and "firm-specific capital" (valuable only within the organization). They show that if the supply of workers in the corporate sector is relatively elastic, an increase in the relative importance of managerial ability leads to fewer promotions, more external hires, and an increase in equilibrium average wages for CEOs. They test their model using CEO pay and turnover data from 1970 to 2000. They show that CEO compensation is higher for CEOs hired from outside their firm, and for CEOs in industries where outside hiring is prevalent.

Internal language, or "codes," constitute an important part of the shared tacit understanding jointly held by members of a group or organization. This shared understanding is often an integral part of a group's culture and reflects important elements of the culture. Using a paradigm developed by Weber and Camerer to study such codes — as a simple metaphor for group or organizational culture — in the laboratory, **Camerer**, **Weber**, and **Rick** explore the interaction between internal language and firm structure in determining outcomes related to firm performance. Subjects in their experiments perform a repeated task in which one subject (the

"manager") has to get a group of other subjects (the "employees") to identify a series of pictures by describing only the content of the pictures. To perform this task efficiently, the group must develop a set of codes. In the experiments, the authors use a very simple treatment variable: they vary the degree of centralization or hierarchy in their laboratory "firms" either by fixing the role of manager on one subject or by rotating it among all subjects. They then examine the ability of each type of laboratory firm to deal with problems similar to those encountered by real-world firms. In a first experiment, the authors examine performance in a repeated but static setting (the same group performing the task for 20 rounds) and in a changing environment (introducing new pictures and new members). While most measures of performance favor the centralized, hierarchical structure — in which the same subject is always the manager — they find that the ability of the group to assimilate new entrants is greater under the decentralized, egalitarian structure. In a second experiment, they test the extent to which the two kinds of structures produce differences in group solidarity by having subjects fill out questionnaires and play a public good game. They find that the decentralized, egalitarian structure produces more favorable attitudes towards the group and greater contributions to the public good.

Cremer, **Garicano**, and **Prat** study the determination of specialized codes under bounded rationality, and its implications for organization. Agents may decrease communication costs by designing codes that fit their own environment, for example by using more precise words for more frequent events. Bounded rationality imposes sharply decreasing returns to scope, since when similarly skilled agents in different services must communicate with one another they must share common codes, which in turn degrades communication within each service. Thus the decision of whether to segregate services or integrate them trades off the synergies that result from better coordination between services against the loss attributable to the need for a common, more vague, code than the one that would optimize communication within services. Alternatively, more skilled "translators" may be used to allow separate services to appropriate the synergies while keeping their own codes. A decrease in diagnosis costs leads to increasing integration among services and to the substitution of common codes for hierarchies, as common codes allow for the direct interaction among agents in different services. When adoption decisions are decentralized and non-contractible, the common code will be inefficiently biased towards the needs of early adapters and there will be too little commonality of codes.

Fifth Annual Conference in India

On January 17-20, 2004 the NBER and India's National Council for Applied Economic Research (NCAER) again brought together a group of NBER economists and about two dozen economists from Indian universities, research institutions, and government departments for their fifth annual conference in India. Mihir A. Desai and Martin S. Feldstein, NBER and Harvard University, and Raghuram G. Rajan, NBER and University of Chicago, organized the conference jointly with Suman Bery and Shashanka Bide of NCAER.

The U.S. participants were: Jagdish Bhagwati, NBER Director and Columbia University; Marianne Baxter and Robert G. King, NBER and Boston University; Michael D. Bordo, NBER and Rutgers University; Mihir A. Desai, Martin S. Feldstein, and Benjamin M. Friedman, NBER and Harvard University; Esther Duflo, NBER and MIT; Karen N. Horn, NBER Director; Anne O. Krueger, on leave from the NBER at the IMF; Karthik Muralidharan, Harvard University; Edward P. Lazear and Kathryn Shaw, NBER and Stanford University; Richard Portes, NBER and Columbia University; and Helene Rey, NBER and Princeton University.

After introductory remarks about the U.S. and Indian economies by NBER President Feldstein and Bimal Jalan of NCAER, the participants discussed: monetary and fiscal policy; financial sector reforms; economic reforms; infrastructure and regulation; economic recovery; and growth and productivity.

A summary of the conference discussion will be available on the NBER web site at www.nber.org/india.

Bureau News

Health Care

The NBER's Program on Health Care met in Cambridge on November 14. Laurence C. Baker and Jay Bhattacharya, NBER and Stanford University, organized this program:

Jill Horwitz, University of Michigan, "Does Corporate Form Matter? Service Provision in the Hospital Industry"

Mireille Jacobson, University of California, Irvine; **Craig Earle**, **James O'Malley**, **Juliana Pakes**, and **Peter Gaccione**, Harvard University; and **Joseph P. Newhouse**, NBER and Harvard University, "Does Reimbursement Influence Chemotherapy Treatment for Cancer Patients?"

Mark Stabile, NBER and University of Toronto; **Adriana Lleras-Muney**, NBER and Princeton University; and **Anna Aizer**, Brown University, "Can Differential Access to Care Explain Infant Health Gradients? Evidence from California's Disproportionate Share Program"

Amy Finkelstein, NBER and Harvard University, and **Kathleen McGarry**, NBER and University of California, Los Angeles, "Private Information and Its Effect on Market Equilibrium: New Evidence from Long Term Care Insurance" (NBER Working Paper No. 9957)

Jay Bhattacharya, and **William B. Vogt**, Carnegie Mellon University and NBER, "Employer Provision of Health Insurance and the Adverse Selection Problem"

Three types of firms — nonprofit, for-profit, and government — own acute care U.S. hospitals, yet we do not know whether different types of hospitals specialize in different medical services. Previous studies of hospital ownership primarily have considered financial behavior. They have produced mixed evidence, although many conclude that nonprofit and for-profit hospitals are similar. **Horwitz** studies the correlation between corporate ownership and the offering of over 30 medical services. She predicts the probability that hospital types offer relatively profitable and unprofitable services, and services for which profitability varies. Her dataset includes every U.S. urban, acute care hospital from 1988 to 2000. Horwitz concludes that hospital ownership is correlated with offering different types of medical services. For-profit hospitals are more likely than comparable government and nonprofit hospitals to offer relatively profitable medical services. Government hospitals are more likely than for-profit and nonprofit hospitals to offer relatively unprofitable services. Nonprofit hospitals often fall in the middle, offering more profitable services and fewer unprofitable services than do government hospitals. Further, for-profits are considerably more responsive to changes in the profitability of services than are the other two types. Such differences in service offerings could correlate with health outcomes.

Despite the increase in equality in both financial and legal access to medical care that took place last century, racial disparities in health remain large. One explanation (Chandra and Skinner, 2003) is that de facto geographic income and racial segregation still exists and limits access to quality health care. **Stabile**, **Lleras-Muney**, and **Aizer** find evidence of an alternative explanation: blacks choose worse hospitals, regardless of their geographical location, and this contributes to their poorer health outcomes. To identify this effect, the authors exploit an exogenous change in policy that occurred in California in the early 1990s which increased the number and quality of hospitals available to poor pregnant women without changing their neighborhood characteristics. The authors show that while blacks move away from hospitals that serve a disproportionate number of low-income mothers to a lesser extent than other low-income groups, they gain the most from hospital desegregation in terms of reduced neonatal mortality. In contrast, other groups with lower initial neonatal mortality moved more and gained less in terms of improvements in birth outcomes. The authors conclude that differential access to health care is still an important determinant of health for blacks. Yet simply expanding the number and quality of hospitals available to blacks is not sufficient to induce them to use higher quality care.

Finkelstein and **McGarry** examine the standard test for asymmetric information in insurance markets: that its presence will result in a positive correlation between insurance coverage and risk occurrence. They show that while there is no evidence of this positive correlation in the long-term care insurance market, asymmetric information still exists. Using individuals' subjective assessments of the chance that they will enter a nursing home, together with the insurance companies' own assessment, the authors show that individuals do have private information about their risk type. Moreover, this private information is positively correlated with insurance coverage. Further, other unobserved characteristics that are positively related to coverage and negatively related to risk occurrence also exist. Specifically, more cautious individuals are both more likely to have long-term care insurance and less likely to enter a

nursing home. These results demonstrate that insurance markets may suffer from asymmetric information, and its negative efficiency consequences, even if those with more insurance are not at higher risk.

Despite the potential vulnerability of the employed uninsured, there has been little research on the constraints and choices that lead to development of such a population. **Bhattacharya** and **Vogt** study those constraints imposed by a competitive labor market and by adverse selection in the employer-based health insurance market. Since many employees do without health insurance, its provision is clearly an important, but perhaps not defining, job attribute for most workers. In a competitive labor market, the dollar value of total compensation to the worker will equal the marginal product of the worker at the firm. Hence, tax considerations aside, all (ex ante identical) workers facing the same health risk should be indifferent between firms that offer health insurance and those that do not. However, some workers are more likely to use medical care than others. If workers have health information not fully observable to employers and insurers, then there exists a potential adverse selection problem: workers who are less healthy than average preferentially seek jobs that offer health insurance. In this case, the effects of adverse selection in the health insurance market spill over to distort decisions in the labor market. The authors propose an equilibrium model of job and health insurance choice. The main implication of this model is that firms in industries with high turnover rates, all else equal, will be less likely to offer health insurance. Holding fixed job income, such a correlation only can be induced by adverse selection problems in the health insurance market. In particular, the authors show how models of "job lock," which depend on observable changes in health status, cannot explain such health insurance and labor market phenomena. Finally, using data from the Current Population Survey, the authors show that the predictions of their model are borne out in the data.

National Security

The NBER's Working Group on National Security, directed by NBER President Martin Feldstein of Harvard University, met in Cambridge on November 21. This Working Group deals with the wide range of issues that affect national security, with a primary focus on the security of the United States. Topics include: military strategy (defense budgets, technical changes, and manpower); sources of terrorist risks (causes of terrorism, financing of terrorism); homeland security policies for dealing with terrorism (nuclear, chemical, and biological); and problem areas (North Korea, Iraq, and so on). The group will meet at least once during the academic year as well as during the NBER's Summer Institute.

The following topics were discussed in November:

Steven J. Davis, **Kevin M. Murphy**, and **Robert H. Topel**, NBER and University of Chicago, "War in Iraq vs. Containment: Weighing the Consequences"

Justin Wolfers, NBER and Stanford University; **Andrew Leigh**, Harvard University; and **Eric Zitzewitz**, Stanford University, "What Do Financial Markets Think of War in Iraq?" (NBER Working Paper No. 9587)

M. Ishaq Nadiri, NBER and New York University, "Lessons from Afghanistan: An Economist's Perspective"

Christopher Foote, Federal Reserve Bank of Boston, and recently U.S. Treasury at Central Command in Baghdad, "The Current Economic Situation in Iraq"

Manuel Trajtenberg, NBER and Tel Aviv University, "Defense R&D Policy in the Anti-Terrorist Era" (NBER Working Paper No. 9725)

Matthew Weinzierl, Harvard University and Council of Economic Advisors, "The Cost of Controlling Nuclear Weapons and Materials"

Francesco Caselli, NBER and Harvard University, and **Wilbur Coleman**, Duke University, "On the Theory of Ethnic Conflicts"

Prior to the war in Iraq, the United States and its allies pursued a policy of containment authorized by the United Nations Security Council. Major elements of containment included trade sanctions, weapons inspections, no-fly zones, and a maritime interdiction force. Continued containment was the leading option to U.S.–led military intervention and forcible regime change. **Davis**, **Murphy**, and **Topel** provide an ex ante assessment of these broad policy options. Containment required a potent U.S. military presence in Southwest Asia. Before the pre-war build-up, the United States devoted roughly 30,000 troops, 30 ships, 200 aircraft, and other military resources to containment efforts at a cost of $13 billion per year. Based on the requirements for effective containment and the likely duration of a hostile Iraqi regime, the authors place the present value cost of containment at $380 billion, a figure that dwarfs pre-invasion estimates of war and reconstruction costs. Containment also involved large costs for the Iraqi people. Under containment, at least 200,000 Iraqis died

prematurely at the hands of the Baathist regime or as a direct consequence of its policies. Comparing this record to Iraqi fatalities in the Gulf War of 1991, the authors argue that continued containment implied a much greater death toll than war and regime change. The authors also develop a simple model to assess the impact of forcible regime change on Iraq economic well-being. The model shows that even a partial recovery of income levels to pre-Saddam levels over a 20-year period implies large welfare gains as a consequence of forcible regime change.

Leigh, **Wolfers**, and **Zitzewitz** use financial market data to make inferences about the economic consequences of the war in Iraq. They examine the way in which stock prices, options prices, and oil prices co-varied with the probability of war during the five months prior to the outbreak of hostilities. To measure the probability of war, they use the price of a "Saddam Security," a new future traded on an online betting exchange that paid $100 if Saddam Hussein was ousted by a certain date. They find that the oil price moved closely with the Saddam Security, suggesting that the market estimated that war would raise oil prices by around $10 per barrel. Analyzing oil futures, the authors suggested that this spike in oil prices would dissipate relatively quickly. Across equity markets, war in Iraq was associated with a 15 percent fall in the stock market, with the effect concentrated in the consumer discretionary sector, airlines, and IT. Analyzing option prices, they find that the large estimated average effects of war in the pre-war era reflect the market pricing in a range of different scenarios: a 70 percent probability that it will lead to market declines of 0 to 15 percent, a 20 percent chance of 15 to 30 percent declines, and a 10 percent risk of a fall in excess of 30 percent. Comparing countries, the most extreme effects were on the stock markets of Turkey, Israel, and several European nations. While their original paper assessed the ex ante cost of war in Iraq, in subsequent work the authors consider whether the market's estimates have since proved accurate. They point out that their average estimate took into account small probabilities of calamitous events, such as the use of chemical and biological weapons, major unrest in neighboring nations, or a retaliatory terrorist strike in the U.S. mainland. So far, these events have not occurred, which suggests that the ex post cost of war may have been somewhere between one-third and two-thirds of the ex ante estimates from equity prices. The authors also outlined the scope for event futures, like the Saddam Security, to continue to inform policy in this domain.

Nadiri opines that the Afghan case is not going well, with much remaining ground to cover; still, thanks to the United Nations and other actors, much starvation has been avoided and steps have been taken to increase the education level of the population. Educational initiatives alone are not enough to address current problems, and issues like agriculture are still being ignored. Afghanistan is a case of external forces having pull — first with the Soviets, then Pakistan through the Taliban, and now the United States. But in the process of rebuilding the country, it is wrong to try and "stage" intervention and reconstruction, he notes. In this complex and interdisciplinary process, you might be able to achieve security (and this is not happening outside Kabul in any case), but where is the economic growth? The solutions we are providing for Afghanistan are admirable but almost too late, Nadiri says. The United States should have started the political process when the bombing began. Democracy is very expensive and it is hard to say whether it will work in Afghanistan. There is no one way to solve state failure, or to rebuild failed states. Nadiri believes that state failure will multiply. We neglect these states and then attack the issues after they have become a problem. We are suffering from internationalization, he concludes, and must think carefully about intervention and the effects of well-intentioned initiatives.

Foote, in a paper coauthored by **William Block** and **Simon Gray**, describes the initial economic policies of the Coalition Provisional Authority (CPA) in Baghdad, Iraq, where the authors began work soon after major military operations ended. The first part of the paper uses some previously unreleased government statistics to characterize Iraq's economy before the war, while the second part outlines the economic policies the CPA implemented in the opening months of the reconstruction. The most striking fact revealed by the newly available economic data is the collapse of investment that began during Iraq's 1980-8 war with Iran. Investment virtually ceased during the 1990s, when the country's oil exports were limited by the United Nations. Immediately after the war, one of CPA's most complex challenges was devising a new currency, to replace a chaotic post-war system in which different denominations of the "Saddam dinar" traded at different rates against the dollar. In addition to currency reform, this paper discusses Coalition efforts to pay public-sector salaries, restart the banking system, reopen trade, impose budget constraints on Iraq's state-owned enterprises, and construct government budgets.

Trajtenberg analyzes the nature of the terrorist threat following 9/11, and explores the implications for defense R and D policy. First he reviews the defining trends of defense R and D since the cold war, bringing in pertinent empirical evidence: the United States accumulated during the 1990s a defense R and D stock 10 times larger than any other country; big weapon systems, key during the Cold War but of dubious significance since then, still figure prominently, commanding 30 percent of current defense R and D spending. The second part of the paper lays out a simple model of terrorism, and examines the role of uncertainty, the lack of deterrence, and externalities. The model focuses on two strategies: fighting terrorism at its source, and protecting individual targets. A key result is that the government should spend enough on fighting terrorism at its source so as to nullify the incentives of private targets to invest in their own security. Intelligence emerges as the central aspect of the war against terrorism and, accordingly, R and D aimed at providing advanced technological means for

intelligence is viewed as the cornerstone of defense R and D. This entails developing computerized sensory interfaces, and increasing the ability to analyze vast amounts of data. Both are dual use; there is already a private market for these systems, with a large number of players. R and D programs designed to preserve this diversity and to encourage further competition may prove beneficial both for the required R and D and for the economy at large.

Nuclear terrorism presents an unparalleled threat to the United States, with the direct economic costs alone of a potential attack ranging well over $1 trillion. The potential for such an attack is very real, as creating a crude nuclear device requires only several kilograms of nuclear material out of the more than 2,000 metric tons that already exist. Nevertheless, this challenge can be met if concerted effort and financial resources are dedicated to securing stocks of vulnerable material around the globe. Past research has indicated that securing the material in the former Soviet Union — where the vast majority of vulnerable material is located — could require anywhere from $5 billion to $30 billion. **Weinzierl** projects a total expected cost of about $21 billion, based on progress made and resources allocated thus far. More challenging is estimating the cost of securing nuclear material in other countries, such as North Korea, China, Pakistan, India, and other potentially unstable states. These nations may view nuclear material and its potential sale to terrorists as a bargaining chip with which to extract economic concessions from the United States. It is difficult if not impossible to estimate how much might be demanded by such countries or be required to coerce such countries into cooperation. The problem can instead be viewed as a collective investment by the United States. Weinzierl uses the estimated cost of an attack, estimates of the probability of such an attack (which are wide open to debate), and a few other simple parameters to illustrate the sort of investment the United States might be willing to make in order to reduce the probability of an attack. Broadly speaking, investments many times larger than those currently being discussed are likely to be justified.

Caselli and **Coleman** present a simple model of ethnic conflict, in which coalitions formed along ethnic lines compete for the economy's resources. The role of ethnicity is to enforce coalition membership: in ethnically homogeneous societies, members of the losing coalition can defect to the winners at low cost, and this rules out conflict as an equilibrium outcome. Empirical studies of the determinants of ethnic conflict have emphasized the relative sizes of different groups. The results by Caselli and Coleman, however, imply that there is a second dimension of a country's ethnic make up — ethnic distance — that is at least as important as relative size in determining the likelihood of conflict. Ethnic distance is the extent to which groups are different from each other, as measured by the costs a member of one group would have to bear in order to become a member of another. Caselli and Coleman are currently engaged in a project to create a cross-country dataset on ethnic distance.

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Market Microstructure

The NBER's Working Group on Market Microstructure, directed by Research Associate Bruce Lehmann of University of California, San Diego, met on December 11. The Market Microstructure Group is devoted to theoretical, empirical, and experimental research on the economics of securities markets, including the role of information in the price discovery process; the definition, measurement, control, and determinants of liquidity and transactions costs; and their implications for the efficiency, welfare, and regulation of alternative trading mechanisms and market structures. The December meeting was organized by Lehmann and Andrew W. Lo, NBER and MIT; Matthew Spiegel, Yale School of Management; and Avanidhar Subrahmanyam, University of California, Los Angeles. The following papers were discussed:

Alfredo Mendiola and **Maureen O'Hara**, Cornell University, "Taking Stock in Stock Markets: The Changing Governance of Exchanges"
Discussant: Utpal Bhattacharya, Indiana University

Jay F. Coughenour, University of Delaware, and **Lawrence E. Harris**, University of Southern California and SEC, "Specialist Profits and the Minimum Price Increment"
Discussant: Shane Corwin, University of Notre Dame

Paul Bennett and **Li Wei**, New York Stock Exchange, "Market Structure, Fragmentation, and Market Quality"
Discussant: Michael Barclay, NBER and University of Rochester

Luncheon Speaker: **Lawrence E. Harris**, "Simplification and Diversification"

Sugato Chakravarty, Purdue University; **Frederick H. Harris**, Wake Forest University; and **Robert A. Wood**, University of Memphis, "Information Revelation in Financial Markets: Impulse Response Functions for Cointegrated Spreads and Depths"
Discussant: Yiuman Tse, University of Texas at San Antonio

J. Doyne Farmer, Santa Fe Institute; **Paolo Patelli**, Sant'Anna School of Advanced Studies; and **Ilija I. Zovko**, University of Amsterdam, "The Predictive Power of Zero Intelligence in Financial Markets"
Discussant: Ioanid Rosu, MIT

Wenjin Kang, University of California, Los Angeles, "Intraday Returns and Heterogeneous Liquidity Sources"
Discussant: Ekkehart Boehmer, Texas A&M University

Over the past five years, ten of the world's largest exchanges have shifted from being cooperatively-organized firms to being publicly-listed corporations. **Mendiola** and **O'Hara** investigate the effect of exchange conversions on exchange performance and valuation. They examine the origins of cooperative exchange structure, and consider why exchange governance is now shifting. They then evaluate how these new corporate exchanges have performed using a variety of accounting measures, performance measures, and return measures. The authors show that exchanges have outperformed other newly listed stocks in their home markets, and that this is attributable to changes in corporate governance. While they find that exchange equitizations have been largely successful, they show that, for at least some exchanges, changing corporate governance cannot overcome the challenges posed by adverse economic environments.

NYSE specialist participation rates and profits are affected by the rules that govern their trades. The decrease in the minimum price increment from $\$^1/_{16}$ to \$0.01 effectively relaxed the public order precedence rule, gave specialists more price points within the bid-ask spread on which to quote aggressively, and narrowed spreads significantly. As a result, **Coughenour** and **Harris** find that participation rates and high frequency trading profits increased for specialists handling low price stocks (where the $\$^1/_{16}$ cost of obtaining order precedence was relatively expensive) and for stocks that formerly traded with few intra-spread price points. Tighter spreads decreased profits for the other stocks.

Have structural changes in the U.S. equities markets, such as decimalization, the growth of electronic communications networks (ECNs), and the improvements in order routing technologies, shifted the competitive landscape to the advantage of decentralized Nasdaq-listed trading? **Bennett** and **Wei** examine a range of market quality indicators for companies that have recently switched listings from Nasdaq to the NYSE, in 2002-3. They find that, consistent with pre-decimal, pre-ECN studies, the switching stocks have shown significant reductions in price volatility and quoted spreads, improvements in the information efficiency of prices, and reductions in trading costs. The improvements appear to stem from the consolidated NYSE order flow. To explore this hypothesis further, the authors examine cross-sectional variation in the degree of order flow fragmentation for the switching stocks. They find that the improvements in key indicators tend to be greater for companies whose Nasdaq order flows are more fragmented, providing additional evidence that order flow consolidation improves market quality. They also provide several types of evidence that their findings are not influenced by sample selection bias.

Harris notes that the order flow externality supports well-established incumbents in the competition among exchange service providers-exchanges, brokers, ECNs, and dealers. The externality, which is characterized well by the phrase "liquidity attracts liquidity," is attributable to the option values associated with offers to trade. The externality makes it difficult for innovators to succeed. Competition among exchange service providers can be enhanced by addressing the associated externality problem. Either all competitors must be able to freely participate in externality, or the externality must be eliminated. The former strategy can be effected by ensuring that all market participants have free and quick access to every other participant's trading system. The latter strategy can be effected by rewarding liquidity-supplying traders for the benefits they now freely confer to market participants. Market data revenue is a pool of funds that might be used for this purpose.

Chakravarty, **Harris**, and **Wood** investigate the path through which an information or liquidity shock reveals itself in subsequent adjustments of the bid-ask spreads and corresponding depths. Their simple model incorporates both the short-term and long-term effects of the spread and depths on the dynamics of adjustment. In particular, the authors study both the stochastic properties of spreads and depths and their permanent impounding of stochastic common trends. Using two years of tick-by-tick quote data on all the DJIA stocks, the authors show that depths rather than spreads indeed are first to impound new information. Specifically, (bid and ask) depths adjust first in virtually every stock in both years, while spreads almost never adjust first in 1998, and do so in only eight out of thirty cases in 1995. Spreads initially widen in response to positive depth shocks but subsequent tightening occurs within 2 minutes and is a permanent effect. Depths decline in response to positive shocks to the spread, but this effect is not permanent. In addition, bid depths and ask depths respond to one another in asymmetrical ways. These results have important implications for testing competing theories of asymmetric information trading, for security market design, and for public policy.

Standard economic models are based on intelligent agents who maximize utility. However, there may be situations in which constraints imposed by market institutions are more important than intelligent agent behavior. **Farmer**, **Patelli**, and **Zovko** use data from the London Stock Exchange to test a simple model in which zero-intelligence agents place orders to trade at random. The model treats the statistical mechanics of the interaction of order placement, price formations, and the accumulation of stored supply and demand, and makes predictions that can be stated as simple expressions in terms of measurable quantities such as order arrival rates. The agreement between model and theory is excellent, explaining 96 percent of the variance of the bid-ask spread across stocks and 76 percent of the price diffusion rate. The authors also study the market impact function, describing the response of prices to orders. The non-dimensional coordinates dictated by the model collapse data from different stocks onto a single curve, suggesting a corresponding understanding of supply and demand. Thus, it appears that the price formation mechanism strongly constrains the statistical properties of the market, playing a more important role than the strategic behavior of agents.

Kang studies the relationship between stock market liquidity and intraday stock returns. He characterizes a momentum-reversal intraday return pattern within which, during the reversal, a negative return can be associated with a positive order imbalance. The implied momentum-reversal return pattern is observed by comparing the post returns of past winners and past losers generated in an intraday context. The empirical study also shows that in the reversal, past winners underperform past losers even though investors still prefer to buy past winners and to sell past losers. The explanation for these phenomena lies in the recognition of the market maker as a specialist and limit orders as two heterogeneous liquidity sources. In the momentum phase there are relatively few limit orders and the market maker charges a high premium to compensate for his inventory risk. Later, when sufficient limit orders arise in the reversal phase, the market makers can switch to this inexpensive liquidity source and thus reduce their premium. Although the momentum-reversal pattern could be a Nash equilibrium for limit-order traders, the market-order traders' welfare is not optimized in the equilibrium.

Economic Fluctuations and Growth

The NBER's Program on Economic Fluctuations and Growth met in San Francisco on February 6. The meeting organizers were Ricardo J. Caballero, NBER and MIT, and Peter J. Klenow, Federal Reserve Bank of Minneapolis. The program was:

Valerie A. Ramey, NBER and University of California, San Diego, and **Daniel J. Vine**, Federal Reserve Board, "Tracking the Source of the Decline in GDP Volatility: An Analysis of the Automobile Industry"
Discussant: Mark W. Watson, NBER and Princeton University

Paul Beaudry, NBER and University of British Columbia, and **Franck Portier**, University of Toulouse, "Stock Prices, News, and Economic Fluctuations"
Discussant: Robert E. Hall, NBER and Stanford University

Fernando A. Broner, University of Maryland, "Discrete Devaluations and Multiple Equilibria in a First Generation Model of Currency Crises"
Discussant: Varadarajan V. Chari, NBER and University of Minnesota

Mark Aguiar, University of Chicago, and **Erik Hurst**, NBER and University of Chicago, "Consumption vs. Expenditure"
Discussant: Mark Bils, NBER and University of Rochester

Ricardo Lagos, Federal Reserve Bank of Minneapolis, and **Randall Wright**, NBER and University of Pennsylvania, "A Unified Framework for Monetary Theory and Policy Analysis"
Discussant: Narayana Kocherlakota, NBER and Stanford University

Benjamin F. Jones, Northwestern University, and **Benjamin A. Olken**, Harvard University, "Do Leaders Matter? National Leadership and Growth since World War II"
Discussant: Charles I. Jones, NBER and University of California, Berkeley

Ramey and **Vine** seek to shed light on the source of the decline in U.S. GDP volatility by studying the microeconomic behavior of plants in the U.S. automobile industry, where the changes in volatility have mirrored those of the aggregate data. They find that changes in the relative volatility of sales and output, which have been interpreted by some as evidence of improved inventory management, are in fact the result of changes in the process driving automobile sales. Using a new dataset that tracks the production and sales of motor vehicles by assembly plant and by model, Ramey and Vine first show that the autocorrelation of sales dropped markedly during the 1980s. A simulation of the assembly plants' cost function illustrates that the persistence of sales is a key determinant of output volatility. A comparison of the ways in which assembly plants scheduled production in the 1990s relative to the 1970s supports the intuition of the simulation. Finally, reduced form evidence suggests that changing behavior of interest rates is the force behind the change in sales persistence.

Beaudry and **Portier** show that the joint behavior of stock prices and Total Factor Productivity favors a view of business cycles driven primarily by a shock that does not affect productivity in the short run (and therefore does not look like a standard technology shock) but does affect productivity with substantial delay (and therefore does not look like a monetary shock). The structural interpretation the authors suggest for this shock is that it represents news about future technological opportunities which is first captured in stock prices. They show that this shock causes a boom in consumption, investment, and hours worked that precedes productivity growth by a few years. Moreover, they show that this shock explains about half of business cycle fluctuations.

The first generation models of currency crises often have been criticized because they predict that, in the absence of very large triggering shocks, currency crises should be predictable and associated with small devaluations. **Broner** shows that these features of first generation models are not robust to the inclusion of private information. In particular, he analyzes a generalization of the Krugman-Flood-Garber (KFG) model, which relaxes the assumption that all consumers are perfectly informed about the level of fundamentals. In this environment, the KFG equilibrium of zero devaluation is only one of many possible equilibriums. In all the other equilibriums, the lack of perfect information makes the peg remains after the point at which the shadow exchange rate equals it, giving rise to unpredictable and discrete devaluations.

Aguiar and **Hurst** revisit the retirement consumption puzzle by documenting that the dramatic decline in expenditures at the time of retirement is matched by an equally dramatic rise in time spent on home production. They empirically disentangle changes in actual consumption from changes in expenditures. To do so, they use a novel dataset which collects detailed food diaries for a large cross-section of U.S. households. The authors show that despite the decline in food expenditures, neither the quantity nor the quality of food intake deteriorates with retirement status. Using their measures of actual consumption, they directly test the Permanent Income Hypothesis (PIH) and find that the marginal value of wealth remains constant as individuals transition into retirement. The authors also show that the increase in time spent on home production is quantitatively large enough to explain the decline in expenditure, holding actual consumption constant. Finally, Aguiar and Hurst show that unemployed house-

holds experience a decline in consumption commensurate to the impact of job displacement on permanent income. Taken together, the results on retirement and unemployment highlight how direct measures of consumption distinguish between anticipated and unanticipated shocks to income, while using expenditure alone obscures this difference and leads to false rejections of the PIH.

Search-theoretic models of monetary exchange are based on explicit descriptions of the frictions that make money essential. However, tractable versions of these models typically need strong assumptions that make them ill-suited for studying monetary policy. **Lagos** and **Wright** propose a framework based on explicit micro foundations within which macro policy can be analyzed. The model is both analytically tractable and amenable to quantitative analysis. The authors demonstrate this by using it to estimate the welfare cost of inflation. They find much higher costs than the previous literature: their model predicts that going from 10 percent to zero inflation can be worth between 3 percent and 5 percent of consumption.

Economic growth within countries varies sharply across decades. **Jones** and **Olken** examine one explanation for these sustained shifts in growth: changes in the national leader. They use deaths of leaders while in office as a source of exogenous variation in leadership, and ask whether these randomly-timed leadership transitions are associated with shifts in countries' growth rates. They find that leaders do matter, particularly in autocratic settings. Moreover, the death of an autocrat tends to be followed by a substantial improvement in growth rates. The authors investigate the mechanisms through which leaders can affect growth, and find that autocrats affect growth directly, through fiscal and monetary policy. Autocrats also influence political institutions that, in turn, appear to affect growth. In particular, small movements toward democracy following the death of an autocrat appear to improve growth, while dramatic democratizations are associated with reductions in growth. These results suggest that individual leaders can play crucial roles in shaping the growth of nations.

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Insurance

The NBER's Working Group on Insurance, directed by Kenneth A. Froot, NBER and Harvard University, and Howard Kunreuther, NBER and University of Pennsylvania, met in Cambridge on February 6 and 7. Insurance, from a theoretical perspective, is a cornerstone of economic theory. It is used often in textbooks as an example of a pure contingent claim (for example, one that pays off upon flood damage to a house, or death from natural causes). It is also used frequently as an example of markets that run into imperfections (such as moral hazard and adverse selection). Even the imperfections are interesting, of course, since they are affected by contractual form (as is true in corporate finance). The NBER's Working Group on Insurance has a broad focus, encompassing theoretical, empirical, and industrial topics, including: insurance customers and investors; insurance producers; equilibrium; and policy questions. Since its inception, it has convened once a year for a 2-day meeting. Participants in the group are predominantly academics from a variety of fields, plus a group of carefully-selected practitioners.

The program for the February meeting was:

Amy Finkelstein, NBER and Harvard University, and **Kathleen McGarry**, NBER and University of California, Los Angeles, "Private Information and its Effect on Market Equilibrium: New Evidence from Long-Term Care Insurance" (NBER Working Paper No. 9957, described earlier in this issue under "Health Care")
Discussant: David M. Cutler, NBER and Harvard University

Martin F. Grace, **Robert W. Klein**, and **Richard D. Phillips**, Georgia State University, "Insurance Company Failures: Why Do They Cost So Much?"
Discussant: Dwight Jaffe, University of California, Berkeley

Stephan Dieckmann, Carnegie Mellon University, "An Equilibrium Model with Heterogeneous Beliefs about Rare Events"
Discussant: Geoffrey Heal, NBER and Columbia University

Michael Braun and **Alexander Muermann**, University of Pennsylvania, "The Impact of Regret on the Demand for Insurance"
Discussant: Richard J. Zeckhauser, NBER and Harvard University

Thomas Russell, Santa Clara University, "Deductible Aversion and the Design of High Cost Insurance Contracts"
Discussant: Howard Kunreuther

Jeffrey R. Brown, NBER and University of Illinois at Urbana-Champaign; **J. David Cummins**, University of Pennsylvania; **Christopher M. Lewis**, Fitch Risk Management; and **Ran Wei**, University of Pennsylvania, "An Empirical Analysis of the Economic Impact of Federal Terrorism Reinsurance"
Discussant: Joan Lamm-Tennant, General Reinsurance Corporation

George Zanjani, Federal Reserve Bank of New York, "The Rise and Fall of the Fraternal Life Insurer: Law and Finance in U.S. Life Insurance, 1870-1920"
Discussant: David Moss, Harvard University

Jeffrey R. Brown and **Amy Finkelstein**, "The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market"
Discussant: Mark Pauly, NBER and University of Pennsylvania

Richard A. Derrig, Automotive Insurers Bureau of Massachusetts, and **Herbert I. Weisberg**, Correlation Research Inc., "Determinants of Total Compensation for Auto Bodily Injury Liability Under No-Fault: Investigation, Negotiation, and the Suspicion of Fraud"
Discussant: Scott Harrington, University of South Carolina

Kenneth A. Froot, "Risk Management, Capital Budgeting, and Capital Structure Policy for Insurers and Reinsurers" (NBER Working Paper No. 10184)
Discussant: Anne Gron, Northwestern University

Gordon Woo, Risk Management Solutions, "A Catastrophe Bond Niche: Multiple Event Risk"
Discussant: Neil Doherty, University of Pennsylvania

Historical evidence shows that insurer insolvencies are, on average, three to five times more expensive than those of other financial institutions. Using a unique dataset of insurer insolvencies from 1986 to 1999, **Grace**, **Klein**, and **Phillips** examine the cost of insolvency resolution and the factors driving these costs. They find that firms in relatively better shape before being seized impose lower costs on the insolvency system. Further, they find evidence consistent with non-benevolent behavior by regulators, both before and after the firm fails, which adds significantly to the resulting costs of the insolvency.

Dieckmann solves an equilibrium model in which agents have different beliefs about the frequency of rare events. (In this context, a rare event can be understood as a significant, negative jump in economic fundamentals caused by a severe catastrophe like earthquakes, windstorms, or even a terrorist attack.) He poses the question of how the risk of a rare event, in addition to small diffusive risk, is shared among agents in a capital market equilibrium. In a complete market

economy, the agent who anticipates less frequent jumps is willing to provide insurance against rare events for the agent anticipating a higher frequency. In the incomplete market economy without insurance, the equity premium of the stock market decreases, because risk sharing solely through the stock is less than optimal. In this case, the agent who anticipates less frequent jumps is leveraging the portfolio optimally, while the agent anticipating a higher frequency reduces stock holdings, compared to the complete market case. The difference in portfolio holdings between the complete and incomplete market looks like a synthetic put option on the stock; the agent who is leveraging the portfolio serves as the seller of the put option. Over time, agents learn about the true frequency of rare events in a Bayesian fashion. As a result, insurance premiums increase significantly as agents update their beliefs after observing a rare event and decline slowly thereafter, a behavior frequently observed in the reinsurance market. Dieckmann compares the long-run wealth effects of the complete and incomplete market and finds a variety of possible scenarios depending on the degree of heterogeneity. Finally, he shows an application of the model to the catastrophe bond market. In a marginal comparison, a reinsurance company would issue a catastrophe bond at a significantly higher yield in the incomplete market. Therefore, these findings help to explain the high yields and insurance premiums observed in the small reinsurance market for rare events.

Braun and **Muermann** examine optimal insurance purchase decisions of individuals whose behavior is consistent with Regret Theory. Their model incorporates a utility function that assigns a disutility to outcomes that are ex-post suboptimal, and predicts that individuals with regret-theoretical preferences adjust away from the extremes of full insurance and no insurance coverage. This prediction holds for both coinsurance and deductible contracts, and can explain the frequently observed preferences for low deductibles in markets for personal insurance.

Insurance contracts frequently contain deductible arrangements very different from those suggested by standard welfare economics. **Russell** tries to explain this by examining two non-standard utility models of insurance demand: rank-dependent expected utility and regret theory. He shows that these two models make opposite predictions regarding deductible demand when loadings are small. He suggests an alternative, context-based model of deductible demand and discusses its implications for the design of high cost policies, such as the Medicare Drug Plan and the California Earthquake Authority.

Brown, **Cummins**, **Lewis,** and **Wei** examine the role of the federal government in the market for terrorism risk, beginning with a discussion of the possible sources of market failure, with particular attention to whether terrorism risk differs from other large-scale natural catastrophes. The authors then show how the markets perceived the Terrorism Risk Insurance Act of 2002, which resulted in unprecedented federal intervention in the market for terrorism insurance in the United States. They examine the stock price response of affected industries to a sequence of 13 events, beginning with the initial proposals for a federal reinsurance role in October 2001 and culminating in the signing of the Act into law on November 26, 2002. They find that, in those industries most likely to be affected by TRIA — banking, construction, insurance, real estate investment trusts (REITs), transportation, and public utilities — the stock price effect was primarily negative. They argue that the Act was at best value-neutral for property-casualty insurers for several reasons, including its elimination of the option not to offer terrorism insurance. The negative response of the other industries may be attributable to the Act's impeding the development of more efficient private market solutions and reducing market estimates of expected federal assistance following future terrorist attacks.

Zanjani studies the rise and fall of fraternal life insurance in the decades surrounding 1900. He shows that the rise of the fraternal life insurer took place while it was exempt from the solvency regulations that governed other insurance companies, and its fade into obscurity followed soon after this exemption ended. Enactment of fraternal regulation at the state level was associated with large drops in fraternal insurer formations. The evidence challenges the notion that claimant protection laws "enabled" insurance organizations to succeed by enhancing public confidence in their operations, suggesting instead that they were a burden on industry.

Long-term care represents one of the largest uninsured financial risks facing the elderly in the United States. **Brown** and **Finkelstein** examine the importance of Medicaid, relative to potential private market failures, in limiting private insurance coverage. They develop an analytical framework to compute a risk averse consumer's willingness to pay for a long-term care insurance policy and calibrate the model using state-of-the-art actuarial data on long-term care utilization probabilities, comprehensive market data on insurance policy characteristics and premiums, and common state Medicaid rules. They find that, given the existence of the public Medicaid program as a payer-of-last resort, individuals throughout most of the wealth distribution would not be willing to pay for either the currently available limited insurance contracts or for comprehensive coverage, *even if prices were actuarially fair*. By contrast, they find that making Medicaid less generous substantially increases the proportion of individuals who are willing to pay for either the currently available, limited policies or for more comprehensive policies, *even at existing prices*. These findings thus highlight the fundamental role played by Medicaid in limiting demand for private long-term care insurance.

Auto bodily injury liability claim payments are predominantly negotiated settlements, with less than 2 percent the result of complete litigation and jury trials. All settlements consist of a combination of claimed economic loss, called special damages, and a payment for "pain and suffering", called general damages. The dependence of the total compensation on a variety of factors relating to the type and magni-

tudes of the economic losses, medical and wage loss, and to the type and severity of injury has been explored by prior researchers; they found medical losses to be the primary determinant of total compensation. They also found that other severity variables play a distinct and significant role in the final settlement values, though. Further research introduced the notion that both the information gathered in the course of investigation and the adjuster's attitude toward the quality of the claim, especially the suspicion of fraud, also played a significant role in the final settlement value. Recently, it has been shown that settlement values for subjective injury claims are systematically lower relative to special damages. This indicates that insurers use their negotiating power to obtain lower settlements on questionable claims as a rational response to the presence of fraud and build up claims. **Derrig** and **Weisberg** extend that research by examining additional variables specifically related to the investigation and negotiation processes. They quantify the effect of those variables on the final total compensation. In particular, they find that strain and sprain claims command lower general damages relative to specials, even in the absence of suspicion of fraud and build up. Still, the intensity of suspicion of fraud and build up can reduce overall payments as much as 26 percent. For the first time, the negotiating effect of attorney demands enters the quantitative model in addition to the usual contingency fee. Finally, evidence that insurers are isolating low impact collisions and reducing the compensation through negotiation is explored and quantified.

Froot develops a framework for analyzing the risk allocation, capital budgeting, and capital structure decisions facing insurers and reinsurers. His model incorporates three key features: 1) value-maximizing insurers and reinsurers face product market as well as capital market imperfections that give rise to well-founded concerns with risk management and capital allocation; 2) some, but not all, of the risks they face can be frictionlessly hedged in the capital market; 3) the distribution of their cashflows may be asymmetric, which alters the demand for underwriting and hedging. Froot shows that these features result in a three-factor model that determines the pricing and allocation of risk and the optimal capital structure of the firm. This approach allows him to integrate these features into: 1) the pricing of risky investment, underwriting, reinsurance, and hedging; and 2) the allocation of risk across all of these opportunities, and the optimal amount of surplus capital held by the firm.

The successful securitization of terrorism risk, pioneered in October 2003 through Golden Goal Finance Ltd., suggests that the catastrophe bond market may yet be expanded through innovation, enterprise, and industry on the part of investment bankers, lawyers, and risk analysts. The issuance to investors of $260 million of bonds, exposed principally to terrorism risk, reveals a latent appetite within the capital markets for specialized forms of risk. **Woo** studies a special class of catastrophe bonds: multiple event instruments which either cannot or are extremely unlikely to default until at least two major events have occurred. He reviews Golden Goal Finance Ltd. and some recent natural peril multiple event transactions, as well as related securitizations, such as Vita Capital for mortality risk.

Industrial Organization

The NBER's Program on Industrial Organization, directed by Nancy L. Rose of MIT, met at the NBER's California office on February 20 and 21. Severin Borenstein, NBER and University of California, Berkeley, and Alan Sorensen, NBER and University of California, San Diego, organized this program:

Federico Ciliberto, North Carolina State University, and **Elie Tamer**, Princeton University, "Market Structure and Multiple Equilibria in Airline Markets"
Discussant: Kenneth Hendricks, University of Texas, Austin

Erin T. Mansur, Yale University, "Environmental Regulation in Oligopoly Markets: A Study of Electricity Restructuring"
Discussant: Frank A. Wolak, NBER and Stanford University

Ali Hortacsu, NBER and University of Chicago, and **Steven L. Puller**, Texas A&M, "Testing Strategic Models of Firm Behavior in Restructured Electricity Markets: A Case Study of ERCOT"
Discussant: Peter C. Reiss, NBER and Stanford University

Fabio Panetta and **Fabiano Schivardi**, Banca d'Italia, and **Matthew Shum**, Johns Hopkins University, "Do Mergers Improve Information? Evidence from the Loan Market"
Discussant: Mark Israel, Northwestern University

David Genesove, Hebrew University, "Why Are There So Few (and Fewer and Fewer) Two-Newspaper Towns?"
Discussant: Joel Waldfogel, NBER and University of Pennsylvania

Meghan Busse, University of California, Berkeley; **Jorge Silva-Risso**, University of California, Riverside; and **Florian Zettelmeyer,** NBER and University of California, Berkeley, "$1000 Cash Back: Asymmetric Information in Auto Manufacturer Promotions"
Discussant: Timothy F. Bresnahan, NBER and Stanford University

Sharon M. Oster, Yale University, and **Fiona M. Scott Morton**, NBER and Yale University, "Behavioral Decisionmaking: An Application to the Setting of Magazine Subscription Prices"
Discussant: Stefano della Vigna, University of California, Berkeley

Ulrike Malmendier, Stanford University, and **Geoffrey Tate**, Harvard University, "Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction"
Discussant: Judith A. Chevalier, NBER and Yale University

Ciliberto and **Tamer** provide a framework for inference in discrete games that involves multiple decision-makers; they use it to study airline market structure in the United States. The authors make inferences about a "class of models", rather than looking for point-identifying assumptions that pin down a unique model. Their estimation strategy is directed at a class of models that obey this fundamental assumption: if a firm enters a market, it expects positive profits. This fundamental condition provides a set of inequality restrictions on regressions that the authors exploit to learn about the profits of various firms. They then examine airline market structure, focusing on the strategic behavior of a set of airlines; they allow for, and find, heterogeneity in the effects that airlines have on each other, and for correlation among the unobservables. The result is multiple equilibriums in the number and identity of firms. Finally, after testing for particular selection rules, the authors find that a rule that picks the equilibrium with the largest total profits is consistent with the data and the model.

Mansur studies the implications of strategic behavior in product markets on pollution decisions and environmental regulation. Given oligopoly behavior, she discusses the conditions under which welfare loss will be reduced if policymakers opt for tradeable permits rather than pollution taxes. She then examines the environmental implications of exercising market power in the context of restructured wholesale electricity markets. Mansur estimates the environmental implications of production inefficiencies attributed to market power in the Pennsylvania, New Jersey, and Maryland restructured wholesale electricity market. Air pollution fell substantially during 1999, the year in which both electricity restructuring and new environmental regulation took effect. She measures the environmental implications of these production inefficiencies by comparing observed behavior with estimates of production in a competitive market. Estimates of competitive production, which account for new environmental regulation, explain approximately 70 percent of the observed sulfur dioxide reductions. The remaining 30 percent can be attributed to firms exercising market power. The share attributed to market imperfections is even larger for nitrogen oxides and carbon dioxide emissions.

Hortacsu and **Puller** ask whether firms competing in an electricity auction submit bids that approximate a benchmark for optimal behavior. First, the authors derive an equilibrium model of bidding into uniform-price auction spot markets for electricity generators, maximizing static profits. Under assumptions of the structure of bidding as a function of private information, firms bid supply functions that maximize ex post unilateral profits for each possible realization of residual demand. Given data on marginal costs of generation, this provides a convenient and computationally straightforward method for constructing a theoretical "equilibrium" benchmark against

which the authors can compare the actual strategies of bidders. Next, they use these results to analyze the evolution of competition in the newly deregulated electricity market in Texas. They use detailed data on demand and firm-level bids and marginal costs to compare actual bids to the theoretical benchmark ex post optimal bids. Using several metrics of performance, they find that the largest seller offered bids that were close to ex post optimal. However, the other sellers deviated from optimal bidding in important ways and the authors explore various explanations for the observed deviation. Sellers with larger stakes in the market generally were closer to theoretical benchmark optimal behavior. Also, there is some evidence of learning over the first year of the market's operation.

Panetta, **Schivardi**, and **Shum** examine the informational effects of mergers and acquisitions, investigating how bank mergers affect the pricing of business loan contracts. Their test is based on the principle that in loan markets, informational benefits should improve banks' abilities to screen their borrowers, leading to a closer correspondence between the default risk of each borrower (which is imperfectly observed by lenders) and the interest rate on its loan. The authors find evidence of these informational effects: after a merger, risky borrowers experience an increase in the interest rate, while nonrisky borrowers enjoy lower interest rates. Further results suggest that that these information benefits derive from improvements in information processing resulting from the merger, rather than from explicit information sharing on individual customers among the merging parties. The results imply that mergers might affect different categories of customers in different ways, so that average price changes might not be sufficient to gauge their welfare effects.

Local concentration in the U.S. daily newspaper industry increased dramatically over the past century. Between 1923 and 1980, the number of counties with more than two competing newspapers fell by half: from 45 percent of counties with at least one newspaper to 21 percent. During that same time period, the monopoly entry threshold population level remained remarkably constant, while the duopoly entry threshold population level increased substantially. This pattern indicates that neither cost changes nor shifts in the overall demand for newspapers can be responsible for the growing concentration; indeed, the time series of per-unit costs and per-capita readership and linage supports that conclusion. A changing degree of competition is the natural alternative. But **Genesove** shows that obvious sources of such a change, such as a decrease in heterogeneity of demand or a changing taste for variety, are unlikely explanations for the entire time period. A number of other explanations also are rejected. A scenario in which demand and supply-side economies of scale lead to multiple equilibriums, and a merger entails a shift from an unconcentrated to a concentrated equilibrium, is a possible explanation.

Automobile manufacturers make frequent use of promotions that give cash-back payments. Two common types of cash-back promotions are rebates to customers, which are widely publicized to potential customers, and rebates to dealers, which are not publicized. While the payments nominally go entirely to one party or another, the real division of the manufacturer-supplied surplus between dealer and customer depends on what price the two parties negotiate. **Busse**, **Silva-Risso**, and **Zettelmeyer** show that customers obtain most of the surplus in cases when they are likely to be well-informed about the promotion (customer rebate), and about half the surplus when they are likely to be uninformed (dealer rebate). However, manufacturers ultimately do not care about the price effect of a promotion; a thousand dollar promotion costs a manufacturer the same amount whether it is directed to customers or dealers. Instead, manufacturers are interested in whether a given promotion leads to the sale of an additional car. The authors find that customer cash promotions, consistent with the pass-through results, have a larger dollar-for-dollar effect on sales than do dealer cash promotions.

Using data from American magazines, **Oster** and **Scott Morton** explore the relationship between subscription discounts and magazine characteristics. They focus in particular on whether a magazine provides its benefits in the future (self-improving) or is simply fun to read now. Time-inconsistent consumers know their future selves will not read the "good" magazines as much as their current selves would like. One response is to engage in commitment behavior: a subscription. The authors find that for magazines whose payoff is in the future and/or that are meritorious for other reasons, subscription discounts are lower, all else equal. This suggests that publishers may be able to set subscription prices in order to extract rents from consumers' willingness to tie their own hands in terms of their future reading.

Overconfident CEOs over-estimate their ability to generate returns. Thus, on the margin, they undertake mergers that destroy value. They also perceive outside finance to be overpriced. **Malmendier** and **Tate** classify CEOs as overconfident when, despite their under-diversification, they hold options on company stock until expiration. The authors find that these CEOs are more acquisitive on average, particularly via diversifying deals. The effects are largest in firms with abundant cash and untapped debt capacity. Using press coverage as "confident" or "optimistic" to measure overconfidence confirms these results. The authors also find that the market reacts significantly more negatively to takeover bids by overconfident managers.

Development of the American Economy

The NBER's Program on Development of the American Economy met in Cambridge on March 6. Program Director Claudia Goldin of Harvard University organized the meeting. These papers were discussed:

B. Zorina Khan, NBER and Bowdoin College, and **Kenneth L. Sokoloff**, NBER and University of California, Los Angeles, "Institutions and Democratic Invention in 19th Century: Evidence from the Great Inventors of the United States, 1790-1930"

John J. Wallis, NBER and University of Maryland, and **Barry R. Weingast**, Stanford University, "Equilibrium Impotence: Why the States and Not the American National Government Financed Infrastructure Investment in the Antebellum Era"

Price V. Fishback and **Shawn Kantor**, NBER and University of Arizona, and **Todd C. Neumann**, University of Arizona, "New Deal Work Relief and Private Wages"

Eric Hilt, NBER and Wellesley College, "Incentives in Corporations: Evidence from the American Whaling Industry"

Kris J. Mitchener, NBER and Santa Clara University, and **Marc Weidenmier**, NBER and Claremont McKenna College, "Empire, Public Goods, and the Roosevelt Corollary"

Using a dataset encompassing over 400 "great inventors" born between 1740 and 1885 and active in the United States, **Khan** and **Sokoloff** highlight a crucial institution whose role in accounting for the remarkably broad socioeconomic composition of invention in the United States during the 19th century has not been fully appreciated. The U.S. patent system was revolutionary in its extension of property rights in technology to an extremely wide spectrum of the population. Moreover, it was exceptional in recognizing that it was in the public interest that patent rights, like other property rights, be clearly defined, well enforced, and transacted easily. The authors demonstrate that those 19th century skeptics who contended that only an elite segment was capable of truly important invention, and therefore that an extension of property rights in technology to the general population would have no beneficial effect on the pace of technical progress, were wrong. Individuals of humble origin and limited formal schooling were much more likely to invest in inventive activity in the United States than in Britain, and indeed were prominent among the "great inventors" through the 19th century, not only because of the far lower cost of obtaining a patent, but also because the examination system facilitated the use of a patent as a general asset that could be sold, licensed, or offered as collateral for finance. This latter feature was of profound importance for technologically creative individuals who lacked the financial resources to exploit inventions directly. In short, the patent system was a key institution in the progress of technology, but it also stands out as a conduit for creativity and achievement among otherwise disadvantaged groups.

Wallis and **Weingast** develop a general political economy model of a democratic legislature faced with the problem of financing a large transportation investment that serves a minority of the geographic units represented in the legislature (states in the federal case). "Sectionalism" is a special case of the geographic competition they posit. Since a majority of districts gain nothing from building a large project concentrated in a specific region, a direct proposal to build such projects always fails: any financing method that imposes positive costs on most districts will fail to gain majority support in the legislature. However, the authors show that three alternative financing schemes can command majority support and leave no district worse off. One of the three alternatives, what they call benefit taxation, which allocates taxes according to a benefit formula, is unavailable to the federal government, because direct taxes must be allocated between the states on the basis of population. As a result, the federal government must use one of the other two methods to finance transportation investment. Wallis and Weingast show that the federal government used the other two methods of finance exclusively in the early 19th century. The method used most often was "something for everyone" — formulaic allocations of funds between states. Unfortunately, this method was incapable of financing large projects like the Erie Canal. The other method, "taxless finance," generated unacceptable political side affects. For example, it was used to finance the first and second Banks of the United States. Nonetheless, both financial methods were used because they were the only methods that could generate sufficient support in Congress. The authors follow the history of federal legislation to support transportation. Every bill that passed Congress followed one of the two predicted financial schemes. They also discuss why constitutional concerns voiced by James Madison and Andrew Jackson were politically expedient rather than constitutionally based. They conclude that the failure of the federal government to invest in transportation was not constitutional restrictions, not lack of public support, but the internal tension created by democratic norms and procedures adopted in the early 19th century. To complete the argument, they observe that states, in contrast to the national government, were able to use benefit taxation schemes to finance large projects. Because benefit taxation allowed states to target the costs of the project in proportion to the expected benefit, no district was made worse off, and many were better off. As a consequence, states built most of the largest

and most important inter-regional transportation links in the antebellum era.

The Great Depression and the New Deal together are one of the most significant economic events of the twentieth century. Recent research has questioned the New Deal's role in the recovery leading up to World War II. Using a recently compiled dataset that describes monthly relief spending in U.S. cities along with business indicators from this period, **Fishback**, **Kantor**, and **Neumann** examine the relationship between relief spending and the private labor market in the framework of a search model. They find that relief spending increased the private wage, but this relationship was complex. Work relief's effect on private wages depended not simply on the magnitude of spending in a particular city, but on the volatility of the private labor market, the likelihood a job seeker might be able to find work relief, and how much a potential relief job paid.

The use of incorporation contributed to the development of many nineteenth century industries, but whaling was not one of them. Of the whaling ventures that received corporate charters in the 1830s, none survived for more than nine years, at a time when unincorporated whaling ventures enjoyed growing success. **Hilt** analyzes the historical origins of the contracts and organizational forms employed in the American whaling industry and examines their development in response to moral hazard problems. Most whaling ventures were owned by a small number of investors and were configured to provide powerful incentives. Hilt argues that the corporate form of ownership, as implemented in the 1830s, was incapable of providing the requisite incentives for success in whaling. The analysis of a newly-collected panel of 874 whaling voyages from 222 different ports supports the main conclusions of the paper.

The Roosevelt Corollary to the Monroe Doctrine marked a turning point in American foreign policy. In 1904, President Roosevelt announced that, not only were European powers not welcome in the Americas, but also that the United States had the right to intervene in the affairs of unstable Latin American countries that did not pay their debts. **Mitchener** and **Weidenmier** use this abrupt change in U.S. policy to test Kindleberger's hypothesis that a hegemon can provide public goods, such as increased financial stability and peace. Using a newly assembled database of weekly sovereign debt prices, the authors find that the average sovereign debt price for countries under the U.S. "sphere of influence" rose by 74 percent in the year after the announcement of the policy. With the dramatic rise in bond prices, the threat of European intervention to support bondholder claims in the Western Hemisphere waned, and the United States was able to exert its role as regional hegemon. There is some evidence that the Roosevelt Corollary spurred export growth and reduced regional conflict in Latin America, both of which improved the likelihood of repayment of sovereign debt and were compatible with broader U.S. commercial and strategic interests.

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Productivity

The NBER's Program on Productivity met in Cambridge on March 12. The meeting was organized by Ernst R.Berndt, NBER and MIT, and Chad Syverson, NBER and University of Chicago. The following papers were discussed:

Boyan Jovanovic, NBER and New York University, "The Pre-Producers"
Discussant: Chad Syverson

Frank R. Lichtenberg, NBER and Columbia University, "Availability of New Drugs and Americans' Ability to Work"
Discussant: Ernst R. Berndt

Daron Acemoglu, NBER and MIT, and **Joshua Linn**, MIT, "Market Size in Innovation: Theory and Evidence from the Pharmaceutical Industry"
Discussant: David Popp, NBER and Syracuse University

Lee G. Branstetter, NBER and Columbia University, "Is Academic Science Driving a Surge in Industrial Innovation? Evidence from Patent Citations"
Discussant: James D. Adams, NBER and Rensselaer Polytechnic Institute

Ana Aizcorbe, Bureau of Economic Analysis, "Product Innovation, Product Introductions and Intel's Productivity over the 1990s"
Discussant: Samuel S. Kortum, NBER and University of Minnesota

Lucy Eldridge and **Patricia Getz**, Bureau of Labor Statistics, "Alternative Hours Data and Their Impact on Productivity Change" and "Employment from the BLS Household and Payroll Surveys: Summary of Recent Trends"
Discussant: Lisa M. Lynch, NBER and Tufts University

While a start-up firm waits for its sales to materialize, it is a "pre-producer." This waiting period represents a special kind of entry cost. **Jovanovic** studies how such entry costs influence the several stages of an industry's life cycle. Assuming that the production hazard is rising in the initial stages of pre-production, industry equilibrium entails an eventual "shakeout" of pre-producers as they are squeezed out by the producers who drive industry price down. This seems to fit the experience of the early automobile industry and of the recent dot.com wave.

Lichtenberg estimates the average or aggregate effect of new drugs on ability to work — the number of days worked per employed person, and the fraction of the working-age population that is employed — by examining whether chronic conditions for which many new drugs were introduced resulted in greater increases in ability to work than conditions for which few new drugs were introduced, controlling for other factors. He uses data on about 200,000 individuals with 47 major chronic conditions observed throughout a 15-year period (1982-96). Under very conservative assumptions, the estimates indicate that the value of the increase in ability to work attributable to new drugs is 2.5 times as great as the expenditure on new drugs.

Acemoglu and **Linn** investigate the effect of (potential) market size on entry of new drugs and pharmaceutical innovation. Focusing on exogenous changes driven by U.S. demographic trends, the authors find that a 1 percent increase in the potential market size for a drug category leads to approximately a 5 percent increase in the number of new non-generic drugs. This response is generally robust to controlling for a variety of non-profit factors, pre-existing trends, and changes in the technology of pharmaceutical research.

What is driving the remarkable increase over the last decade in the propensity of patents to cite academic science? Does this trend indicate that stronger knowledge spillovers from academia have helped power the surge in innovative activity in the United States in the 1990s? **Branstetter** seeks to shed light on these questions by using a common empirical framework to assess the relative importance of various alternative hypotheses in explaining the growth in patent citations to science. His analysis supports the notion that the nature of U.S. inventive activity has changed over the sample period, with an increased emphasis on the use of the knowledge generated by university-based scientists in later years. However, the concentration of patent-to-paper citation activity within what he calls the "bio nexus" suggests that much of the contribution of knowledge spillovers from academia may be confined largely to bioscience-related inventions.

Aizcorbe develops a model for decision-making at Intel — the world's dominant producer of microprocessors in the 1990s — to explore the potential determinants of the inflection point in price indexes for microprocessor markets. To be useful, the model should incorporate many of the features thought to be important for the microprocessor market. Over the 1990s, Intel was, essentially, a durable goods monopolist that faced some competition from fringe firms like AMD and Cyrix. Intel pursued both process and product innovation through investment in R and D. Its multiproduct operations were constrained by learning curves along several dimensions that effectively serve as short-run capacity constraints. With regard to pricing, the anecdotal evidence is that Intel engaged in intertemporal price discrimination — an optimal strategy for a durable-goods monopolist facing capacity constraints. In the model, Intel faces long-run choices (optimal levels of R and D and investment in equipment) that determine the quality trajectory for its chips. Given this trajectory, Intel chooses how often to introduce a new chip, how long to produce it, and how much to charge for it. In this simple model, once Intel chooses the introduction rate, learning curves and capacity constraints dictate

output levels for all existing chips while demand curves for each chip dictate the price Intel can charge. Changes in competitive conditions can, thus, affect introduction rates. Aizcorbe uses the model to explore developments in the industry and their potential role in generating the observed inflection point. One possibility that squares with the anecdotal evidence is that an increase in competition from AMD in the mid-1990s prompted Intel to increase the rate at which it brought out new chips and that this increase in the rate of product *introductions* contributed to the inflection point without an attendant increase in the rate of product *innovation*. One channel through which this might occur is a market where demand is characterized by inter-temporal substitution, so that consumers view today's and tomorrow's chips as substitutes. With regard to tomorrow's chips, consumers care not only about the quality of the chip, but also about the amount of waiting time necessary to obtain it. If this waiting time is viewed as a (negative) attribute of future chips, then an increase in introduction rates (and the attendant reduction in waiting time) would have the same effect on a price index as a quality increase and could generate an inflection point. A more realistic scenario allows for the possibility that Intel is engaging in intertemporal price discrimination over heterogeneous consumers. This case also raises the possibility of an inflection point without an attendant change in the quality trajectory. However, the implications for the price index are more complex.

Getz and Eldridge note that the Bureau of Labor Statistics (BLS) collects data on labor hours in both the household (CPS) and the establishment (CES) surveys and then constructs a quarterly measure of hours worked for all persons. This is used to measure major sector productivity. Consideration of the characteristics of the household and establishment surveys has led the BLS's productivity program to prefer using the CES data as its primary source of data on hours. However, where gaps exist, the CES data must be adjusted using labor force survey data and other information. The BLS productivity program plans to introduce a new technique for estimating non-production and supervisory worker hours in the fall of 2004. BLS research shows that trends in the adjusted series that will result from the new method are identical to the trends in the official productivity measures at the one decimal level at which they are published, over the period 1979-2002. Although this new method will not significantly affect the trends in productivity, it does provide an improved estimate of the level of total hours for all employees. The recent divergence in the CES and CPS employment data has led some to speculate about the impact of using different sources of hours data to construct labor productivity. Therefore, for research purposes Getz and Eldridge looked at differences between the productivity program's hours series and two "hypothetical" hours series based on various combinations of CES and CPS data. Using these hypothetical series of hours yields a somewhat different picture of the growth in hours in the United States than does the hours series used to construct the official productivity measures. However, the productivity speed-up exists regardless of which series is used.

The BLS has conducted extensive review and analysis of the recent employment trend differences between the household and payroll surveys. Some of the differential is attributable to the differing scope and definitions used by the two surveys, but a substantial portion remains unexplained. In particular, the BLS has reviewed population control effects in the household survey, business birth/death modeling used in the payroll survey, and benchmark source data used by the payroll survey. Other possible sources of differences such as the counting of "off-the-books" jobs in the household survey, which would by definition be excluded from the payroll survey, are not readily measurable. Both surveys provide valuable information on the labor market. The payroll survey provides a highly reliable gauge of monthly employment change in nonfarm wage and salary employment. The survey has a large probability sample and is benchmarked annually to a universe count of jobs from the unemployment insurance tax system. It offers industry and geographic information at very detailed levels. The household survey provides a broader picture of employment including agriculture and the self-employed, as well as detailed information on the demographic composition of the employed and unemployed.

International Finance and Macroeconomics

The NBER's Program on International Finance and Macroeconomics met in Cambridge on March 19. Richard K. Lyons, NBER and University of California, Berkeley, and Andrés Velasco, NBER and Harvard University, organized this program:

Pierre-Olivier Gourinchas, NBER and University of California, Berkeley, and **Helene Rey**, NBER and Princeton University, "International Financial Adjustment"
Discussant: Alan C. Stockman, NBER and University of Rochester

Christian Broda, Federal Reserve Bank of New York, and **John Romalis**, NBER and University of Chicago, "Identifying the Relationship Between Trade and Exchange Rate Volatility"
Discussant: Eric Van Wincoop, NBER and University of Virginia

Fernando A. Broner, University of Maryland, "Discrete Devaluations and Multiple Equilibria in a First Generation Model of Currency Crises"
Discussant: Roberto Chang, Rutgers University

Rui Albuquerque and **Gregory H. Bauer**, University of Rochester, and **Martin Schneider**, New York University, "International Equity Flows and Returns: A Quantitative Equilibrium Approach"
Discussant: Linda Tesar, NBER and University of Michigan

Fabio Ghironi, Boston College, and **Marc J. Melitz**, NBER and Harvard University, "International Trade and Macroeconomic Dynamics with Heterogeneous Firms"
Discussant: Paul Bergin, NBER and University of California, Davis

Ariel Burstein, University of California, Los Angeles, and **Martin S. Eichenbaum** and **Sergio Rebelo**, NBER and Northwestern University, "Large Devaluations and the Real Exchange Rate"
Discussant: Carlos Vegh, NBER and University of California, Los Angeles

Gourinchas and **Rey** propose a framework for understanding the dynamics of net foreign assets and exchange rate movements. Focusing on the financial account and its determinants, they show that countries' capital gains and losses on net foreign assets constitute an important channel for external adjustment. For example, a depreciation of the domestic currency, or a drop in the domestic stock market index, improves the sustainability of a country's external position by decreasing the value of its liabilities to foreigners. This theory implies that deviations from trend of the ratio of net exports to net foreign assets contain information about future portfolio returns and, possibly, future exchange rate changes. Using quarterly data on U.S. gross foreign positions and returns, the authors find that adjustments in the country's external position indeed occur mostly at short-to-medium horizons through portfolio revaluations, not through future changes in net exports. At longer horizons, adjustments occur through changes in net exports. There is also evidence that net returns on foreign asset portfolios are predictable at horizons between one quarter and two years. These results cast a new light on the sustainability of U.S. current account deficits.

Broda and **Romalis** develop a model of international trade in which trade depresses real exchange rate volatility and exchange rate volatility affects trade in products differently according to their degree of differentiation. In particular, commodities are affected less by exchange rate volatility than more highly differentiated products. These insights allow the authors to simultaneously identify both channels of causation, thereby structurally addressing one of the main shortcomings of the existing empirical literature on the effects of exchange rate volatility on trade — the failure to correct for reverse causality. Using disaggregate trade data for a large number of countries for the period 1970-97, they find strong support for the prediction that trade dampens exchange rate volatility. Once they address the reverse-causality problem, the large effects of exchange rate volatility on trade described in some previous literature are greatly reduced. In particular, the estimated effect of currency unions on trade is reduced from 300 percent to between 10 and 25 percent.

The first generation models of currency crises often have been criticized because they predict that, in the absence of very large triggering shocks, currency attacks should be predictable and lead to small devaluations. **Broner** shows that these features of first generation models are not robust to the inclusion of private information. In particular, he analyzes a generalization of the Krugman-Flood-Garber (KFG) model which relaxes the assumption that all consumers are perfectly informed about the level of fundamentals. In this environment, the KFG equilibrium of zero devaluation is only one of many possible equilibriums. In all the others, the lack of perfect information delays the attack on the currency past the point at which the shadow exchange rate equals the peg, giving rise to unpredictable and discrete devaluations.

Albuquerque, **Bauer**, and **Schneider** consider the role of foreign investors in developed-country equity markets.They present a quantitative model of trading that is built around two new assumptions: both the foreign and domestic investor populations contain investors of different sophistication; and investor sophistication matters for performance in both public equity and private investment opportunities. The model delivers a unified explanation for three stylized facts about U.S. investors' international equity trades: trading by U.S.

investors occurs in bursts of simultaneous buying and selling; Americans build and unwind foreign equity positions gradually, and U.S. investors increase their market share in a country when stock prices there have been rising recently. The results suggest that heterogeneity within the foreign investor population is much more important than heterogeneity of investors across countries.

Ghironi and **Melitz** develop a stochastic, general equilibrium, two-country model of trade and macroeconomic dynamics. Productivity differs across individual, monopolistically competitive firms in each country. Firms face some initial uncertainty concerning their future productivity when making an irreversible investment to enter the domestic market. In addition to the sunk entry costs, firms face both fixed and per-unit export costs. Only a subset of relatively more productive firms export, while the remaining, less productive firms only serve their domestic market. This microeconomic structure endogenously determines the extent of the traded sector and the composition of consumption baskets in both countries. Exogenous shocks to aggregate productivity, sunk entry costs, and trade costs induce firms to enter and exit both their domestic and export markets, thus altering the composition of consumption baskets across countries over time. This model generates deviations from purchasing power parity that would not exist absent its microeconomic structure with heterogeneous firms. It provides an endogenous, microfounded explanation for a Harrod-Balassa-Samuelson effect in response to aggregate productivity differentials and deregulation. In addition, the deviations from purchasing power parity triggered by aggregate shocks display substantial endogenous persistence for very plausible parameter values, even when prices are fully flexible.

Burstein, **Eichenbaum**, and **Rebelo** argue that the primary force behind the large fall in real exchange rates that occurs after large devaluations is the slow adjustment in the price of nontradable goods and services. Their empirical analysis is based on data from four large devaluation episodes: Mexico (1994), Korea (1997), Brazil (1999), and Argentina (2001). They conduct a more detailed analysis of the Argentina case using disaggregated CPI data, data from their own survey of prices in Buenos Aires, and scanner data from supermarkets. They then construct an open economy general equilibrium model that can account for the slow adjustment in nontradable good prices after a large devaluation.

Health Economics

The NBER's Program on Health Economics met in Cambridge on March 26. Program Director Michael Grossman, also of City University of New York, organized this program:

Ted J. Joyce, NBER and Baruch College, "Some Simple Tests of Abortion and Crime"

Neeraj Kaushal, Columbia University, and **Robert Kaestner**, NBER and University of Illinois, "Welfare Reform and Health Insurance of Immigrants"

Thomas C. Buchmueller, NBER and University of California, Irvine, "Price and Health Plan Choices of Retirees"

Philip J. Cook, NBER and Duke University, and **Jens Ludwig**, Georgetown University, "Gun Ownership and Homicide Risk"

Bruce D. Meyer, NBER and Northwestern University, and **Anthony T. Lo Sasso**, Northwestern University, "The Health Care Safety Net and Crowd-Out of Private Health Insurance"

Isaac Ehrlich and **Yong Yin**, State University of New York, "Rationalizing Diversities in Age-Specific Life Expectancies and Values of Life Saving: A Numerical Analysis"

The inverse relationship between abortion and crime has spurred new research and much controversy. If the relationship is causal, then policies that increased abortion have generated enormous external benefits from reduced crime. In previous papers, **Joyce** argued that evidence for a casual relationship was weak and incomplete. In this paper, he describes a number of new analyses intended to address criticisms of his earlier papers. First, he closely examines the effects of changes in abortion rates between 1971 and 1974. The changes in abortion rates during this period were dramatic, varied widely by state, had a demonstrable effect on fertility, and were more plausibly exogenous than changes in the late 1970s and early 1980s. If abortion reduced crime, then crime should have fallen sharply as these post-legalization cohorts reached their late teens and early 20s, the peak ages of criminal involvement. It did not. Second, he conducts separate estimates for whites and blacks because the effect of legalized abortion on crime should have been much larger for blacks than whites since that legalization had a much stronger effect on the fertility rates of blacks. He finds little race difference in the reduction in crime, though. Finally, he compares changes in homicide rates before and after legalization of abortion, within

states, by single year of age. The analysis of older adults is compelling because they were largely unaffected by the crack cocaine epidemic, which was a potentially important confounding factor in earlier estimates. These analyses provide little evidence that legalized abortion reduced crime.

Kaushal and **Kaestner** investigate the effect of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) on the health insurance coverage of foreign- and U.S.-born families. They find that PRWORA increased the proportion of uninsured among low-educated, foreign-born unmarried women by 9.9 to 10.7 percentage points. In contrast, the effect of PRWORA on the health insurance coverage of similar U.S.-born women is negligible. The authors also find that PRWORA increased the proportion of uninsured among foreign-born children living with low-educated, single mothers by 13.5 percentage points. Again, the policy had little effect on the health insurance coverage of the children of U.S.-born, low-educated single mothers. Finally, this investigation finds some evidence that the fear and uncertainty engendered by the law had real effects on immigrant health insurance coverage.

Buchmueller analyzes health plan choices of retirees in an employer-sponsored health benefits program that resembles "premium support" models proposed for the Medicare program. A recent change in the employer's premium contribution policy creates a natural experiment for estimating the effect of premiums on the choice among competing plans. The amount the firm contributes toward a retiree's coverage depends on when an individual retired and his or her years of service as of that date. Changes over time in the employer contribution generate additional variation. The results indicate that price is a significant factor influencing the health insurance decisions of retirees. Preliminary elasticity estimates are at the low end of the range found in previous studies on active employees.

Cook and **Ludwig** develop an estimate of the marginal social costs of gun ownership based on new estimates of the effect of household gun prevalence on homicide rates. Using a panel dataset of 20 annual observations on the 200 largest counties, the authors estimate an elasticity of homicide with respect to gun prevalence equal to +.10, conditioning on county fixed effects, year fixed effects, burglary and robbery rates, and percent black. Using the same estimation procedure for gun and non-gun homicides separately, they find that all of the effect of gun prevalence is on gun homicide rates. The authors apply the same set of procedures to state-level data for the same period, with qualitatively similar results. The elasticity estimates from state-level data are larger and less robust than for county-level data. All estimates use the percentage of suicides committed with a gun as a proxy for gun prevalence. Earlier research has demonstrated that it is superior to other proxies in common use for cross-section analysis. New results presented here confirm its validity in time-series analysis of repeated cross-sections. Given that more guns cause more homicides and have little effect on other types of crime, it appears that the marginal external social cost of private gun ownership is positive. The magnitude of this cost increases with the level of crime and violence in the community. While it is not possible to make separate estimates of the effects of different types of guns, it is relevant that handguns, which constitute about one-third of the guns in private hands, account for 80 percent of all homicides. At mean values, an increase of 10,000 handgun-owning households in a county is associated with 1 additional homicide per year. If these lives are valued at just $1 million, the average annual marginal social cost of household handgun ownership is $100. If the harm from gun violence instead is monetized using contingent-valuation estimates, they imply that the average annual social cost per household is on the order of $600.

There is an extensive literature on the extent to which public health insurance coverage through Medicaid induces less private health insurance coverage. However, little is known about the effect of other components of the health care safety net in crowding out private coverage. **Lo Sasso** and **Meyer** examine the effect of Medicaid and uncompensated care provided by clinics and hospitals on insurance coverage. They construct a long panel of state-level data on hospital uncompensated care and free and reduced price care offered by Federally Qualified Health Centers. They then match this information to individual level data on coverage from the Current Population Survey for two distinct groups: children aged 14 and under and single, childless adults aged 18 to 64. The results provide mixed evidence on the extent of crowd-out. Hospital uncompensated care appears to have some crowd-out effect for children, while health center uncompensated care appears to crowd-out private coverage for adults.

Despite general recognition of rising life expectancies worldwide, little attempt has been made to quantify the extent to which individual efforts at health and life protection may account for some of the observed diversities in age-specific life expectancies across individuals and over time. **Ehrlich** and **Yin** address these issues via calibrated simulations of a dynamic, life-cycle model of life protection in which life's end is a stochastic event, age-specific mortality risks are endogenous variables, and life protection choices are set jointly with market insurance options: life insurance as well as annuities. A unique feature of the model is that it links mortality risks and private value-of-life-savings (VLS) measures as two sides of the same coin, and allows for systematic variation in both across different age and population groups. The simulations show that life protection has a non-negligible impact on life expectancy. It can account for a significant portion of observed diversities in life expectancies by age, gender, race, and education groupings, as well as for the wide range of VLS magnitudes previously estimated using the "willingness to pay" approach.

Bureau Books

NBER Macroeconomics Annual 2003

NBER Macroeconomics Annual 2003, edited by Mark Gertler and Kenneth S. Rogoff, will be available from the MIT Press this spring for $32.00 in paperback and $65.00 clothbound. The *NBER Macroeconomics Annual* presents, extends, and applies pioneering work in macroeconomics and stimulates work by macroeconomists on important policy issues. Each paper in the Annual is followed by comments and discussion.

This volume includes papers on: the relationship between information technology and productivity growth; a discussion of inflation expectations; and, whether inflation targeting can be successfully used in emerging market economies.

Gertler and Rogoff are NBER Research Associates in the Programs on Monetary Economics and International Finance and Macroeconomics, respectively. Gertler is a professor of economics at New York University; Rogoff is a professor of economics at Harvard University.

E-mail orders for this volume to: mitpress-orders@mit.edu.

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Seeking a Premier Economy: The Economic Effects of British Economic Reforms, 1980-2000

Seeking a Premier Economy: The Economic Effects of British Economic Reforms, 1980-2000, edited by David Card, Richard Blundell, and Richard B. Freeman, will be available from the University of Chicago Press this spring. Part of the Comparative Labor Markets Series, the book is priced at $95.00.

In the 1980s and 1990s, successive U.K. governments enacted a series of reforms to establish a more market-oriented economy, closer to the American model and further away from its Western European competitors. Today, the United Kingdom is one of the least regulated economies in the world, marked by transformed welfare and industrial relations systems and broad privatization. Virtually every industry and government program has been affected by the reforms, from hospitals and schools to labor unions and jobless benefit programs.

This volume focuses on the labor and product market reforms that directly affected productivity, employment, and inequality. Its authors ask: How did the United Kingdom manage to stave off falling earnings for lower paid workers? What role did the reforms play in rising income inequality and trends in poverty? At the same time, what reforms contributed to reduced unemployment and the accelerated growth of real wages?

Card is an NBER Research Associate and the Class of 1950 Professor of economics at the University of California, Berkeley. Blundell is a Professor of Economics at University College London and Director of Research at the Institute for Fiscal Studies. Freeman directs the NBER's Program on Labor Studies and is the Herbert Ascherman Professor of Economics at Harvard University.

Perspectives on the Economics of Aging

Perspectives on the Economics of Aging, edited by David A. Wise, is available from the University of Chicago Press this spring for $75.00.

This book investigates several important issues in the economics of aging, including the accumulation of wealth and the relationship between health and financial prosperity. Examining the changes in savings behavior and investment priorities in the United States over the past few decades, contributors to the volume point to a dramatic shift from employer-managed, defined benefit pensions to employee-controlled retirement savings plans. Further, the legislative reforms of the 1980s and the booming stock market of the 1990s did their share to influence the individual wealth accumulation patterns of Americans. These papers also explore the relationship between health status and economic status, considering factors like pension income and health, mortality, and medical care. The findings are based on evidence from the United States, Britain, South Africa, and Russia. The volume culminates with wide-ranging discussions on a number of key issues in the field, including innovations and factors that have contributed to a decline in mortality rates, the various medical advances that have benefited different groups and populations over time, and the determinants of expenditures on health.

Wise directs the NBER's Program on the Economics of Aging and is the John F. Stambaugh Professor of Political Economy at Harvard University's Kennedy School of Government.

Growth and Productivity in East Asia

Growth and Productivity in East Asia, edited by Takatoshi Ito and Andrew K. Rose, will be available soon from the University of Chicago Press. This is the thirteenth conference volume resulting from the NBER's East Asia Seminar on Economics. It is priced at $85.00.

Considering the examples of Australia and the Pacific Rim, the book offers a contemporary explanation for national productivity that measures contributions not only from capital and labor, but also from economic activities and relevant changes in policy, education, and technology. For this conference, Ito and Rose organized a group of collaborators from several Asian countries, the United States, and other parts of the globe who ably balance both macroeconomic and microeconomic study with theoretical and empirical approaches. The resulting volume pays special attention to the causes for the unusual success of Australia, one of the few nations to maintain unprecedented economic growth despite the 1997 Asian financial crisis and the 2001 global downturn. A new database comprising 84 Japanese sectors reveals findings for the last 30 years of sectoral productivity and growth in Japan. Papers focusing on Indonesia, Taiwan, and Korea also consider productivity and its relationship to research and development, foreign ownership, and policy reform in such industries as manufacturing, automobile production, and information technology.

Ito and Rose are Research Associates in the NBER's Program on International Trade and Investment. Ito is also a professor at the University of Tokyo. Rose is the B.T. Rocca Professor of Economic Analysis and Policy at the Haas School of Business at the University of California, Berkeley.

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