

The George J. Stigler Center for the Study of the Economy and the State

George Stigler founded the Center for the Study of the Economy and the State at the University of Chicago in 1977. It has from the beginning been a joint enterprise of economists and legal scholars at the Graduate School of Business, Department of Economics and Law School of the University of Chicago. The Center was renamed in George Stigler's memory after his death in 1991.

The Stigler Center is dedicated to the study of the effects of political life on economic life and the reciprocal effects of economic life on political life. That is not a very restrictive program, since there are few areas of our lives where neither economics nor the state intrudes. To carry out its mission, the Stigler Center supports research of faculty at the University of Chicago and of visitors from other academic institutions. The Center publishes a Working Paper series, and it promotes the dissemination of this research to a wider audience via conferences and lectures.

The Stigler Center contributes importantly to the continuity and growth of 'Chicago Economics,' which is known worldwide for two attributes:

- A tough-minded professional style that views economic theory not as an end but as a tool to assist in understanding the real world
- A lively appreciation for the working of private markets

George J. Stigler

George Stigler joined the faculty of the Graduate School of Business and the Department of Economics at the University of Chicago in 1958. This event and the arrival two years later of Merton Miller is widely recognized as establishing the Business School as a world leader in academic research and making it a full partner in an extraordinarily fruitful cooperative research enterprise with the University's Department of Economics and Law School.

Stigler was one of the great economists of the 20th century. He made seminal contributions to the economic theory of information and oligopoly and to the economic analysis of government regulation and the public sector. Stigler received the profession's highest honors including the presidency of the American Economic Association and the Nobel Memorial Prize in Economic Science. His 1982 Nobel Prize was the first awarded to an economist whose primary appointment was in a Business School.

More information may be found at the Stigler Center's website:

<http://gsbwww.uchicago.edu/research/cses/>

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INTRODUCTION

The Stigler Center's mission is to support and disseminate research at the University of Chicago on the interface of the private economy and the state. This Report summarizes the work of the Center's research community during the 2002/03 academic year. Fourteen University of Chicago faculty and three visitors have worked on a wide range of topics during this past year.

One of the hallmarks of Chicago Economics is a constant search for new applications of economics. That search is much in evidence in this Report, which includes topics as diverse as the role of religion in economic development (Zingales) and interracial marriage (Wong). Accordingly, any attempt at broadly classifying the work summarized in this Report is inevitably somewhat arbitrary and incomplete. However, some broad patterns are discernible.

Our research community continues to devote considerable attention to issues related to health and health care. This is an area of increasing government involvement all over the world, and there is much ongoing discussion of the appropriate extent of that involvement. Stigler Center scholars contribute to this discussion directly by their work on currently important policy areas such as the regulation of introduction of new drugs (Philipson) and the growing shortage of organ transplants (Becker). We also try to add to understanding of some of the more basic forces underlying current policy debates. For example, policies that affect medical innovations need to be informed by a sense of their importance. The work on the value of extra longevity (Topel and Murphy) and the implications for inequality (Becker and Philipson, Topel and Murphy) help provide that sense.

Another area that has drawn considerable interest from both policy makers and our research community is corporate governance. Our research community's interest in the topic predates the recent corporate upheavals and the subsequent legislation. Much of the research we have done and continue to do is in the best Chicago empirical tradition of discovering how governance systems and the regulation that shapes them actually work. That approach is represented in this Report by research in areas like the recent changes in corporate hierarchies (Rajan), the effects of taxes on governance systems (Zingales), how governance differs between regulated and unregulated industries (Helland), and the arrangements between venture capitalists and entrepreneurs (Kaplan).

Since the Center was established in 1977, economic analysis of government institutions and policies that affect the private economy has been central to the work of our research community. There are numerous examples of such research in this Report, including the impact of securities regulation (Greenstone), the link between pollution regulation and politics (Helland), the measurement of regulation (Mulligan), the division between private and public enforcement of criminal law (Helland).

Some of this research has come to focus particularly on how government affects economic growth. Examples include research on the connection between Japanese financial regulation and that country's economic stagnation (Kashyap), the tradeoff

between pollution regulation and economic activity (Greenstone), the impact of public education on productivity (Topel), and the impact of corporate taxes on the formation of new corporations (Goolsbee). We believe that work like this will contribute to the increasing public discussion of economic growth.

Members of our research community have a long-standing interest in issues related to inequality. This is another area where our work predates the recent upsurge of public discussion, which has been triggered by the welfare reforms of the late 1990s and the recent recession. This Report summarizes research on several topics related to inequality including the recent changes in unemployment and wages (Murphy and Topel), racial wage differentials (Neal), the welfare system and single-motherhood (Neal), the role of competition in education (Neal), and the impact of inequality on marriage (Wong). Also, as mentioned above, inequality is central to some of the Center's research on health.

Some of the research projects mentioned here and throughout the Report are summarized in the Stigler Center's Working Paper series. Many of these Working Papers are available the Center's website at:

<http://gsbwww.uchicago.edu/research/cses/documents/GSCworkingPapersPDFs.htm>

The Stigler Center's mission includes bringing discussion of the issues that stimulate our research to a non-academic audience. In the 2002/03 academic year the Center co-sponsored two conferences. One of these, in conjunction with the Ronald Coase Institute, was on the legal and institutional barriers to the formation of private enterprises in less-developed countries. This was held at the University's downtown Gleacher Center, and brought together business practitioners, academics and government officials from several countries and the World Bank.

Ronald Coase, a celebrated Chicago economist and Nobel laureate, has long emphasized the importance of property rights for economic development. He provided the impetus for creation of an Institute bearing his name that is dedicated to sharing practical knowledge about implementing property rights in less-developed countries with policy makers in those countries. This conference advanced that goal.

The second conference, on obesity, was held in Washington at the US Department of Agriculture (USDA). It was organized by Tom Philipson, whose own work on the topic is summarized in this Report. Obesity has become a policy issue as it has become more widespread in the population. There is pressure from several sources, including the threat of class-action litigation, to shift some of the onus of obesity onto food producers and to increase government regulation of the industry. The USDA and the Food and Drug Administration share regulatory oversight of the food sector. The conference at USDA was mainly aimed at these regulators. It sought to summarize current knowledge about obesity and to provide an agenda for the future research that these agencies will need.

The Stigler Center's research community occasionally contributes its talents directly to public policy. Next year Randy Kroszner, the Center's Associate Director prior to his appointment to the President's Council of Economic Advisers, returns from that appointment. At the same time, two members of our research community will assume

policy making positions in Washington. Tom Philipson is the Senior Economic Advisor to the new Commissioner of the Food and Drug Administration. This fall Raghuram Rajan will become Economic Counsellor and Director of Research at the International Monetary Fund. The FDA and IMF may have many faults, but we are pleased that a shortage of sound economic advice will not be among them in the year ahead.

Our accomplishments could not have occurred without the generosity of our supporters. All of the Stigler Center's research community is grateful for that support.

Finally, thanks are due to Victoria Ryberg for excellent administration of the Center's operations and its website.

A handwritten signature in black ink, appearing to read 'Sam Peltzman', with a long, sweeping horizontal stroke extending to the right.

Sam Peltzman
Director

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University of Chicago Faculty

Gary Becker

I have worked on topics in health economics and the war on drugs.

Tomas Philipson and I have been analyzing the impact of increased longevity on world inequality. Usually GDP per capita is used to measure the quality of life of individuals living in different countries. The lack of convergence in this measure for the world as a whole has led to concerns about the impact of globalization of markets on world inequality. However, well-being is also affected by quantity of life, as represented by longevity. Our analysis incorporates longevity into an overall assessment of the evolution of cross-country inequality.

The absence of income convergence noticed in the growth literature stands in stark contrast to the reduction in inequality after incorporating recent gains in longevity. We compute a ‘full’ income measure to value the life expectancy gains experienced by 49 countries between 1965 and 1995. Countries starting with lower income tended to grow more in terms of ‘full’ income than countries starting with higher income. The average growth rate of ‘full’ income is about 140% for developed countries, compared to 192% for developing countries. Additionally, we decompose changes in life expectancy into changes attributable to thirteen broad groups of causes of death. We find that infectious, respiratory and digestive diseases, congenital and perinatal conditions, and ‘ill-defined’ conditions are responsible for most of the mortality convergence observed between 1965 and 1995.

Kevin Murphy, Michael Grossman, and I have continued work on the market for illegal drugs. The current system of supply interdiction plus penalties for possession has numerous costs – the explicit costs of enforcement and incarceration and the resources devoted by buyers and sellers to evading detection and securing ‘turf.’ We are comparing those costs to alternative methods of restraining the consumption of these drugs. For example, one alternative that has been discussed is decriminalization plus a tax on consumption. This would replace the implicit non-monetary tax of the current system with an explicit tax. There would however be an important difference in social cost, because the current implicit tax requires an expenditure of resources by criminals and the government. Much of that expenditure would be converted to government revenue with an explicit tax.

Our analysis, in the paper “The Economic Theory of Illegal Goods: The Case of Drugs,” suggests that a well-designed monetary tax on drugs could reduce consumption of drugs more than optimal enforcement of an outright prohibition. Thus it may be more effective to fight a war on drugs by legalizing consumption and then taxing it than to pursue the current policy of criminalizing the production and sale of drugs. The optimal policy depends in part on the price elasticity of demand for drugs. We are currently working on estimating this elasticity for cocaine and heroin from data we have obtained on actual use of these drugs. (Most previous estimates use recall data on consumption.)

Julio Elias and I have continued to analyze the potential of using the price system to overcome the shortage of organs in transplant surgery. We are especially considering payment for live transplants. Almost half of all kidney transplants use live donors and so do to a growing number of liver transplants. These often come from relatives of the donee, who are both more interested and more likely to provide a medically appropriate match.

However, the potential for live transplants seems underdeveloped. Under the present system the queues for organ transplants have continued to grow, and many persons die while waiting for organs to become available. These queues could be eliminated by allowing organs to be bought at a market clearing price. In our analysis, we integrate the markets for live and cadaver organs and we show that the marginal donors for kidneys and livers are very likely to be live donors if the price of organs clears the market. Our preliminary calculations indicate that it would not be expensive-relative to the cost of the surgery- to clear the markets for kidneys and livers with live donors.

Austan Goolsbee

During the past year, I have been working on the impact of corporate tax policy on the economy. I completed a project on the formation of corporations.

The Impact of the Corporate Income Tax on the Formation of Corporations. The corporate income tax generates a distortion by double taxing corporate income. Corporations typically pay income tax on income earned at the corporate level and then shareholders pay personal income tax upon the income when it is distributed to them. Recently enacted legislation reduces, but does not eliminate, the tax on dividends.

One effect of the double taxation of corporate income is the incentive this creates for shifting resources away from the corporate sector. That shift of resources reduces efficiency: there is a deadweight loss (DWL) because resources that would otherwise be more productive if they were employed in a corporation are employed in a less appropriate way – for example by partnerships or by individuals. A central issue in the literature has been how large this DWL is in practice. My research takes up this issue by analyzing the effect of high corporate income taxation on the formation of corporations.

The earlier literature has, perhaps surprisingly, tended to ignore the effect I am exploring. Instead previous work assumes that some sectors (e.g., manufacturing) are corporate sectors, while others (services) are non-corporate. Then, a tax on the corporate sector will lead resources to move to the non-corporate sector. In these analyses the DWL arises from the excessive relative growth of the non-corporate sector. The general finding from studies that follow this path is that the DWL of the high corporate income tax is relatively small—less than 20 percent of the revenue generated.

More recently, economists have looked at the effect of taxes on resource allocation within sectors. They have explicitly allowed for the fact that there can be both corporate and non-corporate production in the same sector. In this case, when corporate income is taxed more heavily than non-corporate income the same kind of activity will be shifted from corporations to non-corporate forms, such as partnerships and individual proprietorships. A key empirical question that emerges from this literature is how much firms in the same industry shift to non-corporate forms in response to the corporate income tax. The research on this question thus far has tended to show that there does not seem to be much shifting in response to tax rates, which would suggest that the DWL of the corporate income tax is relatively modest overall.

An underlying problem with much of this empirical literature comes from data constraints. Most of the analyses are conducted at a highly aggregated level, such as how total corporate formation in the U.S. responds to federal tax rates. There are at least two problems with this approach. First, there has been almost no variation in federal corporate tax rates over the past 30 years. Second, when the corporate tax rate does change, such as in 1986, many other aspects of the federal tax code change as well, making it difficult to disentangle the effect of corporate tax rates from these other changes.

In my work, I have tried to overcome these problems by looking at one industry – retailing – in detail. I have identified previously unused and highly disaggregated cross-state data from the census of retail trade. These data do have some problems that traditional tax data do not have, but they have many advantages as well. For example, retailing is a sector with considerable variety in organizational form, ranging from large corporations to mom and pop corner stores. Thus, the opportunity to observe shifting from one form to the other is especially great in this industry. In addition, because of the degree of disaggregation, I am able to observe the response to cross-state differences in state corporate tax rates. Those taxes have changed at different times in different states, so my data allow for a clearer estimate of the effect of corporate taxes than the previous literature. To be sure, it is important to recognize that the impact of state and federal corporate income taxes may differ (since firms have an easier time moving to different jurisdictions to avoid state taxes, for example). However, this cross-sectional approach does yield a direct estimate of the impact of tax rates on corporate incentives to incorporate.

The results from my research show that the relative taxation of corporate to personal income plays an important role in the share of firms, employment and sales that are done by corporations versus partnerships and sole proprietorships. This stands in sharp contrast to the previous literature. For example, an increase in the corporate tax rate by .10 reduces the corporate share of firms by 5-10 percent and the corporate share of sales and employment by 2-6 percent. This impact of tax rates is an order of magnitude larger than previous estimates based on time-series variation in the tax rate and suggests a larger, though still modest, DWL from corporate taxation.

This work will be published in the *Journal of Public Economics*.

Michael Greenstone

During the past year, I have worked on the following projects about securities regulation and environmental regulation.

The Effects of Mandated Disclosure Laws on Equity Markets. In this project, Annette Vissing-Jorgensen, Paul Oyer and I are analyzing the effects of laws that require publicly traded firms to disclose financial information to the public. The Securities Act of 1933 and the Securities and Exchange Act of 1934 required firms whose shares were traded on the American and New York Stock Exchanges to file detailed balance sheets and income statements and to report on insider trading. These disclosure requirements are controversial, because it is not understood whether they needlessly burden public companies or serve as a source of information that private markets would fail to produce on their own. Notably, George Stigler vociferously argued in favor of the former.

This project examines the Securities Act of 1964, which extended these reporting requirements to firms traded on over-the-counter exchanges. The aim is to test whether mandated disclosure limits the ability of management to expropriate firm assets from outside investors, thereby improving the profitability and stock market valuations of affected firms. Additionally, the project will examine whether the increased availability of reliable information about these firms reduced the variance of their equity prices. We have completed a lengthy process of data collection and have begun to analyze these data.

The Impacts of Clean Air Regulations. Over the last three decades, the federal government has attempted to balance the dual and often conflicting goals of promoting economic activity and environmental quality. The tension between these goals arises because regulations that reduce environmental degradation are likely to hamper economic progress. This project analyzes one of the most important examples of such a tension – the federal government’s regulation of air pollution through the Clean Air Act (CAA).

The first part of this project estimates the costs that these regulations impose on polluters and workers. I began work on a paper, “The Trade-off between Economic Activity and Environmental Quality: Evidence from Plant-Level Data,” that will estimate the effects of the CAA on plant level pollution emissions, employment, investment, and shipments. The results will allow for the calculation of the regulation-induced trade-off between environmental quality and employment. This trade-off has not been estimated previously but is central to policy debates on environmental regulation. The estimates will also provide insight into how firms adjust their production processes to mitigate the costs of regulation. Further, I will analyze plant-level production in order to directly estimate the economic costs incurred by plants due to mandated reductions in pollution.

The second part of this project estimates the benefits of the CAA regulations. Kenneth Chay and I recently completed a draft of a paper, “Air Quality, Infant Mortality, and the Clean Air Act of 1970.” This paper examines the effects of total suspended particulates (TSPs) pollution on infant health using the air quality improvements induced by the 1970

CAA in the first year that it was in force. This legislation imposed strict regulations in “nonattainment” counties that exceeded the federal TSPs ceiling.

We find that TSPs nonattainment status is associated with sharp, large reductions in both TSPs pollution and infant mortality. These reductions are also evident in nonattainment counties near the federal ceiling, relative to other counties near the ceiling that narrowly avoid the nonattainment designation, suggesting that the regulations are a causal factor. We estimate that a 1% reduction in TSPs results in approximately a 0.4% reduction in the infant mortality rate at the county level. Most of this effect is driven by a reduction in deaths occurring within one month of birth, implying that fetal exposure is a potential biological pathway. The estimates imply that roughly 1300 additional infants survived to 1 year of age in the first year that the CAA was in force.

In a related paper titled, “The Clean Air Act of 1970 and Adult Mortality,” we examine the effect of these same reductions in TSPs on adult and elderly mortality. We fail to find a consistent association between the regulation-induced reductions in TSPs and adult (or elderly) mortality rates. This is notable because the EPA claims that the regulation of TSPs is necessary because of its pernicious health consequences for adults and the elderly.

This paper will be published in the *Journal of Risk and Uncertainty*.

The Economic Costs of Global Warming. There is a growing consensus that emissions from human activity, primarily the release of carbon dioxide, lead to global warming and increased precipitation. It is thought that these changes in climate will impact the U.S. economy. Since temperature and precipitation are direct inputs in agricultural production, many believe that the largest effects will be in this sector. However, the evidence on the effects in this sector is inconclusive.

Most previous research is based on estimates of the technological link between temperature and precipitation on one hand and agricultural output on the other. These technological links are then applied to presumed effects of global warming on temperature and precipitation to produce estimates of the effects on agricultural output. The problem with this line of research is that it ignores the compensatory responses of profit maximizing farmers to changes in weather and consequently is likely to overestimate any adverse effects on output.

In this project, Olivier Deschenes and I propose an alternative strategy to estimate the effects of climate change. We use a county-level panel from the Censuses of Agriculture to estimate the effect of climate change within each county on profits of farmers in that county. The idea is that the profit response of the fairly homogeneous group of farmers that operate in the same county should reflect their adaptations to the common climate changes they face. In particular, we suspect that farmers are able to alter some inputs (e.g., fertilizer usage, chemical usage, and labor) in response to weather shocks and in some cases may be able to change the crops that they plant.

Our preliminary results suggest that a doubling of atmospheric concentrations of greenhouse gases will actually increase annual agricultural profits by between \$700 million and \$2.3 billion (1997\$) or 2%-6%. However, given the margin of error in these estimates, we cannot firmly conclude that there is any effect at all. Overall, our preliminary results undermine the contention that climate change will have substantial effects, positive or negative, on the U.S. agricultural sector.

Steven Kaplan

In the last year, I have worked on projects related to corporate governance, venture capital and the market for corporate control.

The State of U.S. Corporate Governance: What's Right and What's Wrong? The U.S. corporate governance system has recently been heavily criticized, largely as a result of failures at Enron, WorldCom, Tyco and some other prominent companies. Those failures and criticisms, in turn, have served as catalysts for legislative change (Sarbanes-Oxley Act of 2002) and regulatory change (new governance guidelines from the NYSE and NASDAQ).

In this paper, Bengt Holmstrom and I consider two questions. First, is it clear that the U.S. system has performed as poorly as the critics charge? Second, will the changes lead to an improved U.S. corporate governance system? We first note that the broad evidence is not consistent with a failed U.S. system. The U.S. economy and stock market have performed well both on an absolute basis and relative to other countries over the past two decades. And the U.S. stock market has continued to outperform other broad indices since the scandals broke. Our interpretation of the evidence is that while parts of the U.S. corporate governance system failed under the exceptional strain of the 1990s, the overall system, which includes oversight by the public and the government, reacted quickly to address the problems. We then consider the effects that the legislative, regulatory, and market responses are likely to have in the near future. Our assessment is that they are likely to make a good system better, though there is a danger of overreacting to extreme events.

This paper is available as a Stigler Center Working Paper and will be published in the *Journal of Applied Corporate Finance*.

I have continued to work on the venture capital industry. This industry has been an important source of financing new firms, especially in risky new technologies. Unlike more traditional financial intermediaries, such as banks, information on the operation of venture capital (VC) firms has been skimpy. My ongoing research has sought to fill this gap. I worked on three projects related to this industry.

Financial Contracting Theory Meets the Real World. Per Stromberg and I revised our study that analyzes the structure of VC financings. There is a large academic literature in security design, capital structure, and contracting in general. The papers in this literature often begin with a situation in which a principal (the VC firm in this case) negotiates with an agent (the entrepreneur) over the financing of a project or company. These theoretical papers typically make a number of different assumptions and predictions concerning these negotiations. These assumptions concern how easy it is to observe the agent's actions and write contracts based on these actions, the ability to renegotiate these contracts and the nature of information and uncertainty.

Despite the large volume of theory, there is relatively little empirical work that compares the characteristics of real world financial contracts to their counterparts in financial

contracting theory. In this paper, we attempt to inform theory by conducting a detailed study of actual contracts between venture capitalists and entrepreneurs. VC firms would seem to closely approximate the investors of theory. They have strong incentives to maximize value, but, at the same time, they receive few or no private benefits of control.

The distinguishing characteristic of VC financings is that they allow for separate allocations of cash flow rights, voting rights, board rights, liquidation rights, and other control rights between the VC firm and the entrepreneur. Our study describes how these rights are allocated in a large sample of VC contracts. This allocation has the following characteristics in our sample: (1) while convertible securities are used most frequently, VCs also implement a similar allocation of rights using combinations of multiple classes of common stock and straight preferred stock. (2) Cash flow rights, voting rights, control rights, and future financings are frequently made contingent on observable measures of financial and non-financial performance. (3) Specifically, if the company performs poorly, the VC firm usually obtains full control. As company performance improves, the entrepreneur retains or obtains more control rights. If the company performs very well, the VC firm retains its cash flow rights, but relinquishes most of their control and liquidation rights. The entrepreneur's cash flow rights also increase with firm performance. (4) It is common for VCs to include non-compete and vesting provisions aimed at mitigating the potential hold-up problem between the entrepreneur and the investor.

This paper has been published in the *Review of Economic Studies*.

How Do Venture Capitalists Choose Investments? In this paper, Per Strömberg and I consider how VC firms choose or screen their investments. We do this by studying the internal investment analyses produced by 10 venture capital firms for investments in 42 portfolio companies. Consistent with most academic and anecdotal accounts, we find that it is common for VCs to consider explicitly factors influencing the attractiveness of the opportunity, such as the market size, the entrepreneur's strategy, the technology, prospects for customer adoption, competition, and so on. We also provide evidence on how the VC firms expect to monitor their investments. In at least half of the investments, the VC firm expects to play an important role in recruiting management. We complement the investment analyses with information from the financial contracts for the investments and consider how both the initial investment analysis and the contract terms are related to subsequent performance of the investment. In both analyses, the evidence suggests that the VC firm's initial appraisal of the management team is important. Stronger management teams obtain more attractive contracts and are more likely to succeed in taking their companies public.

Private Equity Performance: Returns, Persistence and Capital Flows. In this paper, Antoinette Schoar and I investigate the performance of private equity partnerships using a data set of individual fund returns collected by Venture Economics. VC firms often organize partnerships to invest in a series of opportunities. When a partnership is successful, that success may be used to attract funds to subsequent partnerships. Indeed, we find that better performing funds are more likely to raise follow-on funds and raise

larger funds than funds that perform poorly. This relationship is concave so that top performing funds do not grow proportionally as much as the average fund. We also find that returns tend to persist, so that the return to the follow-on from a successful fund also tends to be above average. Over the sample period, average fund returns net of fees approximately equaled the return to the S&P 500, although there is a large degree of heterogeneity. Finally, we find that entry into the private equity market is cyclical. Funds (and partnerships) started in boom times are less likely to raise follow-on funds, suggesting that these funds subsequently perform worse. Several of these results differ markedly from those for mutual funds.

Finally, I have been working on the following analysis of corporate takeover contests.

What is the Price of Hubris? Using Takeover Battles to Infer Overpayments and Synergies. In this paper, Pekka Hietala, David Robinson and I analyze the amount of information that can be extracted from stock prices around takeover contests. This work is motivated by numerous studies showing that bidders tend to overpay for targets in takeover contests. In many of these studies the gains to the target minus the bidder's overpayment are taken to be the market's assessment of the net value created by the takeover. The first part of the paper shows that it is not possible in general to use target and bidder stock price movements to infer the market's estimates of synergies, bidder overpayment, and changes in bidder and target values. In two generic cases, however, we show that it is possible to use bidder and target stock prices to obtain market estimates of overpayment.

In the second part of the paper, we illustrate one of these two generic cases through a clinical study of the takeover contest for Paramount Communications. We find that the market estimated that Viacom, the eventual "winner" of the takeover battle, overpaid by approximately \$1.4 billion when it agreed to purchase Paramount in a \$9.2 billion acquisition in February 1994. We also find that the market believed that QVC, the eventual "loser" of the battle, had substantially larger synergies (on the order of \$1 billion more) with Paramount than Viacom. Viacom prevailed because of its willingness to overpay by much more than QVC. This overpayment occurred despite the fact that Sumner Redstone, the CEO of Viacom, owned roughly 2/3 of Viacom. We view the results for Paramount and Viacom as consistent with analyses emphasizing the bidder's overestimate of its own abilities to create synergies.

This paper will be published in *Financial Management*.

Anil Kashyap

This past year I have worked on the economic and financial crises in Japan. These began with a stock market crash in the late 1980s. Since then the Japanese economy has stagnated and the Japanese financial system remains in an unresolved crisis. Because the Japanese economy is the second largest in the world there is much concern that these difficulties are having adverse effects on economic growth in Asia and indeed the rest of the world. Accordingly, it is especially important for academics and policy makers to understand what has happened in Japan and what may be the appropriate policy response. My work hopefully contributes to that discussion.

In “Sorting out Japan’s Financial Crises” I explain how the well publicized problems in the banking system are closely inter-connected with problems of Japanese life insurers and government sponsored financial agencies. One of the important points of the paper is that these problems are not solely due to the decade long recession. It is true that any financial system would be encountering trouble given the massive decline in collateral values that has occurred in Japan. But I argue that the Japanese problems are deeper and are greatly affected by the way the Japanese financial sector is organized and regulated.

The banks have several recurrent problems. First, they are undercapitalized. Most of the large banks have capital that would be below the regulatory minimums if the accounting were properly done. Second, they are too large and do not have a product mix that is conducive to earning adequate returns to justify their size. Thus, they have systematically lower rates of return than other globally active banks. Third, they are currently rolling over large amounts of loans to many money losing firms. The alternative would be to call the loans and recognize losses, but this would expose the banks’ own insolvency. Thus far Japanese regulatory authorities have acquiesced in this process of disguising the insolvency of the banks by allowing them to roll over loans of dubious value.

These problems are exacerbated because the private banks have to compete with many government-sponsored financial institutions (such as the Housing Loan Corporation and the Postal Savings System.) These government entities often are providing subsidies to their customers by pricing their products below cost. This undercuts the private sector, and shuttering these government institutions will be necessary for the banks to fully regain their health. Their losses will also ultimately have to be paid for by the taxpayers.

The insurance companies enter the picture because they have also suffered losses from the sharp decline in asset prices since the 1989 stock market crash. This left insurers undercapitalized. The insurers partly made up for their capital shortfalls by selling securities to the banks, and the banks in turn raised some capital by selling securities to the insurance companies. These sham transactions have left both the banks and insurers exposed to each others’ subsequent losses. Therefore, as losses are recognized in either sector they spillover to the other.

Altogether I estimate the Japanese taxpayers are likely to have to pay an additional 24% of GDP to make up for the shortfalls of the government financial institutions and the

banks. This is a staggering figure. For example, the cost of resolving the U.S. Savings and Loan crisis in the early 1990s amounted to only 3% of GDP. Moreover, these enormous costs will be on top of the past write-offs of the banks that are already equal to roughly 18% of GDP.

In my follow up work I am investigating the consequences of the capital misallocation that has occurred because of the financial crisis and the alternatives for rehabilitating the banking sector. One important, and sometimes overlooked, fact is that the banking problems merely reflect the poor conditions of their borrowers. Simply putting in capital to banks to make up for past losses would be pointless if the underlying corporate problems are not addressed.

In work with Ricardo Caballero and Takeo Hoshi we emphasize that the growth problems today cannot be due solely to a lack of solvent financial institutions. There have always been international banks (and insurance companies) operating in Japan, and the number rose substantially as a result of the so-called “Big Bang” deregulation that was completed in April of last year. These foreign firms are solvent but are choosing not to lend much in Japan. So the problem is not simply that the domestic financial institutions are undercapitalized. This is an important point, because it suggests that merely injecting more capital into the banks, as some have suggested, will not resolve the crisis.

Our work explores the mechanism by which rolling over the loans to the bad firms depresses the incentives of the firms that might otherwise grow and prosper. There is a useful analogy between the current Japanese situation and what happened in Russia following the collapse of the Soviet Union. In that case insolvent state-owned banks were lending to bankrupt state-owned firms. This retarded the growth of the Russian private sector because new private firms had to compete with heavily subsidized government firms. In Japan, as in Russia, the inefficient firms will have to be allowed to disappear before their more efficient rivals can grow. Until that happens, Japan’s long period of sluggish growth may not end.

Hoshi and I are just beginning a project to evaluate alternative proposals for rehabilitating the banks (assuming that the corporate problems are tackled). This work builds on the book that we published together 2 years ago on the Japanese financial system. (That book was funded by the Stigler Center and was awarded the 45th Nikkei Prize for Excellent Books in Economic Science last year.)

I also completed several book projects. One will be published in August by Cambridge University Press. This deals with monetary policy in Europe. (I described this work in last year’s report.) The second looks at the range of structural problems facing the Japanese economy. This book, which I helped edit on behalf of the National Bureau of Economic Research, will be published in September, 2003 by the University of Chicago Press.

Casey Mulligan

I have continued my work on the measurement of regulation. This is motivated by the importance of regulation as an instrument of public policy on one hand and the difficulty of measuring the extent of regulation on the other. In my current work, I have been studying the relation between regulation and population. The population-regulation relation may tell us something about the importance of size in determining the political influence of various groups, the economic distinctions between regulation and taxes, and measuring the growth of regulation over time.

With the help of Chicago undergraduate students Herbert Lian and Pakshun Ng, and coauthor Andrei Shleifer, I have been exploring this regulation-population relation across states and across countries. One approach we have taken is to compare the number of pages (or characters) in the statutes of the various states. We take the length of a state's legal code as an indicator of the degree of regulation in that state. By this measure, the amount of regulation in a state is nearly proportional to the square root of its population. For example, the Texas law books have 54,000 pages – or almost five times the pages of Wyoming law books. The corresponding difference in population is more like 25 times. Although different states in many ways, Delaware and Wyoming have nearly the same number of pages in their law books – in our view because they both have so few citizens.

A second approach we have taken is to look at the existence of a particular type of regulation at a point in time – like telegraph regulation in 1850, minimum wage laws in the 1920's, employment discrimination laws in 1960, rent control in the 1990's, conscription in 1985, capital punishment in the 1980's, or labor and business entry regulation in 1999 – and determine whether the larger jurisdictions (cities, states, or countries) are more likely to have the particular regulation. We find this generally to be the case.

Kevin M. Murphy

My research over the past year has focused on three areas: (1) Black-White Differences in the Economic Value of Improving Health, (2) The Evolution of US Unemployment over the 1990s, and (3) The Economics of Illegal Goods.

Black-White Differences in the Economic Value of Improving Health. Economists typically measure economic progress by the growth in per capita income. There is a similar focus on incomes when comparisons are made across groups rather than over time. In this paper we ask a relatively simple question: how much do differences over time and across groups in longevity add to the typical measures of progress and inter-group differentials. Our analysis focuses on changes in longevity as measured from the Vital Statistics of the United States for 1968-1998. We focus on gains for and differences between groups defined by both race (black and white) and gender. In keeping with standard economic analysis we use willingness-to-pay to measure the economic value of gains in longevity.

Over the 30-year period covered by our data we find that the economic value of the progress in longevity was enormous. Measured at birth, the gains for white males were about \$245,000 per person while the gains for black males were far larger, about \$390,000 per person. The gains for women were somewhat smaller with white females gaining about \$150,000 per person and black females gaining about \$305,000 per person. Measured at 40 years of age (an age somewhat before the onset of death from the major diseases) the gains for white and black men were roughly \$350,000 and \$500,000 respectively while the gains for white and black women were roughly \$180,000 and \$400,000.

Our data imply that all race and gender groups have gained significantly from reductions in mortality over the past three decades. Our data also suggest that there have been significant gains for blacks relative to whites. In 1968, the economic value of the longevity gap between white and black males (per person) was about \$410,000 (measured at birth) and the racial gap for females was about \$325,000. By 1998, these gaps had declined considerably and were about \$260,000 for males and \$170,000 for females. In trying to understand the black-white gap in longevity, we also ask a natural question, how much of the gap in mortality between whites and blacks can be explained by differences in income? Our estimates suggest that about 1/3 to 1/2 of the current black-white gap can be explained by differences in income.

We also examine changes in mortality prospectively. In particular we examine the potential gain to our race and gender groups from progress against various categories of disease. We find that a 10% reduction in deaths from cancer would be worth about \$18,000 to a 40 year-old white male and \$23,000 to a 40 year-old black male. For women the corresponding numbers are \$17,000 and \$19,000. The largest racial differences are for infectious diseases (including AIDS), diabetes, hypertensive heart disease, and cerebrovascular disease.

Recent Unemployment Historically Contemplated. About a decade ago Bob Topel and I published a study of the growing joblessness in the 1970s and 1980s. We concluded that a precipitous drop in the demand for low skilled workers had reduced the returns to work for the less skilled. This led to high rates of unemployment and long spells of joblessness for less skilled workers. After our paper was published in 1992, things seemed to change dramatically. The 1990s saw a brief recession followed by the longest expansion in U.S. history. Over the expansion, unemployment rates fell steadily and by 2000 had reached their lowest levels in three decades.

Bob Topel and I have analyzed this recent experience, and some of our findings are surprising. For example, the trends toward longer spells of joblessness and rising non-employment have continued in spite of the prolonged expansion and the fall in unemployment rates. Second, the fall in unemployment to levels close to historical lows is very misleading. Broader measures of joblessness show that the labor market of the late 1990s is more like the relatively slack labor market of the late 1980s than the booming labor market of the late 1960s. Finally, the supply and demand forces identified in our previous paper continue to importantly affect today's labor markets.

Our data reveal that over the 1990s while unemployment was falling, time spent out of the labor force was rising. In fact, the increase in time spent out of the labor force was so large that total joblessness in 2000 (unemployment and out of the labor force together) was as high in the business cycle peak of 2000 as it was in the business cycle peak 1989. This is in spite of the fact that the unemployment rate was roughly 2 percentage points lower in 2000.

While the growth in the amount of time American males spent out of the labor force continues a trend found in our earlier research, other trends have changed somewhat over the most recent decade. For example, real wages, which had been falling precipitously for less skilled males, stabilized and even rebounded somewhat in the later half of the decade. Our data also suggest that the long-standing growth in income inequality has finally run its course (at least at the bottom of the income distribution).

The data on joblessness reflect the impact of the changing wage trends. For example, the long-term divergence in employment rates between low wage workers and high and moderate wage workers that was so pronounced in our earlier work has stopped. The gap in unemployment has even closed somewhat in recent years along with the closing wage gaps. This congruence between patterns of change in wages and employment fits well with our previous work, which stressed wage changes as the dominant factor driving changes in employment rates.

The Economic Theory of Illegal Goods: The Case of Drugs. Economists have devoted much attention to the effects of excise taxes on prices and outputs, and they have discussed intensively the normative effects of these taxes. However, most of this analysis has focused on monetary taxes. Non-monetary taxes in the form of criminal and other punishments for illegal production have received little discussion. In this paper Gary Becker, Michael Grossman and I analyze both the positive and normative effects of the

punishments that attempt to enforce laws that make production and consumption of particular goods illegal. We use the supply and demand for illegal drugs as our main example, a topic of considerable interest in its own right, although our general analysis applies to prostitution, restrictions on sales of certain goods to minors, the underground economy, and other activities.

First, we provide a simple graphical analysis that shows how the elasticity of demand for an illegal good is crucial to understanding the effects of punishment to producers on the overall cost of supplying and consuming that good. We then formalize that analysis, add expenditures by illegal suppliers to avoid detection and punishment, and derive the optimal public expenditures on apprehension and conviction of illegal suppliers. We assume the government maximizes welfare and accordingly takes account of differences between the social and private values of consumption of an illegal good. Optimal enforcement expenditures obviously depend on the extent of this difference, but they also depend crucially on the elasticity of demand for the good. In particular, when demand is inelastic, it would not pay to enforce any prohibition unless the social value of consumption was negative and not merely less than the private value.

We then compare outputs and prices when a good is legal and taxed with outputs and prices when the good is illegal. Our analysis shows that a monetary tax on a legal good could cause a greater reduction in output and increase in price than would an optimal non-monetary tax. This is so even when we account for producers seeking to go underground to try to avoid a monetary tax. Indeed, the optimal monetary tax that maximizes social welfare tends to exceed the optimal non-monetary tax. This means, in particular, that it may be easier to fight a war on drugs by legalizing drug use and then taxing consumption than by continuing to prohibit the **consumption** of drugs.

Derek Neal

During the past year, I have worked on two related problems on racial differences. One is the growth of single motherhood among blacks. The other is the wage gap between blacks and whites and its relationship to education. Both of these have been contentious public policy issues, and I believe that my work will contribute to this ongoing debate.

In “The Relationship between Marriage Market Prospects and Never-Married Motherhood,” I develop a model of family structure decisions and explain the deficiencies of existing empirical work, which has been done mainly by demographers. Much attention has been paid in this literature to the role of government aid to single mothers and the collapse of earnings and employment among less skilled black men in contributing to the dramatic rise in never-married motherhood among black women. It is true that the explosion of never-married motherhood among less educated black women during the past thirty years has been coincident with a collapse in employment rates among less skilled black men. However, studies that examine how the supply of marriageable men and the number of single mothers move together across states or metropolitan areas find little evidence that shortages of marriageable men contribute significantly to the rise of never-married motherhood among black women. This seems counterintuitive because the rise in joblessness and incarceration rates among less skilled black men has been so dramatic over the past two decades.

My model offers an answer to this puzzle. It shows that marriage markets can deteriorate to the point where most all women who would choose single motherhood instead of remaining single without children outside marriage have no realistic marriage option. This occurs when marriage market prospects are particularly bleak for less educated women. In this scenario, single motherhood is prevalent primarily because of a dramatic decline in the supply of marriageable men. However, once this initial decline in marriage market prospects occurs, subsequent changes in rates of single motherhood may be unrelated to changes in marriage market conditions. Essentially, virtually all of these women are choosing between single motherhood and remaining single without children.

It is important to note that the existence of welfare programs makes this scenario possible. Even though changes in welfare levels do not closely track changes in rates of single motherhood, single motherhood cannot exist on a large scale without some source of support for single mothers. The women most adversely affected by rising incarceration rates and falling employment rates among less skilled black men are economically disadvantaged black women, and disadvantaged women often do not command the resources required to raise children on their own.

This study will be published in the *Journal of Human Resources*.

The next phase of this project will be to estimate an empirically tractable version of my model. Simulations based on estimated parameters from this model should then provide new insights concerning how aid programs and marriage market conditions interact to determine differences in family structure decisions among marriage markets and over time. Thus far, I have used funds from the Stigler Center to collect details on welfare

programs over the period 1965 to 2000. In particular, I have been focusing on the changes that occurred as a result of the welfare reforms in the 1990s. Once this documentation is completed, I will need to develop a consistent method for characterizing program differences among states. Then I will investigate whether these differences can be related to changes in family structure.

My ongoing work on racial wage differentials produced one new paper last year. In “The Black-White Wage Gap among Women is Too Small” I analyze the much discussed relative success of black women in the labor market. As early as 1980, some government reports documented wage parity among black and white women. Although official measures of black-white female wage gaps have grown over the past two decades, they remain quite small compared to the gaps among men. However, I show that the conventional wisdom concerning the labor market success of black women is wrong. Missing wage data create a serious measurement problem.

Specifically, the official data do not reflect the income earning potential of women who do not work in the market, and this differs greatly between black and white women. A disproportionate number of white women who are not working in the market are married and raising children. These women often have higher potential earnings than the white women who are working. By contrast, among black women, the dominant group of non-working females consists of single mothers on government aid. They have much lower earning potential than the black women who are employed. Accordingly, the official data on racial wage gaps compare wages for relatively high potential black women and relatively low potential white women. My adjustments for these differences in who decides to work imply that the racial wage gap among women is likely 60% larger than one would estimate from official data on wages of working women.

This study will be published in the *Journal of Political Economy*.

My current work on the racial wage gap among women is pursuing additional measurement issues. To my surprise, I have recently discovered a simple error in census data that also contributes to a false impression of market success among black women. It appears that, many persons answer a key census question concerning usual hours worked per week incorrectly, because they think the time frame in the question is a day instead of a week. For example in the 1980 Census data an unusually large number of respondents say they work exactly 8 hours per week. Importantly, this apparent error is much more pronounced among blacks and than whites. People who make this mistake then report earnings per hour that are roughly five times too large. Preliminary calculations suggest that this is an important source of error in the early studies that pointed to the 1970s as a time of great labor market success for black women.

I am also working on a paper for the *Handbook of Economics of Education* on the black-white skill gap and its consequences for black-white gaps in earnings, employment, and wages. So far, I have discovered that there is gradual convergence in black-white skill levels as measured by test scores and education levels. However, the convergence is misleading. While the top 50% of black scores are moving closer to their counterparts in the white distribution, there is little or no progress in the bottom half of the distribution.

This result is consistent with an important theme in my paper “How Would Vouchers Change the Market for Education,” which was recently published in the *Journal of Economic Perspectives*. Here, I argued that one of the most important potential benefits of moving to vouchers for funding public schooling in large cities is that disadvantaged minorities appear to have the most to gain from expanded access to private schools and increased competition among the schools that serve their communities. My recent work on trends in the black-white skill gap has reinforced this conviction.

Sam Peltzman

I have continued to work on a project on the behavioral consequences of medical breakthroughs. This is an empirical investigation of whether large, unexpected improvements in medical technology lead to changes in risky behavior. Thus, suppose there is a significant invention, such as a cure for cancer. Once implemented, this will substantially reduce mortality rates. But, I argue, this advance will also induce changes in behavior that can affect mortality.

Some of these behavioral changes can be favorable, such as the freeing up of medical researchers to work on other diseases. But other responses can work the other way. For example, resources (including time, effort, etc.) formerly devoted to avoiding or treating cancer can also be shifted to other activities that people enjoy but which also entail health risks. My project focuses on these latter sorts of responses.

The first phase of the project has analyzed mortality data from the period surrounding the introduction of antibiotics and other anti-bacterial drugs. This was arguably the most important medical advance of the 20th century. So this period should show whether the possibility that medical advances encourage behavior with collateral risks has any empirical content.

My earlier work on this innovation suggested that there may have been such an offsetting response to the large decline in mortality from infectious diseases. This concentrated on US mortality data. Several aspects of these data are consistent with offsetting behavior. These are summarized in Stigler Center Working Paper 169 and in last year's Annual Report.

This year I have extended the work to include many other countries. Two distinct patterns emerge, one for rich countries and quite another for poor countries. However, both sets of countries show some evidence of offsetting behavior.

Rich countries (defined as having at least 60 per cent of US per capita GDP at the start of the antibiotic revolution in the late 1930s) tend to follow the US pattern. Specifically, in most rich countries the decade or so following completion of the antibiotic revolution is marked by a partly offsetting reversion of mortality toward pre-antibiotic trends. And the age groups most favorably affected by antibiotics tend to revert most profoundly. This latter tendency is pervasive: it holds for 11 of 12 rich countries for males and for all 12 for females.

The same pattern also emerges when comparing a specific age group across the rich countries. The antibiotic revolution had the largest relative effects on the young and middle aged, because childhood infectious diseases and tuberculosis were essentially wiped out. However, the strength and speed of the decline in mortality for a particular age group varied across countries. I found that, for every age group from infants through age 50, the countries with unusually favorable effects of antibiotics on mortality tended to have unusually unfavorable mortality trends in the ensuing fifteen years. (This is the same pattern I had previously found across the US states.)

The seven poor countries in my sample (Chile, Italy, Japan, Spain, Portugal, Ireland, Finland) have mortality patterns that are, in important respects, the opposite of those in rich countries. Technologically, the antibiotic revolution was essentially complete by the mid 1950s. In the rich countries, the offsetting effects described above show up in the ensuing 15 years, from around 1955 to 1970. In the poor countries there is instead continued progress in this latter period. Aggregate mortality continues to decline at historically unprecedented rates. (See the summaries of Gary Becker and Tomas Philipson for discussion of some of the implications of this divergence between rich and poor countries.) Moreover, the age groups that benefit most from antibiotics tend to continue to have unusually favorable mortality experience from 1955-70, just the opposite of the rich country pattern.

Closer examination shows that this apparent diversion between rich and poor countries is more a matter of timing than it is a real difference in behavior. The rich countries entered the antibiotic revolution with developed medical infrastructures that could apply the technological advances essentially as they occurred. The poor countries had less well-developed infrastructures to begin with, but all of them were developing rapidly over the relevant period. Today, for example, Italy, Japan, Finland and Ireland would be among the world's richest countries. This economic growth and concomitant development of medical infrastructure brought the benefits of antibiotics to increasing numbers of people well after the technological advance had been completed.

The more drawn out antibiotic revolution in the (initially) poor countries seems to delay the offsetting behavior. But that behavior does eventually appear in my data. For example, if the end of the revolution is dated at 1970 for the poor countries, instead of 1955, the same pattern of below average subsequent mortality progress for the age groups most favorably affected shows up. Like the rich countries, that pattern is pervasive, showing up in 6 of the 7 countries for females and in all 7 for males.

The international evidence on antibiotics is summarized in another Stigler Center Working Paper (177, which also includes everything in the previous one.)

My ongoing work in this area is focusing on a newer medical breakthrough, the treatment of heart disease. While there is no single cause and while the effects are not as profound as the antibiotic advance there has been a notable acceleration in progress against heart disease mortality since around 1970. This acceleration has continued until at least the mid 1990s, so it is harder to make the kind of before-after comparison for this advance that I relied on in the case of antibiotics. Nevertheless, I am trying to see if the behavioral response patterns in this case are similar to antibiotics or different.

I am investigating two kinds of behavioral response to the heart disease advances. One is a 'within mortality' response: do the groups most favorably affected by the advance in treatment do things that raise the risk of getting heart disease. One example of this is the well known rise in obesity (see Tomas Philipson's summary.) This is a major risk factor for heart disease. I am investigating whether the timing and age distribution of the rise in obesity is plausibly related to the medical progress against heart disease.

Another type of response is ‘across mortalities’ whereby non-heart disease risks respond to the heart disease advance. I will also investigate this kind of response. For example, I want to see if progress in non-heart disease mortality changed in any way for the affected age groups once the magnitude of the heart disease advance became clear.

I also reworked and rewrote a paper “Firm Response to Income Inequality and the Cost of Time” initiated by the late Peter Pashigian and Jeanne-Mey Sun. The paper shows how one industry, super markets, responded to some of the important aspects of the growing inequality of income in the last part of the 20th century. Specifically, the income gap between suburbs and their central cities grew and this was especially true for females (who are the primary super market shoppers in most married households.)

The paper documents a number of ways that supermarkets responded to growing female earnings. All are consistent with a simple economic model whereby the stores economize on shoppers’ time when the market value of the shoppers’ time increases. For example, super markets increase in-store labor, locate closer to the shopper and add more checkouts when female incomes increase. These kinds of responses characterize super markets in the aggregate (because, we argue, female incomes have generally increased relative to male incomes) over the 1970-1990 period. And these responses go furthest in markets (usually in the suburbs) where the rise in female earnings has been greatest.

The paper will be published in the *Review of Industrial Organization*. I am honored to have had a hand in bringing this work to fruition. Peter Pashigian was a friend and valued member of the Stigler Center’s research community for many years.

Tomas Philipson

I worked on a number of topics in the health economics area. These include several projects on pharmaceutical markets as well as work on obesity and the contribution of medical advance to the reduction of inequality.

For many years concern over the speed of the Food and Drug Administration's (FDA) new drug approval process has been a major policy issue. (I am spending the 2003/04 academic year as senior economic advisor to the new FDA commissioner.) I started a project, with Ernie Berndt at MIT, on the costs and benefits of the FDA approval process. This project will pay particular attention to the effects of the FDA approval process on the productivity of drug research and development. We think this aspect of the approval process has been understudied.

Since Peltzman's work in the 1970s there has been concern that the lengthy approval process produces greater costs than benefits. Most of this work focuses on the tradeoff between the benefit of greater safety and the cost of delayed benefits from drugs that are eventually approved. This focus treats the drug pipeline as more or less given and thus ignores the negative effects of a lengthy approval process on the research and development process itself.

This is a potentially serious shortcoming. Even successful new products now require a decade or more of testing at a cost of several hundred million dollars before they begin generating revenues. Anything that increases this gestation period or raises the costs of testing will reduce the expected profitability of R&D projects and thereby reduce the number of projects that drug companies will want to undertake. Thus an important cost of a lengthy and costly approval process is the loss of benefits from new drugs that never get developed. We are trying to estimate that cost and incorporate it into the overall costs and benefits of recent FDA approval activity.

I started a paper, in collaboration with staff at the World Bank, entitled "Corruption, Pharmaceutical Markets, and Health Care in Developing Countries." It analyzes the economic effects of the diversion of drugs that are donated to poor countries or purchased through their governments. Such drugs often find their way to be resold in black markets in these countries. This type of corruption has raised many economic and health issues in these countries and is of major importance for international programs that attempt to supply drugs to these nations. The paper analyzes the economic incidence of such black markets. As part of the project, we will produce a unique data set that uses "phantom patients" to obtain comparable price- and quality information for both legal and illegal drug markets.

I completed a paper titled "Intellectual Property for Goods with External Effects in The Pharmaceutical Industry" with Stephan Mechoulan at University of Toronto. The paper is about the general issue of public policy toward new goods that affect people who do not consume them, i.e. there are 'consumption externalities.' We discuss this issue in the context of pharmaceuticals, where new products and consumption externalities are both important. For example, widespread use of antibiotics creates more resistant bacteria that

harm non-users (a negative externality) while a new AIDS drug helps prevent the spread of the disease to non-users (a positive externality).

A long-standing economics literature argues that such externalities should be corrected by applying subsidies and taxes that line up private incentives with social ones. An equally long-standing literature tackles the appropriate methods (for example, patents, subsidies, etc.) of generating the efficient amount of R&D into goods that have only private benefits. We analyze the joint problem of the optimal provision of R&D and consumption incentives for goods that at the same time undergo technological change and have external consumption effects. The need for integrating the two problems is especially important for goods like pharmaceuticals. For example, in the case of antibiotic resistance, considering the negative externality alone would suggest a tax to slow the use of the antibiotic. But the prospect of such a tax could reduce the incentive to develop new antibiotics that can overcome resistance.

I have completed a paper with Gary Becker and Rodrigo Soares titled “The Quantity and Quality of Life and The Evolution of World Inequality.” This paper incorporates value of life estimates into the computation of the international evolution of welfare. Most international comparisons of welfare focus on the level or growth of current income or consumption. A shortcoming of this approach is that it ignores increases in longevity. If per capita income did not grow at all, but people live longer there is a gain in welfare just as surely as if per capita grew and longevity remained unchanged.

Our work is attempting to value the longevity gains experienced by 90 countries between 1962 and 1995. Our approach is to estimate the income gains that would represent the same welfare improvement as the observed longevity gains. We then consider how the growth in the full income - the growth of material per-capita income plus the value of the increase in longevity - changes the traditional results of cross-country welfare comparisons. For example, these comparisons sometimes show a widening gap between high and low-income countries. However, life expectancy tends to increase more in low-income countries than in high-income countries. Our results show that this difference is important enough to eliminate or reverse the conclusion that the gap between rich and poor countries is widening.

Darius Lakdawalla (RAND) and I completed “Technological Change and Obesity: A Theoretical and Empirical Examination” This paper received *the Milken Institute Award for Distinguished Economic Research, 2003*. The rise of obesity has become a major policy concern. Our paper assesses empirically the forces contributing to the rise in obesity and the role of public interventions in affecting its continued growth. We estimate the importance of technological change on the upward trend in obesity. We analyze individual-level data from 1976 to 1994.

An important finding is that technological change, which reduced both food prices and job-related exercise, has significantly contributed to the growth of obesity. In particular, we find that about forty percent of the recent growth in weight seems to be due to agricultural innovation that has lowered food prices, while sixty percent may be due to

factors such as declining physical activity from technological changes in home and market production.

I organized a conference called *The Economics of Obesity* together with the United States Department of Agriculture (USDA) and co-sponsored by the Stigler Center. It was held in Washington DC April 22, 2003, and included 7 papers from the health economics community on the rising obesity problem and the role of public intervention aimed at limiting its spread. I wrote a summary report on the conference, together with Carolanne Dai and Lorens Helmchen who are graduate students at Chicago. The report attempts to set out the priorities for USDA research funding in this area.

Raghuram Rajan

I have worked on issues related to the banking system and on corporate management structure.

In “Money in a Theory of Banking”, Douglas Diamond and I extend our model of banks to understand the connection between money, banks, and aggregate credit. Our goal is to understand the sources of instability in banking systems and how these affect the real economy. Most past work on this subject looks to government policies, such as deposit insurance, reserve requirements, etc. as either the source of monetary instability or a necessary bulwark against it. Then assumptions about price flexibility are introduced to show how the instability in banking can affect output and employment. Our goal is to see to what extent cyclical fluctuations emanating from the banking sector can occur without government intervention.

Accordingly, we start with a simple “real” model without money. Here all banking transactions occur in claims payable in goods. Banks make loans repayable in goods and depositors hold claims on the bank payable on demand in goods. In such a world a cyclical contraction would occur if production in the economy is simply delayed. In that case, banks will have insufficient goods to pay depositors’ claims. They will then have to contract new lending to accumulate the goods needed to pay depositors, and this contraction will lead to still lower output. Thus a temporary delay in production can be amplified by banks into a more permanent reduction of total output. A number of inefficiencies including bank failures can result from this process.

We then introduce money in this model. We show that if demand deposits are repayable in money rather than in goods, banks can be hedged against production delays. For example, a delay in production can raise the price level. This would reduce the real value of the deposits banks have to pay out. However, demand deposits payable in money also can expose the banks to new risks. In particular, the value of money can fluctuate for reasons other than delays in aggregate production. Because deposits are convertible into money on demand, a temporary rise in money demand immediately boosts the interest rate banks have to pay depositors. This in turn boosts the real amounts banks must pay depositors. This increase in the real deposit burden can again lead to the curtailment of bank lending and even bank failures. The way to combat these contractionary effects is to infuse more money into the banking system when there is a temporary rise in money demand.

Our analysis thus makes transparent how changes in the supply of money can work through banks to affect real economic activity, without invoking sticky prices, reserve requirements, or deposit insurance. It also suggests how bank failures could lead to a fall in prices and a contagion of bank failures, as described by Friedman and Schwartz in their celebrated *Monetary History of the United States*.

There has been much recent discussion of the ‘flattening’ of corporate management. This is the notion that firms can improve their performance by cutting down on the number of

management layers between the chief executive and the work force. Comparatively little is known about what has actually occurred in this dimension of corporate organization.

Accordingly in “The Flattening Firm: Evidence from Panel Data on the Changing Nature of Corporate Hierarchies”, Julie Wulf and I examine changes in the organization of U.S. firms in recent years. We have a detailed database of managerial job descriptions, reporting relationships, and compensation structures in over 300 large U.S. firms. These data indicate that there has been a trend toward flatter corporate organizations. Specifically, we find that the number of positions reporting directly to the CEO has gone up significantly over time. We also find that the number of levels between the lowest managers with profit center responsibility (division heads) and the CEO has decreased and more of these managers are reporting directly to the CEO. Moreover, more of these managers are being appointed officers of the company.

It does not seem that divisional heads are handling larger tasks making them important enough to report directly. Instead, our findings suggest that layers of intervening management are being eliminated and the CEO is coming into direct contact with more managers in the organization, even while managerial responsibility is being extended downwards. Consistent with this, we find that a significant part (but certainly not all) of the increase in the number of managers reporting to the CEO is due to the elimination of the position of Chief Operating Officer (COO). In the previous, ‘taller’ organization the COO was an intermediary between the CEO and divisional managers. The elimination of the COO position is also accompanied with greater authority being given to divisional managers.

The structure of pay is also different in flatter organizations. Pay and long term incentives are becoming more like that in a partnership. Salary and bonus at lower levels are lower than in comparable positions in a tall organization, but the pay differential is steeper to the top. At the same time, employees in flatter organizations seem to have more long term pay incentives like stock and stock options offered to them. Taken together, the evidence suggests that U.S. firms are becoming less bureaucratic both in their structure and in the incentives facing managers.

Lester Telser

I completed my work on the Veterans' Bonus of 1936. The Veterans' Bonus, enacted January 1936, disbursed 9 year non-marketable U.S bonds with a 3 percent annual interest rate to 3 million World War I veterans. The average bonus per person exceeded 30 percent of the mean household income for the veterans' age bracket. In June 1936 Federal deficit was a peacetime record. In two weeks that June veterans cashed in 46 percent of their total bonus, an amount nearly one percent of annual GNP. The growth rate of GNP in 1936 was more than 2.5 times larger than in the preceding two years probably because of the effects of this Bonus on consumption outlays. The redemptions of the veterans' bonus bonds in June 1937 were 45 percent of the amount the year before, but did not stimulate the economy as much because the Federal deficit in June 1936 was 4 times larger than in June 1937. This will appear in the *Journal of Post-Keynesian Economics*.

I also completed a study of the distribution of the value of shipments for the biggest relative to the second biggest manufacturer by 5-digit SIC code using 1950 data for individual companies collected and published by the Federal Trade Commission. In 1950 the FTC collected data from the 1000 largest manufacturing companies on the value of their shipments by 5-digit SIC code. It published summary statistics in 1957. This was not unusual, but in 1972 the FTC did something very unusual. It published the details of the 1950 data by company. To the best of my knowledge these have gone unnoticed. However, they provide a unique opportunity to estimate the distribution of sales by 5-digit class for the top two firms in 116 industries chosen by the FTC. One issue that can be explored with these data is whether the largest firm is typically more successful than would be predicted by chance. My results indicate that this is not the case.

Robert Topel

I have begun a project with Fabian Lange on “The Private and Social Benefits of Education.” A traditional rationale for government support of education is that the social returns to education exceed the private returns. We are seeking quantifiable evidence on the divergence between the private and social returns to education.

There are three main arguments for a difference between private and social returns. First and least quantifiable, educated individuals may simply be better citizens. They are more informed voters, make better neighbors, and are more interesting to talk to, so the social benefits exceed the private returns. Second, critics of education often argue that an individual's years of schooling act as a labor market "signal", serving to distinguish more able individuals from less able ones, even if productivity is not affected. If this is true the private returns to schooling exceed the social benefits and (some) education is wasteful. Third, an educated workforce may raise social productivity by more than it raises private ones. For example, interactions among more educated individuals may lead to a faster production and diffusion of new ideas and innovation, which raises economic growth. This kind of externality is not taken into account by private decision makers, so if it is important this would reinforce the case for subsidization of education.

We focus on the second and third issues. To get at the importance of signaling, we assume that individual productivities are learned by employers over time. Accordingly, the importance of schooling as a signal should decline as more private information is revealed. Using panel data from the National Longitudinal Survey of Youth we find that the effect of standardized test scores on earnings rises with labor market experience, as predicted by learning models. However, the effect of schooling does not decline with experience, which is inconsistent with signaling models of education. We are able to estimate the portion of the effect of schooling on wages that could be due to signaling, and we find that it is negligible.

To examine impact of education on aggregate productivity, we study a spatial model of labor market equilibrium and productivity growth. Using census data from 1940 through 1990, we control for the effects of schooling on individual productivity. We find that increases in aggregate schooling in a state raise total factor productivity, which is consistent with the existence of schooling externalities in driving productivity growth.

I have continued to work with Kevin Murphy on the gains from medical research. The central finding of that research is the enormous size of the economic value of major health advances. For example, we found that the gains from increased longevity were on the order of \$2.8 trillion annually in recent years. These findings are spelled out in our book, *Measuring the Gains from Medical Research*, which was published by the University of Chicago Press. The current focus of this research is on racial and gender differences in the economic value of increased longevity. We find that gains to both blacks and whites have been substantial. However, the gains in recent decades have tended to be larger for blacks than whites and larger for males than females. One reason for these differences is the considerable recent progress in treating heart disease, which disproportionately affects males and blacks.

Luigi Zingales

Last year my research focused on three areas: the political economy of financial development, the role of cultural norms in economic development and corporate governance.

The financing of business in Europe has been evolving from a relationship-based system (family owned firms, tight links between banks and businesses, etc.) to an arm's-length system where suppliers and demanders of capital are unrelated. Raghuram Rajan and I have written a paper, "Banks vs. Markets: The Changing Character of European Corporate Finance", on the political and economic forces behind this historic change. We also try to forecast where this trend toward arm's-length financing will lead. The paper discusses the basic economic trade-offs between relationship-based financing and arm's-length financing, and it applies the political economy framework developed in our book, *Saving Capitalism from the Capitalists*.

We identify two major forces behind the expansion of arm's length financing in Europe in the last decade: the revolutionary nature of innovation and the process of integration, both monetary integration at the European level and financial integration at the worldwide level. Both these forces make arm's-length financing relatively more attractive than relationship-based financing. But the second force also had important political effects. Integration opened up domestic financial intermediaries to foreign competition. These foreign competitors could not be easily controlled through the political process. Thus, external competition limited the ability of incumbents to hamper the development of arm's-length markets.

Now that the goal to remove internal barriers is by and large accomplished, however, and that the political objective is to build a common European policy, the effect of integration can be the opposite. Within the European Union (EU) many regulatory functions have been transferred from individual countries to the EU central authority in Brussels. This restores the regulatory monopoly that had been broken by increased competition among the various countries' financial institutions. Thus, we conclude that the pro-market bias that has characterized the European Union policy up to now (with notable exceptions such as agricultural policy) runs the risk of being reversed in the future.

Even if the trend towards markets were to continue, however, its effect would not necessarily be entirely positive. Arm's-length markets need a sound legal, regulatory, and monitoring infrastructure to work properly. The degree to which this infrastructure is in place differs greatly within Europe, with Southern Europe lagging much behind. At the same time, the ability of a country's economy to take advantage of arm's-length markets also depends upon its industrial structure. Large, formally organized companies have the necessary scale to generate the information needed by the system at a low cost and to take full advantage of the economies of scale present in arm's length markets. Small businesses are likely to be relatively worse off as a result of this movement toward markets, the more so, the more inadequate the local infrastructure is. Since firms tend to be smaller in Southern Europe, this part of the Union might suffer, with neither the

benefits of the market nor the certainties of the uncompetitive relationship system, unless it undertakes serious structural reforms.

This paper, which has appeared as a Stigler center working paper, was presented at the 2nd European Central Banking Conference last October and has been recently published in an ECB volume.

My work on cultural norms resulted in a paper with Luigi Guiso (Universita' di Sassari) and Paola Sapienza (Northwestern University) on the impact of religion on economic attitudes. This topic has been actively debated since Max Weber. Much of the existing evidence on the link between religion and economic development is based on cross-country studies in which the impact of a country's religion is confounded by other institutional differences, such as differing legal systems, among countries.

We have tried to overcome this problem by focusing on religious differences within countries. Specifically, we use changes in the intensity of religious belief within each country over time to help us separate the effect of religion from the effects of other aspects of a country's history. The crucial data come from the World Values Surveys, a collection of surveys administered to a representative sample of people in 66 countries from 1981 to 1997. The survey answers allow us to analyze the relation between religion and six groups of variables that are related to economic development: people's attitudes toward cooperation, women, government, legal rules, the market economy and its fairness, and thriftiness. We also distinguish among religious denominations to investigate whether the effects of a country's dominant religion is different from other religions.

We find that on average, religious beliefs are associated with "good" economic attitudes, where "good" is defined as conducive to higher per capita income and growth. However, religious people tend to be more racist and less favorable toward women entering the labor force. These effects differ across religious denominations. Overall, we find that Christian religions are more positively associated with attitudes conducive to economic growth, while religious Muslims are the most anti-market. Within Christian denominations, the ranking is unclear: Protestants are more trusting and favor incentives more. Catholics are more thrifty and favor private property and competition more.

This research has received great amount of attention in the press. The *Financial Times* dedicated two articles to it, and articles appeared in *Barron's*, *Il Corriere della Sera* (Italy), and *Les Echos* (France).

The paper, which has appeared as a Stigler center working paper, has been published in the *Journal of Monetary Economics*.

Corporate governance has come under increased regulatory and legislative scrutiny in the wake of recent corporate scandals. Corporate taxation has also received much recent attention. These issues have been treated as if they were unrelated. However, Alexander Dyck, Mihir Desai and I have been working on a paper that explores the connection between corporate governance and corporate taxes. The motivation is very simple. The

state, thanks to its tax claim on cash flows, is *de facto* the largest minority shareholder in almost all corporations. Yet, its actions are not part of the standard analysis of corporate governance, nor does corporate governance enter the standard analysis of corporate taxation. Our paper integrates these two dimensions.

We show that the characteristics of a taxation system impact managerial incentives to divert corporate funds for their own use. A higher tax rate increases the amount of income a manager would divert, while stronger tax enforcement reduces it and, in so doing, can increase the stock market value of a company in spite of the increase in the tax burden. We also show that the corporate governance system affects the level and sensitivity of tax revenues to tax changes. When the corporate governance system is ineffective (i.e., when it is easy to divert income) or when ownership concentration levels are high, an increase in the tax rate can reduce tax revenues generating a corporate version of the Laffer-curve. We test the Laffer-curve predictions in a panel of countries. Consistent with the model, we find that corporate tax rate increases have smaller (in fact, negative) effects on revenues when ownership is more concentrated and corporate governance is worse.

Visitors

David Genesove

During my visit to the Stigler Center my research focused on the industrial organization of media markets. There has been much concern expressed about increased concentration in media markets, but little research has been done on the causes or effects of increased concentration. Much of my research on media markets centers on the role of concentration.

My main project examines the growing degree of concentration in the local newspaper market in the United States. I have previously shown that while the number of large markets that are monopolies has grown over the last eighty years, small market monopolies are about as common as they have been in the past. This suggests that the growing number of monopoly markets cannot be explained by simple changes in demand or supply conditions. For example, if growing economies of scale or declining demand were leading to more monopolies, we should also have seen many small town monopoly newspapers exiting. We have not observed this. Accordingly, I argue that the growth of large market monopolies must be the result of some more subtle change in reader preferences, such as the degree of reader heterogeneity, consumer taste for variety or network effects that operate through the fixed costs of composition.

To further understand this historical process, I used much of my time at the Stigler Center in building a multi-year dataset of newspaper circulation and subscription and advertising prices, for use in examining (a) the relationship among advertising prices, circulation prices, circulation and advertising, as interpreted through the key elements of a monopolist's or duopolist's profit-maximizing calculus and (b) the change in these variables consequent upon entry or exit of a competing firm.

I also began related research on the early days of radio in the United States. This time period offers two opportunities to examine the effect of market structure on product variety. The National Broadcasting Company ran two separate networks, the Blue network and the Red network, until effectively forced to divest itself of one of them by the FCC in the early 1940s. Soon afterwards, owners of more than one station in a given local market were forced by the FCC to sell one of the stations. During my visit to the Stigler Center I began collecting radio listings from this period of both network shows and local shows in the affected markets, as well as for a set of control markets. I intend to use these to examine how variety changes with forced changes in the market structure. I also collected information on the prices of radio stations in this period to examine how prices of forced divestitures differ from prices of freely chosen sales. I mean to interpret the difference in terms of the slope of a supply curve for owners.

A long standing question in Industrial Organization is whether advertising abets or limits concentration. I began a project on the effect of the introduction television advertising on the market concentration for products advertised on television, which should help answer that question. Television broadcasting was introduced at differing

dates across American cities in the later 1940s and early 1950s. Accordingly, I can compare concentration in cities that are exposed to television advertising and those that are not. I have survey data on the consumption of a wide range of consumer items collected by a consortium of newspapers from 1948 through the 1960s. These permit me to track market shares, and so concentration, at the level of a city over time.

In all these matters, The University of Chicago's Regenstein Library proved invaluable. Its large collection of trade magazines and government statistical publications allowed me to advance noticeably in my research.

Eric Helland

During my visit to the Stigler Center I have worked on a number of projects in three broad areas: the courts and justice system, environmental regulation and the law and regulation of corporate governance.

My projects on criminal justice include the following:

The Location of Women's Prisons and the Deterrence Effect of "Harder" Time. In this project, Kelly Bedard and I estimate the deterrence effect of the conditions of incarceration. Specifically, we are interested in the deterrence effect of punitiveness that is unrelated to sentence length. We focus on the punitiveness of reduced visitation associated with incarceration in institutions far from one's city of residence. Our estimation strategy takes advantage of the natural experiment created by recent expansions in the female penal system. The physical expansion of the penal system decreased the distance to prisons for some cities while increasing it for others. Thus some prisoners gained easier access to visitors while others became more isolated from visitors. If the isolation has a deterrent effect, we should see crime declining in cities served by prisons further away. Our results suggest that incarceration location does have a sizable deterrence effect. Increasing the average distance to a woman's prison by 40 miles reduces the female violent crime rate by approximately 6 percent.

The paper will be published in the *International Review of Law and Economics*.

Contingency Fees, Settlement Delay and Low-Quality Litigation: Empirical Evidence from Two Datasets. In this project, Alex Tabarrok and I examine the impact of contingent fee arrangements between plaintiffs' lawyers and their clients. Although flat fees are common for divorces, wills and trusts and probate, lawyers in personal injury cases generally are paid by contingency fee or at an hourly rate. There is much controversy about the effects of these alternative payment schemes. One argument is that contingency fees increase low-quality, "frivolous" litigation. A counter-argument suggests that contingency fees actually limit such litigation and that instead it is hourly-fees that increase low-quality litigation.

Our project examines these issues empirically. One test is to see whether states where contingency fees prevail for personal injury cases tend to have lower quality cases than states where hourly fees prevail. Another test uses medical malpractice claims in Florida before and after a law change that limited contingency fees. We also examine the impact of fee arrangements on the expected time to settlement. We find that hourly fees encourage the filing of low-quality suits and increase the time to settlement (i.e. contingency fees increase legal-quality and decrease the time to settlement).

This paper will be published in the *Journal of Law, Economics and Organization*.

Public versus Private Law Enforcement: Evidence from Bail Jumping. After being arrested and booked, most felony defendants are released to await trial. On the day of the trial, many fail to appear. If the failure to appear is not quickly explained, warrants are

issued and two quite different systems of pursuit and rearrest, one public and one private, are put into action. Public police have the primary responsibility for pursuing and rearresting defendants who were released on their own recognizance or on cash or government bail. Defendants who skip trial after they made bail by borrowing from a bail bondsman, however, must worry about an entirely different pursuer. The bondsman will forfeit the bond unless the fugitive is soon returned. As a result, bail bondsmen have an incentive to monitor their charges and ensure that they show up for trial. When a defendant does skip, bond dealers hire bail enforcement agents, more colloquially known as bounty hunters, to pursue and return the defendants to custody.

In this paper Alex Tabarrok and I compare the public versus private pretrial release systems. Our results suggest that the private system has lower failure to appear rates, lower fugitive rates and higher capture rates of felony defendants compared to the public system.

Using Placebo Laws to Test “More Guns, Less Crime”: A Note. This note reexamines Mustard and Lott’s important and controversial study on the effect of “shall-issue” gun laws on crime using an empirical standard error function randomly generated from “placebo” laws. The motivation for this note begins with the fact that once a state passes a gun law that law tends to stay on the books for a long time. It has been shown that, if this persistence is ignored, the accuracy of conventional statistical tests of the effect of the law tends to be overstated.

When I take account of the persistent nature of shall-issue laws, I find that the effect of shall-issue laws on specific types of crimes tends to be much less well-estimated than the Lott and Mustard (1997) and Lott (2000) results suggest. We also find, however, that the differential effects of the law implied by the Lott-Mustard theory are strongly supported.

The Impact of Drug Policy on Criminal Prosecutions Evidence from Asset Forfeiture Laws. In this paper Brent Mast and I examine the role of asset forfeiture laws on the disposition of criminal cases. Almost all states and the federal government have now passed asset forfeiture laws that allow police and prosecutors to keep a portion of any assets seized while being used in the commission of a crime. Previous studies have found that asset forfeiture laws have altered arrest patterns toward drug offenses, where asset seizures are more common, and away from other types of crimes. This suggests that the incentives provided by asset forfeiture laws encourage police to adjust their enforcement efforts in ways that increase the likelihood of seizing assets.

One implication of that view is that the ‘quality’ of drug arrests will decline. For example, the police will accept a greater risk of losing a case if there is some chance they can seize assets when they win. Accordingly, we examine the impact of the disposition of criminal prosecutions. We do find that the passage of an asset forfeiture law reduces the quality of drug arrests. Specifically, the likelihood a drug case will be dismissed increases, while the likelihood that a drug case will result in plea bargain and the length of sentences that result from plea bargains decrease.

Does Three Strikes Deter? A Non-Parametric Estimation. California passed a ‘three-strikes’ law that requires long prison sentences for criminals after a third conviction. In this paper Alex Tabarrok and I try to estimate the deterrent effect of this law. We are able to do this by comparing individuals who have three trials for strikeable offenses but vary in the number of strike convictions they have on their record due to plea bargains or dismissals. For example, a third trial with two prior convictions could result in the ‘three strike’ penalties, but a third trial after one or two non-convictions would not. If the three strikes law has significant deterrent effect, the likelihood of a third arrest for the individual with the two prior convictions should be lower than for the individual without them. We find that California’s three strike legislation significantly reduces felony arrests rates among the class of criminals with 1 strike by 48 percent and among the class of criminals with 2 strikes by 12.5 percent.

My work on pollution control included the following projects:

Pollution Incidence and Political Jurisdiction: Evidence from the TRI. In this project Andy Whitford and I examine the role that jurisdictional or boundary considerations play in determining the implementation of environmental laws. Anecdotal evidence suggests that local regulators are more lenient in their treatment of polluters when the incidence of pollution falls partially on those outside the state. One explanation for such behavior is that regulators take actions to maximize political support. This paper tests this jurisdictional model using Toxics Release Inventory (TRI) data from 1987 to 1996. We find that facilities’ emissions into the air and water are systematically higher in counties that border other states. These results are consistent with the hypothesis that jurisdictional considerations are an important determinant of pollution incidence.

This paper will appear in the *Journal of Environmental Economics and Management*.

Pollution Abatement as a Barrier to Entry, Economists have understood that pollution regulation could limit entry of new firms, particularly small firms. The reason is that new firms are often subject to tougher regulation than established firms. Also, there are economies of size in application of some control technologies. In this paper Mayumi Matsuno and I estimate the impact of environmental regulations as barriers to entry using a panel of industries over ten years. Our main finding is that environmental costs increase the stock market value of the largest quartile of firms. This suggests that compliance costs constitutes a barrier to entry and thereby creates profits for larger existing firms.

This paper will appear in the *Journal of Regulatory Economics*.

Estimating the Settlement Process in Environmental Litigation: A Game-theoretic Approach, Enforcement of environmental regulations takes three forms: inspection, detection, and finally imposition of penalties. While the first two aspects have been extensively studied the final stage has received little attention. Most penalties that are imposed at the federal level arise from litigation; most of that litigation results in a mutually agreed-upon settlement between the Department of Justice (acting at the behest of the Environmental Protection Agency) and the defendant in the case. In this paper Andy Kleit and I develop a simple game-theoretic model of the process that leads to

settlement in civil environmental litigation. We then estimate the attributes of the settlement process using the EPA's DOCKET database. This project is ongoing.

My work on corporate governance includes:

Regulation and the Evolution of Corporate Boards: Monitoring, Advising or Window Dressing? In this paper, Mike Sykuta and I examine the role of “political” directors on corporate boards. It is generally agreed that boards serve both an oversight and advisory role in a firm. While the oversight role of boards has been extensively studied relatively few studies have examined the advisory role of corporate boards. In this study we examine the participation of political directors on the boards of natural gas companies between 1930 and 1998. We define ‘political’ directors to include lawyers working in Washington as well as former government officials.

We focus on the 1954 regulation and 1986 partial deregulation of the natural gas industry. Using datasets covering the periods from 1930 to 1990 and 1978 to 1998, we test whether regulation and deregulation altered the share of political directors on companies' boards. We do find such a change in board composition for this industry. Specifically, the regulation of natural gas is associated with an increase in the number of political directors and deregulation is associated with a decrease in the number of political directors on boards.

Is Corporate Philanthropy an Agency Cost? Critics of corporate charitable giving, such as Milton Friedman, have argued that the practice harms the interests of stockholders and can survive only because of the ‘agency cost’ in enforcing the stockholders’ interests on management. The main counter-argument is that appropriately targeted charitable giving can enhance shareholder wealth by in effect buying valuable inputs (an oil company donates to a geology program at a university). In this project Janet Smith and I study corporate charitable giving behavior using an original database that includes firm-specific measures of giving, corporate governance, and administration of giving programs. We document the overlap between management of the corporation and the management of the firm’s giving program.

Our results tend to favor the agency cost explanation for philanthropy. Specifically, giving tends to be smaller where there are mechanisms associated with effective monitoring of management by stockholders. For example, dollar giving is lower where the board is small and the CEO is not involved in managing the giving program. Giving is also lower where large block holders are represented on the board and where institutional ownership is substantial.

We also examine the choice of a firm to establish a separate corporate foundation. This too is related to governance and in the same way as dollar donations. The results contribute insight on recent Securities Exchange Commission (SEC) policy discussion concerning greater transparency of corporate actions and the call for shareholder involvement in charitable donation decisions.

Does Shareholder Litigation Lower Management Quality? Enforcement of financial regulation in the US depends on both the actions of the SEC and private citizens who initiate suits against firms. The primary benefit of shareholder suits is that they are thought to deter future corporate misconduct. There is considerable debate as to whether private securities cases are meritorious and hence able to serve as deterrence to future fraud. Some commentators argue that class actions complement SEC efforts while detractors claim that suits exist to extract legal fees from shareholders. The literature on the benefits to shareholders from private litigation is inconclusive.

In this study I take an indirect approach. I estimate the impact of fraud allegations on the likelihood that a director receives a directorship at a new corporation. Further I compare the two methods of prosecuting alleged fraud: public and private. If private securities class actions are meritorious, that is they on average contain allegations of fraud against shareholders which could be proven in court, then directors on those firms accused of fraud should suffer a reputational penalty in the market for new outside directors. Since outside directors exist to protect shareholders interests a meritorious fraud case would indicate that at best the director failed to protect shareholders interest or at worst was in league with management to harm shareholders.

This work is at an early stage. One intriguing, but highly preliminary, result is that director's serving on a board subject to private litigation actually have an increased probability of being offered a new directorship elsewhere. By contrast allegations of fraud by the SEC are associated with decreases in the likelihood that such directors receive new directorships.

Linda Wong

During my visit my research has focused on the economic analysis of marriage patterns, with a special emphasis on the racial aspects of the problem. There has been much discussion of the changes in family structure and of the increase in interracial marriage. My research will hopefully inform this discussion by showing some of the important market forces that are at work in this area.

Why Do Only 5.5% of Black Men Marry White Women? While black-white marriages are increasing, they are still rare. For example, 1990 census data show that only 5.5 percent of black males married white females. At the same time, family income is 7 percent higher for intermarried black males compared to other black males with the same characteristics. There is still much debate over the causes of the low intermarriage rate, and little analysis of the intermarriage premium. In this paper, I develop and estimate a marriage model that incorporates a mating taboo, courting opportunities, and individual endowments.

The mating taboo can be either self-generated or societal-driven. It amounts to distaste for selecting a mate outside one's own racial group. Individual differences in endowments, such as market earning potential and educational attainment, affect black men's marriageability, because black males may fail to attract white females through lack of these endowments. Endowments, in turn, affect black males' opportunities to court white females. My study tries to separate these forces: how much of the low intermarriage rate arises from measurable economic forces, such as endowments and their effects on courting opportunities, and how much is due to a mating taboo?

I use data from the Panel Studies of Income Dynamics (PSID) 1968-97. My estimates show that income and education both increase male marriageability, with education being the more important of the two. However, taken together, the two traits account for only 16 percent of an index of black men's marriageability. Given these estimates, the mating taboo is found to be the greatest factor accounting for the low intermarriage rate. According to my estimates, eliminating the mating taboo would raise the intermarriage rate from 5.5 to 64 percent, and do away with the intermarriage premium. (The premium currently acts as a partial offset to the mating taboo.)

This paper will appear in *International Economics Review*.

A Note on Black/White Intermarriage Patterns. Racial studies cover a wide variety of topics such as wage inequality, employer hiring, residential segregation, crime rates, mortgage lending, as well as political stability. Despite the large scope of race studies, one issue that has been understudied is racial intermarriage, which is considered to be the best indicator of the health of race relations.

This note uses census data for 1850-1990 to discuss a salient feature in black/white intermarriage: most intermarriages are between black males and white females. Throughout the period, black males' intermarriages surpassed those of black women', except for 1870 and 1960. In particular after 1960, the rate for men accelerated while that

for women declined. Males' intermarriage rate continued to exceed that for females at least by 2-fold from 1970 onwards. Even after allowing for effects due to interstate migration patterns these divergent post-1960 intermarriage trends remain.

To the extent that white men have more consumption power on average than black men, they should appeal to black women more readily than do white women to black men; and marriages with white spouses should be more frequent for black women than men. But the reverse is observed.

My paper reviews the ability of existing theories to explain the reversed asymmetry in gender intermarriage rate. Whether taste-based or search-based, I find that discrimination theories do not seem to contribute to our understanding of the sexual difference in intermarriage pattern.

On Interracial Marriage Patterns. This paper, with Victor Rios-Rull, grows out of the note described above. We argue that the low intermarriage rate for black females arises from sex differences in the variability of marriageability. Intuitively, if females are relatively similar with respect to their quality (less variation than men), women have a higher chance than men to find exceptionally marriageable mates. Women would then have an incentive to search for exceptional qualities in men, while men's search would be more affected by racial preferences. The women's greater incentive to search for high quality males will lead to intermarriages when the quality of the male is high enough to overcome racial preferences. We are in the process of calibrating the model, and we will see if it is capable of explaining the asymmetry in the gender composition of intermarriages.

An Empirical Study of Darwin's Theory of Mate Choice. In Darwin's (1871) theory of mate choice, males compete, females choose, males are more differentiated, and highly ornamented males mate earlier. If sexual difference in mate selection is important for evolution/inequality, as posited by R.A Fisher (1915), a better understanding of human mate selection behavior is necessary. In this paper, I reexamine the latter three hypotheses of Darwin about human mate selection by estimating a marriage market equilibrium model that uses all restrictions implied by marriage theory.

The model is estimated using data from the National Longitudinal Survey of Youth (NLSY79) 1979-98. First, I develop an index of marriageability that is based on data on education and wages and allows for unobserved heterogeneity of potential mates. I then solve a matching model for an acceptable pool of partners. This solution produces estimates of the importance of the various forces operating on mate selection.

Results do not support Darwin's claim: males are as choosy as females. However, the notion that males are more differentiated than females and that marriageable (highly ornamented) males tend to marry earlier are both supported by my results. Both men and women find education to be a more desirable trait for marriageability than wages. Thus the popular notion of women marrying up for income is not supported by evidence. There is a spatial mismatch between men and women: while good (marriageable) men are found in suburbs, good women are mostly located in cities. Interestingly, results show that

females in cities tend to have more desirable unobserved characteristics when compared with males in cities and females in suburbs. The marriage market appears to be sensitive to changes in agents' levels of education and variability in wages.

This paper is available as a Stigler Center working paper.

The Labor Market and the Marriage Market. In this project, Zvi Eckstein and I are examining the link between labor supply and marriage. In the past three decades marriage formation has declined and wage inequality has increased. Both trends have separately received great attention from economists and policy makers. We believe these trends are related. For example, it is well-known that there is a marriage premium in the labor market. If this premium reflects productivity differences among men, changes in marriage composition can affect productivity in the labor force. On the other hand, if productive characteristics also reflect marriageable characteristics, changes in wage inequality may affect selection in the marriage market. Accordingly, a decline in marriage can widen the inequality in productivity (more low productivity unmarried males), and a wider productivity gap can reduce the marriage rate (more less desirable low productivity potential mates).

We want to estimate a model that explicitly accounts for the impact of wage on mate preference and the wage response to marriage decision. Additionally, we will quantify the extent of marriage premium, and the extent to which an increase in unemployment benefits affects marriage composition.

Finally, I have started projects on (i) the effect of taxes on labor market outcomes in the US (with Steve Davis), and (ii) building a model that establishes a link between the rising male wage dispersion and female-male wage ratio and provides quantitative explanations for the wage structure.