During my days as a Ph.D. student at the University of Pennsylvania, I was trained to think about economic problems through both the lens of economic theory and the empirical data. I was also instilled a strong belief that empirical research should be guided by appropriate theory and theoretical research should be inspired by empirical observations. Such indoctrination has had a profound influence on my research style and research interests. I consider myself as an applied microeconomist with broad theoretical and empirical interests with a focus on Public and Labor Economics. My work tends to cross the boundaries of narrowly defined fields and disciplines as I choose my projects based mainly on whether the ideas are promising instead of whether they fit into my “area.” I have developed theoretical models in order to cast new light on a topic of interest, and when appropriate, have conducted empirical work to determine whether the theory is an adequate description of reality. So what unifies my research is not so much the research topics, rather it is the tight connection that I always attempt to maintain between theory and empirical work. I have view the distinctions among applied microeconomics fields to be only artificial because there are no differences in their theoretical and empirical tools.

In this research statement, I attempt to categorize my research papers into several related topics. Within each topic, I first summarize my completed (both published and unpublished) research, and then I describe my research plan for the next five years. All of my research papers are listed in “Reference” in the end.

In summarizing my research, I attempt to explain the questions of interest in the research topics to which I contributed, describe the genesis of my interest in them, and try to put in context the relationship among the various papers I consider relevant to each topic. Some papers will appear in multiple topics. Table 1 below provides the crosswalk between research topics and papers.
<table>
<thead>
<tr>
<th>Research Topics</th>
<th>Papers</th>
</tr>
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<tbody>
<tr>
<td>1. Economics of Discrimination:</td>
<td>[1, 12, 13, 14, 35, 36, 37]</td>
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<tr>
<td>Theory, Empirical Methods and Evidence</td>
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</tr>
<tr>
<td>2. Social Economics</td>
<td>[1, 8, 9, 19, 26, 30, 32, 33]</td>
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<tr>
<td>3. Assessing the Impact of Welfare Reform of 1996 on Single Mothers and Their Children</td>
<td>[5, 6, 16, 23, 34]</td>
</tr>
<tr>
<td>4. Applications of Psychology in Economics</td>
<td>[5, 7, 10, 16, 25, 34]</td>
</tr>
<tr>
<td>6. Other Topics</td>
<td>[4, 20, 27, 28, 31]</td>
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Table 1: Papers in Each Research Topic: A Crosswalk.

*Note:* See “Reference” for the title of the papers. Papers numbered 1-22 are completed; and papers numbered 23 and higher are either actively in progress or in the immediate research agenda. All completed papers are available from my website at [http://pantheon.yale.edu/~hf54](http://pantheon.yale.edu/~hf54).
1 Economics of Discrimination: Theory, Empirical Methods and Evidence

1.1 Summary

This research topic originated in my 2000 University of Pennsylvania Ph.D. dissertation titled “Discrimination with Endogenous Group Choices and its Empirical Application.” The main motivation for this research project is the following observation: in many economic transactions, the basis on which we are preferentially treated or discriminated against is not race or gender (traits that are exogenously given and immutable), rather it is whether we belong to an endogenously chosen group (such as whether we graduated from an Ivy League university or whether we belong to an exclusive golf club, etc.). To the extent that such group labels can be endogenously altered with some cost, my dissertation theoretically investigates whether discrimination based on such mutable group memberships can persist. On the theoretical front, the main discovery is the idea of “endogenous signaling instrument.” An endogenous signalling instrument is an activity (which defines one’s group label) that a priori does not satisfy Spence’s single-crossing property, but in a discriminatory equilibrium, it does, and thus becomes a valid signaling instrument endogenously. I used this idea in my paper “Social Culture and Economic Performance” [AER 2001] to examine the efficiency rationale for providing preferential treatments to “elite” groups that are defined by whether one undertakes some seemingly irrelevant activities. In that paper, I interpret the connection between obtaining higher paying jobs and undertaking some seemingly irrelevant activity as “social culture.” In the context of a society trying to adopt a new technology, I show that by allowing the firms to give preferential treatment to workers based on some “cultural activity,” the society can partially overcome an informational free-riding problem, and allow the society to adopt new technologies that require workers’ unobservable skill investment to be productive. As a result, social culture may affect the economic performance by altering the effective production technology of the economy.

On the empirical front, I used the framework as the basis of a structural model of endogenous educational choices and wage determination to estimate the contributions of ability signaling and productivity enhancement in the college wage premium. This was my junior job market paper in 2000, “Disentangling the College Wage Premium: Estimating a Model with Endogenous Education Choices,” [IER, forthcoming]. Here,
education choices, whether it is college or high school, become the relevant group labels. This is a parsimonious structural model that nests both ability signaling and human capital enhancement explanations of the college wage premium. The model has empirical implications on college and high school wage distributions as well as college enrollment rate. The key idea to distinguish ability signaling from productivity enhancement can be heuristically illustrated as follows. Imagine a population of agents with heterogeneous abilities. In an ability signaling model, the college wage premium is the result of the difference in the average abilities between college and high school graduates. To the extent that education choices are endogenous, the scope of ability signaling in generating wage differentials is restricted by the equilibrating forces of education choices. On the other hand, the scope of productivity enhancement in generating college premium is not restricted by the equilibrating process since it is an exogenous technology parameter in the education production function. This suggests that in general a model that admits the forces of both productivity enhancement and ability signaling can better rationalize the observed college wage premium than a pure signaling model, given a family of parametric models. In the extreme case that the observed college wage premium lies outside the level that can be rationalized in a pure ability signalling model, the data will actually call for some role of productivity enhancement. I estimate the parametric structural parameters of the model using Census data; and then disentangles the contribution of ability signaling to the observed college wage premium through a counterfactual experiment. In that experiment, I examine the maximal sustainable college wage premium in a hypothetical economy where college were not productivity enhancing; and I consider the difference between the college wage premium in the hypothetical economy and the actual college wage premium as the contribution of productivity enhancement of college education. The model is estimated under various distributional parameterizations using 1990 U.S. Census five percent Public Use Micro Sample. Under these parameterizations, I find that college education enhances attendees’ productivity by about forty percent, and productivity enhancement accounts for close to two-thirds of the college wage premium.

The question of how information free riding problem in the labor market (which was the focus of [1]) may be alleviated or exacerbated by government policy is the focus of a joint paper with Peter Norman titled “Government-Mandated Discriminatory Policies: Theory and Evidence” [13, IER 2006]. In this paper we analyzed perverse incentive effects of government-mandated discriminatory policies. We study an economy with private
and public sectors in which workers invest in imperfectly observable skills that are important
to the private sector but not to the public sector. Government regulation allows native
majority workers to be employed in the public sector with positive probability while excluding
the minority from it. We show that even when the public sector offers the highest wage rate, it
is still possible that the discriminated group is, on average, economically more successful. The
reason is that the preferential policy lowers the majority’s incentive to invest in imperfectly
observable skills by exacerbating the informational free riding problem in the private sector
labor market. The widening Chinese/Malay wage gap in Malaysia since the adoption of
its New Economic Policy in 1970, which is actually an economic policy that expanded and
mandated discrimination against the Chinese and gave preferential treatment to the Malays,
is consistent with our model, but difficult to rationalize with alternative explanations.

My most recent research interest on the topic of economics of discrimination centers on
racial profiling. In a joint paper with my student Shamena Anwar (now at the Heinz School
of Public Policy at Carnegie Mellon) titled “An Alternative Test of Racial Prejudice
in Motor Vehicle Searches: Theory and Evidence” [AER 2006], we propose
a simple model of trooper behavior to design empirical tests for whether troopers of differ-
ent races are monolithic in their search behavior, and whether they exhibit relative racial
prejudice in motor vehicle searches. The test we propose is a variant of the outcome test
of Gary Becker. However, our proposed test of relative racial prejudice provides a partial
solution to the well-known infra-marginality and omitted-variables problems associated with
outcome tests. More specifically, the infra-marginality problem refers to the problem that
the “marginal” is typically not equal to “average.” While the rigorous use of the outcome test
relies on the comparison of “marginals,” typically only “averages” are observed. Our pro-
posed test relies on the comparisons of average search rates and search success rates against
a given race of motorists by police officers of different races. Because our test relies on the
comparison of search rates and search success rates against the same race of motorists, it
is not subject to the infra-marginality problem as long as officers of different races face the
same distribution of motorists of that given race. We also propose resampling methods to
deal with situations for which this assumption is not valid. We call our test “rank order
invariance test” because the test will reject the null hypothesis that the troopers of different
races do not exhibit relative racial prejudice when the ranking over officers of different races
of the average search rates and/or search success rates differ by the race of the motorists.
When applying to a unique dataset from Florida, our tests soundly reject the hypothesis that troopers of different races are monolithic in their search behavior, but the tests fail to reject the hypothesis that troopers of different races do not exhibit relative racial prejudice.

1.2 Research Agenda

This will continue to be one of my primary research and teaching interests. In the immediate future, I will be exploring several projects in this topic.

Optimal Contract Design in Law Enforcement [35]. My research on racial profiling as reported in “An Alternative Test of Racial Profiling in Motor Vehicle Searches: Theory and Evidence” [12, AER 2006] has led me to consider the “industrial organization” issues of law enforcement. Imagine that a policy maker is interested in some objective function (which, for example, may be a combination of crime rates, or victimization rates, in the population and the number of innocent drivers being searched). Assume that police wants to maximize their own utility (which includes monetary payoffs and costs of search efforts, for example). Can we say something interesting about the optimal contract? This is an interesting principal-agent problem where the principal is the policy maker, and the agent is the police, but the feature that is novel to this application is that, here, the agent, namely, the police, is not completely in control of the outcome that the principal cares about. For example, the principal cares about crime rate in the population, but the crime rate itself is determined as the equilibrium outcome of the game played between the police and the citizens.

Identification of Taste and Statistical Discriminations [36]. I am also interested in systematically understanding how taste and statistical discrimination can be empirically distinguished.

“The Book Project:” Economics of Discrimination: Theory, Empirical Methods and Evidence [37]. It is almost fifty years since the publication of Becker’s classic “The Economics of Discrimination” (Chicago University Press 1957). The theoretical literature of discrimination has developed tremendously in this time span. Theories of statistical discrimination, discrimination with endogenous group choices, discrimination as a result of
inter-group interactions all contribute to a better understanding of the disparate outcomes between groups. On the empirical side, many methods such as outcome tests, audit methods and their combination have been developed and polished. Ample empirical evidence has accumulated. In teaching this material in my Ph.D. public economics class at Yale, I have found that students are very interested in this topic. I am planning to write a manuscript on this topic based on lecture notes I accumulated over years in teaching this topic. A book outline has been prepared.

2 Social Economics

2.1 Summary

This project attempts to bring sociological concepts into economic analysis; and study the role of various important sociological constructs such as social norms, social status, culture and identity in economic performance from a rational-choice perspective. My interest on this topic is heavily influenced by my Ph.D. advisors Andrew Postlewaite and George Mailath who have studied the effect of social norms in regulating non-market interactions. More recently I have also been interested in understanding the phenomenon of residential segregation, neighborhood emergence and transition, as well as risk sharing properties of social networks.

My first attempt on this topic was an application of the discrimination with endogenous group choices model on social culture, reported in “Social Culture and Economic Performance” [1, AER 2001] which I described earlier.

With Glenn C. Loury, I have worked on a paper titled “Toward an Economic Theory of Collective Identity” [9, in Social Economics of Poverty, Chapter 2]. “Identity” and “collective identity” are important sociological concepts that have not been incorporated into economic analysis until recently by George Akerlof and Rachel Kranton. They proposed models of identity where an individual’s identity directly enters his or her utility function. We take a different approach and ask the question of how such notion of identity-behavior mapping in Akerlof and Kranton could be modelled in a rational-choice framework. In the process, we advance a novel choice-theoretic model of “identity” based on the notions of categories and narratives. Identity, in our paper, is conceived as a matter of “reflexive perception” — how people understand themselves. Choosing an identity is equivalent to making a generalization about one’s past that highlights the most salient aspects
of experience. When many individuals make a common choice in this regard, they embrace a collective identity which is dysfunctional if it is Pareto dominated by an alternative self-classificatory schema. Using a simple multi-stage risk sharing game, we explore conditions under which dysfunctional collective identities might be expected to emerge. We show that different collective identities have different implications on the scope of risk sharing. A summary of this longer book chapter also appeared in “Dysfunctional Identities Can be Rational” [8, AER P&PE 2005].

My recent effort in this research topic is the collaborated research titled “Separate when Equal? Racial Inequality and Segregation” [19, NBER Working Paper 11507] with Patrick Bayer and Robert McMillan. In this paper, we question the standard intuition which suggests that residential segregation in the United States will decline when racial inequality narrows. Instead, we hypothesize that the opposite will occur. We note that middle-class black neighborhoods are in short supply in many U.S. metropolitan areas, forcing highly educated blacks either to live in predominantly white high-socioeconomic status (SES) neighborhoods or in more black lower-SES neighborhoods. Increases in the proportion of highly educated blacks in a metropolitan area may then lead to the emergence of new middle-class black neighborhoods, causing increases in residential segregation. We formalize this mechanism using a simple model of residential choice that permits endogenous neighborhood formation. Our primary empirical analysis, based on across-MSA evidence from the 2000 Census, indicates that this mechanism does indeed operate: as the proportion of highly educated blacks in an MSA increases, so the segregation of blacks at all education levels increases. Time-series evidence provides additional support for the hypothesis, showing that an increase in black educational attainment in a metropolitan area between 1990-2000 significantly increases segregation. We discuss in length how other seemingly plausible mechanisms do not fit the evidence. Our analysis has important implications for the evolution of both residential segregation and racial socioeconomic inequality, drawing attention to a negative feedback loop likely to inhibit reductions in segregation and racial inequality over time.

2.2 Research Agenda

Collective Identities and Economic Incentives [26]. On the issue of collective identity, Glenn Loury and I are currently investigating the incentive effects of collective identity.
The starting point of this analysis is the fact that in our previous papers \cite{8, 9} we assumed that one’s experience (in the risk-sharing example, one’s income realizations each period) is not affected by the adopted collective identity in the community. But if different collective identity implies different scopes of risk sharing, and to the extent that individuals can choose effort that may affect the income realizations, we may think that collective identities that are good at achieving ex post risk sharing may be bad in providing ex ante effort incentives. We show that in a world of incomplete income indicators (which was the reason for the role of collective identities in the first place), such intuition is not necessarily true.

**Endogenous Social Status \cite{30}**. In this joint work with Fali Huang at Singapore Management University, we endogenize an individual’s social status as the sum of “social rewards” to this individual chosen by other people. This differs from previous papers in this important social status literature where individual social status is typically determined by his/her position in the societal income distribution. We show that there exists an equilibrium in which individuals will choose appropriate amount of social rewards (or penalties) to others at levels that exactly compensate for valuable externalities generated by others. As a result social optimum is realized in such an equilibrium. We also generalize the result to situations where social status is group specific rather than individual specific. We also compare this efficient equilibrium with other social status equilibrium and investigate how individual effort, group size and composition are affected. The paper also sheds light on the relationship between social status and relative performance concerns.

**How Do Middle-Class Black Neighborhoods Emerge? \cite{33}** This project continues my collaborated research with Patrick Bayer and Robert McMillan as reported in \cite{19, NBER Working Paper 11507}. In that paper we found that in 2000 there were about 143 Census tracts (out of a total of more than 49,000 tracts in the US) whose residents were more than 40% black and more than 40% college-educated simultaneously. We call such neighborhoods middle-class black neighborhoods. We know exactly where these 143 middle-class black neighborhoods were located in 2000. We argued in our previous research that such kind of middle-class black neighborhoods are most desirable for highly-educated blacks, and the emergence of such neighborhoods plays an important role in determining whether, in the long run as blacks catch up with whites in their social economic status, we can expect to see more or less residential racial segregation.
In this project, we go a step further and ask the question of how these precious middle-class black neighborhoods we saw in the 2000 Census emerge. To do this, we use the time series Census tract level data going back to 1970s compiled by Geolytics. We have extracted data from Geolytics Census time series data the tract level characteristics covering the period of 1970-2000. We will first trace back the characteristics of the current 143 middle-class black neighborhoods to see how they evolved over time; we will then ask, back in 1990, 1980 and 1970, were there neighborhoods similar to those 143 back then? We will then investigate whether there are systematic determinants of whether neighborhoods similar in their race/education composition will turn into a sustainable middle-class black neighborhoods, or disintegrate into low-SES black neighborhoods?

Racial Disparities in Risk Sharing Properties of Social Networks: Theory and Evidence [32]. This research, which is joint work with Andrea Moro and Giorgio Topa at the Research Department of the Federal Reserve Bank of New York, is motivated by the familiar images from the catastrophe caused by Hurricane Katrina where throngs of blacks, but rarely whites, were seen in the shelters. Of course it is true that New Orleans had a very large percentage of black population, but there were still lots of whites, and especially poor whites. Katrina is a regional catastrophe, and it is a shock that many residents, unfortunately also all levels of governments, were not well prepared for. Our research question is, what explains the fact that whites, and even those poor whites, are able to deal with this unforeseen negative shock better than blacks? We will focus on the social networks of individuals and families, and understand the sources of the racial disparities in the ability of their social networks to cope with negative shocks. More specifically my research hypothesis is that blacks were disproportionately represented in the shelter population not only because they were poorer on average, but also because their social networks were less diversified geographically. The question is what are the sources of this racial disparity in risk sharing properties of social networks.

A simple theoretical model of residential location choices for different members of the family. In words, the model can be described as follows. Imagine that there are two possible residential locations, A and B; and consider the location decisions of a family of two people. Each individual’s income will depend on his/her individual characteristics and the common characteristics of the location he/she chooses to live in. If the two members of the family live in the same location, the benefit is that they can tend to each other’s individual shock
at a lower cost. For example, if one member or his/her children are sick, the other family member can help. The cost of living in the same location is that, if the location is hit with a negative shock such as a hurricane (as in New Orleans) or experiences a decline of the main industry (as in Detroit), then there is no one to help them. The costs and benefits for the family members to live in different cities are exactly the opposite. The cost is that they cannot tend to each other’s daily negative shocks; but the benefit is that they can help each other out when one region, but not the other, is hit with a negative shock. The theoretical part of the project aims to derive testable implications about how families with different means will optimally choose their residential location patterns with these trade-offs in mind.

Empirically, we would like to, first of all, document the racial differences in social networks, in terms of residential location and occupation. For this purpose Mitchell will be working with Panel Study of Income Dynamics (PSID) and National Longitudinal Survey of Youth (1979 Cohort and their children supplement). We will also attempt to use recent regional data from the Federal government related to Katrina to do further analysis on these issues. Second, we would like to test the implications of our theoretical model.

3 Assessing the Impact of Welfare Reform of 1996 on Single Mothers and Their Children

3.1 Summary

This project originated with the puzzling observation that welfare reform of 1996, with its time limits and work requirement, was advertised by politicians as being compassionate to the recipients themselves. This is puzzling because in standard economic models, eligibility restrictions such as time limits and work requirement will necessarily make a potential welfare recipient worse off.

With Dan Silverman in a paper titled “On the Compassion of Time-Limited Welfare Programs” [5, JPubE 2004], we started out by proposing a simple model of agents with present-biased preferences that may provide a rationale for the claim. We first identify four types of outcome that describe the behavior of a present-biased agent in the absence of time limits. We then show that the behavioral consequences of time limits are contingent on which outcome characterizes the agent’s behavior in the absence of time limits. We show
that under some conditions the imposition of time limits may improve the wellbeing of welfare recipients evaluated both in terms of long-run, time-consistent utility and the period-one self’s utility. This benefit of time limits may come either from allowing the welfare eligible to start working earlier than they otherwise would or, contrary to the intent of the reforms, from allowing them to postpone working.

We were not satisfied to merely have a possible theoretical rationale for the possible compassion of time-limited welfare reform; we want to know the empirical relevance of such theories. For that purpose, in a companion paper “Time Inconsistency and Welfare Program Participation: Evidence from the NLSY” [16, CFDP 1465], we empirically implement a dynamic structural model of labor supply and welfare program participation for agents with potentially time-inconsistent preferences. Using panel data on the choices of single women with children from the NLSY 1979, we provide estimates of the degree of time-inconsistency, and of its influence on the welfare take-up decision. With these estimates, we conduct counterfactual experiments to quantify the utility loss stemming from the inability to commit to future decisions, and the potential utility gains from commitment mechanisms such as welfare time limits and work requirements.

My knowledge in the institutional details of the US welfare system was significantly boosted in my joint work with Michael Keane on the paper “Assessing the Impact of Welfare Reform on Single Mothers” [6, Brookings Papers on Economic Activity 2004]. The main goal of this paper is to ascertain the contributions of various components of welfare reform, and other contemporaneous economic and policy changes, to the huge decline in welfare participation and increase in work among single mothers from 1993-2002. To this end, we have constructed an extensive data set that characterizes changes in welfare policy, as well as other important determinants of welfare participation and work, at the State level for the 1980-2002 period. Using these data together with the individual level data from the Current Population Survey, we develop a model that rather successfully explains both levels and changes in welfare and work participation rates across States, time, and various demographic groups, for the whole 1980-2002 period. We then use the estimates of the model and simulation to obtain estimates of the contributions of various policy and economic variables to the labor supply of single mothers.
3.2 Research Agenda

Assessing the Impact of Welfare Reform on the Well-Being of Single Mothers and Their Children [23]. This project is a natural extension of my earlier work with Michael Keane as reported in “Assessing the Impact of Welfare Reform on Single Mothers” [6, Brookings Papers on Economic Activity 2004]. Recall in that paper we attempted to disentangle the contributions of various elements of the welfare reform and other economic and policy variables on the labor supply/welfare participation decisions of single mothers. In this paper we will instead focus on the impact of welfare reform on the well-being of single mothers and their children. For this purpose we will first use Consumer Expenditure Survey data from 1983-2004, PSID data from 1983-2004, Current Population Survey from 1980-2004 and the children’s sample of NLSY 1979 to document the changes in the distribution of income, consumption, expenditure and children’s cognitive measures. Then we will use the extensive policy and economic variables data I collected earlier with Michael Keane to ask what elements are most responsible for the observed changes in these measures of well-being for the single mothers and their children. This project is supported by Smith Richardson Foundation in the form of a Domestic Public Policy Fellowship.

Time Aggregation in Dynamic Choice Models when Agents Have Time Inconsistent Preferences: Monte Carlo Evidence [34]. In the empirical research reported in “Time Inconsistency and Welfare Program Participation: Evidence from the NLSY” [16, CFDP 1465], we made the rather arbitrary assumption that a decision period lasts for a year. Similar assumptions about the length of the decision period are also made in all empirical studies of dynamic choice models. These assumptions may be valid if we know exactly when and how frequently an agent can choose to make a move, but in most situations they are made for convenience, or as a result of data availability restrictions. The assumption about the length of a decision period becomes more important with hyperbolic-discounting decision makers because higher rate of discounting is assumed between now and the next period, but not between periods thereafter. In this project I plan to uses Monte Carlo simulations to investigate if standard methods would be able to uncover the parameter that measures the length of a period an agent uses in decision making. More generally I would like to understand better the issue of time aggregation in applied dynamic choice models.
4 Applications of Psychology in Economics

4.1 Summary

My interest in this topic initiates in my research on the compassion of time-limited welfare programs described above. That project brought me to the realm of behavioral economics. My general view on this topic is that economists should not dismiss off-hand robust behavioral anomalies. Incorporating such behavioral biases into economic analysis does not at all mean the rejection of rationality; rather, it implies rationality subject to more constraints, or rationality with respect to non-standard preferences or technologies.


We also jointly worked on a third paper titled “Distinguishing Between Cognitive Biases: Beliefs vs. Time Discounting in Welfare Program Participation” [10, in Behavioral Public Finance, Chapter 3]. In that paper, we start to worry about how different forms of psychological biases can be empirically distinguished. We consider this to be an important challenge for behavioral economists as they introduce more and more cognitive biases into economic models. We present a simple model of welfare program participation that nests two well-documented cognitive biases that economists have recently incorporated into their analyses: projection bias and present bias. We argue that agents with present bias and projection bias will exhibit different attitude toward time limits and other welfare eligibility restrictions, both before and after such restrictions are implemented. To the extent that such attitudes can be accurately elicited and measured, we argue that we can use attitudinal data to distinguish present bias and projection bias models.

With Giuseppe Moscarini, I have examined the implications of overconfidence on firms’ optimal wage setting policies in a paper titled “Morale Hazard” [7, Journal of Monetary Economics 2005]. This paper provides a new and fully rational theory of fairness in wage setting, based on the notion that workers may be overconfident about their own ability. (Self overconfidence of the possession of desirable traits is indeed a very robust psychological finding.) In that model, we assume that a worker is uncertain about his own ability, which affects the marginal productivity of his effort. As a result, a worker’s effort responds to wage
incentives both directly and indirectly through its effect on his perception of his own ability, which we call his “morale”. If the firm receives noisy and private information about worker’s ability through performance evaluations for example, then any wage offers by the firm play both the direct allocative role as well as a signaling role. Wage differentiation reveals who did and did not do well in the firm’s evaluation, thus affecting the individual morale of each employee. The resulting decline in the effort of some workers, due to their discouragement when receiving a lower wage (or a wage cut), may more than offset the encouragement of the others, and be detrimental to the firm overall.

4.2 Research Agenda

Time Aggregation in Dynamic Choice Models when Agents Have Time Inconsistent Preferences: Monte Carlo Evidence [34]. This project was briefly described above in Section 8.

Is there a Mickey Mantle Effect? The Effect of Subjective Life Expectancy on Health Behaviors [25]. In this joint work with Michael Keane, Ahmed Khwaja, Martin Salm and Dan Silverman, we investigated the implications of optimism on the demand for health investment and health insurance. Beliefs about future health should play an important role in determining current health decisions. In theory, the direction of the effect of differences in expectations for longevity on health investments is unclear. Greater optimism may make current health investments either more or less appealing. OLS estimates using data from the Health and Retirement Study show that beliefs about longevity are only weakly associated with current health decisions after conditioning a number of other demographic and economic characteristics. Problems of reverse causality and omitted variables imply that these OLS estimates may be misleading. An individual’s index of general optimism, measured as the tendency to answer questions about macroeconomic and policy events optimistically, is not subject to the reverse causality problem. There is a statistically significant and relatively large positive association between general optimism and most health investments. As an instrument for beliefs about future health, however, the index of optimism is weak. Therefore, IV estimates indicating that more optimistic beliefs about future health substantially increase the likelihood of making most health investments are difficult to interpret. This finding does have an interesting policy implication. Currently in the US and elsewhere, the government
information campaign against smoking and drinking has mainly focused on the negative consequences, both on health and on life in general, of such actions; our finding suggests a useful complementary information campaign that emphasizes to the viewers that the medical technology has improved so much that one can actually live a quite long life. Once viewers are convinced that they are likely to live long, they would choose to smoke and drink less!

5 Multi-dimensional Private Information: Auctions, Public Goods and Insurance Market

5.1 Summary

Issues of multi-dimensional private information appear in several of my research papers. My focus in this research topic is on how multidimensionality affects the equilibrium of standard mechanism, and how it affects the optimal mechanisms, and how it affects the market equilibrium.

It started in my joint work with Sergio Parreiras (currently at UNC-Chapel Hill) when we were both still Ph.D. students at the University of Pennsylvania in a project tilted “Auctions with Financially Constrained Bidders.” Two publications came out of this project. The first is titled “Equilibrium of Affiliated Value Second Price Auctions with Financially Constrained Bidders: The Two-Bidder Case” [2, Games and Economic Behavior 2002]. In that paper, we study affiliated value second price auctions with two financially constrained bidders. In this auction environment bidders have two dimensions of private information, their signal for the value of the object and their bidding budget. We prove the existence of a symmetric equilibrium under quite general conditions and provide comparative static results. In the second paper is titled “On the Failure of the Linkage Principle with Financially Constrained Bidders,” [3, Journal of Economic Theory 2003], we provide a class of examples of two-bidder common value second price auctions in which bidders may be financially constrained and the seller has access to information about the common value. We show that the seller’s expected revenue under a revelation policy may be lower than that under a concealing policy. The intuition for the failure of the linkage principle is as follows. In the presence of financial constraints, the bidders’ upward response in their bids to the seller’s good signals is limited by their financial constraints, while their
downward response to bad signals is not.

With Stephen Morris, I wrote a paper titled “Multidimensional Private Value Auctions” [11, Journal of Economic Theory 2006] in which we consider parametric examples of symmetric two-bidder private value auctions in which each bidder observes her own private valuation as well as noisy signals about her opponent’s private valuation. Thus in our set up, bidders have multi-dimensional private information in the sense that they both possess private information about their own valuation for the object (which we call “valuation type” and is the same as the standard auction models) and private information about signals about their opponents’ value (which we call “information type” and it does not appear in standard auction models). This provides the simplest framework to examine the effect of higher-order beliefs on the equilibrium of standard auctions. We show that, in such environments, the revenue equivalence between the first and second price auctions breaks down and there is no definite revenue ranking; while the second price auction is always efficient allocatively, the first price auction may be inefficient; equilibria may fail to exist for the first price auction. We also show that auction mechanisms provide different incentives for bidders to acquire costly information about opponents’ valuation.

The work with Stephen Morris led to a collaboration with David J. Cooper at Case Western Reserve University on an experimental economics project titled “Understanding Overbidding in Second-Price Auctions: An Experimental Investigation” [21, Cowles Foundation Discussion Paper 1557]. It is well-known that overbidding is prevalent and persistent in lab experiments. Surprisingly economists have rather limited empirical understanding of why overbidding occurs in SPA. The key idea of our paper is the following. Suppose that bidders are either given for free, or are allowed to purchase, noisy signals about their opponents’ value. Even though in standard models of SPA, such information about opponents’ value theoretically has no strategic use, it provides us with a convenient instrument to change bidders’ perception about the “strength” (i.e. the value) of their opponent. This empirical relationship between the incidence and magnitude of overbidding and bidders’ perception of the strength of their opponent provides the key to understand whether overbidding in second price auctions are driven by “spite” motives or by the “joy of winning.” Our experimental data show that bidders are much more likely to overbid, though less likely to submit large overbid, when they perceive their rivals to have similar values as their own. We argue that this empirical relationship is more consistent
with a modified “joy of winning” hypothesis than with the “spite” hypothesis. However, neither of the non-standard preference explanations are able to fully explain all aspects of the experimental data. We find clear evidence of learning both in avoiding costly overbidding and in subjects’ choices to purchase costly information, thus lending support for the role of bounded rationality. We also find that bidder heterogeneity plays an important role in explaining their bidding behavior.

I have continued the investigation of the effect of multi-dimensional private information in settings other than auctions. The next topic of interest is the provision of multiple excludable public goods. This project is joint with Peter Norman and it resulted in a line of research on bundling that has eventually gone beyond public goods. Before describing the details of the papers in this project, let me state up-front that mechanism design for multi-dimensional private information environment is a very difficult problem whose complete solution will probably require new mathematical tools. Facing such a technical barrier, three different approaches, none of which is perfect, are taken in our research. The first approach is simply to do with simple parametric family of examples; the second approach takes the number of goods to infinity and appeal to law of large numbers; and the third approach focuses on local deviations instead of global analysis of the optimal mechanism.

In “Optimal Provision of Multiple Excludable Public Goods” [17, Cowles Foundation Discussion Paper 1441R], we took the first approach. We study the optimal provision mechanism for multiple excludable public goods when agents’ valuations are private information. We provide some partial characterizations for the optimal mechanism that significantly reduce the set of mechanisms that we need to consider, but are unable to characterize the optimal mechanism for general environments. However, we are able to completely characterize the optimal mechanism for a parametric class of problems with binary valuations. We show in that parametric family of examples that the optimal mechanism involves bundling. Bundling alleviates the free riding problem in large economies in two ways: first, it can increase the asymptotic provision probability of socially efficient public goods from zero to one; second, it decreases the extent of use exclusions.

In “Overcoming Participation Constraints” [18, Cowles Foundation Discussion Paper 1511R], we took the second approach and ask whether any almost efficient mechanism is feasible when the number of goods go to infinity. This paper is most closely related to a recent Econometrica paper by Matthew O. Jackson and Hugo Sonnenschein
titled “Overcoming Incentive Constraints by Linking Decisions.” In that paper, Jackson and Sonnenschein showed that the utility costs associated with incentive constraints become negligible when the decision problem is linked with a large number of independent replicas of itself under the linking mechanism in which agents must budget their representations of preferences so that the frequency of preferences across problems mirrors the underlying distribution of preferences, and then arguing that agents’ incentives are to satisfy their budget by being as truthful as possible. The nice feature of Jackson and Sonnenschein’s result is that the linking mechanism works under non-transferable utility environments. Our paper complements Jackson and Sonnenschein’s analysis because it departs from their in two dimensions. The first difference is that we restrict ourselves only to transferable utility environments, which is obviously a shortcoming. The second difference, however, is a relaxation: we consider a large number of independent but unrelated issues. We provide regularity conditions under which a Groves mechanism amended with a veto game implements an efficient outcome with probability arbitrarily close to one, and satisfies interim participation, incentive and resource constraints.

The paper “To Bundle or Not To Bundle” [15, Rand Journal of Economics, forthcoming] is about the profit-maximizing bundling decisions for a monopolist seller who sells finite number of private goods. The idea in this paper grew out of the public good provision research reported above where we first discovered the usefulness of the statistical concept called “peakedness.” We focus on the finite product case because for the infinite case research by Mark Armstrong has shown that the monopolist can extract all the surplus by exploiting the laws of large numbers. Our knowledge about whether bundle increases profits in the case of finite number of goods is limited to a few numerical examples by Richard Schmalensee. In this paper, we obtain a rather intuitive characterization for when a multi-product monopolist should bundle and when it should sell the goods separately in order to maximize its profits. To some extent this confirms (mainly) numerical results in Schmalensee’s studies, namely, the higher the marginal cost and the lower is the mean valuation, the less likely that bundling dominates separate sales. When limiting our comparison to pure bundling and separate sales, we are able to highlight a clear intuition for what happens when two or more goods are sold as a bundle. The key effect driving all the results is that the variance in the relevant willingness to pay is reduced when goods are bundled. In our paper we provide a partial characterization for when this reduction in variance is beneficial
for the monopolist, and when it is not.

Multi-dimensional private information also appears somewhat surprisingly in an empirical paper (joint with Michael Keane and Dan Silverman) titled “Sources of Advantageous Selection: Evidence from the Medigap Insurance Market” [22, NBER Working Paper]. This paper is closely related to the empirical implications of the classical theoretical models of insurance. These models assume that potential insurance buyers have one-dimensional private information regarding their risk type, and they choose from a menu of contracts, specifying the price and amount of coverage, the one best suited to their type. A testable empirical prediction of these models is the so-called “positive correlation property,” namely, there must be a positive correlation between insurance coverage and ex post realizations of loss. This property is implied by the standard insurance model of one-dimensional private information with or without moral hazard. However, recent empirical papers fail to find empirical support for the positive correlation property in a variety of important insurance markets, including life insurance, automobile insurance and health insurance markets. These empirical findings have point toward the possibility of selection based on multi-dimensional private information, and the existing literature has focused on risk aversion as the leading suspect for other dimensions of private information that may affect the demand for insurance and cause the positive correlation property to fail. However, so far the literature has not provided direct evidence to support this conjecture. Our paper fills this gap. We study the advantageous selection phenomenon using data from the Medicare supplemental or “Medigap” insurance market. We show that the Medigap insurance market is characterized by advantageous selection: conditional on the determinants of price, those who purchase supplemental insurance tend to be healthier than those who do not. More importantly, we go beyond prior research to investigate several potential sources of this advantageous selection. We provide direct evidence that risk aversion, can explain a substantial portion of the observed advantageous selection in the Medigap market. But that is not the whole story. We find that additional important sources of advantageous selection include selection based on education, income, longevity expectations and financial planning horizons, along with other measures not typically included in economic models, such as cognition and numeracy. Once we condition on all these variables, we find that individuals with higher expected medical expenditures are indeed more likely to purchase Medigap insurance.
5.2 Research Agenda

Public Provision of Private Goods as Constrained Efficient Outcome. In this paper, Peter Norman and I pursue a third strategy described above, namely, local deviations strategy, to deal with multi-dimensional mechanism design problem. Specifically, we show that public provision of private goods may be justified on pure efficiency grounds in an environment where consumers consume both public and private goods. The idea is that public provision of a bundle that consists of a private and a public good can make it easier to extract revenue from the customers for reasons familiar from the literature on multiproduct monopolies. We show that partial public provision of the private good improves economic efficiency under a condition that is always fulfilled under stochastic independence and satisfied for almost all distributions.

Akerlof’s Lemons Market Revisited: What if Sellers Have Multi-dimensional Private Information? The empirical results reported in “Sources of Advantageous Selection: Evidence from the Medigap Insurance Market” point toward several interesting theoretical questions. The first question is the relationship between selection based on multi-dimensional private information and the equilibrium size of the market. Consider two insurance markets, say life insurance and annuity insurance markets. In both insurance markets suppose that individuals choose to buy more insurance if they have higher risks (mortality risk for life insurance and longevity risk for annuity insurance) and if they have higher values of another variable γ (I am deliberately vague about what γ is, but it is safe to assume it denotes risk aversion). Suppose that in one market (say life insurance market) γ is negatively correlated with risk (i.e. mortality risk), but in another market (say annuity insurance market), γ is positively correlated with risk (i.e. longevity risk). What can be said about the equilibrium size of the markets? Would it always be the case that the equilibrium market size will be higher in the first market where γ acts as a source of advantageous selection to alleviate the adverse selection due to selection based on risk? What about efficiency? These questions are important for a better understanding of the implications of multi-dimensional private information on market equilibria. In this proposed research I intend to examine Akerlof’s lemons market which is a much simpler setting that allows me to abstract from the screenings by the sellers.
6 Other Research Interests

I now describe several research papers that are at this moment only my nascent efforts into new research topics, and as such I am not yet ready to call them one of my main areas of research interest. I hope that some of them will eventually become part of a larger research agenda as my career progresses.

6.1 Issues Related to Development Economics

I am interested in the interaction between development economics and public economics. As I emphasized earlier I view the distinction between these fields to be artificial. Individuals in developing economies make calculations similar to those in developed world, and the difference is in their institutional constraints. As such data from developing economies provide important, sometimes vital, sources of information for us to understand the effects of different institutional arrangements. I have worked on two research papers using micro level data from China, one to study the determinants and effects of “Entertainment and Travel Costs” expenditure item among Chinese firms, and the other to study the insurance role of Rotating Savings and Credit Association (ROSCAS).

“Corruption.” I worked with Hongbin Cai of UCLA and Peking University and Colin Xu of the World Bank on a paper titled “Eat, Drink, Firms and Government: An Investigation of Corruption From Entertainment and Travel Costs of Chinese Firms” [20, NBER Working Paper 11592]. As some background, Entertainment and Travel Costs (ETC) is an expenditure item in standard accounting books of firms in China that amount to about 20% of total wage bills in a sample of 3470 Chinese firms. Using a detailed dataset of these firms, we analyze the composition of ETC and effects of ETC on firm performance. We develop a simple model of managerial decisions on the amount of entertainment expenditures to spend on strengthening relational capital with suppliers and clients, bribing government officials, and private consumption. This model allows us to identify components of ETC by examining how they should respond to different environmental variables. We find strong evidence that firms’ ETC compromise a mix that includes expenditures on government officials both as “grease money” and “protection money,” expenditures to build relational capital with suppliers and clients, and managerial private consumption. Overall,
ETC have significantly negative effects on firm performance, but their negative effects can be much less pronounced when their marginal returns are higher, particularly, under severe government expropriation and when the quality of government service is very poor. This research has been profiled in mainstream print media in Singapore (The Strait Times) and in Hong Kong (South China Morning Post).

Rotating Savings and Credit Associations (ROSCAS) [31]. ROSCAS are an important informal financial institution in developing countries. In a typical ROSCA, a group of individuals, mostly connected in certain social network, commit to contributing a given sum of money at each of equally-spaced dates to form a pot, and then the pot will be allotted through certain mechanism to each of members in turn. There are two prevalent mechanisms to determine the order in which these individuals access the pot: random lottery and bidding. The seminal analysis by Timothy Besley, Stephen Coate and Glenn Loury modelled the role of ROSCAS as a Pareto improving institution in the context of saving to purchase expensive durable goods. The subsequent literature has extended their model in several important directions, but none has examined the role of ROSCAS in the presence of formal credit markets. Indeed in a unique data set of a large number of bidding ROSCAS from China (City of Wenzhou, Zhejiang Province), Rongzhu Ke (currently a Ph.D. student at MIT) and I found two interesting features. First, many of the ROSCAS participants actually have access to formal credit market and in fact some of them are borrowing money from the formal credit market in order to fulfil their obligations in the ROSCAS. Second, the implicit interests for these ROSCAS typically are non-monotonic with respect to time, which is at odds with the predictions from Besley, Coate and Loury’s model. These empirical observations motivate our theoretical investigation of a model of ROSCAS in the presence of formal credit markets and focus on its role of mutual insurance.

6.2 Issues Related to Education

I am also interested in two issues in education [27, 28]. My interest in these issues are new and not much formal progress has been made yet. The first issue is about college major choices. I am interested in documenting its change over time and understanding how much of the changes in college wage premium, Black-White wage gap, and gender wage gaps could be attributed to the changes in the major choices of the college students, and the changes in
the mapping from college majors and occupations. Second, I am interested in understanding the labor market returns to non-cognitive skills acquired through extracurricular activities. I plan to use nationally representative post-secondary education data sets, NLS-72, High School and Beyond-80, NELS 88 and Baccalaureate and Beyond-93 to examine these issues.

References


