Statement on Research, Teaching and Service Gautam Gowrisankaran, Associate Professor of Economics Candidate for promotion to the rank of Professor November 2010

Introduction:

The central goal of my research, teaching and service is to further the knowledge and use of economics by answering important questions in industrial organization with state-of-the-art empirical and theoretical methods. Much of my scholarly work has focused on two broad areas: the industrial organization of healthcare and markets for new high-technology goods. Recently, I have also begun working in energy/environmental economics. These are exciting areas in which to work. The healthcare sector is very important to the economy, continues to grow and has a vast governmental involvement, all of which result in difficult but crucial questions. Hightechnology goods have also been a huge force in the economy in recent decades, and understanding phenomena such as network externalities and consumer preferences for these goods is necessary to evaluate their impact and formulate policies. As climate change and other environmental pressures build, economic analyses of potential policy innovations are crucial as well. My scholarly work has significantly contributed to both of these fields by developing new and useful methods; by directly answering questions that are of interest; by mentoring students in developing and using these methods; by helping others foster and create their own work on economics; and by evaluating the work of scholars throughout the world.

Research:

In the field of the industrial organization of healthcare, my research contributions lie in my work on evaluating the quality of hospital care; my work on managed care performance and information; my work on high-technology medical services; my work on understanding the impact of government policy on hospital market structure, and my work on understanding the impact of new healthcare delivery mechanisms such as wellness incentives. In the field of new high-technology goods, my contributions lie in the following areas: my work on network externalities; my work on mergers; my work on entry models; my work on dynamic estimation of demand for consumer durables; and my work on renewable energy technologies. I have also researched on a number of other topics, notably the incumbency advantage in senate elections and computational methods and have begun several projects on energy economics.

As measures of the impact of my research, I have given 37 invited seminars over the past five years at institutions such as UCLA, Stanford, Harvard, Duke, the University of Wisconsin and the London School of Economics; I serve on the Board of Editors of the American Economic Review and two other journals; I have served as the PI for 4 investigator-initiated federal grants worth a combined total of over \$1 million plus a number of private foundation grants; and my 10 most-cited papers have a combined total of 716 cites on Google scholar.

I would also like to briefly summarize my philosophy about what I consider interesting research questions. I am motivated to answer research questions where policymakers might ultimately care about the answers and where I feel that I can contribute to the knowledge of these answers given the existing literature. Some of my research is directly relevant to policies. Other research is more abstract, and government or firms are not about to base current policies on these

abstract findings. However, even in my abstract research, my goal is to develop methods and insights that might be useful inputs for broader policy decisions of the future. I now detail a few of my research topics in order to highlight some as my contributions.

Evaluating the quality of hospital care:

The goal of this research agenda is to find methods to derive accurate measures of hospital quality, using hospital discharge data. These measures are useful in of themselves and are also necessary for a wide range of economic problems, such as understanding the relationships among hospital costs, technology usage and quality, and between competition and quality.

The difficulty with inferring hospital quality from mortality is that patients may select hospitals on the basis of their severity of illness. If severity of illness is unobserved in part, then hospital mortality measures would reflect both hospital quality and patient severity of illness, and standard methods could not disentangle these two effects. Previous studies on this topic have proceeded by adding more regressors and hence have been unable to disentangle these effects.

Our initial insight was to understand that distance could serve as a randomizer, and hence allow us to find the part of hospital mortality that relates to hospital quality rather than patient severity of illness. Under the assumption that there are no unobserved clusters of severity of illness in the population, the distance to a hospital serves as a randomizer (or an exogenous shifter) that is correlated with the choice of hospital but not with the residual severity of illness. The underlying identification strategy was to infer hospital quality from the risk-adjusted death rate among patients who were likely to be admitted to that hospital based on where they lived, rather than among the actual patients at that hospital.

Although the identification assumptions that we made appeared reasonable and the idea useful, we discovered that simple estimators did not perform well for this problem. This was due to a variety of factors, including the discrete nature of mortality and the low signal-to-noise ratio present in our data, caused by the fact that in-hospital mortality is both a relatively rare event and mostly not due to hospital quality. Thus, we developed Bayesian statistical methods to accurately infer hospital quality from these data. Although complex, these methods are based on the simple idea above and provide new and useful methods to answer the important question of hospital quality. These methods reveal the extent to which quality for pneumonia care varied based on competition and type of hospital in Los Angeles County.

I believe that this work has provided impact in two dimensions. First, it has resulted in a set of methods to develop ratings that address the problem of selection and low signal-to-noise ratios. These methods are potentially widely applicable, for a variety of settings both in healthcare and outside healthcare, such as education. Second, it has directly answered how the quality of hospital care varies. This is a question that might ultimately bear on a host of important firm and governmental policies.

This work also illustrates my philosophy about what is necessary to perform good research. In addition to the ideas, executing this research agenda requires both a thorough understanding of the complex medical institutions, procedures and data, and also an understanding of econometrics, computation and economic theory.

High-technology medical services and the impact of policy on the hospital market:

The overall goal of this research agenda is to understand the usage and costs for high technology medical services. Other research has found that new and expensive but useful medical treatments are the cause of the huge increase in healthcare spending over the last 20 years. This research agenda analyzes the use of high technology services from a variety of angles.

One paper in this research agenda examined bypass surgery, using entry data to estimate the financial returns that hospitals receive from different types of patients for performing bypasses. This paper found evidence that financial returns were high for fee-for-service patients and roughly zero for managed care patients, and that Medicare returns were very high in 1984 but declined substantially over the next 10 years and ended up roughly zero.

An ongoing paper in this research agenda examines aims to shed light on the impact of the Rural Hospital Flexibility Program (Flex) on hospital care for rural residents. Congress established Flex in 1997 in response to growing concern about rural Americans' access to health care. When the legislation passed in the late 1990s, there was significant concern about rural hospitals closing. The legislation ensured that people in rural areas have access to hospitals. One way it did so was to allow rural hospitals to convert to Critical Access Hospital status. The analysis we propose should provide policymakers with important information to formulate an overall assessment of the program and guide potential changes to improve its efficacy.

Critical Access Hospitals (CAH) receive more generous inpatient and outpatient costbased reimbursements from Medicare. In order to qualify for CAH status, hospitals must have fewer than 25 beds, limit inpatient stays to four days, and link with other institutions to foster quality improvements. In the years since the program was established, over 1,300 rural hospitals, representing more than 25 percent of all U.S. hospitals, have converted to CAH status. In 1997, 15 percent of rural hospitals had 25 beds or less; by 2004, that number had risen to 45 percent. The unexpected result of the legislation was that hospitals were incentivized to reduce bed capacity. We aim to discover whether the extra beds that hospitals eliminated to qualify as a CAH wasted capacity, or whether there could be a negative effect on hospital service offerings. This project is supported by a \$577,000 grant from AHRQ for which I am the principal investigator.

Dynamic estimation of demand for consumer durables:

This ongoing research agenda develops new methods to estimate the dynamics of demand for differentiated product consumer durable goods that extend the literature on discrete choice estimation. This methodology is critically important in determining the value of innovation. I was recently asked to give a short course on this methodology to the U.S. Bureau of Economic Analysis so that government economists could better understand the usefulness of this methodology in evaluating the impact of innovation on inflation. We apply the methods to estimating consumer preferences for the markets for DVD players and digital camcorders. Over the past 4 years, this research agenda has been supported by two NSF grants worth a total of \$312,000 for which I am the principal investigator.

Rapidly falling prices and improving product attributes have been two of the most consistent features of these markets. A rational consumer who contemplated purchasing a DVD player early on would need to form expectations about the future path of price and quality, in order to decide whether to purchase a model then or wait for future models and most likely, lower prices. This suggests the importance of modeling dynamics in estimating consumer preferences. Moreover, people who bought a DVD player early on are likely to be out of the market for some time (because DVD players are durable), implying that the set of potential customers, and in particular the set of high–value potential customers, is shrinking over time. This further suggests the need for a model with heterogeneous consumer types.

This research project estimates a structural dynamic model of consumer preferences for new consumer durable goods that incorporates consumer heterogeneity and the rational expectations of consumers about future price and quality paths. Preliminary results show that consumer expectations are very important in determining the sales path of DVD players, and that modeling these expectations is necessary to obtain reasonable estimates of consumer preferences for this industry.

This project contributes to the literature in that it develops new methods for estimating dynamic demand systems that are potentially broadly applicable. Moreover, many important decisions depend on the answers that we find. In particular, it is very important to understand the extent to which new consumer goods have contributed to consumer welfare, as a host of government programs depend on accurate price indices. In my opinion, the only theoretically sound way to understand the welfare contributions of these goods is to model the dynamics of demand for these goods, which our paper is among the first to do. Understanding the nature of consumer preferences for these industries is crucial to evaluating firm decisions about dynamic price discrimination and advising firms on pricing strategies for new consumer durables.

Conclusion:

Given the different topics on which I have researched, a natural question is the direction that my research will take in the future. Much of what I envision researching will involve the economics of healthcare, markets of new goods and the economics of renewable energy. Healthcare is a sector that accounts for 15 percent of U.S. GDP and has been growing. Much of the reason for this growth stems from increases in new high-technology services. Yet, little is known about how much consumers value these services, especially since consumers rarely pay for the cost of healthcare treatments at the margin. Moreover, this is an area where government programs such as Medicare are huge and will continue undergone rapid changes, as with the Patient Protection and Affordable Care Act of 2010. Understanding the economics of the energy industry and in particular the challenges of developing effective renewable energy sources is of equal policy importance.

Teaching and Service:

As a faculty member at the University of Arizona, I believe strongly in the model of a research-driven public university, where our substantial research expertise helps us teach rigorous and challenging skills that will allow our students to develop a long-term competitive edge. My contribution in teaching and service at the University of Arizona has been diverse, including teaching Ph.D. students in the Econometrics of Dynamic Industrial Organization; advising Ph.D. students in Econometrics, Industrial Organization and Energy/Environmental Economics on their dissertations; teaching undergraduates in Industrial Organization; organizing workshop series; supervising dissertation credits; and teaching physician-executives on competitive strategy and healthcare management. In a previous position at Washington University in St. Louis, I also taught MBA students competitive strategy among other courses.

My service commitment to the University of Arizona includes serving as the Director of Graduate Studies and as a member of the Recruiting Committee as well as participation in a number of departmental, college and university committees. In addition, I serve on the Board of Editors of the American Economic Review and as Associate Editor of two other journals and I referee many research papers. I am gratified that the Economics profession sees my opinion as informed and useful.

Of my teaching accomplishments at the University of Arizona, I am most proud of my success with Ph.D. students. I am gratified of the recognition that I received in this dimension as the recipient of the 2009 Kalt Prize for best doctoral student mentorship in the Eller College as well as the placements of my advisees at tenure-track positions at institutions such as Washington University in St. Louis. I have succeeded in helping my Ph.D. students develop interesting dissertation ideas, follow through on those ideas and communicate them to the rest of the world, such that they have obtained successful placements. Teaching Ph.D. students is also a crucial component in helping me develop as a scholar. For example, my ongoing recent work on renewable energy started because of my advising of Joseph Cullen, currently a postdoctoral fellow at Harvard University. I have found that success for Ph.D. students depends on a high level of economic theory, econometric, and computational skills, knowledge about industries, a knack for finding good research questions, and probably most importantly, on a strong work ethic. Maintaining a work ethic is particularly difficult in the context of a long, independent research project with uncertain outcomes such as dissertation research. I believe in setting high, but realistic, expectations for Ph.D. students and then working closely with them to make sure that they have all the help that I can offer towards meeting those expectations.

My primary skills in teaching in a classroom setting are my ability to listen, to engage the class, to explain difficult concepts and to create an atmosphere that allows people to contribute and learn. I try to foster an inclusive environment, where people with different backgrounds and skills feel comfortable to contribute. Towards this goal, I cold-call on students who have not talked much. If they do not have a thoughtful response, I encourage them to be more prepared the next time, but also make it clear that cold-calling is not meant to humiliate them or make them feel bad. In general, when people give answers that are logically inconsistent, I think that it is important to help them understand what part of their thought process is inconsistent but also to stress that wrong answers are a necessary part of learning. I believe that intellectually rigorous teaching is part of our mission. Yet, I think that humor can play an important role in creating an environment where people feel welcome to participate and make mistakes. My goal is a class where students are required to think on their feet but are not afraid to make mistakes

For my MBA and physician-executive teaching, I believe that economic methods, including game theory and data analysis, yield insights that can help transform the way in which business decisions are made. The overall format of this teaching has been to help students analyze business cases, economic theories and research papers and through that to develop skills that better allow them to analyze important business decisions. My technique in teaching difficult concepts in this setting is to help students understand why the concepts can help them in a business environment and also to put them in contexts with which they are familiar. My experience teaching undergraduate students is similar. However, I believe that for undergraduates, we must also offer a liberal arts education at its core; an education that helps develop and foster the ability to continue learning skills that will help in future career and other aspects of life.