

DISSERTATION DEFENSE

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A Dynamic Structural Analysis of Health Care Service Market with Information Asymmetry

My dissertation provides a dynamic structural analysis of demand and supply in a service market with information asymmetry. Specifically, I examine the health care market, which accounts for 17% of U.S. GDP and arguably is the most personal and important service consumers buy. This industry is particularly interesting for several reasons. First, health care service is very expensive and surpassed \$2.6 trillion in 2008. The increase of health care costs is particularly relevant in the context of chronic diseases, which account for 75% of total health care expenditure. In such a context, consumers have two types of health-care consumption choices: preventive care and curative care. Although the vast majority of cases in chronic diseases could be managed by preventive care according to experts, more than 96% of the health care expenditure goes to more expensive curative care. Second, health care market often suffers from adverse selection and moral hazard problems. Firms' profits depend on both the actions and the identity of consumers.

Despite the importance of health care service markets, there is relatively little empirical work on demand and firm behavior in such markets. This dissertation focuses on two aspects of health care service markets that have received little attention in the literature: the demand of preventive care and curative care, particularly in the chronic disease context, and the impact of consumers' health status information on insurer pricing behavior. To conduct the empirical analysis, I constructed a comprehensive data set including purchases of insurance plans, health care consumption histories, insurance premium and plan characteristics, and individual demographic information from January 2005 to December 2007. I use this proprietary data to construct econometric models of consumer choices and insurer behavior.

First, I attempt to understand why many consumers opt for more expensive curative care which leads to a significant increase in the health care costs, but only a marginal increase in their welfare. To do so, I build a dynamic structural model of how consumers choose between different insurance plans,

and conditional on the insurance plans, how they make the health care consumption decisions. I use the model to investigate the observed health care consumption pattern. The results reveal the following insights: (i) while preventive care mainly provides information about the health status (informative effect), curative care mainly improves the current health status (investment effect). (ii) Decreasing deductible or copayment increases frequency of preventive care more as compared to curative care, and decreasing coinsurance rate does the opposite. (iii) The inefficiencies mainly arise from health care decisions of a sizable segment of risk-averse consumers who are not very sick but are uncertain about their health status. These consumers opt for more comprehensive insurance plans; once in that plan, they prefer to more expensive curative care even when the illness could be managed through preventive care. Using counterfactual simulations, I examine how these inefficiencies can be reduced. I find that while subsidizing curative care increases consumer welfare at the expense of increasing the overall costs, subsidizing preventive care not only increases consumer welfare but also decreases overall health care costs. Moreover, consistent with recent trend of personalized medicine, providing more accurate information about health status through health care increases consumer welfare and decreases overall costs.

I then analyze asymmetric information and moral hazard in the health insurance market based on a dynamic theory of an insuree's dynamic risk through asymmetric learning (adverse selection/advantageous selection) and consumption choices (ex ante and ex post moral hazard). I use the theory to characterize the heterogeneous dynamic change in insurance choices to avoid out-of-pocket expenditure that are generated by the asymmetric learning and their effects on consumption choices between preventive and curative care. I explore these structural implications of adverse/advantageous selection and moral hazard. Unlike much of earlier literature, I find evidence of adverse/advantageous selection and moral hazard.

I also examine the insurance contract design (pricing menu) using this same data set. I combine the demand structure from the previous case with supply-side contract design under adverse selection and moral hazard. To accommodate these, I allow for random sequence of participation. In turn, I explore the implications of asymmetric learning on insurance choices. One particular challenge for this investigation is separating adverse selection from ex ante/ex post moral hazard. Therefore, I employ rich, transaction-level data and the restrictions from optimal contracting behavior to differentiate the effects of hidden information from the effects of pure moral hazard. Combining these data with observed pricing decisions, I can estimate the firm's indirect cost and assess the profitability of alternative pricing policies. This model may be relevant for any service market in which hidden information and hidden actions exist at the same time.