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**Article**

## Selection and asymmetric information in insurance markets

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*Suggested Citation:* Einav, Liran; Finkelstein, Amy (2011) : Selection and asymmetric information in insurance markets, NBER Reporter Online, National Bureau of Economic Research (NBER), Cambridge, MA, Iss. 3, pp. 5-7

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<sup>19</sup> "From Financial Crash to Debt Crisis," forthcoming, *American Economic Review*, August 2011.

<sup>20</sup> R. Chang and Andres Velasco, "A Model of Financial Crises in Emerging Markets," *Quarterly Journal of Economics* 116 (May

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<sup>21</sup> M. Feldstein, and C. Horioka, "Domestic Saving and International Capital Flows," *Economic Journal* Vol. 90, No. 358, 1980, pp. 314–29.

<sup>22</sup> O. J. Blanchard and F. Giovazzi, "Current Account Deficits in the Euro Area: The End of the Feldstein-Horioka Puzzle," in G. Perry and W. Brainard, eds., *Brookings Papers on Economic Activity*, September 2002.

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## Research Summaries

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### Selection and Asymmetric Information in Insurance Markets

Liran Einav and Amy Finkelstein \*

Since the seminal theoretical work of Arrow, Akerlof, and Rothschild and Stiglitz, economists have been aware of the potential for market failures arising from the existence of asymmetric information in private insur-

ance markets. The possibility that competitive forces may not push toward efficiency in such a large and important class of markets creates interesting and difficult economic and policy issues. It also poses a challenge for empirical research: identifying and quantifying the effects of asymmetric information and tracing its implications for welfare, competition, and government policy.

The empirical research in this area has advanced rapidly over the past decade. However, although providing valuable descriptive information about the workings of an insurance market, tests for whether asymmetric information actually exists in particular insurance markets and in what

form have some important limitations. Notably, without a clear mapping from patterns in the data to underlying economic primitives, the tests are relatively uninformative about the extent of market inefficiency or the welfare impact of potential market interventions.

Motivated by these concerns, we and our coauthors have written a series of papers that attempt to incorporate theoretically grounded specifications of consumer preferences and firms' pricing into this analysis. Our models can be used to quantify both the welfare distortions arising from asymmetric information and the potential welfare consequences of such government policies as

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mandates, pricing restrictions, and taxes. Our approach takes its cues from descriptive findings in the initial testing literature, in particular by seeking to incorporate rich heterogeneity in consumer preferences, as well as the heterogeneity in risk emphasized by the classic theoretical contributions.

In this article we summarize some of our own recent work and findings. A less self-centered discussion of these topics can be found in our recent overview article.<sup>1</sup>

## Determinants of Insurance Demand

Why do individuals place different values on insurance coverage? Much of the seminal theoretical work assumed that individuals only varied along one dimension, their expected risk. Some individuals face greater risk and therefore are willing to pay more for insurance. For example, all else equal, older and sicker individuals would be willing to pay more for health and life insurance; individuals who commute long distances would be willing to pay more for auto insurance; and retirees with greater life expectancy would place a higher valuation on annuities. If risk (or some component of it) is private information to the individual, then adverse selection can result.

At the heart of these contributions on adverse selection is the idea that at a given price of insurance, buying insurance is more attractive for riskier individuals. This is the same idea that subsequently guided early empirical attempts to test for the existence of asymmetric information, focusing on comparing claims rates for consumers who self-selected into different insurance contracts. A finding that consumers who selected more insurance coverage have higher claim rates, conditional on all information available to insurers, would suggest asymmetric information: either these consumers had prior information about their exposure to risk (adverse selection) or the purchasers of greater coverage took less care (moral hazard).

In our early work in this area, we examined some of the correlates of purchases of annuities, insurance products that provide a survival-contingent payment stream to help smooth consumption when individu-

als cannot know when they are going to die. Consistent with the original theoretical work, we found that individuals who lived longer were more likely to purchase annuities.<sup>2</sup> We also found that, among those who purchase annuities, those whose policies had more coverage were more likely to live longer.<sup>3</sup>

Yet, our subsequent empirical work challenged the notion that risk was the only determinant of insurance demand. In two separate papers, we showed that while private information about risk indeed plays an important role in insurance demand, another dimension of heterogeneity—risk aversion—may be just as important, or even more so. Recognizing this potential for multiple dimensions of private information can complicate testing for the presence of selection, and has implications for welfare analysis of the consequences of selection and for optimal contract design.

To study the long-term care insurance market in the United States,<sup>4</sup> we combined data on coverage choice, long-term care utilization, and self-reported beliefs about the chance that an individual would subsequently use long-term care. We found, just as the classic asymmetric information theory would predict, that individuals who believe that they are more likely to use long-term care are also more likely to buy long-term care insurance. At the same time, we found that individuals who exhibit more precautionary behavior (those who wear seat belts or get flu shots, for example) are both more likely to buy long-term care insurance and less likely to subsequently use long-term care. The net result is that in this market, adverse selection is eliminated: the insureds are not more likely than those without insurance to use long-term care. Insurance policies are attractive to more risky individuals but also to more risk-averse individuals who, in this setting, are less risky, thus offsetting adverse selection.

A second paper<sup>5</sup> investigated a similar idea, using data from an Israeli auto insurance company and a more structural modeling approach. We specified a model of deductible choice, such that greater coverage (that is, a lower deductible) is attractive to individuals with greater risk and/or higher risk aversion. Using the model and

the data on coverage choices and subsequent claim realization, we were able to estimate the joint distribution of risk and risk aversion. In contrast to the U.S. long-term care market, we found strong evidence in this market of adverse selection and a positive association between risk and risk aversion. However, we also found that heterogeneity in risk aversion was important in determining insurance demand; indeed, in this case it appeared to be more important than heterogeneity in risk.

Recognition of the importance of risk aversion—and how it varies across individuals—in determining insurance demand also provoked our interest in heterogeneity in risk aversion within and across contexts. Specifically, we investigated the extent to which individuals display a stable ranking in their willingness to bear risk, relative to their peers, across different choices.<sup>6</sup> Using data on employee choices regarding health, drug, and disability insurance, as well as 401(k) investment decisions, we found that an individual's choices in one insurance market have substantial predictive power for their choices in other insurance domains, but that the willingness to bear risk in an insurance context has considerably less predictive power for the willingness to bear risk in 401(k) asset allocation decisions.

## Welfare Implications of Adverse Selection

Adverse selection and its associated welfare consequences have always been an important rationale for government intervention in insurance markets. Indeed, researchers have documented patterns in the data that point to the existence of adverse selection in particular insurance markets. But are the welfare consequences of this adverse selection important, and can they be remedied by standard interventions? In several papers, we have developed ways to quantify the efficiency consequences of asymmetric information. Our approach was influenced and guided by our earlier findings that preferences, in addition to risk, can play an important role in determining insurance demand.

In one of our most recent papers on this topic,<sup>7</sup> we presented a graphical

framework that can be used to analyze and quantify the welfare distortions that may arise because of inefficient pricing associated with selection. We noted that the key aspect of selection is that competitive pricing responds to the average *insured* individual, while efficient pricing should be based on the *marginal* individual. In the presence of adverse selection, the average covered individual is riskier than the marginal one, thus leading to prices that are too high and to the familiar result of under-insurance. In an earlier paper,<sup>8</sup> we developed and applied this framework to data on employees' health insurance choices at Alcoa, Inc. We showed how one could use price variation across individuals, and data on insurance choices and subsequent claims, to estimate the efficiency consequences of selection. While we found evidence of adverse selection, our exercise suggested that its welfare cost in this setting was modest, and was lower than the welfare cost that would be associated with possible interventions, such as mandates or subsidies.

In another paper,<sup>9</sup> we address a similar question using data on annuity choices in the United Kingdom where, as noted, we had previously found evidence of adverse selection. In this paper, we did not have quasi-experimental variation in annuity prices, so we relied more heavily on a fully specified model of underlying consumer primitives that gives rise to annuity valuation and welfare. We used the model and our estimates to quantify the welfare costs associated with adverse selection and with possible government interventions in the market, such as mandates. Again, we found the welfare costs to be relatively modest and evaluated the welfare consequences of mandates.

## What about Moral Hazard?

Thus far we have focused on adverse selection, but consideration of moral hazard raises several interesting issues. First, it complicates the detection of adverse selection. If one observes in the data that individuals who purchase more insurance have more accidents, does this reflect ex-ante selection into greater insurance by those with private information, or ex-post behav-

ioral changes induced by the greater insurance? Clearly it is important to distinguish between these two very different forms of private information, which motivate different potential welfare-improving government interventions. In the same paper that showed how identifying price variation can be used to quantify the welfare costs of adverse selection, we also showed how this pricing variation can be used to test for adverse selection separately from moral hazard.

While it is of interest to empirically distinguish between adverse selection and moral hazard, we suggested in our most recent paper that the two concepts are not completely independent.<sup>10</sup> Specifically, returning to our earlier interest in the determinants of insurance demand, we noted that when moral hazard is present, it can be of interest to decompose risk into a component that is invariant to coverage (that is, "traditional selection") and a component that arises because of coverage (which we term "selection on moral hazard"). We used panel data on employer-provided health insurance choices and subsequent claims (again from Alcoa, Inc.), and showed that individuals increased their medical utilization as a response to greater insurance coverage. This pattern is often characterized as "moral hazard" in the literature. Moreover, we found that individuals who exhibit a greater behavioral response to the increased coverage are also more likely to choose greater coverage. Such patterns may have important implications. For example, when trying to predict the reduction in health-care costs associated with offering a high-deductible health insurance plan, one would obtain larger estimates if individuals who select into such plan are those with the smallest behavioral response to the decrease in coverage. This paper also stimulated our interest in understanding more generally the nature and determinants of moral hazard in health insurance, a topic that we are currently exploring.

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<sup>6</sup> L. Einav, A. Finkelstein, I. Pascu, and M. R. Cullen, "How General are Risk Preferences? Choices under Uncertainty in Different Domains," NBER Working Paper No. 15686, January 2010.

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