New health care technologies offer the promise of improved health and longevity, but also are widely viewed as the biggest contributor to rising health care costs in the U.S. This duality raises the question of whether new technologies are worth the cost and how the rate of health care innovation can be slowed if the costs of new technology exceed the benefits.


The researchers develop a model of patient demand and supplier behavior to explain the parallel trends of technology and expenditure growth. The model is one where health spending can affect individuals’ longevity and quality of life and providers care about both their patients’ health and their own income. The model’s key finding is that the productivity of a health care innovation depends on the shape of the health production function (which translates health spending into health outcomes), the heterogeneity of treatment effects across patients, and the cost structure (many procedures have high fixed costs and low marginal costs).

The authors use this finding to develop a typology of medical technology productivity. The first category consists of "home run" treatments that are highly cost effective and useful for nearly everyone. One example is the development of antibiotics, which were highly effective in reducing mortality from pneumonia, tuberculosis, and other diseases starting in the 1930s. Category I treatments can be expensive, so long as they are cost effective and unlikely to be used on patients who will not benefit from the treatment; the use of antiretroviral drugs to treat HIV is an example in this vein.

The second category includes those technologies that are highly cost-effective in some patients but less useful for others. Despite their value to some patients, Category II treatments may have modest or poor average cost-effectiveness due to their use by many patients who experience few health gains. A leading example is angioplasty, which dramatically improves survival following a heart attack if administered within 24 hours, but yields no survival benefit and only modest functioning improvements for those with stable coronary disease.

The third category consists of treatments for which benefits are small or as yet unproven. Category III includes treatments like arthroscopic surgery for osteoarthritis of the knee, which was famously found to have no medical value in a randomized control trial where some patients received “placebo surgery,” despite the fact that some 650,000 such surgeries were being performed annually at a cost of more than $5,000 each. Category III also includes treatments for which there is little scientific evidence of their value. Ethical and logistical considerations can make it difficult to conduct double-blinded trials, the gold standard for establishing the efficacy of medical treatments, and even when such trials are possible, it can take years for studies to be done.

Next, the authors ask how much of the gains in survival and cost increases over the past several decades have been driven by diffusion of each type of treatment. Using cardiovascular disease as an example, they note that 44 percent of the reduction in mortality from 1980 to 2000 was due to improved health behaviors. Another 22 percent of the decline was due to inexpensive Category I treatments such as aspirin and beta blockers, 12 percent was due to Category II treatments like angioplasty, and perhaps 10 percent was due to Category III treatments. On the cost side, the spread of Category I and II treatments appears to have contributed only modestly to cost growth, suggesting a larger role for Category III spending. Despite the rapid diffusion of "home run" technologies like beta blockers during this period, the average cost of saving an additional life-yeartripled, to nearly $250,000.
The researchers acknowledge funding from the National Institute on Aging (P01 AG19783) and the Robert Wood Johnson Foundation.
uninsured are projected to enroll, implying that 39 million individuals would gain coverage as a result of the law. Removing the tax penalty imposed by the individual mandate, a provision whose constitutionality is being challenged in federal court, would result in 7 to 12 million fewer individuals gaining coverage.

The authors note that this projected decrease in the uninsured population is larger than the estimate generated by the Congressional Budget Office, likely resulting from the fact that the price sensitivity they estimate and use is greater than that found in previous studies.

The authors offer several possible reasons for this difference. First, the uninsured population is poorer than the population of workers offered employer-sponsored insurance and may be more price sensitive as a result; indeed, the authors find that within their sample, relatively richer people are less price sensitive. Second, this study is designed to evaluate sensitivity to prices in a range that is generally lower than that explored in previous work.

Turning to the issue of adverse selection (the question of whether those who are less healthy will be more likely to buy insurance), the authors find that less healthy individuals are less price sensitive, but no more likely to enroll under the ACA’s subsidy schedule. However, the authors note that the results might differ under other subsidy schedules.

The authors conclude “our results suggest that extrapolating the effects of premium subsidies for the uninsured from the elasticities generated in past papers could seriously underestimate the coverage rates these policies could achieve.”

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**Does Framing Affect Social Security Claiming?**

The decision of when to claim Social Security benefits is one of the most economically significant choices facing older Americans. Eligible individuals are entitled to claim benefits as early as age 62 but can defer claiming to as late as age 70. Monthly benefit levels are adjusted depending on claiming age—for example, an individual who stops working at age 62 but waits to claim until age 70 will receive a monthly benefit that is 76 percent higher (in real terms) than what she would have received if she had claimed at 62.

About half of workers eligible for Social Security benefits claim at age 62 and roughly two-thirds claim before age 66, the current Full Retirement Age. Does the substantial amount of early claiming represent rational, utility-maximizing behavior on the part of workers? Or is it possible that other factors, such as how information about Social Security benefits is presented, also influence workers’ decisions?

This question motivates a new working paper by researchers Jeffrey Brown, Arie Kapteyn, and Olivia S. Mitchell, *Framing Effects and Expected Social Security Claiming Behavior* (NBER Working Paper 17018). The researchers use an experimental design to explore whether the manner in which Social Security claiming information is framed influences expected claiming behavior.

The authors first explain the “frames” that are shown to survey participants. The first frame is designed to present the information as neutrally as possible. This is similar to the approach used by the Social Security Administration (SSA) since 2008 and serves as a baseline against which other frames may be compared. The second frame emphasizes a “breakeven” concept, stressing the minimum number of years one would need to live in order for the incremental benefits resulting from delayed claiming to exceed the benefits “forfeited” by claiming later. This frame is similar to the approach used by the SSA for decades, prior to the adoption of more neutral language in 2008. It is also an approach frequently used by financial advisers.

The other frames test workers’ sensitivity to framing the claiming decision in terms of consumption vs. investment, gains vs. losses, and older vs. younger reference ages. The motivation for exploring each of these dimensions comes from previous studies in economics and psychology. For example, prior studies have shown that consumers are more interested in purchasing an annuity when it is described as protecting one’s ability to consume throughout life, than when it is described in terms of its investment return. Past literature has also shown that individuals are often more sensitive to losses than to gains with an equivalent value, and that “anchoring bias” affects decision-making in a wide variety of contexts.

To test the effect of these frames on expected claiming behavior, the authors fielded a survey through the RAND American Life Panel, a sample of roughly 3,000 households who are regularly interviewed over the Internet. Survey respondents were asked about their expected claiming age in one wave of the survey, and then in subsequent survey waves were presented with different frames and asked to provide their expected claiming age again in view of the new information. This approach allows the authors to test how different frames affected expected claiming behavior, controlling for any individual-specific factors (e.g., poor health) that might also affect it.

Turning to the results, the authors find that presenting individuals with the breakeven frame leads them to plan to claim 15 months earlier than they would if presented with the neutral frame—a very large effect. Framing the decision in terms of gains rather than losses or using an older anchoring age (66 or 70 vs. 62) is associated with later claiming ages, though the effects are not as large as that seen with the breakeven frame. The authors find no significant difference in framing the decision in terms of consumption vs. investment.

The authors derive two conclusions from their study. First, the results “cast doubt on a simple economic model of fully rational decision-making by showing that individual decisions are influenced by factors other than ultimate consumptions outcomes.” Second, on a more
practical level, the findings suggest “the manner in which information is provided to plan participants can shape behavior.” The authors note that their findings are particularly relevant for an agency such as the SSA, which prides itself on providing information without offering advice and has the authority to determine how information is presented to future Social Security beneficiaries.

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NBER Profile: Kent Smetters

Kent Smetters is a Research Associate of the NBER’s programs in aging and public economics. Smetters is a Professor of Insurance and Risk Management at the Wharton School of the University of Pennsylvania.

Dr. Smetters is a non-resident scholar of the American Enterprise Institute, a member of the National Academy of Social Insurance, and a research associate of the Michigan Retirement Research Center and the Pension Research Council. He has served as the Deputy Assistant Secretary for Economic Policy at the U.S. Treasury Department and as a member of the U.S. Congress' Blue Ribbon Advisory Panel on Dynamic Scoring, and has testified before Congress numerous times.

Dr. Smetters is the winner of several research awards, including the TIAA-CREF Paul A. Samuelson Certificate of Excellence and the Robert C. Witt award for the best paper in the Journal of Risk and Insurance. He has published his research in journals including the American Economic Review and the Journal of Political Economy and written opinion pieces for The Wall Street Journal and The Financial Times.

Professor Smetters holds a Ph.D. in Economics from Harvard University and a B.S. in Economics and Computer Science from Ohio State University. Prior to joining the faculty at Wharton, he worked as an economist at the Congressional Budget Office; he has also been a visiting professor at Stanford University. At Wharton, he teaches courses in insurance economics and managerial economics.

Professor Smetters’ research includes the dynamic modeling of Social Security and tax policy. In some of his recent work, he has examined whether privatizing Social Security increases efficiency and who bears the burden of the corporate tax.

In his spare time, he enjoys spending time with his wife, as Kent was recently married, much to the delight of his 99-year old grandmother who thought that Kent would never marry.

Abstracts of Selected Recent NBER Working Papers

Insurance Mandates and Mammography
Marianne P. Bitler, Christopher S. Carpenter
NBER Working Paper No. 16669

Recently adopted federal health reform requires insurers to cover mammograms without cost-sharing. We examine similar state insurance mandates that vary substantially in the timing of adoption and in specifying the ages of women eligible for different mammography benefits. In triple differences models we find that mandates requiring coverage of annual mammograms significantly increased past year mammography screenings by about 8 percent, representing over 800,000 additional women screened from 1987–2000. Mandates that explicitly prohibit deductibles are especially effective at increasing screenings among high school dropouts, suggesting that federal health reform is likely to further increase use of screening mammography.

Selection in Insurance Markets: Theory and Empirics in Pictures
Liran Einav, Amy Finkelstein
NBER Working Paper No. 16723

We are pleased to offer NBER Working Papers on NIA-funded research in aging and health free on CD. The CD includes more than 175 papers from 2002–2008, along with Content Lists arranged by title, by author, and by date. To request a free copy, follow the link at http://www.nber.org/programs/ag/ or contact Janet Stein at (617) 588-0366 or jstein@nber.org.

A complete list of all NBER Working Papers, with searchable abstracts, and the full texts of Working Papers issued since November 1973 are available at http://www.nber.org/papers.html to anyone located at a university or other organization that subscribes to the Working Paper series.
We present a graphical framework for analyzing both theoretical and empirical work on selection in insurance markets. We begin by using this framework to review the "textbook" adverse selection environment and its implications for insurance allocation, social welfare, and public policy. We then discuss several important extensions to this classical treatment that are necessitated by important real world features of insurance markets and which can be easily incorporated in the basic framework. Finally, we use the same graphical approach to discuss the intuition behind recently developed empirical methods for testing for the existence of selection and examining its welfare consequences. We conclude by discussing some important issues that are not well-handled by this framework and which, perhaps not unrelatedly, have been little addressed by the existing empirical work.

The Long-term Impact of Medicare Payment Reductions on Patient Outcomes
Vivian Y. Wu, Yu-Chu Shen
NBER Working Paper No. 16859

This study examines the long-term impact of Medicare payment reductions on patient outcomes using a natural experiment—the Balanced Budget Act (BBA) of 1997. We use predicted Medicare revenue changes due to BBA, with simulated BBA payment cuts as an instrument, to categorize hospitals by degrees of payment cuts (small, moderate, or large), and follow Medicare patient outcomes in these hospitals over a 11 year panel: 1995–1997 pre-BBA, 1998–2000 initial years of BBA, and 2001–2005 post-BBA years. We find that Medicare AMI mortality trends stay similar across hospitals when comparing between pre-BBA and initial-BBA periods. However, the effect became measurable in 2001–2005: hospitals facing large payment cuts saw increased mortality rates relative to that of hospitals facing small cuts in the post-BBA period (2001–2005) after controlling for their pre-BBA trends. We find that part of the worsening AMI patient outcomes in the large-cut hospitals is explained by reductions in staffing level and operating cost following the payment cuts, and that in-hospital mortality is not affected partly due to patients being discharged earlier (shorter length-of-stay).

Physician Response to Pay-for-Performance: Evidence from a Natural Experiment
Jinhua Li, Jeremiah Hurley, Philip DeCicca, Gioia Buckley
NBER Working Paper No. 16909

Explicit financial incentives, especially pay-for-performance (P4P) incentives, have been extensively employed in recent years by health plans and governments in an attempt to improve the quality of health care services. This study exploits a natural experiment in the province of Ontario, Canada to identify empirically the impact of pay-for-performance (P4P) incentives on the provision of targeted primary care services, and whether physicians’ responses differ by age, practice size and baseline compliance level. We use an administrative data source which covers the full population of the province of Ontario and nearly all the services provided by practicing primary care physicians in Ontario. With an individual-level data set of physicians, we employ a difference-in-differences approach that controls for both “selection on observables” and “selection on unobservables” that may cause estimation bias in the identification. We also implemented a set of robustness checks to control for confounding from the other contemporary interventions of the primary care reform in Ontario. The results indicate that, while all responses are of modest size, physicians responded to some of the financial incentives but not the others. The differential responses appear related to the cost of responding and the strength of the evidence linking a service with quality. Overall, the results provide a cautionary message regarding the effectiveness of pay-for-performance schemes for increasing quality of care.

Selection on Moral Hazard in Health Insurance
Liran Einav, Amy Finkelstein, Stephen P. Ryan, Paul Schmipf, Mark R. Cullen
NBER Working Paper No. 16969

In this paper we explore the possibility that individuals may select insurance coverage in part based on their anticipated behavioral response to the insurance contract. Such “selection on moral hazard” can have important implications for attempts to combat either selection or moral hazard. We explore these issues using individual-level panel data from a single firm, which contain information about health insurance options, choices, and subsequent claims. To identify the behavioral response to health insurance coverage and the heterogeneity in it, we take advantage of a change in the health insurance options offered to some, but not all of the firm’s employees. We begin with descriptive evidence that is suggestive of both heterogeneous moral hazard as well as selection on it, with individuals who select more coverage also appearing to exhibit greater behavioral response to that coverage. To formalize this analysis and explore its implications, we develop and estimate a model of plan choice and medical utilization. The results from the modeling exercise echo the descriptive evidence, and allow for further explorations of the interaction between selection and moral hazard. For example, one implication of our estimates is that abstracting from selection on moral hazard could lead one to substantially over-estimate the spending reduction associated with introducing a high deductible health insurance option.

How does Risk Selection respond to Risk Adjustment? Evidence from the Medicare Advantage Program
Jason Brown, Mark Duggan, Ilyana Kuziemko, William Woolston
NBER Working Paper No. 16977

Governments often contract with private firms to provide public services such as health care and education. To decrease firms’ incentives to selectively enroll low-cost individuals, governments frequently “risk-adjust” payments to firms based on enrollees’ characteristics. We model how risk adjustment affects selection and differential payment—the government’s payments to a firm for covering an individual minus the counterfactual cost the government directly covered her. We show that firms reduce selection along dimensions included in the risk-adjustment formula, while increasing selection along excluded dimensions. These responses can actually increase differential payments relative to pre-risk-adjustment levels and thus risk adjustment can raise the total cost to the government of providing the public service. We confirm both selection predictions using individual-level data from Medicare, which in 2004 began risk-adjusting payments to private Medicare Advantage plans. We find that differential payments actually rise after risk adjustment and estimate that they totaled $30 billion in 2006, or nearly eight percent of total Medicare spending.

The Pragmatist’s Guide to Comparative Effectiveness Research
Amitabh Chandra, Anupam B. Jena, Jonathan S. Skinner
NBER Working Paper No. 16990

All developed countries have been struggling with a trend toward health care absorbing an ever-larger fraction of government and private budgets. Adopting any treatment that improves health outcomes, no matter what the cost, can worsen allocative inefficiency by paying dearly for small health gains. One potential solution is to rely more heavily on studies of the costs and effectiveness of new technologies in an effort to ensure that new spending is justified by a com-
Optimal Portfolio Choice with Wage-Indexed Social Security
Jialun Li, Kent Smetters
NBER Working Paper No. 17025
This paper re-examines the classic question of how a household should optimally allocate its portfolio between risky stocks and risk-free bonds over its lifecycle. We show that allowing for the wage indexation of social security benefits fundamentally alters the optimal decisions. Moreover, the optimal allocation is close to observed empirical behavior. Households, therefore, do not appear to be making large “mistakes,” as sometimes believed. In fact, traditional financial planning advice, as embedded in “target date” funds—which enormous recent growth has been encouraged by new government policy—often leads to even relatively larger “mistakes” and welfare losses.

Financial Literacy around the World: An Overview
Annamaria Lusardi, Olivia S. Mitchell
NBER Working Paper No. 17107
In an increasingly risky and globalized marketplace, people must be able to make well-informed financial decisions. Yet new international research demonstrates that financial illiteracy is widespread when financial markets are well developed as in Germany, the Netherlands, Sweden, Japan, Italy, New Zealand, and the United States, or when they are changing rapidly as in Russia. Further, across these countries, we show that the older population believes itself well informed, even though it is actually less well informed than average. Other common patterns are also evident: women are less financially literate than men and are aware of this shortfall. More educated people are more informed, yet education is far from a perfect proxy for literacy. There are also ethnic/racial and regional differences: city-dwellers in Russia are better informed than their rural counterparts, while in the U.S., African Americans and Hispanics are relatively less financially literate than others. Moreover, the more financially knowledgeable are also those most likely to plan for retirement. In fact, answering one additional financial question correctly is associated with a 3–4 percentage point higher chance of planning for retirement in countries as diverse as Germany, the U.S., Japan, and Sweden; in the Netherlands, it boosts planning by 10 percentage points. Finally, using instrumental variables, we show that these estimates probably underestimate the effects of financial literacy on retirement planning. In sum, around the world, financial literacy is critical to retirement security.