Julian Reif – Research Statement, May 2020

I am an applied microeconomist who primarily studies health economics. Within health economics, I focus on two areas: health policy evaluation and the value of health and longevity. My research uses both experimental and observational empirical methods and applies theory to data. I frequently develop new methods and models that are valuable to the broader academic community.

My studies inform the design of public health policies and environmental health regulations. For example, my research has found that workplace wellness programs—which are encouraged by the Affordable Care Act—fail to reduce health care costs and that public health insurance reduces elderly mortality. My research findings also imply that strengthening current U.S. air pollution standards would improve population health. I expect my future research to further speak to issues relevant to the ongoing debates about health care reform and environmental health regulation.

I also study the dynamics of consumer behavior, a line of work that is closely related to my research on the value of health and longevity. My research in this area has consistently demonstrated that people are forward looking, and that this forward-looking behavior has meaningful consequences for how researchers should conduct empirical research in similar settings.

The remainder of this statement describes my research in more detail. I begin with my work on evaluating health policies, which comprises the largest part of my research portfolio.

Health Policy Evaluation

A longstanding question in health economics is whether large-scale interventions can improve health. For example, wellness programs are widely touted by advocates as an effective way to reduce health care spending and to improve health. These programs cover over 50 million workers and are included as part of several state Medicaid programs. However, the enthusiasm for these programs is based primarily on results from observational (non-experimental) studies, which are susceptible to selection bias if wellness program participants differ in systematic ways from non-participants.

In **Jones, Molitor, and Reif (2019 QJE)**, we study these wellness programs in a workplace setting with a randomized controlled experiment involving nearly 5,000 employees. We find that the people most eager to participate in our workplace wellness program were already relatively healthy before the program began, and that—in contrast to many prior studies—the program itself did not have any significant causal effects on medical spending, health behaviors, or worker productivity. Our paper received the NIHCM Foundation Health Care Research Award, and our results have been widely publicized in the media, including the *New York Times* and the *Washington Post*, for demonstrating that prior observational studies of these programs may be flawed.

In a related paper, **Reif et al. (2020 JAMA Internal Medicine)**, we investigate the effects of our workplace wellness program on health beliefs and clinical outcomes. We find that the program improved employees' beliefs about their own health but had no effects on biometric measures such as cholesterol levels or on utilization measures such as physician office visits. In a second related paper, **Jones, Molitor, and Reif (2020 ongoing work)**, we study peer effects and find that employees were more likely to participate in our program if their coworkers were randomly assigned to the treatment group.

As with wellness programs, a major reason to provide public health insurance is its potential to improve health. Estimating the causal effect of health insurance on rare outcomes such as mortality is challenging, however, because it requires a large sample size in addition to a source of experimental or quasi-experimental variation. In **Huh and Reif (2017 JHE)**, we study the 2006 introduction of Medicare Part D, a prescription drug insurance plan that currently covers nearly 40 million elderly beneficiaries. The introduction of Medicare Part D is an excellent natural experiment because it rapidly reduced the number of U.S. elderly without prescription drug insurance by about 25 percentage points (millions of individuals). We find that Medicare Part D significantly increased drug utilization and reduced elderly mortality. Our paper provides the first evidence that the increase in drug utilization attributable to Medicare Part D saved lives and shows that the public provision of health insurance can have a significant nationwide impact on adult mortality.

Another line of my research investigates the relationship between air pollution and health. While there is little doubt that air pollution is harmful, designing optimal pollution standards requires accurately measuring the amount of harm caused by a typical person's level of exposure. However, prior quasi-experimental studies are limited to small geographic areas and to short time periods. In **Deryugina et al. (2019 AER)**, we employ a novel research design that allows us to study the nationwide effect of fine particulate matter (PM 2.5) on mortality and health care utilization among the U.S. elderly over a 15-year period. We estimate that the decline in PM 2.5 that has occurred since 1999 saves over 50,000 elderly lives per year and reduces Medicare's hospitalization costs by over $1 billion per year. Our empirical estimation employs cutting-edge econometric techniques. First, we develop a new method to estimate the number of life-years lost due to pollution exposure. Second, we adapt a machine-learning framework recently developed by Chernozhukov et al. (2018) to show that individuals in poor health—such as those suffering from lung cancer—are disproportionately vulnerable to air pollution. Our paper won the iHEA Kenneth J. Arrow Award for the best health economics paper published in 2019.

In a related paper, **Deryugina and Reif (2020 ongoing work**), we also quantify the effect of air pollution on mortality among infant and working-age populations, which were not examined in our previous work. This paper additionally focuses on the dynamic and long-run effects of pollution.

While the young are certainly affected by air pollution, it is not their most pressing health concern: the two leading causes of death for teenagers are suicides and motor vehicle accidents. Both these causes are often accompanied by substance abuse, which itself is also a leading cause of death for teenagers. In **Huh and Reif (2020 ongoing work)**, we investigate the effect of minimum legal driving age laws on teenage mortality and risky behaviors. We find that not only does gaining a driver's license increase motor vehicle fatalities, but it also substantially increases drug overdose deaths among females. To our knowledge, we are the first to uncover this strong relationship between driving and drug overdoses.

Value of Health and Longevity

The value of health and longevity plays a central role in policy discussions surrounding both health care and environmental hazards. Traditional methods estimate the physical and financial costs to those who fall ill but ignore the value to others of reducing the risk of falling ill. In **Lakdawalla, Malani, and Reif (2017 JPubE)**, we develop a framework that accounts for the risk-reducing (insurance) benefits of medical treatments that improve health (quality of life). Our paper finds that traditional methods of valuing a medical treatment—which ignore its "insurance value"—can significantly underestimate the value of treatments for severe illnesses such as Alzheimer's disease. This insight has been discussed by

the Institute for Clinical and Economic Review (2019) as a new potential dimension of value for medical therapies.

The standard model of the value of life cannot distinguish between preventive care and medical treatments and unrealistically assumes that people can use capital markets to perfectly smooth their consumption over their life cycle. In **Bauer, Lakdawalla, and Reif (2020 ongoing work)**, we address these shortcomings by developing a more general framework. We find that, unlike in the standard model, a rational person values preventive care less than medical treatment, even when both extend life by the same amount. This result helps explain puzzles such as why society invests less in prevention than in treatment and why preventive care interventions such as workplace wellness programs frequently fail to deliver results. We also show that increases in the benefit generosity of pension programs raise the demand for health care at older ages, which implies that retiree health insurance programs such as Medicare may be more valuable than has previously been recognized.

Consumer Dynamics

In most empirical work—including several of my studies—it is common to check whether an outcome variable changes before policy implementation. The detection of pre-policy changes is generally interpreted as a sign of model misspecification. For example, perhaps the policy was enacted in response to these prior changes in the outcome, in which case causality runs from the outcome to the policy rather than vice versa. These pre-policy changes, however, might alternatively reflect anticipation of the policy if people are forward looking. In **Malani and Reif (2015 JPubE)**, we provide a framework for estimating such anticipation effects. We first show theoretically that failing to account for anticipation leads to downward bias in estimation. We then show that this bias can be large in an application that estimates the effect of medical malpractice tort reform on physician supply.

In **Deryugina, MacKay, and Reif (2020 AEJ: Applied)**, we show that consumer dynamics such as forward-looking behavior are an important characteristic of household electricity consumption. Our study exploits price variation arising from a natural experiment: the introduction of an Illinois policy that led to substantial, long-lasting decreases in electricity prices in many communities. We show that households increased their electricity usage after the announcement of the price decrease but before the actual date of the price decrease. These kinds of behaviors can generate significant dynamics: we estimate that the price elasticity of demand increases from –0.09 in the first six months to –0.27 two years later. In addition to providing a novel quasi-experimental estimate of the price elasticity of residential electricity demand, our paper highlights the importance of accounting for consumer dynamics when estimating the long-run effects of policy changes. In a related paper, **Fullerton and Reif (2020 ongoing work)**, we find that gasoline sales temporarily increase after the announcement of a tax increase but before the tax goes into effect.

While the dynamics generated by forward-looking behavior often pose a challenge to empirical estimation, **Reif (2018 Economic Inquiry)** provides an example of how dynamics can be helpful. This paper develops a new model of forward-looking demand that incorporates both addiction and social interactions, two phenomena relevant to consumer goods such as cigarettes and alcohol. I show how the dynamics introduced by addiction help identify the causal effects of social interactions. In addition, while the goal of many applied papers is to identify the presence of social interactions, my paper emphasizes that this presence is generally insufficient for assessing positive or normative implications.

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