



## Impact of China's Urban Employee Basic Medical Insurance on Health Care Expenditures and Health Outcomes

When prices go up for a good, people usually buy less. This relationship can be described more formally as the law of demand, and it's why demand curves are downward-sloping. Health care is a unique good for many reasons. Does it follow the law of demand?

*PERC Research Fellow* Li Gan and Feng Huang seek to answer this question in *PERC* Working Paper 1408. They study the effect of a national reform to health care in China that resulted in a large change to cost-sharing in many insurance programs. Because these changes resulted in consumers shouldering a larger portion of the costs of their health care, it is reasonable to hypothesize that those insured through such programs will use less health care. The authors study the effects of the reform on health care utilization and expenditures, as well as health.

Using a panel of data from the China Health and Nutrition Survey

(CHNS), the authors are able to tell which individuals are affected by the reform and which are not. Importantly, the 1998 reform created the Urban Employee Basic Medical Insurance (UEBMI) program, which changed the benefits for many in-

**“The findings suggest that increased cost sharing causes a reduction in excess medical care.”**

dividuals already covered by private insurance while extending health insurance to many individuals who were previously uninsured.

The authors focus not on the expansion of health insurance, but on the changes that occur for those previously insured under China's insurance system for urban workers (primarily via the Government Insurance System and the Labor In-

urance System, which both provided nearly full coverage). For these individuals, the largest change in their insurance was an increase in cost sharing for patients through changes to deductibles, coinsurance and the introduction of individual savings accounts.

Because this change is their focus, the authors study the group of individuals who were insured before the reform, and then received coverage through UEBMI. They compare these individuals to those who never had health insurance coverage (before and after reform) in a difference-in-differences model. This strategy compares the post-reform and pre-reform changes in outcomes for the insured (treatment) group to the corresponding changes for the uninsured (control) group over the same period.

This identification strategy has the advantage that the treatment (UEBMI) group and the control (uninsured) group are subject to

the same local and cultural changes over that period. Therefore, any changes in the outcomes at the time of reform can be attributed to the reform.

For the main models, the authors find that having UEBMI insurance leads to a lower health care utilization rate as well as lower health care expenditures. Specifically, the recipients are 5.1-9.2 percentage points less likely to use formal medical services. After employing various strategies for addressing ambiguous coverage status, the estimates are 8.7-9.2 percentage points.

The authors also find that health

care expenditures go down after the reform. After controlling for inconsistencies, the results indicate a 35.7-39.1% reduction in expenditures.

If consumers are price sensitive to the cost of health care, they will consume less of it after such a reform. Importantly, the reform affected the price of outpatient care, while barely changing the price to consumers of inpatient care. As expected, the effect on outpatient care is large and statistically significant, and the effect on inpatient care is small and statistically insignificant.

Health care utilization ideally improves health, so a reduction

in it may not necessarily be a good thing unless the baseline level of utilization was excessive. Because the health insurance received before the reform was nearly universal, it is reasonable that this may have been the case.

The authors test whether the reduction in health care utilization and expenditures had an effect on health by looking for effects on self-reported health status. They find no evidence that this reduction had adverse health effects. In conjunction, the findings suggest that increased cost sharing causes a reduction in excess medical care.

## The Probability Premium Approach to Comparative Risk Aversion

Consider the following scenario. An individual has the opportunity to improve his wealth, but only if the good state  $G$  occurs; otherwise, the bad state  $B$  occurs and his wealth worsens. Examples of such a setting abound. An individual could choose to pre-pay for a hotel room at the beach, making him better off unless it rains. An individual could consider changing companies for a higher-paying job which will increase his wealth unless the destination company hits troubled times and must lay him off. An individual could consider purchasing an illiquid asset that would improve his wealth position unless an emergency occurs and he needs the funds for something else. An individual could also hire a lawyer to recover a financial loss in court which will improve

his financial position only if the case is won.

A famous exploration of this setting comes in Pratt (1964) in his definition of the probability premium, which is intended to measure the strength of a decision maker's risk aversion. Pratt defines the probability premium,  $q$ , as the probability of the good event  $G$  that makes the individual indifferent between initial wealth,  $w$ , and the event-dependent lottery. His central theorem establishes that one individual always requires a higher probability premium than another if and only if the first individual is Arrow-Pratt more risk averse than the second one.

In *PERC* Working Paper 1504, *PERC Research Scientist* Liqun Liu and William Neilson generalize

Pratt's probability premium approach to measuring risk aversion to higher-degree risk aversion according to the following basic idea: the individual makes a decision involving trading in his current wealth distribution for a new, state-dependent one. If event  $G$  (good) occurs then an  $m$ th-degree risk decrease in wealth takes place, but if event  $B$  (bad) occurs then an  $n$ th-degree risk increase in wealth takes place. The required probability of event  $G$  that makes the individual indifferent between his current wealth and the state-dependent one is defined as the  $m$ th probability premium of  $n$ th-degree risk aversion. It is shown that the interpersonal comparison of the  $m$ th probability premium of  $n$ th-degree risk aversion is characterized by the  $(n/m)$ th-degree Ross



more risk aversion of Liu and Meyer (2013).

Specifically,  $n$ th-degree risk aversion/loving – that is, aversion/loving to  $n$ th-degree risk increases – is determined by the sign of the  $n$ th-order derivative of the utility function in the framework of expected utility, but there exist competing notions of one decision maker being  $n$ th-degree more risk averse than another. The probability premium approach to comparative higher-degree risk aversion proposes  $(n - 1)$  alternative measures of the strength of  $n$ th-degree risk aversion: the  $m$ th probability premium of  $n$ th-degree risk aversion for each integer  $m$  such that  $n > m \geq 1$ . The central result of Liu and Neilson is that  $u(x)$  always has a higher  $m$ th probability premium than  $v(x)$  if and only if  $u$  is  $(n/m)$ th-degree Ross more risk averse than  $v$  as defined by Liu and Meyer (2013), a notion that includes Ross more risk aversion as a special case (Ross 1981).

Liu and Neilson then extend the probability premium approach to the risk apportionment literature begun by Eeckhoudt and Schlesinger (2006) and Eeckhoudt et al. (2009). These works show that  $n$ th-degree risk aversion, i.e., aversion to  $n$ th-degree risk increases, can be characterized by preferences over 50-50 lotteries that display a preference for risk apportionment; combining “good” with “bad” is preferred to combining “good” with “good” and “bad” with “bad.” While risk apportionment has proven useful for characterizing higher-degree risk attitudes, it has yielded only limited success for comparing those attitudes across individuals. Extending the probability premium

approach to risk apportionment allows for a comparison of  $n$ th-degree risk aversion across individuals. Interestingly, the approach also yields multiple versions of the probability premium for measuring  $n$ th-degree risk aversion (there is a unique version when  $n = 2$ ), and when  $n = 3$

**“Extending the probability premium approach to risk apportionment allows for a comparison of  $n$ th-degree risk aversion across individuals.”**

these alternatives provide insight into comparative downside risk aversion or prudence.

Pratt (1964) proposes two measures of risk aversion, the risk premium (the reduction in the non-random initial wealth the decision maker is willing to pay to avoid a zero-mean gamble) and the probability premium (the probability of winning the positive outcome of a zero-mean binary gamble that makes the decision maker indifferent between the gamble and the status quo), and shows that interpersonal comparisons of both measures are characterized by Arrow-Pratt more risk aversion. Since then, the risk premium approach to comparative risk aversion has been generalized to deal with risk aversion of higher degrees. By comparison, the probability premium approach to comparative risk aversion has largely been abandoned.

Importantly, the risk premium approach to comparative risk aver-

sion can only lead to the notion of  $(n/1)$ th-degree Ross more risk aversion. Since  $(n/m)$ th-degree Ross more risk aversion includes the  $(n/1)$ th-degree Ross more risk aversion as a special case, the probability premium approach not only produces alternative measures of  $n$ th-degree risk aversion that are fundamentally equivalent to the risk premium measures, but also generate additional measures of  $n$ th-degree risk aversion. This may prove useful in future investigations of various factors that affect the intensity of higher-degree risk aversion.

Recent experimental studies have demonstrated, in various contexts, a salient aversion to risk increases of 3rd and even higher degrees. At the same time, experimentalists have developed tools designed to measure comparative 2nd-degree risk aversion in the lab. The results of this paper can be used to construct new measures of (higher-degree) risk aversion. In the future, economists and other social scientists may want to investigate the determining factors of the strength of 3rd- and higher-degree risk aversion, just as they have extensively done so for the 2nd-degree risk aversion. Liu and Neilson are confident that the results in their paper will deepen the understanding of, and help in creating alternative measures for, the intensity of  $n$ th-degree risk aversion.





PRIVATE ENTERPRISE  
RESEARCH CENTER

Texas A&M University  
4231 TAMU  
College Station, TX 77843-4231

NONPROFIT ORG.  
U.S. POSTAGE  
**PAID**  
COLLEGE STATION,  
TEXAS 77843  
PERMIT NO. 215



PRIVATE ENTERPRISE  
RESEARCH CENTER  
TEXAS A&M UNIVERSITY

## PERCspectives on RESEARCH

The Private Enterprise Research Center was founded in 1977 as a research organization at Texas A&M University. The mission of the Center is to raise economic understanding and to increase awareness of the importance of individual freedom to the strength and vitality of our economy. The Center produces research that addresses important issues of public policy and educational materials that make the results available to the general public.

PERCspectives on Research are not copyrighted and may be reproduced freely with appropriate attribution of source. Please provide the PERC office with copies of anything reproduced.

The opinions expressed in PERCspectives on Research are those of the authors and not necessarily those of Texas A&M University.

Visit our website for current and archived copies of all of PERC's publications and information about donating to PERC.

[perc.tamu.edu](http://perc.tamu.edu)

Spring 2015

Private Enterprise Research Center  
Texas A&M University  
4231 TAMU  
College Station, TX 77843-4231  
(979) 845-7722  
[perc@tamu.edu](mailto:perc@tamu.edu)