



# HEALTH INSURANCE REFORM IN AN EXPERIMENTAL MARKET

March 2009

Stephen Rassenti, Ph.D.

Carl Johnston, Ph.D.



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1201 "F" Street, NW  
Suite 200  
Washington, DC 20004  
[nfib.com](http://nfib.com)

# COMMENTS ON “HEALTH INSURANCE REFORM IN AN EXPERIMENTAL MARKET”

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by *Vernon L. Smith*

*Co-Recipient, 2002 Nobel Memorial Prize in Economic Sciences*

I am honored to write a brief encomium for this important experimental study.

This is a path-breaking, sophisticated study of healthcare reform proposals in a controlled setting. It measures and evaluates the effect of nine policy treatments on the payoff-motivated choices made by subjects. In turn, it measures and evaluates how those choices impact the costs and earnings of employees and employers (differing in size and profit margins), premiums paid, benefits received, and level of subsidies incurred. The NFIB Research Foundation and the research scholars who made this important work available are to be highly commended. I am pleased to see this quality research completed and made available to the health community, the public and the business community for further examination and discussion.

Of particular interest to me were the findings that no scenario of treatments makes all stakeholders better off, while some plans come precariously close to making all stakeholders worse off. Hence, we see the importance of this study in trying to identify plans with unintended consequences to be avoided, and some of the more promising alternatives that pose inevitable tradeoffs for the participants. Finally, the data show that people are better at choosing efficient health plans for themselves than for others, reinforcing the importance of individual involvement in the choice of health plans. Ordinary people should not be dismissed as too poorly informed to be allowed to choose.

To give this research some historical perspective, let me note that it is potentially comparable to the experimental testing of producer-supply and consumer-demand markets of standard microeconomics starting in the 1960s, and the asset market studies beginning in the 1980s. The experiments representing the goods and service markets of ordinary daily life were found to perform far more efficiently and effectively than had been expected. But the experimental asset markets, thought to be too transparent to generate price bubbles, routinely yielded such bubbles. Both kinds of market findings were robust when replicated across people from all walks of life—including practitioners in business and finance. Results from the goods and service markets seemed too good to be true, while those from the asset markets seemed too bad to be true.

What did we discover? There is a fundamental difference between how people behave in markets for things that serve immediate consumption needs and for long-lived assets that could be resold, and whose worth is seen as depending on what others think it is worth. It yielded basic insights about the performance of the economy with lessons for the problems facing the nation as I write.

The largest housing bubble in US history began in 1997. It was sustained by self-fulfilling expectations until it crashed in 2006, followed by the associated mortgage and banking indus-



try a year later, which in turn spread to the stock market and an otherwise well-functioning international market for goods and services.

This new NFIB Research Foundation study of healthcare plans and choice under different scenarios deserves to be further replicated, and its robustness explored. It could identify elements of human behavior that are essential to understanding how we develop a viable approach to the solution of healthcare problems.

The lives and the resources ultimately saved might include your own.



Chapman University  
January 2009



# NFIB AND “HEALTH INSURANCE REFORM IN AN EXPERIMENTAL MARKET”

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by *Robert F. Graboyes*

*Senior Healthcare Advisor, NFIB*

Any comprehensive healthcare reform proposal ventures into uncharted territory. For example, would an individual mandate to purchase health insurance help or hurt employers and/or employees? Most of us who study healthcare policy have strong opinions. But for many proposals, real-world precedents are few, so our views rely heavily on conjecture and introspection.

For such circumstances, “Health Insurance Reform in an Experimental Market” offers economists and policy analysts new tools for comparing strengths and weaknesses of healthcare reform proposals. NFIB hopes others will continue the work begun here.

Policy failures can be extremely costly, and they can disrupt the lives and security of ordinary people. Recently, one state launched a major initiative to expand health insurance coverage. Within months, unexpected market reactions rendered the program financially unstable, forcing the state to abandon the idea. One motive for experimental economics is to enable researchers to test ideas in the laboratory before unleashing them on the public. Failures in the laboratory help prevent failures in the public arena.

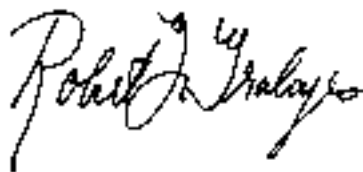
This study is one of the first ever to apply experimental economics to healthcare and health insurance markets. NFIB commissioned this work because no one has a higher stake in healthcare reform than the families of those who own and work for small businesses. Their lives and livelihoods depend profoundly on what course healthcare reform takes. Small business pays more than others for insurance, gets sparser coverage, and has fewer choices; their community includes most of America’s uninsured. These problems threaten the firms that generate most new American jobs and provide millions with their first steps toward the American dream.

Importantly, this project drew on individuals with diverse backgrounds and skills. There were those on the experimental economics side. The authors, Stephen Rassenti (Chapman University) and Carl Johnston (George Mason University), are protégés of Vernon Smith and designed and ran the experiment. Lance Clifner (August Systems) managed the business side, and Jeffrey Kirchner (George Mason University) programmed the software. Then there were those on the NFIB side. I am a health economist with a policy and academic background. Denny Dennis directs the NFIB Research Foundation and brought decades of experience with small business and healthcare. Amanda Austin and Michelle Dimarob, NFIB’s healthcare lobbyists, contributed their enormous knowledge of healthcare institutions and policy.

NFIB recognizes that this study is only a beginning and that its results ought to be tested with an augmented set of variables. We encourage other economists and policy analysts to



expand on these experiments and take the methodology in new directions. It would be particularly gratifying to see researchers with divergent views collaborating on extensions of this work. We are happy to offer our advice and assistance to those who are interested



Robert F. Graboyes, M.S.H.A., Ph.D.  
National Federation of Independent Business (NFIB)  
1201 F Street NW, Suite 200; Washington, DC 20004  
202.314.2063; bob.graboyes@nfib.org





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# EXECUTIVE SUMMARY

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We examined nine different experimental markets featuring different health care insurance scenarios, including a scenario in which no reform occurred compared to different combinations of employer and individual mandates, restricted rating, inability to forecast health care costs accurately, and variations in numbers of choices and requirements that employers pay minimum percentages of their employees' insurance premiums. We then tracked the performance of stakeholders, including employees and large and small employers, as well as firms in high-profit-margin and low-margin markets and their overall revenues and analyzed the resulting data.

We found that employee and individual mandates, separately or combined, are not enough by themselves to improve outcomes for all stakeholders. The graph in Figure 2 demonstrates that each scenario makes some parties better off and some worse off than they would be without reform<sup>1</sup>. Some reform scenarios actually come close to making everyone worse off, but no scenario makes a strict improvement for all stakeholders. In particular, the results show the vulnerability of small-and low-margin employers and their employees to policy errors and improper formulation of mandate regimes. Equitable reform of the system probably requires either a large increase in subsidies to level out the disparate outcomes among stakeholders, and/or a deeper, fundamental reform of tax and incentive structures of a type not studied in this report. We would recommend further study of such fundamental reforms as the next step in any research agenda.

## HEALTH INSURANCE SCENARIOS AFFECT LARGE AND SMALL COMPANIES IN DIFFERENT WAYS

Small companies lack the advantages of size when optimizing their health care spending and suffer higher costs of providing benefits. In our experiments, large companies were able to use all scenarios and reforms to their advantage because their large scale and lower cost of benefits helped them to attract higher value employees.

## HIGH-PROFIT, LOW-PROFIT COMPANIES ALSO AFFECTED DIFFERENTLY

We also found that companies in markets where profit margins are low tend to have preferences similar to small companies, even if those low-margin companies happen to have many employees and otherwise appear 'large.'

## INDIVIDUALS ARE VALUE-CONSCIOUS, BUT NOT WHEN DECIDING FOR OTHERS

When it comes to selecting health plans, individuals seem to be better at picking efficient

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<sup>1</sup> Stakeholder performance in each treatment is compared to stakeholder performance in other treatments, and performances are relative. The results are not the outcome of a zero-sum game.



plans for themselves than they are at selecting plans for other people. This is an important factor to keep in mind when considering proposals to require employers to offer insurance to their employees.

## MANDATORY MINIMUMS BOOST EMPLOYEES, BUT SLASH EMPLOYER EARNINGS

When mandatory minimum employer contributions are added to either an employer mandate or combined employer and individual mandates it has a substantial negative effect on earnings, particularly for small and low-margin firms.

## RESTRICTED RATING

We found that the restricted rating of health insurance policies depressed the profits of companies, but increased the earnings of individual employees compared to the control scenario in which there were no insurance reforms. Effectively, this shifted the higher costs of premiums from the employees to the employers.

## BANKRUPTCY

The ratio of relative risk of going bankrupt<sup>2</sup> varies widely among treatments. See Table 5 below which gives the relative risk ratio of going bankrupt in each of the eight reform scenarios compared to the risk in the 'None' scenario in which there is no reforms. Compared to the baseline treatment, the relative risk of going bankrupt went down in the Individual-mandate and combined Individual- and Employer-mandate scenarios when no minimum contribution from employers is mandated. The individual mandate shows the lowest relative risk ratio of bankruptcy versus the no reform scenario. However, the individual mandate can actually *increase* the risk of bankruptcy when combined with other factors, such as Restricted Rating requirements in the RR Treatment and poor decision-making by employees in the HiError scenario. The greatest likelihood of bankruptcy occurs in the two treatments, Min50Both and Min50Emp where employers are required to contribute at least half of health care costs.

## QUESTIONS AND ANSWERS

The experimental markets described in this report were designed to supply some answers to questions that formed the original motivation for this report. Following are the questions and a summary of the answers.

**How do employer, employee, and total earnings differ when employer-employee mandates and/or restricted rating are in effect? What kind of insurance system works best for employers and employees?**

*Employer and employee earnings move in opposite directions whenever mandates are applied. The direction and magnitude of the difference depends on the combination and type of mandates. If individuals are required to buy insurance, it improves the profitability of employers. If employers are required to buy insurance, it improves the employees' performance, i.e. income after accounting for health care costs.*

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<sup>2</sup> In this case, bankruptcy occurs when a subject is left with only one employee. In this situation, the subject is only able to make an inefficient limited number of products, and cannot attract new employees.

## **Do earnings differ between small and large firms in each of these cases?**

*An important finding of this report is that large firms and firms with large profit margins appear to respond in the same ways to health insurance reforms; likewise small and low-margin businesses also respond to market changes similarly. It appears that large and highly profitable companies are able to use their advantages of size and financial strength to use health care mandates to their advantage. Large companies use their size to acquire insurance more cheaply; high-margin companies use their bigger profit to offer more generous benefits to draw employees in a competitive market. Small firms and firms with narrower profit margins have none of the advantages, and changes in mandates tend to work against them.*

## **How do mandated minimum employer contributions to employee premiums affect earnings of employers and employees?**

*Requiring employers to pay for half of individual insurance costs reduces employer earnings, but increases incomes of employees. This is the reverse of what happens when employees are required to acquire insurance without a mandatory contribution.*

## **How do earnings differ when employers and/or employees are more or less perceptive? One rationale for employer involvement is the perception that employers are better at choosing health insurance options for their employees.**

*When employees are less perceptive and then face an individual mandate to buy insurance, earnings for all stakeholders either hold steady or decline compared to No Reform with more perceptive employees.*

## **How do earnings differ when employer/subjects choose from a few policies vs. from many policies? When it comes to the number of policies, is more the same thing as better?**

*We tested a scenario in which subscribers had a choice of six plans, the 6Choice scenario, as opposed to the three choices available in other scenarios. The addition of three extra choices depressed earnings for employees, and most types of firms. This effect may have been due to the fact that one of the choices was a low-benefit-to-cost insurance policy that featured a low premium and was bought frequently by employees with low health costs in order to comply with the individual mandate in effect in that treatment. On balance, the treatment was worse for all employees and small companies and high-margin companies.*

## **Do employers offer insurance in search of higher profits or out of a sense of noblesse oblige?**

*Provision of health insurance plans for employees in these experiments usually had a concrete business purpose. Labor was, by design, in short supply. Health insurance was a vital tool for attracting employees in a competitive labor market. Under most circumstances, employers acquired insurance for their employees, but commonly did without insurance for themselves—which gives some support to the notion that some altruistic impulse was involved. On the other hand, as discussed earlier, employers chose low-premium plans for their employees, but better quality plans for themselves under certain circumstances.*



# PURPOSE

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The purpose of this project was to investigate the effects of nine health-care scenarios on health costs and earnings of companies, as well as the earnings and welfare of their employees in an experimental economy.



# MOTIVATION

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Employers provide 62 percent (Gruber 2008) of the private health insurance consumed by U.S. citizens, but researchers have seldom studied the effect on company earnings of a government requirement for this benefit. The impact of different health care reform measures on small and large company earnings, and earnings of companies in low-margin versus high-margin product markets has been studied even less.

## EXPERIMENT QUESTIONS

The experiments discussed in this paper were designed to measure the effectiveness of insurance policy selection in the context of an ongoing business under different health insurance reform regimes.

The specific questions addressed by this research are:

1. How do employer, employee, and total earnings differ when employer-employee mandates and/or restricted rating are in effect? What kind of insurance system works best for employers and employees?
2. Do earnings differ between small and large firms in each of these cases?
3. How do mandated minimum employer contributions to employee premiums affect earnings of employers and employees?
4. How do earnings differ when employers and/or employees are more or less perceptive? One rationale for employer involvement is the perception that employers are better at choosing health insurance options for their employees.
5. How do earnings differ when employer/subjects choose from a few policies versus from many policies? When it comes to the number of policies, is more of the same thing as better?
6. Do employers offer insurance in search of higher profits or out of a sense of noblesse oblige?



Experimental treatments were then designed to address those questions. The treatments studied in this research are:

- (1) **None**: an experimental economy without any mandates.
- (2) **MinZeroEmp**: an employer mandate without any requirement that employers pay part of their employees' premium costs.
- (3) **Ind**: an individual mandate.
- (4) **MinZeroBoth**: a combined individual and employer mandate without any requirement that employers pay part of their employees' premium costs.
- (5) **RRInd**: restricted rating of policy premiums + individual mandate.
- (6) **6ChoiceInd**: greater choice of plans + individual mandate.
- (7) **HiErrorInd**: limited ability of employees to discern their best course of action with respect to health insurance + individual mandate.<sup>1</sup>
- (8) **Min50Emp**: an employer mandate with a minimum 50 percent contribution.
- (9) **Min50Both**: a combined individual and employer mandate with a minimum 50 percent employer contribution.

The design of the experimental economic environment and its parameters are addressed below.

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<sup>1</sup> Note that treatments 3, 4, 5, 6, 7, and 9 all included an individual mandate.





# EXPERIMENTAL DESIGN

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Two hundred and sixteen subjects were recruited in groups of six (up to 24 per session) to participate in a two-hour long experiment with 30 minutes devoted to instructions, 80 minutes to interactive experience with the laboratory environment, and 10 minutes to payout and vacating the lab.

Subjects acted as employers. They operated a business and were required to select insurance policies for themselves and their employees. They could choose between insurance policies with several different features: premium, co-pay, deductible, out-of-pocket limitation, and co-pay for catastrophic illness benefits above a certain cost. Employees, which were automated software robots acting as ‘virtual people’, chose between paying for the insurance policy selected by the employer and paying for health costs (if any) out-of-pocket.

Subjects knew that:

1. They had a means of earning money during the experiment.
2. Certain kinds of illnesses could temporarily or permanently reduce the capacity of themselves or their employees to continue to earn money.
3. They could take steps to remedy those circumstances and regenerate their capacity to earn money.

Each employer participated in a continuous series of up to 360 decision-making periods, each eight seconds long, in which they not only chose insurance policies but also ‘earned a living’ by operating a business based on the strategic decisions they made in competition with robotic adversaries. The employers had information about costs, income, the terms of insurance policies offered, as well as an estimate of employees’ health care needs. Employer income was based on their business decisions, the decisions of their robotic adversaries (robots acting as competitive firms), the health (productivity) of their employees, and insurance costs. Subjects earned real money based on their performance as employers in the experiment.

Robotic employees were associated with a particular employer, except when they were unemployed. They occasionally ‘left’ one employer in order to join another company with better benefits. They earned a salary that was fixed for all employees in their category so that salary was not a factor when switching jobs. Rather, employees based their employment decisions on the expected value of health benefits an employer would be willing to provide. Employees had private information about their own health status. They had final responsibility for their own health costs. They could choose to buy the insurance coverage offered by the employer or remain uninsured, depending on which status provided them the lowest expected cost. They had no other choices. Uninsured employees paid their own health costs.

Employees knew their probability of illness and could estimate their cost of getting sick (see Table 1). But they were required to choose whether or not to buy insurance before their illness was determined by random device. Their health costs were in a range that was skewed (i.e. most had few health costs, but a few had extremely large costs.)



The range of the strategic insurance decisions available to employers during each period remained fixed throughout—they always had the same number of insurance policies to offer employees, and in some treatments they also could choose not to offer any insurance. But the range of ‘affordable’ options decreased if income fell or health costs rose. ‘Illness’ among employees or employers tended to reduce the number of feasible options for both the employees and employers. More illness meant less income. Less income for the employers meant they could not hire as many employees of the same quality and consequently became limited in the amount and type of products they could manufacture.

All employers started the experiment with 12 employees from different categories (as described in Table 3). The initial distribution of employee categories amongst the employers is shown in Table 4.

As they made decisions in their businesses, employers could expand or reduce the size of their labor force. They had incentives to add at least a few employees in order to maximize profit. Some business decisions could force them to cut back on the size or quality of their workforce. Health care costs, which doubled over the course of the experiment, could force employers to abandon health insurance plans and/or shed workers, thereby reducing the profit potential of their businesses.

If a subject did not make a decision in any particular period, the system always assumed that the previous period’s decision prevailed unless there was an automatic restriction due to ‘illness.’

Each subject ‘earned a living’ playing in a separate strategic game completely independent of all other subjects (see Description of Treatments). The amount of money the subject earned during each eight-second period depended on the joint decisions they and their preprogrammed robotic adversaries made.

**TABLE I**  
AFFLICTION CHARACTERISTICS

Affliction	Duration Min (Months)	Duration Max (Months)	Cost Min	Cost Max	Cat 1 probability	Cat 2 probability	Cat 3 probability	Cat 4 probability
1	1	3	50	200	0.09	0.16	0.40	0.25
2	1	5	210	1490	0.08	0.05	0.12	0.30
3	1	6	1500	2500	0.07	0.08	0.01	0.25

*Note: Afflictions 1-3 caused employees to cease work for at least Duration Min. and no more than Duration Max during which costs of at least Cost Min were incurred up to Cost Max. Each Category of employee (1-4) was associated with a different probability of contracting each one of the three afflictions.*

Each subject (employer) and each employee had a chance of encountering small or large health costs according to a pre-set distribution. Some illnesses had high cost, and others were low-cost, with low-cost illnesses being far more common than high-cost illnesses. Seeking medical treatment reduced the duration of the illness by 30 percent. Absences from work required the employer to find replacement help at a temporary cost of two times the usual salary for that category of worker (see Table 1).



# DESCRIPTION OF TREATMENTS

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Each human subject (employer) played the role of an employer with 12 ‘robot’ employees producing Goods ‘A’ and ‘B’ as described above. Each subject participated in one of nine different treatments, with each treatment having different rules for providing health insurance coverage to employees. Subjects were assigned to one and only one treatment, and subjects were not allowed to participate in the experiment more than once, so that participants had no way of knowing what it would be like to participate in a different treatment.

In all treatments, insurance purchased through the employer received a 30 percent discount relative to what could be purchased outside of the employer-based market. Also, the robotic insurers were private, profit-seeking entities. Employers in all of the treatments could offer insurance to their employees and were allowed to subsidize the cost of insurance premiums. Unlike most employer mandate proposals in political discussion, employers faced no mandatory minimum payment for their employees’ insurance in two of the treatments: MinZeroEmp and MinZeroBoth. They also had no “Pay-or-Play” option. Their contribution could be as little as 1 percent of the premium cost in other treatments. Employees could still benefit, however, because they buy it with pre-tax income through their employer that is often less expensive than purchasing policies with after-tax dollars in the individual market. In treatments None, and Individ (see descriptions below), employers could select the option to not offer their employees any insurance. In most treatments where employers elected or were required to offer insurers, employers could select a number between 1 and 100, representing the percentage of the insurance premium that they would be willing to pay to employees who purchased any employer-offered plan. In Treatments Min50Emp and Min50Both, employers were required to select a subsidy greater than 50 percent.

Each of the human subjects participated in one of the following treatments described here:

## NO MANDATES (NONE)

Under this scenario, employers could offer one of three insurance policies described in Table 2, but they were not obligated to do so. Likewise, employees were not required to buy any insurance. Employers might choose to offer their employees no insurance option, meaning that employees who wanted to insure would have to buy insurance privately at a higher price than would be available through an employer. Insurers were able to increase or lower rates in response to their cost experience at the individual company, as well as other factors, such as the size of the firm. Larger companies received a discount.

## EMPLOYER MANDATE (MINZEROEMP)

Under the employer mandate scenario, employers were required to offer an insurance plan to employees, but employees were not obligated to buy any plan. Employees still could buy insurance outside of the company, but would only do so if the outside plan were cheaper than the tax-subsidized employer plan, which is infrequently the case. The subject (employer)



must select one of the three plans available to offer to employees; employers were not able to select “no plan.” Employers were required only to contribute 1 percent toward the cost of their health insurance. They were not given a “Pay-or-Play” option.

## INDIVIDUAL MANDATE (IND)

The individual mandate required employees to buy insurance, but placed no obligation on employers to offer any insurance policies.

## EMPLOYER MANDATE COMBINED WITH INDIVIDUAL MANDATE (MINZEROBOTH)

In this scenario, employers were required to offer an insurance policy, and individual employees were required to buy a policy. However, individuals did not necessarily have to buy the plan that employers offered—although it was usually the cheapest plan available due to the tax benefit of employer-provided insurance. As with Treatment 2, employers were required only to contribute 1 percent toward the cost of their health insurance. They were not given a “Pay-or-Play” option.

## VARIATIONS ON INDIVIDUAL MANDATES: RESTRICTED RATING, MORE CHOICES, LIMITED RATIONALITY

We also modified the individual mandate in four different ways to test whether or not they changed behavior. Specifically, we looked at the individual mandate coupled with restricted rating<sup>1</sup>, and the individual mandate added to a wider choice of insurance companies. We also examined the possibility that persons with limited ability to choose policies might harm the efficiency of the individual mandate. An Individual Mandate to buy insurance was in force.

## RESTRICTED RATING + INDIVID (RRIND)

In the Restricted Rating treatment, insurers could not raise rates at an individual firm unless they also raised rates for all of other clients at the same time. Insurance companies could still raise rates in order to reflect overall cost inflation and because of a firm’s size (smaller firms pay higher premiums than larger firms). However, they could not charge a higher rate to an individual firm because it experienced higher costs than other firms. An individual mandate to buy insurance was in force.

## INCREASED NUMBER OF OPTIONS + INDIVID (6CHOICEIND)

We created three extra insurance policy types in addition to the three types available in the other treatments to see whether or not subjects would get confused and select policies that are not rational. The three additional choices included one policy with a substantially reduced premium with significantly higher co-pays and deductibles than other policies in the experiment. Additionally, the insurance company offering this policy demanded three times as much profit margin (30 percent) as the insurer offering the best deal in the system (10 percent). The profit margin was not visible to subjects. An individual mandate to buy insurance was in force.

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<sup>1</sup> See Restricted Rating (Treatment 5) for a description of what ‘restricted rating’ means.

## AGENTS WITH BOUNDED RATIONALITY + INDIVID (HIERRORIND)

Finally, we also examined the question of bounded rationality in the employee robots, i.e. “What happens when employees are unable to properly analyze choices presented to them?” To investigate, we varied the accuracy of employee expectations for expenses related to health care costs. In other treatments, the robot employees calculated to within 1 percent their expected cost/benefit from buying a particular insurance plan given their health status. In this treatment, robots had a much larger average error rate (25 percent) when calculating their expected costs. An individual mandate to buy insurance was in force.

## COMBINED EMPLOYER, INDIVIDUAL MANDATES, MINIMUM 50 PERCENT EMPLOYER CONTRIBUTION (MIN50BOTH)

In this scenario, employers are required to offer insurance and pay 50 percent of their employees’ health insurance cost, and individuals must purchase an insurance plan either from their employer or on the open market. Employers are not required to subsidize insurance plans they do not select.

## EMPLOYER MANDATE WITH 50 PERCENT MINIMUM CONTRIBUTION (MIN50EMP)

In this scenario, employers are required to pay 50 percent of the cost of their employees’ health insurance and are also required to offer an insurance plan. Individual employees, however, are not required to buy any plan.



# PARAMETER DESIGN

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The markets were designed to accommodate six experimental subjects at a time. Each experimental session gathered 30 “years” worth of data, with each year consisting of 12 months. Each period (month) was 8 seconds in length, and there was a 40-second gap between years that allowed subjects more time in which to select insurance policies, change subsidy rates and alter employment levels.

Instructions were divided into three parts with each part discussing a different facet of the experiment (see Appendix C for a summary of subject instructions). The first five years’ worth of data was devoted to these instructions sessions and so these data were not used in analysis. Medical costs were assumed to inflate at a rate of 3 percent per year, a rate which doubles medical costs every 24 years. However, salaries remained the same. The tax system was assumed to give employers offering a health plan a 30 percent price advantage compared to insurance policies offered outside of the employment relationship.

Treatments were handled as software features that could be switched on and off. For example, in treatments where employers were required to offer insurance, subjects were forced to make an entry for the type of insurance plan they wished to offer or else were forced to accept the default plan, which was Plan 1. Clicking a box in the operator panel could disable this feature and the option to offer no insurance would be available.

An example of the computer display seen by the subjects (the client Graphical User Interface or GUI) is shown in Figure 1 below.

## HEALTH INSURANCE

The duration of an illness was reduced by 30 percent when an employee was insured. In some treatments, employers were required to provide insurance to their employees; in other treatments they had no requirement and could offer no insurance. In those instances where employers chose or were required to offer insurance, they could only offer one of either three or six insurance options. (In Treatment 6ChoiceInd, employers could choose between six options, employers had three choices in all other treatments.) Each plan had five variable parameters:

**Premium:** Monthly cost of the plan.

**Deductible:** The medical costs the employee must pay themselves each year before the insurance will begin covering some of their medical costs.

**Copay Percent:** Once the deductible has been reached the employee will only have to pay this percentage of their medical costs.

**Out-of-pocket Max:** The total medical costs the employee must pay before their co-pay percent is reduced to catastrophic co-pay percent.

**Catastrophic Copay Percent:** Once the out-of-pocket maximum has been reached the employee will pay this percentage of their remaining medical costs for the remainder of the year.



Single employees paid a lower premium than a head of household who covered his entire family. The different rates are listed in Table 2: Insurance Policy Characteristics

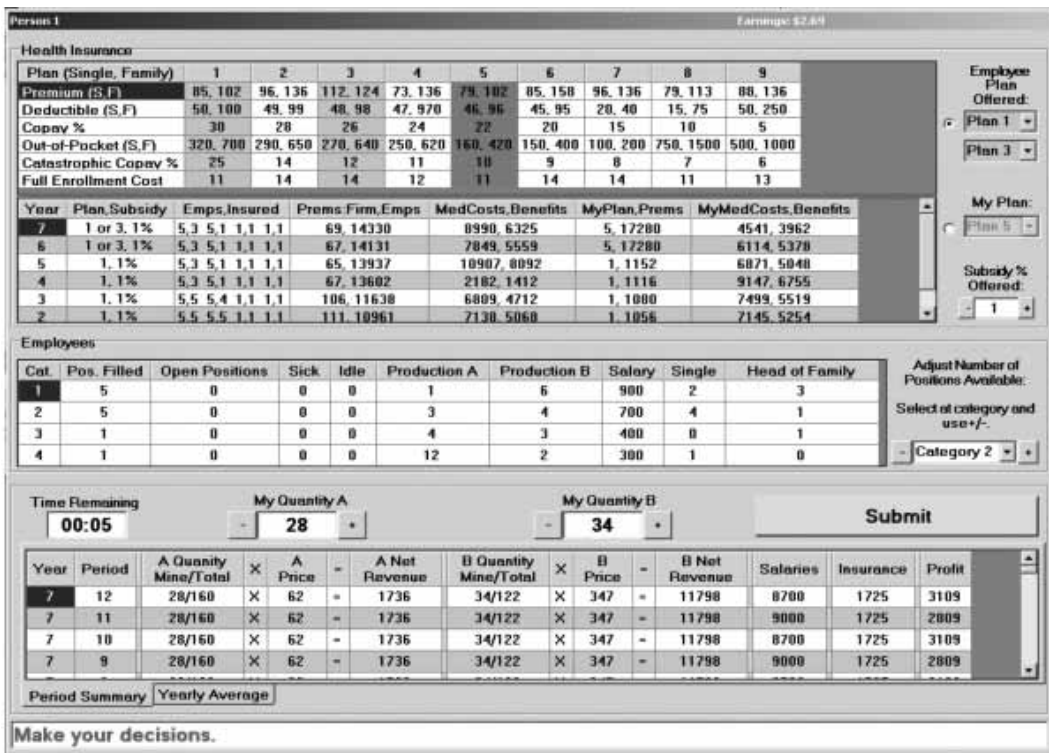
If an employee was single he or she got the single rate; if the employee was a head of household he or she got the family rate. Single (S) and Head-of-Family (F) rates for Deductibles and Out-of-Pocket expenses were also displayed. The maximum cost for providing a plan was shown by Full Enrollment Cost at the bottom of the insurance window (see Figure 1). The enrollment cost increased/decreased with the amount of subsidy that the employer offered to employees as well as the premium amount. The type (category) of employees each subject had was located in the middle of the screen.

In the No Mandates and Employer Mandate treatments, (None, MinZeroEmp and Min50Emp, respectively), employees were allowed to choose to be uninsured. Because the employees were robots, they could do a calculation of their expected costs given their illness history in the past. They could determine whether or not a specific policy had actuarial value to them given their tolerance for unreimbursed illness costs.

The number of employees enrolled in each plan was noted at the bottom portion of the Health Insurance frame on the Subject Display and broken down by type. Employers could offer to subsidize some percentage of the insurance premium. The minimum subsidy an employer could offer was 1 percent in the MinZeroEmp and MinZeroBoth treatments and 50 percent in the Min50Emp and Min50Both treatments. Employees could choose to buy one of the plans not offered by the employer if it was more attractive to them given their medical history. Healthier employees were more likely to opt out of insurance completely. If an employee chose a plan the employer did not select, he could not get the employer's subsidy and also had to pay a higher insurance premium to reflect the fact that he was paying the premiums from after-tax income.

Employees could choose to buy one of the plans not offered by the employer if it was more attractive to them.

**FIGURE 1**  
SCREEN SHOT OF SUBJECT DISPLAY



**TABLE 2**  
**INSURANCE POLICY CHARACTERISTICS**

**Insurance Policy Characteristics Initial Features**

Plan ID	Premium	Family Premium	Deductible	Family Deductible	Co-pay	Out-of-pocket Max	Family-Out-of-pocket Max	Catastrophic Copay	Profit Margin
1	500	1250	100	200	0.30	600	1400	0.05	0.15
2	575	1415	75	150	0.28	300	750	0.04	0.10
3	670	1650	48	98	0.26	180	450	0.02	0.15
4	450	1175	200	970	0.24	700	1500	0.11	0.20
5	350	900	350	1200	0.30	800	1500	0.10	0.30
6	750	1400	75	150	0.30	900	2500	0.09	0.20

Source: NFIB Experiment Parameters

*Note: In all treatments except Treatment 6, employers had available only the first three options: Plan ID 1-3. In Treatment 6, employers had to choose between all six options. In the experiment, parameters were divided by 10 in order to preserve screen size.*

**TABLE 3**  
**CHARACTERISTICS OF ROBOTS BY CATEGORY**

**Characteristics of Robotic Virtual Employees by Category**

Employee Type	Max Production of A	Max Production of B	Salary	Prob. Of Seeking New Job	Prob. Of Illness	Sensitivity to Health Costs
1	1	6	700	0.1	0.10	2500
2	3	4	500	0.1	0.10	2500
3	5	2	400	0.1	0.25	2500
4	12	2	300	0.1	0.30	2500

Source: NFIB Experiment Parameters

At the bottom of the “Health Insurance” section of the screen, subjects could see insurance plans, subsidy, employee category size and insurance enrollment by category. They also saw a report from the insurance company summarizing plans selected, Premiums paid by the Firm and by the Employees as well as employees’ Medical Costs and Insurance Benefits.



**TABLE 4**  
**INITIAL DISTRIBUTION OF ROBOT/EMPLOYEES ACROSS SUBJECTS BY CATEGORY TYPE**

**Initial Distribution of Robot/Employees by Subjects, Competitors**

Subject ID	Human Subjects				Robot Competitors			
	Cat 1	Cat 2	Cat 3	Cat 4	Cat 1	Cat 2	Cat 3	Cat 4
1	5	5	1	1	2	2	7	7
2	5	5	1	1	2	2	7	7
3	1	1	5	5	7	7	2	2
4	1	1	5	5	7	7	2	2
5	1	1	5	5	7	7	2	2
6	5	5	1	1	2	2	2	2

Source: NFIB Experiment Parameters

*Note: This Table displays for each Subject, the initial distribution of (robot) employees by Category Type. Subject 1 had five robot/employees each from Categories 1 and 2 and one each from Categories 3 and 4 (each subject is also playing in a market game against two Robot-operated competitors). The Robots have a different staff distribution. So Robots in Subject 1's market have two each of employees from Categories 1 and 2 and seven each of Categories 3 and 4.*



# AGENT PROPERTIES

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Each subject began the experiment with a staff of 12 employees. The employees each belonged to one of four possible categories with numerically defined characteristics governing their productivity, salary, sensitivity to health costs, and propensity to illness.

## PARAMETERS FOR INDIVIDUAL BUSINESSES

Each experimental business run by a human subject competed in product markets against a pair of robot businesses that maximized profit given demand rules established by the experimenter's parameters. In the experiments described here, businesses had a fixed cost for creating product 'A' of 50 and a fixed cost of 60 for product 'B'. The demand function for product 'A' was:

$$160 - 0.3 * (\text{TOTAL QUANTITY A})$$

where total quantity A was the combined production of the human business plus the two robots.

The demand function for product 'B' was:

$$700 - 2.4 * (\text{TOTAL QUANTITY B})$$

Each employer had an initial complement of employees according to a set distribution outlined in Table 4.

These parameters created a labor shortage among robot businesses of employees proficient in the production of Good 'B'. Human players 1, 2, and 6 could take advantage of this shortage by specializing in the production of Good 'B' presumably by hiring Category 1 and Category 2 workers who were most efficient at producing Product 'B'. Conversely, robot businesses had a labor shortage constraining their ability to produce enough of Good 'A' in markets 3, 4, and 5. Thus, Players 1, 2, and 6 have a built-in ability to produce Good B that ensures that they will have higher profits than Players 3, 4 and 5. This feature was designed to account for the variability of profitability in different markets under the assumption that some business sectors are more profitable than others and that such differences might affect their behavior with respect to worker health care and insurance. We refer to companies 3, 4, and 5 as 'low-margin' companies, and companies 1, 2, and 6 as 'high-margin' companies.

Insurance premiums fluctuated from period-to-period depending on several variables. The variables included the medical risk of each firm, which we were holding steady for purposes of these experiments. Another factor was whether or not the insurance was offered through the employer or not. If the employee purchased the insurance through the employer, the premium was 30 percent lower than if the policy were purchased without employer intervention. Premiums were also lower for large firms than small firms, and premiums increased if the insurer experienced a financial loss or was unable to achieve its customary profit margin. See Table 2. (An exception occurs in Treatment RRInd, which is designed to test the effect of restricted rating on employer decisions. In that Scenario, insurers must charge all clients the same premium regardless of cost/illness history.) Insurers also had a target profit margin that was set exogenously. If an insurer found that its costs with respect to insuring the employees of a certain company eroded its profit margins to an unacceptable



level, i.e. below the target profit margin of 15 percent, the insurer raised its premiums until the target level was reached or exceeded (except in Treatment RRInd, where restricted rating was in effect). Costs in the system rose 3% per year, doubling the costs over 24 years, so premium increases were inevitable.

## NO INSURANCE REFORM IS BASELINE

We use the “No Reform” (None) baseline environment as the standard by which to measure the effectiveness of other scenarios, such as employer mandate, individual mandate, restricted rating, etc. While the treatment is free of the other scenarios, it does have certain features that are widely discussed in the literature that would shape our expectations for what individuals will do in this environment. The treatment features a 30% tax advantage for health care plans that are purchased by robots through their employers.

We expect overall results in terms of health and employer profit to be on the whole more profitable for employers because this environment provides the fewest constraints on efficient action by subjects and robots. At the margins, however, we expect to find considerable inequality of welfare across robots. Tax measures offered through employers tend to be less “fair” to individuals in the sense that benefits accrue only to those who already have advantages—they have jobs. We would expect the existence of this tax advantage to create a shortage of insurance outside of the tax-advantaged system and some “over-insurance” among robots qualifying for the tax advantage. (Summers 1989)

Some health insurance reform plans rely entirely on changes in the tax system to cover the uninsured, but we have not modeled these proposals for this investigation. For example, Gruber suggests that tax changes alone could eliminate more than half of the uninsured in the U.S. at half the cost of an individual mandate. (Gruber 2008) Others suggest a variety of minimal scenarios that could be instituted to enhance the effectiveness of tax changes. (Antos and Bilheimer 1999; Furman 2008) (Schoen, Davis et al. 2008) (Aaron and Butler 2008)

Another popular reform measure relies on expanding public sector insurance to reduce the number of uninsured persons in the environment. We have not modeled this either. This type of reform is controversial among analysts because of concerns that public sector insurance will “crowd out” private insurers and thus introduce inefficiencies into the system. See Gruber 2007. (Gruber and Simon 2007)

## THE LITERATURE ON EMPLOYER MANDATES

We would expect the uninsured rate to be lower under a regime of employer mandates than under a system without mandates. However, we would also expect employer costs to be higher, and profits potentially lower as employers who previously spent nothing on health costs begin to experience those costs. We would also expect rates of non-insured individuals to be higher than under the treatment in which individuals are required to buy insurance. The preponderance of analysts have said the individual mandate is more effective than employer mandates at reducing the ranks of uninsured persons. For a broader discussion of employer mandates, see (Dick 1994) (Burkhauser and Simon 2008) (Ginsburg 2008) (Chernew, Frick et al. 1997) (Gruber and Washington 2003) (Glied, Hartz et al. 2007) (Burkhauser and Simon 2008).

## INDIVIDUAL MANDATE INSURES MORE, RAISES COSTS

A preponderance of studies on individual mandates suggest that the number of uninsured should be fewer under a regime of individual mandates than under the employer mandate and than under no mandates, but enforceability in the real world remains an issue. (Gruber 2008) (Steuerle 1994) (Ginsburg 2008) (Glied, Hartz et al. 2007) Political support for an individual mandate has been growing among some constituencies, lately even among insurers. (Bodaken



2008) Several of these analyses also noted that individual mandates tend to increase costs for the individual since many individuals who believe they do not require insurance will experience higher costs for a good that they do not value. Therefore we expect to see lower incomes for employers and employees under this treatment compared with the Employer Mandate.

## COMBINING EMPLOYER AND INDIVIDUAL MANDATES

Combining individual and employer mandates (through a ‘Pay-or-Play’ mechanism) was the key feature of the recent healthcare reform in Massachusetts. The effort recognized the importance of including people who are not employed or who are under-employed in the workforce and are therefore left out of the tax-subsidized healthcare system. The Massachusetts model is not a pure test of the combined employer/individual mandate, however, because of substantial government subsidies of the insurance market that we have not modeled in our experiment. The subsidies in Massachusetts have had two effects: they boosted the cost of the reform to state taxpayers, and resulted in considerable crowd-out by allowing people already insured to become better insured rather than bringing uninsured people into the system. (Glied, Hartz et al. 2007) In theory, the individual mandate would achieve nearly full coverage with little net increase in national health spending. (Schoen, Davis et al. 2008) Although this approach is touted as the best of all possible worlds, we noted several references to higher individual costs in this literature. We would expect our experiment to be a fair test of whether or not this structure increases individual insurance purchasers’ costs as it smoothes out costs for other stakeholders.

## RESTRICTED RATING’S EFFECT

Most state health care scenarios to date have featured some form of restricted rating; usually combining a limit on the amount insurers can boost rates with some form of guaranteed issue, guaranteed renewal, or requirements to cover certain conditions. Insurers have so far not been required to implement full Restricted Rating. Rather states adopted ‘rate bands’ that permit insurers some freedom to vary premiums up or down in response to certain factors such as age. In our experiments, we would expect to find higher health care costs as insurers are forced to raise their rates for firms with a low experience of health costs and accept “sicker” employees moving into the system.

## WHAT IF INDIVIDUALS MAKE BAD DECISIONS?

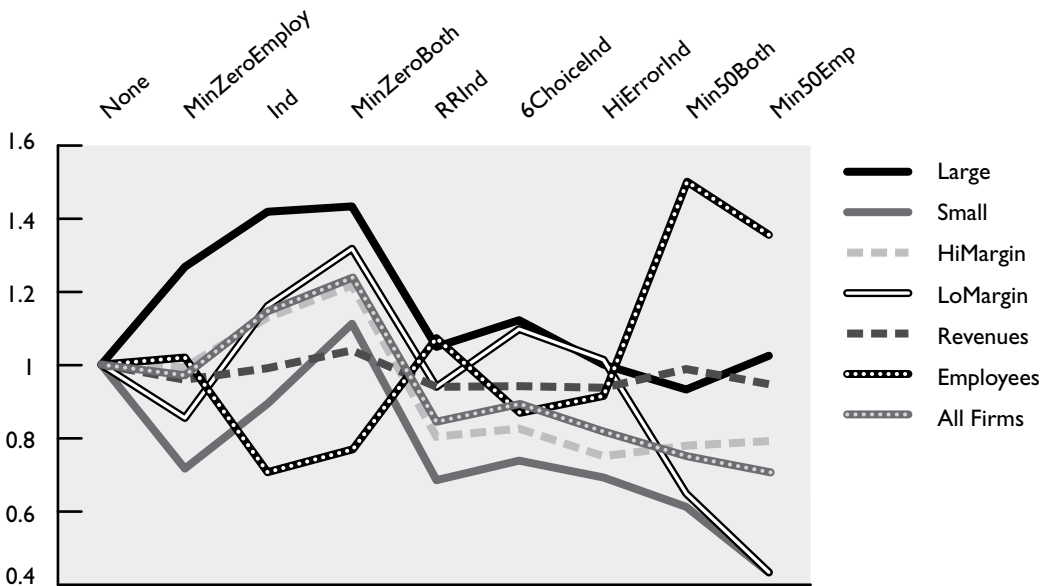
We use HiErrorInd to examine the consequences of the fact that individuals frequently have limited information about their health, the health care system and insurance and therefore do not make efficient decisions. We would expect limits on rationality to have two perverse effects on an insurance market. First, robot employees with bounded rationality should become more risk-averse with respect to small, immediate losses such as the cost of premiums. Second, they should become bigger risk-takers with respect to potential large losses in the future. On the whole, employees with bounded rationality should be underinsured and less healthy relative to treatments where employees exhibit greater rationality. All else equal, employers’ costs should rise.



# STAKEHOLDER RELATIVE PERFORMANCE BY TREATMENT

The graph in Figure 2 shows how each stakeholder (high- and low-margin, large and small firms, employees, and overall economic performance [expressed as industry revenues]) performed in each of the nine health insurance reform scenarios studied in this report.

**FIGURE 2**  
RELATIVE PERFORMANCE OF HEALTH CARE REFORMS BY STAKEHOLDER



In the graph, the markers in each data set represent the mean performance of each stakeholder in each treatment relative to the scenario in which no health care reform occurs (None). For example, Employees had highest average earnings in Min50Both of 6548.00, and lowest earnings of 3108.90 in treatment Individ and earnings of 4393.10 in the treatment without any reforms, 'None'. The employee data set marker is therefore  $3108.90/4393.10 = .707$  in Individ, and  $6548.00/4393.10 = 1.49$  for Min50Both. Firm average profit is displayed in Table 6 and employee earnings are in Table 8. In contrast to employee performance, small company earnings are best under the MinZeroBoth treatment, and worst under the Min50Emp scenario resulting in scores of 1.10 and 0.43, respectively.

## COMPARING HEALTH INSURANCE SCENARIOS

Individual mandates depress employee incomes; see Figure 8, but employer mandates cut earnings of companies (Figure 3), particularly those of small companies (Figure 5), and firms with low-margin businesses (Figure 7). In return, however, employees experienced a substantial increase in workplace attendance (an indicator of health), and consumed more health care than in other treatments. Attempts to level the playing field by requiring employers to pay half of employee health care costs do help improve employee earnings when individual man-



dates are in place, but they have a major negative impact on small and low-margin businesses. In particular, the combination of employer-and individual-mandates with mandatory minimum employer contributions was associated with the lowest profit performance (and highest employee earnings) in the study. On the other hand, combining individual and employer mandates with no mandatory minimums was associated with higher company profit, higher profitability, and a substantial drop in the cost of substitutes for workers on sick leave (Table 7). Increased profitability offset higher health care costs for employers (Table 11). However, employee-earnings were lower, reflecting a doubling of premiums paid and a smaller increase in benefits received.

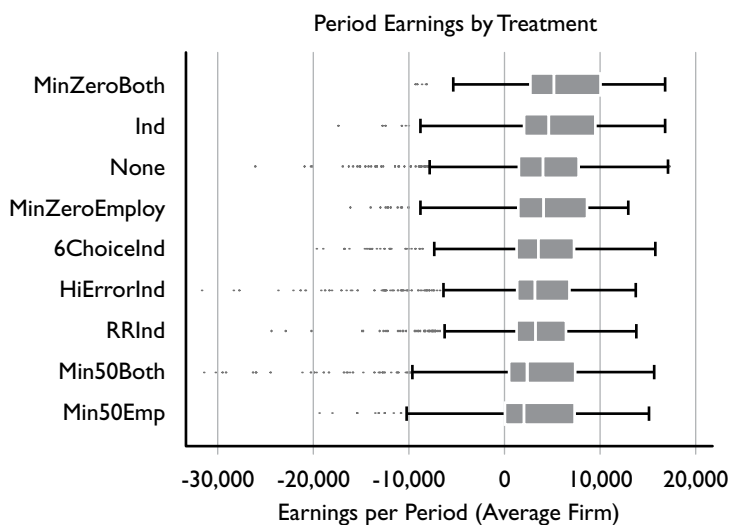
The graph in Figure 2 above shows performance relative to the 'None', or No Reform, baseline scenario. Points above 1 on the y-axis show improvements relative to No Reform. Points below 1 on the y-axis show performances that are on average lower than in the 'None'. A significant feature of Figure 2 is that no single reform leaves all stakeholders above 1, although some treatments, Restricted Rating, and High Error, come close to making all stakeholders worse off.

On balance, contriving a combination of mandates and contributions that does better than the current baseline policy for all healthcare stakeholders will be difficult. The scenario in which we modeled no policy change was a consistent moderate performer for all stakeholders except high-margin firms and big companies.

*How to Read this Figures 3-8: Center line in the middle of the box indicates the median value. The right edge of the solid part of the box represents the 75th percentile of the distribution; the left edge is the 25th percentile. The two lines extending horizontal from the box represent the statistical "fence" around the distribution (as defined by Tukey (1977)). The values located outside of the fence, represented by 'dots' are statistical outliers.*

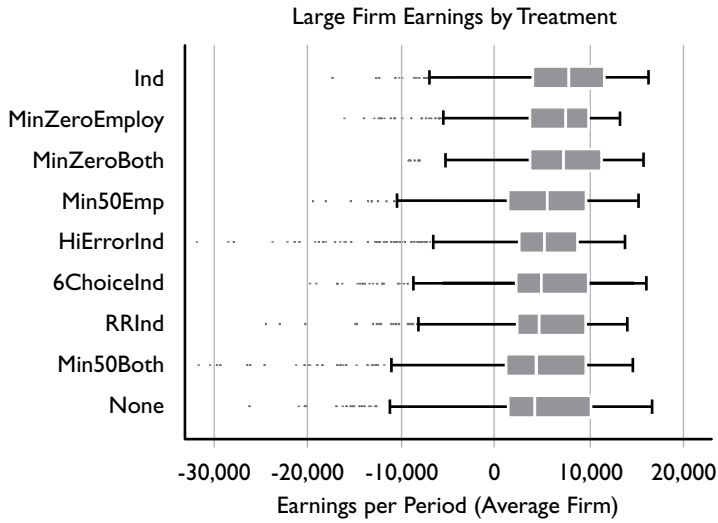
**FIGURE 3**  
PERIOD EARNINGS BY TREATMENT

Results sorted from high to low of the median value of per period earnings over all nine treatments.



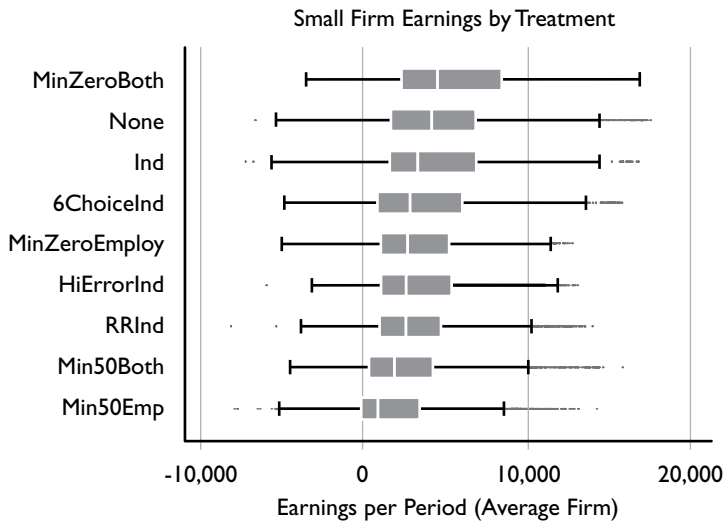
**FIGURE 4**  
**LARGE FIRM EARNINGS BY TREATMENT**

Results sorted from high to low of the median value of per period average earnings for large firms over all nine treatments.



**FIGURE 5**  
**SMALL COMPANY EARNINGS (MEDIANS) BY TREATMENT**

Results sorted from high to low of the median value of per period earnings for small firms over all nine treatments.



## HEALTH INSURANCE SCENARIOS AFFECT LARGE AND SMALL COMPANIES IN DIFFERENT WAYS

Our findings indicate that health care reform is a matter of trade-offs in which benefits for some translate into costs for others although there is a large social gain from insurance coverage expansion (see Figure 4, Figure 5, and Table 8).

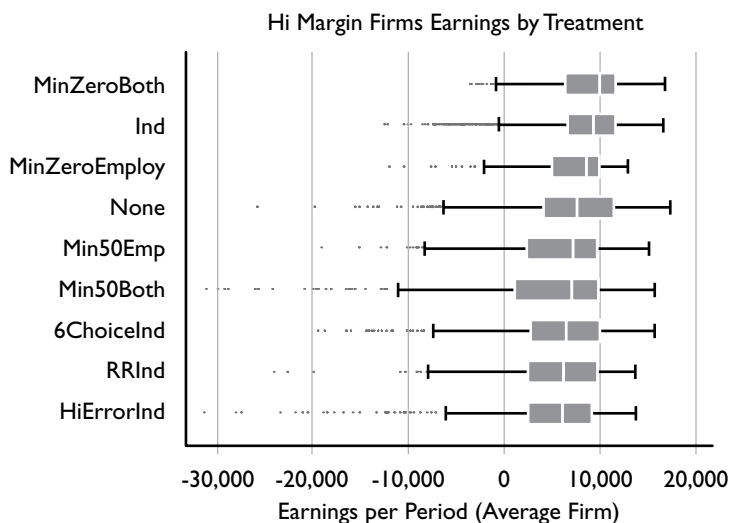
Both large and small companies had the best profit performance under a combination of employer and employee mandates without government-set minimum contribution levels. However, for small companies, no insurance reform at all would be better than a pure employer mandate or pure individual mandate. Adding a required minimum employer contribution made conditions even worse for small companies. Small companies lacked the advantages of size when optimizing their health care spending and suffered higher costs of providing benefits under these treatments. In our experiments, large companies were able to use all scenarios to their advantage because their large scale and lower cost of benefits helped them to attract higher-value employees. Consequently, within the bounds of this experiment, large companies would prefer either an individual mandate or an employer mandate to no reform at all. If these results were found to occur in actual markets, policy-makers would want to heed differential effects and aim to balance costs among all participants efficiently.

## HIGH-PROFIT, LOW-PROFIT COMPANIES ALSO AFFECTED DIFFERENTLY

We also found that companies in markets where profit margins are low tend to have preferences similar to small companies, even if those low-margin companies happen to have many employees and otherwise appear 'large' (see Figure 6 and Figure 7). Also, preferences of companies with higher profit margins mirror those of large companies, even if they happen to have only a few employees. So, the health care reform preferences of large low-margin national retailers may be similar to those of a mom-and-pop convenience store. On the other hand, a company that is both small and highly profitable may behave more like a large multinational. In these cases, small but profitable companies can use their large profit to offset their higher costs in ways unavailable to other small companies or large companies in low-margin businesses.

**FIGURE 6**  
HIGH-MARGIN FIRM EARNINGS (MEDIANS) BY TREATMENT

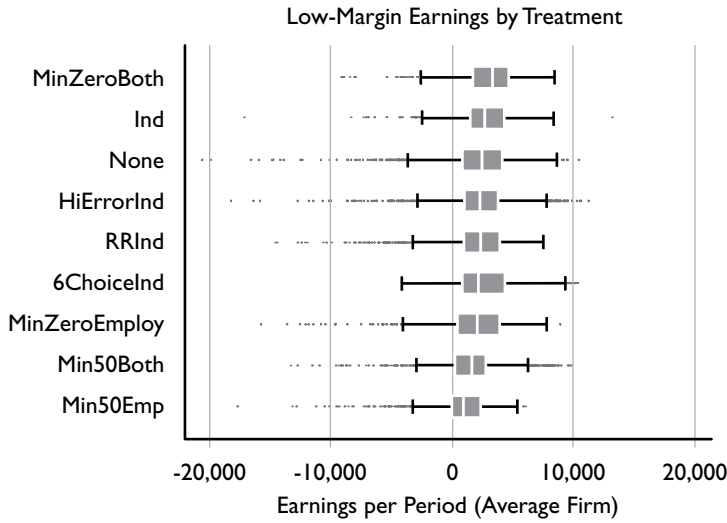
Results sorted from high to low of the median value of per period median earnings for high-margin firms over all nine treatments.





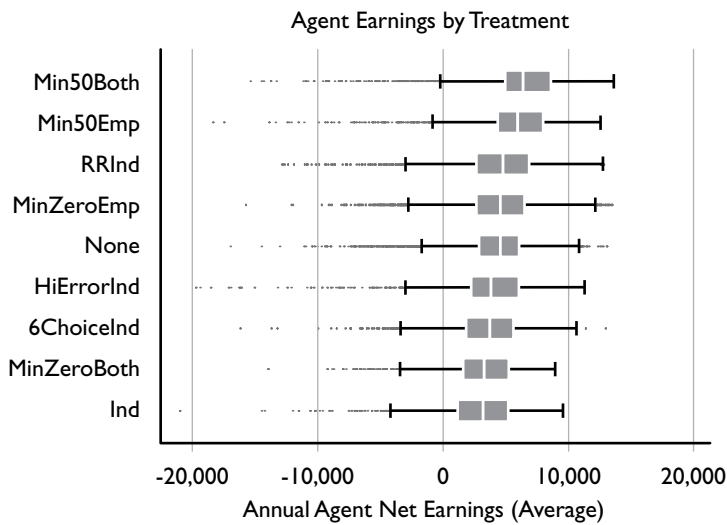
**FIGURE 7**  
**LOW-MARGIN EMPLOYER EARNINGS (MEDIANS) BY TREATMENT**

Results sorted from high to low of the median value of per period median earnings for low-margin firms over all nine treatments.



**FIGURE 8**  
**EMPLOYEE EARNINGS (MEDIANS) BY TREATMENT**

Results sorted from high to low of the median value of per period median earnings for low-margin firms over all nine treatments.



## INDIVIDUALS ARE VALUE-CONSCIOUS, BUT NOT WHEN DECIDING FOR OTHERS

Our experiments suggest that employers act in the interest of their businesses when they offer insurance to employees. However, the decision to offer insurance depends on the rules and regulations in place. Both the decision to offer insurance and the type of insurance offered tend to be different under different insurance reform regimes. Also, employers make differ-



ent decisions for their own insurance coverage compared with what they choose for their employees. One reason is they have better information about their own needs than about their employees' needs. Generally speaking, employers select more efficient, often less generous, insurance plans for themselves than they do for their employees. They also tend to select efficient plans when individuals are required to buy insurance and thus become 'active' shoppers for policies in an environment where employers face competitive pressure to offer employees plans with good value.

For example, in one test, we compared the plans employers chose for themselves with plans they chose for their employees. In this test, one of the plans had an extremely low premium but little economic value.

Figure 9 and Figure 10 show that in Treatment 6ChoicesInd the employers most often chose Insurance Plan 5 for their employees. Plan 5 was an insurance plan that featured very high deductibles and co-pays, and the insurer took a 30 percent profit margin, compared to the 10% profit margin of the most efficient insurer (Plan 2). The reason the plan drew such strong demand was its low premium in an environment where individuals were required to buy insurance.

## MANDATORY MINIMUMS BOOST EMPLOYEES, BUT SLASH EMPLOYER EARNINGS

When mandatory minimum employer contributions are added to either an employer mandate or combined employer and individual mandates, it has a substantial negative effect on earnings, particularly for small and low-margin firms. The employer contributions do improve earnings for employees who would otherwise suffer lower earnings under any scenario with individual mandates. However, earnings of large, small, high- and low-profit margin firms do most poorly in this scenario.

## RESTRICTED RATING

We found that the restricted rating depressed the profit of companies, but increased the earnings of individual employees compared to the scenario in which there were no insurance reforms. Also, employers tended to subsidize their employees' insurance more under this treatment than under the control. This suggests that employers of healthy individuals who would receive lower insurance premiums in the control environment had to pay subsidies to keep their employees under the restricted rating environment. Effectively, this shifted the higher costs of premiums from the employees to the employers. The combination of Restricted Rating with an Individual Mandate contributed to this effect. This was an unexpected result, but may help to explain situations in which state regulations force premiums higher, but employers step in to shield their employees from the higher rates though they suffer lower profit as a result.

## CHOICE IS GOOD WHEN YOU MAKE YOUR OWN CHOICE

We tested two different conditions for the number of policies that employers could choose from: (1) employers choose between three policies, and (2) employees choose between six policies. Six options were available in the 6ChoicesInd scenario, but three options were available in all other treatments. The individual mandate was also in effect when we offered the greater number of choices. Earnings of employers were clearly lower, on average when employees had more choices, than in Individual Mandate scenario without any other features. However, employee earnings were higher on average than in other treatments. Moreover, employers paid close to the same amount in temporary pay to replace sick employees as they did in the Individual mandate scenario, suggesting that employees continued to enjoy the same level of health (see Table 7).



The concern, however, is that employers tended to offer their employees a less valuable insurance plan more often under this treatment in an apparent effort to save money on premiums.

See the section Individuals are Value-Conscious, but Not When Deciding for Others above. However, market conditions forced employers to offer a higher level of subsidy to employees in this option, so employers failed to benefit from their choice of the less expensive policy due to competition for employees.

## EMPLOYEES WITH BOUNDED RATIONALITY

Even though employees had little idea about what the right plan for them was, they tended to choose the one offered by the employer, in this case, the most efficient plan. Moreover, an individual mandate was in effect, so employees were compelled to purchase insurance even though—left to their own preferences—they might not have done so. As a result, individuals' costs were actually lower in this treatment than elsewhere. However, employers seemed to suffer from paying higher subsidy rates, apparently in an effort to compensate for unpredictable behavior of the employees they needed. In this case, the decline in individual earnings that should have occurred in theory did not occur because the mechanism of the individual mandate shifted the costs onto the shoulders of the employers (see Figure 8 and Table 8).

## BANKRUPTCY

The ratio of relative risk of an employer going bankrupt<sup>1</sup> varies widely among treatments. See Table 5 below which gives the relative risk ratio of going bankrupt in each of the eight reform scenarios compared to the risk in the 'None' scenario in which there is no reform.

Compared to the baseline treatment, the relative risk of going bankrupt went down in the Individual-mandate and combined Individual- and Employer-mandate scenarios when no minimum contribution from employers is mandated. The individual mandate shows the lowest relative risk ratio of bankruptcy versus the no reform scenario. However, the individual mandate can actually *increase* the risk of bankruptcy when combined with other factors, such as Restricted Rating requirements in the RR-Individ treatment and poor decision-making by employees in the HiError-Individ scenario. The greatest likelihood of bankruptcy occurs in the two treatments, Min50Both and Min50Emp where employers are required to contribute at least half of health care costs.

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<sup>1</sup> In this case, bankruptcy occurs when a subject is left with only one employee. In this situation, the subject is only able to make an inefficient limited number of products, and cannot attract new employees.



**TABLE 5**  
**RELATIVE RISK OF EMPLOYER BANKRUPTCY BY TREATMENT**

<b>Relative Risk of Bankruptcy Model</b>		
Variable	(1)	(2)
MinZeroEmp	0.72***	2.42
Ind	0.33***	4.66
MinZeroBoth	0.59***	6.55
RRInd	1.85***	7.37**
6ChoiceInd	0.24***	2.85
HiErrorInd	1.37***	6.63*
Min50Both	2.20***	10.66**
Min50Emp	2.96***	10.57**
Employees		0.01***
Obs.	66221	66221
d.f.	8	9
chi2	3419	47733

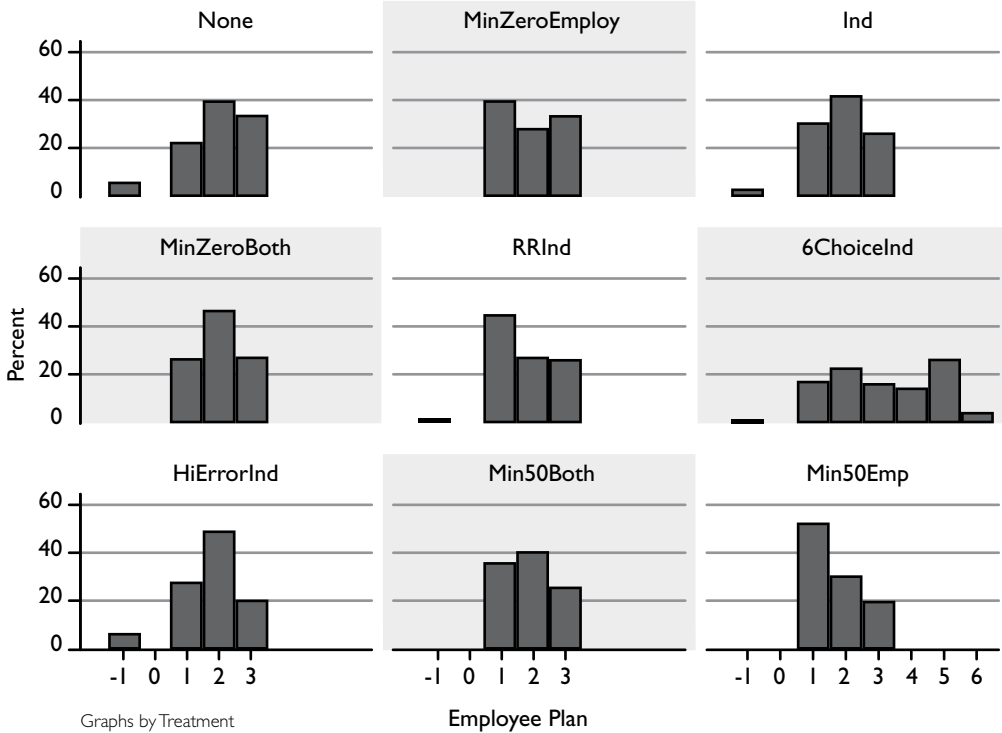
Legend: \* p < .1; \*\* p < .05; \*\*\* p < .01

Source: NFIB Experiment Data

The first regression (1) in Table 5 gives relative risk ratios for all of the treatments (except for the baseline ‘None’ case). The second regression (2) adds a factor, “Employees,” that takes the firm size as measured by the number of employees, into account. The first regression shows the relative risk of bankruptcy of all companies regardless of size and shows that all treatments have a statistically significant effect. When size is taken into account, given that small firms are more likely to go bankrupt than large firms, only Min50Both, Min50Emp, and the Restricted Rating scenarios are significant at the .05 level. This means that those three treatments will have a significant effect on firms even if they are large.

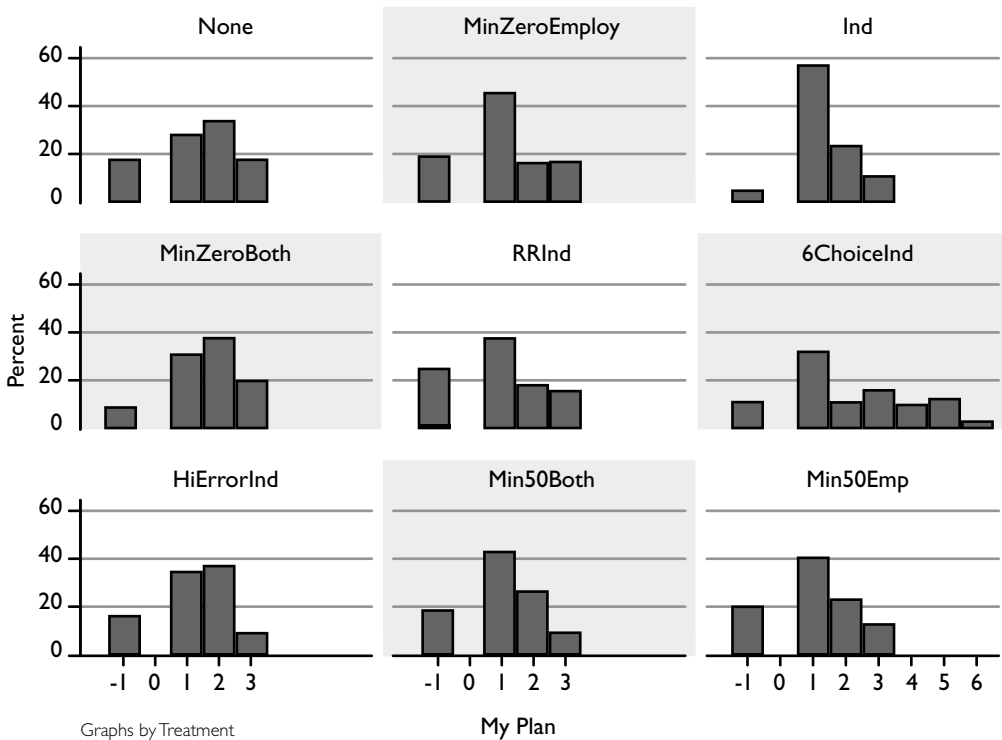


**FIGURE 9**  
EMPLOYERS' SELECTION OF INSURANCE PLANS FOR THEIR EMPLOYEES



Note: Plans are given as numbers on x-axis: -1 means No Plan was chosen; 1 is high deductible plan; 2 is the most efficient plan; 3 is a low-deductible plan; 4 is an inefficient high deductible plan; 5 is a plan with the highest expense to benefit ratio but a low premium; 6 is a very high cost low deductible plan. Details of each plan are in Table 2 The y-axis represents the frequency in percent with which the plan was chosen.

**FIGURE 10**  
EMPLOYERS' INSURANCE PLAN CHOICE FOR THEMSELVES AND THEIR FAMILY



**TABLE 6**  
**ALL EMPLOYER MEAN EARNINGS BY TREATMENT**

		<b>Profit</b>								
		<b>Treatment</b>								
	None	MinZero Employ	Ind	MinZero Both	RRInd	6Choice Ind	Hi ErrorInd	Min50 Both	Min50 Emp	Over all
<b>All Firm Profit</b>	5034.18	4851.96	5739.33	6283.49	4226.80	4516.09	4131.84	3786.70	3556.81	4655.92
<b>HiMargin</b>										
Lo Profit	2418.23	2057.27	2815.39	3196.37	2258.47	2650.23	2474.23	1584.22	1036.39	2259.36
Hi Profit	7650.13	7646.66	8663.26	9370.61	6195.14	6381.95	5789.45	5989.67	6077.22	7052.56
<b>Large</b>										
Small	4964.67	3652.88	4418.58	5509.64	3391.69	3654.09	3454.76	3031.20	2132.52	3797.98
Large	5149.15	6511.14	7288.90	7360.10	5379.40	5750.15	5145.11	4775.62	5272.41	5831.98
<b>Sample size 7,200</b>		6,846	7,200	7,200	7,200	7,200	7,200	8,975	7,200	66,221

Source: NFIB Experimental Data

**TABLE 7**  
**ALL-EMPLOYER MEAN TEMPORARY PAY<sup>2</sup> BY TREATMENT**

		<b>Temporary Pay</b>								
		<b>Treatment</b>								
	None	MinZero Employ	Ind	MinZero Both	RRInd	6Choice Ind	Hi ErrorInd	Min50 Both	Min50 Emp	Over all
<b>All Firm TempPay</b>	530.08	569.06	315.58	313.01	336.76	315.29	319.35	299.40	319.89	365.79
<b>HiMargin</b>										
Lo Profit	530.22	576.69	311.50	311.11	362.25	353.03	340.94	280.68	283.50	368.67
Hi Profit	529.94	561.44	319.67	314.92	311.28	277.56	297.75	318.12	356.28	362.91
<b>Large</b>										
Small	347.58	425.99	201.52	188.99	110.73	167.99	137.16	142.04	123.54	203.78
Large	831.92	767.03	449.41	485.55	648.73	526.17	591.99	505.38	556.40	587.86
<b>Sample size 7,200</b>		6,846	7,200	7,200	7,200	7,200	7,200	8,975	7,200	66,221

Source: NFIB Experimental Data

<sup>2</sup> Temporary Pay is the amount of money paid to temporary workers who stand-in for absent/sick full-time workers at a pay rate of twice the usual level for the same category of worker. This is our proxy for the health of employees.

**TABLE 8**  
**EMPLOYEE COSTS, PREMIUMS, BENEFITS AND SUBSIDIES BY TREATMENT**

Treatment	Mean					
	Earns	Employee Cost	Employer Cos	Med Costs	Ins Benefits	Subsidies
Overall	4491.59	1395.64	857.65	2465.39	1947.33	35.01
None	4393.10	1006.54	631.45	2139.41	1357.52	29.19
MinZeroEmp	4457.75	898.84	602.23	2132.02	1305.07	25.89
Ind	3108.90	2259.29	188.46	2530.81	2128.14	7.76
MinZeroBoth	3386.67	2174.50	397.65	2546.83	2159.31	13.36
RRInd	4726.35	1390.40	1091.51	2718.50	2245.98	42.73
6ChoiceInd	3842.49	1588.99	476.21	2480.91	1864.50	25.34
HiErrorInd	4010.38	1870.43	742.11	2545.77	2138.23	27.99
Min50Both	6548.00	551.45	1963.97	2477.07	2114.16	75.85
Min50Emp	5948.94	795.49	1612.51	2600.56	2180.96	66.48
<b>Sample size</b>	67,125					

Source: NFIB Experimental Data



# CONCLUDING REMARKS

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Combinations of employee and individual mandates are not enough by themselves to improve outcomes for all stakeholders. The graph in Figure 2 demonstrates that each scenario makes some parties better off and some worse off than they would be without reform. Some reform scenarios actually come close to making everyone worse off, but no scenario makes a strict improvement for all stakeholders. In particular, the results show the vulnerability of small-and low-margin employers and their employees to policy errors and improper formulation of mandate regimes. Equitable reform of the system probably requires either a large increase in subsidies to level out the disparate outcomes among stakeholders, and/or a deeper, fundamental reform of tax and incentive structures of a type not studied in this report. We would recommend further study of such fundamental reforms as the next step in any research agenda.

We will now return to the original questions that formed the motivation of this report and try to supply some answers:

**How do employer, employee, and total earnings differ when employer-employee mandates and/or restricted rating are in effect? What kind of insurance system works best for employers and employees?**

*Employer and employee earnings move in opposite directions whenever mandates are applied. The direction and magnitude of the difference depends on the combination and type of mandates. If individuals are required to buy insurance, it improves the profitability of employers. If employers are required to buy insurance, it improves the employees' performance, i.e. income after accounting for health care costs.*

**Do earnings differ between small and large firms in each of these cases?**

*An important finding of this report is that large firms and firms with large profit margins appear to respond in the same ways to health insurance reforms; likewise small and low-margin businesses also respond to market changes similarly. It appears that large and highly profitable companies are able to use their advantages of size and financial strength to use health care mandates to their advantage. Large companies use their size to acquire insurance more cheaply; high-margin companies use their bigger profit to offer more generous benefits to draw employees in a competitive market. Small firms and firms with narrower-profit margins have none of the advantages and changes in mandates tend to work against them.*





**How do mandated minimum employer contributions to employee premiums affect earnings of employers and employees?**

*Requiring employers to pay for half of individual insurance costs reduces employer earnings, but increases incomes of employees. This is the reverse of what happens when employees are required to acquire insurance without a mandatory contribution.*

**How do earnings differ when employers and/or employees are more or less perceptive? One rationale for employer involvement is the perception that employers are better at choosing health insurance options for their employees.**

*When employees are less perceptive and then face an individual mandate to buy insurance, earnings for all stakeholders either hold steady or decline compared to No Reform with more perceptive employees.*

**How do earnings differ when employer/subjects choose from a few policies versus from many policies? When it comes to the number of policies, is more the same thing as better?**

*We tested a scenario in which subscribers had a choice of six plans, the 6Choice scenario, as opposed to the three choices available in other scenarios. The addition of three extra choices depressed earnings for employees, and most types of firms. This effect may have been due to the fact that one of the choices was a low-benefit-to-cost insurance policy that featured a low premium and was bought frequently by employees with low health costs in order to comply with the individual mandate in effect in that treatment. On balance, the treatment was worse for all employees and small companies and high-margin companies.*

**Do employers offer insurance in search of higher profits or out of a sense of noblesse oblige?**

*Provision of health insurance plans for employees in these experiments usually had a concrete business purpose. Labor was, by design, in short supply. Health insurance was a vital tool for attracting employees in a competitive labor market. Under most circumstances, employers acquired insurance for their employees, but bought far less insurance for themselves—which gives some support to the notion that some altruistic impulse was involved. On the other hand, as discussed earlier, employers chose low-premium plans for their employees, but better quality plans for themselves under certain circumstances.*



# APPENDIX A: EXPERIMENTS AND HEALTHCARE, WHY WE USE LABORATORY EXPERIMENTS TO STUDY HEALTH INSURANCE REFORM

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Health economists often assume that changes in health care costs do not affect total wages, i.e. hourly wages plus cost of benefits such as health insurance, all else being equal. In theory, increases in health expenditures are offset by lower wages or more hours worked, and *vice versa*.<sup>1</sup> On the other hand, some analysts have noted that employers' ability to offset cost increases through lower compensation may be reduced by elasticity of labor supply, legal constraints, and employees' valuation of the benefit package. Baicker and Chandra (Baicker and Chandra 2005) found that increases in healthcare costs were not entirely offset by wages and that when health insurance premiums go up by 10 percent, the fraction of the population that is employed goes down by 1.4 percent. Unstated is the implication that changes in employment are related to economic impact and employer performance. Completely unaddressed has been the question of whether smaller companies with fewer employees suffer greater (lesser) health cost gains relative to larger companies.

When cost increases are due to secular health insurance reform, rather than from inflationary/technological changes in costs of care, it raises a different set of questions since these scenarios are often implemented in the form of unfunded mandates rather than a direct cost.

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<sup>1</sup> Cutler and Madrian Cutler, D. M. and B. C. Madrian (1998). "Labor Market Responses to Rising Health Insurance Costs: Evidence on Hours Worked." *The RAND Journal of Economics* 29(3): 509-530.

Increases in the cost of providing health insurance must have some effect on labor markets, either in lower wages, changes in the composition of employment, or both. Despite a presumption that most of this effect will be in the form of lower wages, we document a significant effect on work hours as well. Using data from the Current Population Survey (CPS) and the Survey of Income and Program Participation (SIPP), we show that rising health insurance costs during the 1980s increased the hours worked by those with health insurance by up to 3%. We argue that this occurs because health insurance is a fixed cost, and as it becomes more expensive to provide, firms face an incentive to substitute hours per worker for the number of workers employed. They found that health cost increases in the 1980s resulted in increased hours worked by those with health insurance by up to 3%. They argued that this occurs because health insurance is a fixed cost, and as it becomes more expensive to provide, firms face an incentive to substitute hours per worker for the number of workers employed. Another possibility is wage reduction.



Modern insurance reform proposals are typically built around the assumption that such mandates are more efficient because they avoid many of the inefficiencies of government provision of public goods, such as deadweight loss from taxes. (Summers 1989) They also have the added benefit of permitting businesses or individuals some ability to shop around for health insurance as opposed to a government benefit. Because higher costs due to reform tend to be the result of increasing the number of people covered by health insurance, they may also have beneficial secondary effects by protecting individuals from bankruptcy due to catastrophic illness, better screening for preventable illness, management of chronic conditions, and reduction of communicable disease. To the extent that mandated benefits achieve universal coverage, they may also increase efficiency of insurance markets by eliminating the need for extra reserves to protect against adverse selection bias.

Field studies of insurance mandates' effects on economic activity and employment have been mixed. For example, some studies of the Hawaiian 1974 health care reform initiative requiring employers to offer their full-time employees health insurance have found evidence that the reform increased the rate of insurance without harming economic activity. (Lewin and Sybinsky 1993) (Neubauer 1993) But others have been skeptical, claiming either that the law was not as effective as claimed or that it suppressed wage growth. (Thurston 1997) (Dick 1994)

Obtaining data to measure health reform effects on employers indirectly is also difficult. Data about the employer costs of health insurance and alternatives available to employees are not contained in data sets such as the Census and the Current Population Survey (CPS). Furthermore, data cannot be generated unless a reform of interest has already been implemented. Where they exist, useful data may not be available for years or decades. Even then, research quality may be inconsistent. Therefore relevant econometric analysis of existing data sets is not always available to inform policy-makers considering novel institutional scenarios.

Conducting field experiments would be the best way to test institutional changes, but in health insurance reform such trials are expensive. The Gold Standard of scientific analysis of reform proposals was the RAND health insurance experiment (HIE), a controlled field study in the 1970s and early 1980s in which experimenters assigned subjects to different treatments; some received totally free health care, and others faced co-pays of varying amounts. Arguably the most influential health care study ever performed, it ushered in an era of higher co-pays and deductibles in insurance plans across the country that persists to this day. But the HIE cost more than \$100 million in current dollars to conduct. As elaborate as the HIE was it still had features that made its findings difficult to apply to certain situations.<sup>2</sup> Also, social policy field experiments of this kind were the subject of ethical debate (Rivlin) as observers became concerned about the potentially unfair treatment of experimental subjects.

While Congress has not funded comparable projects since the RAND HIE, neither have regional (state) governments picked up the slack. Weil (Weil 2008) noted that state government health scenarios have not been accompanied by rigorous analysis of the type that preceded the 1994 Welfare Reform. Instead, the Department of Health and Human Services (HHS) has granted Section 1115 Waivers that are called "research and demonstration" projects. These primarily enable states to make program changes and contain little actual research money. In Medicare Part D, research funds were used to cover certain costs of the program. Calls for more rigorous "evidence-based" policy making based on standardized assessment of health scenarios are among the top concerns of policy makers. (Wharam and Daniels 2007)

If Congress were to spend more on research clearly it should spend money on full-fledged experiments like the RAND HIE, and more data gathering. However, it should also consider

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<sup>2</sup> For example, RAND HIE could not charge premiums for the insurance it offered because of state laws governing the insurance business.



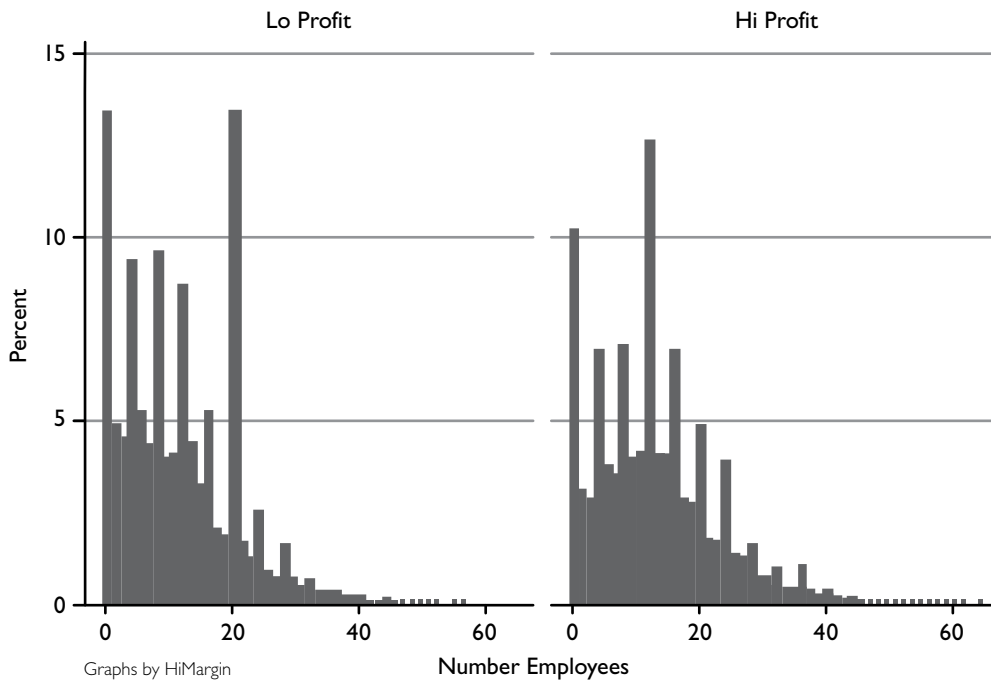
non-aggregated methods of policy analysis, including agent-based computation and laboratory experiments. Econometricians have made progress in squeezing the maximum out of existing data sets. (see, for example, Gilleskie (Gilleskie 1998). However, their ability to forecast the effects of institutional scenarios on economic actors is limited by the scope and quality of data available to them as well as fundamental issues concerning data aggregation. The Congressional Budget Office (CBO) and various consultants have simulation models for estimating the prospective costs of new programs. However, the models typically make crucial assumptions about behavior based on econometric evidence that make their forecasts difficult to test or replicate. As Lucas (Robert E. Lucas 1976) pointed out and Geweke (Geweke 1985) and Kupiec and Sharpe (Kupiec and Sharpe 1991) later demonstrated, even robust estimations of behavioral coefficients derived from aggregate data can be expected to change in response to alterations of policy regime. See also Kirman's discussion of aggregation in the presence of policy change. (Kirman 1992)

The main difference between the experiments described here and statistical forecasts based on simulation is that experimental data derived are obtained from motivated individuals acting in an actual experimental market with rules and constraints that emulate the reform being studied. Their behavior and expressed preferences are a direct response to changes in the rules governing their markets and are not derived by means of statistical aggregation. In many respects it offers a pure test of a specific change in market structure with a higher level of control and granularity than is obtainable by other means.

No methodology in economics is perfect. Experimental economics involves trade-offs just as do other forms of economic analysis, such as theoretical and econometric analysis. The experiments reported here exclude many important variables, involved a relatively small number of participants and were a first try at using this kind of methodology on a health insurance scenario. Furthermore, the policy scenarios discussed here were deliberately chosen because they differ in significant ways from specific proposals currently being discussed. For example, the employer mandate investigated in this report did not give employers a 'pay-or-play' option in which the employer must either pay for part of employee premiums or pay a penalty. Because the scenarios are different from actual reform proposals, this study cannot be construed as an endorsement of any particular reform plan or project. The investigators in this report also did not examine how variations in the tax code—the deductibility of health care insurance premiums, in particular—affect various scenarios. Finally, the investigators did not allow employers to vary individual employee salaries. Employers were allowed to select different categories of employees with lower or higher salaries, but could not "fine tune" individual salaries to adjust to different health care reform scenarios. This might have prevented some employers from adjusting to the effect of different insurance requirements and normalizing their profits.

# APPENDIX B: SUPPLEMENTARY DATA

**FIGURE 11**  
CORRELATION BETWEEN LARGE/HIGH-MARGIN AND SMALL/LOW-MARGIN FIRMS



A key finding of this report was that the preferences of large firms and firms with high profit margins were highly correlated, as were the preferences of small firms and firms with low profit margins. Figure 11 above gives a sense of how the two populations overlap. The histogram shows the percentage of firms on the y-axis broken down by the number of employees per firm along the x-axis. The left panel (titled '0') indicates the size distribution of low-margin firms, and the right panel shows the distribution of high-margin firms. The graphs show that there is a sizeable overlap of high-margin firms with both small and large firms, as well as overlap of low-margin firms among small and large firms.

In the regressions outlined in Table 10, we show a multinomial logistic regression of plan choice by all of the factors relating to the employer. It shows that large firms that are not 'rich,' i.e. in a high-margin market, are more likely to avoid buying insurance for their employers. However, when the factors 'rich' and 'large' are combined, there is a strong likelihood that they will choose insurance, with a slight preference for buying insurance policy #3, which is the most generous insurance choice (the policy with the lowest copays and deductibles).



**TABLE 9**  
**LOGISTIC REGRESSION OF EMPLOYER PLAN SELECTION VERSUS FIRM CHARACTERISTICS**

Variables	(1) HighDeduct.	(2) Value	(3) LowDeduct
large	-1.45*** (0.17)	-1.11*** (0.17)	-1.17*** (0.17)
rich	0.84 (0.84)	2.29** (0.84)	2.89*** (0.84)
quantity a	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)
quantity b	-0.01 (0.01)	-0.02 (0.01)	-0.04** (0.01)
price a	0.01 (0.02)	-0.01 (0.02)	-0.00 (0.02)
price b	0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)
employees 1	0.27*** (0.04)	0.15*** (0.03)	0.22*** (0.04)
employees 2	0.18*** (0.03)	0.13*** (0.03)	0.20*** (0.03)
employees 3	0.28*** (0.02)	0.22*** (0.02)	0.16*** (0.02)
employees 4	0.44*** (0.03)	0.39*** (0.03)	0.38*** (0.03)
MinZeroEmp	20.16*** (0.04)	19.22 (0.00)	19.52*** (0.04)

Standard errors in parentheses  
 \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

*This regression compares the likelihood of picking a type of plan to picking no plan given the presence of a specific experiment variable. The variable Large indicated that the company had more than 12 employees; rich indicated that the company was in market 1,2, or 6; quantity a and quantity b indicated the number of products a or b produced by the company; price a and price b were prices of a and b in the company's market; employees 1, employees 2, employees 3, and employees 4 were the number of employees of the company belonging to categories 1-4 respectively.*

The table below shows the number of uninsured employees in each of the three treatments where rules permitted employees to opt out of buying insurance. The rate was highest under the treatment in which employers were required to offer insurance (but individuals were not

required to pay) at 19.1%, and was lowest in the treatment where employers were required to offer insurance and pay 50% of the premium costs, at 0.9%.

**TABLE 10**  
**NUMBER OF MONTHS/ROBOTS WITHOUT INSURANCE BY TREATMENT**

<b>Uninsured Employees</b>			
Treatment	No. Uninsured	Total Employees	Pct. Uninsured
None	1574	9970	15.7
MinZeroEmp	1673	8744	19.1
Min50Emp	74	7464	0.9

Source: NFIB Experimental Data

Table 11 shows the ratio of profits to revenues on average in each of the treatments. Profit ratios were highest under the MinZeroBoth treatment at 37%, and lowest in Min50Emp.

**TABLE 11**  
**RATIO OF PROFIT TO REVENUES BY TREATMENT**

Treatment	Avg Profitability
None	0.32
MinZeroEmploy	0.28
Ind	0.33
MinZeroBoth	0.37
RRInd	0.31
6ChoiceInd	0.25
HiErrorInd	0.29
Min50Both	0.22
Min50Emp	0.21
<b>Total</b>	<b>0.29</b>
<b>Sample size</b>	<b>66,221</b>

Source: NFIB Experimental Data



# APPENDIX C: SUBJECT INSTRUCTIONS

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**Overview of the Experiment:** Words enclosed in rectangles refer to items on the computer screen

**Roles:** You and other participants are all Business Owners, and each of you produces two goods: A and B.

**Employees:** There are several different qualities of employees, and each commands a different salary and each can produce different quantities of A and B.

In each category, wages consist of the number of employees times the salary paid to each employee.

Each employee produces either Good A or Good B, but not both

Employees decide whether to work for you or for other firms based on wages, quality of health insurance policy you offer them, and amount of subsidy that you offer employees on the health insurance policy purchase.

If one of your employees sees a better opportunity in another firm, that employee will leave you, and your number of **Open Positions** increases.

As the size of your workforce changes, so will the salaries and insurance premiums you pay each month. If the number of employees falls too low, your production level could fall because you are short employees.

Your company competes for employees with the other players in the room.

**Goods:** In both markets, profits = (revenues minus wages minus health insurance premiums)

Revenues equal the quantity of the good produced times the price of that good

As you and your virtual competitors sell more of the good, the price drops.

The quantity of each good produced is limited by the number of employees in each market

Once all your employees are producing Good A or Good B, you cannot expand production.

You can shift employees from Good A to Good B and vice versa.

You can allow some of your employees to remain idle, rather than producing either good. Leaving employees idle allows you to boost the market price of one or both goods, but you still have to pay the idle employees' salaries, and you get nothing in return.

The third panel shows the status of the four types of employees you can hire, including **Positions Filled**, **Open Positions**, **Sick** employees, **Idle** employees, the amount of good A each type of employee can produce (**Production A**), the amount of Good B each type of employee can produce (**Production B**), the **Salary** each type of employee commands, how many employees are **Single** (no spouse or dependents) or **Head of Family** (has spouse and/or dependents).

**Illness:** From time to time, on a random basis, your employees will get sick. There are a variety of illnesses they could contract. Each illness has a different duration, medical cost, and



frequency with which it strikes. When an employee is sick, he/she produces nothing. Still, you must pay his/her salary. The number of **sick** employees appears on the employee panel.

The duration of illness and absence from work are 30% less for insured employees than for uninsured employees.

Just like employees, you may contract an illness. You are required to pay its associated medical costs.

**Health Insurance:** Once a year, you must/may choose an insurance policy for your employees and one for yourself.

Providing a plan means higher payroll costs, greater employee retention, and fewer sick days.

Choose your employees' plan by entering the appropriate plan number in **Employee Plan Offered** box in the upper right. Plans are defined by the following:

**Premium** – monthly cost of the plan.

**Deductible** – medical costs the insured must pay each year before insurance begins covering costs.

**Copay %** – the percentage of health care costs the insured must pay after the deductible has been met.

**Out-of-Pocket Maximum** – the total amount an insured can pay in a year. Larger for families than for singles.

**Catastrophic Copay %** – Once the out-of-pocket max has been reached, the employee must pay this percentage of remaining medical costs for the remainder of the year.

**Full enrollment cost** – the maximum cost you face when providing the plan to all employees. This cost increases/decreases by the amount you choose to subsidize it. If you choose to pay the entire premium (100% subsidy), set 100 in the **Subsidy % Offered** box to the right of the second panel. If you choose to pay 60 percent, you would set the number in the box at 60. The minimum subsidy you can offer is 1 percent

**Single** employees are less expensive to insure than **Head of Family** employees.

As the size of your workforce changes, the price of your insurance premiums will change. The more employees you have, the larger the group discount you will receive.

In some experiments, employees may (on a random basis) choose to be insured.

You can choose to insure yourself. If you choose a plan for yourself that is different from your employees' plan, you will pay a high rate on your own insurance because you do not receive the group discount. Choose your plan in the **My Plan** box in the upper right.

Insurance rates and average medical costs will increase by 3% a year.

**Length of game:** The game extends through 30 years, each divided into 12 months.

**Annual choices:** At the beginning of each year, you must make several choices:

How many employees of each quality level to hire.



How many employees will produce Good A and how many will produce Good B.

Which health insurance policy, if any, to provide to your employees

Which health insurance policy, if any, to provide to yourself

How heavily to subsidize your employees' health insurance purchases

After making these choices, you cannot change them until the beginning of the next year.

Between years, there is a pause in which to make hiring and insurance decisions.

**Monthly choices:** At the beginning of each month, you choose how much to produce of Good A and Good B

You do not compete on sales with others in the room. Each of you operates in your own niche market, and you compete only with two virtual firms to sell each good.

Choose the quantities by adjusting the **My Quantity A** and **My Quantity B** boxes in the lower middle of the screen. Use **+** to increase a quantity and **-** to decrease a quantity.

As you choose your quantities, your virtual competitors will make similar decisions, which will affect the demand for your production. The higher the quantity produced by you and your competitors, the lower the market price will be.

The bottom panel on the screen shows the **Year** and month (**Period**), **Quantity**, **Price**, and **Revenue** for each good, along with the amount spent on **Salaries** and **Insurance**. In the last column, **Profit = A Net Revenue + B Net Revenue - Salaries - Insurance**

At the beginning of each month, you have 30 seconds to make your changes. Leaving quantities unchanged is an option, though probably not advisable. The **Time Remaining** box shows counts down the 30-second period.

**Historical Data:** You can examine year-by-year data on insurance in the second panel and on production, prices, profits, and costs in the fourth panel.

The insurance data show:

**Plan,Subsidy** – Which plan you choose for your employees and the level of your subsidy.

**Emps,Insured** – How many employees you have by category. The number after each comma is the number of insured employees in that category. For example, 5,0 5,0 5,0 2,0 shows five employees in each category, except category four which has two employees. None of the employees in any category has insurance.

**Premis: Firm,Emps** – How much does the firm pay for insurance? How much do employees pay?

**MedCosts,Benefits** – What are employees' medical costs? How much was paid for by insurance?

**MyPlan,Premis** – Which policy do you have? How much did you pay in premiums?

**MyMedCosts,Benefits** – What were your medical costs? How much was paid for by insurance?



The fourth panel lets you look back over production, price, and profit information from previous months, **Period Summary** and look at the average for each year **Yearly Average**.

## REFERENCES

- Aaron, Henry J. and Butler, Stuart M.** "A Federalist Approach to Health Reform: The Worst Way, except for All the Others." *Health Affairs*, 2008, 27(3), pp. 725-35.
- Altman, S. H. and Doonan, M.** "Can Massachusetts Lead the Way in Health Care Reform?" *New England Journal of Medicine*, 2006, 354(20), pp. 2093-95.
- Antos, J. R. and Bilheimer, L.** "Medicare Reform: Obstacles and Options." *American Economic Review*, 1999, 89(2), pp. 217-21.
- Axtell, R.** "The Complexity of Exchange." *Economic Journal*, 2005, 115(504), pp. F193-F210.
- Baicker, Katherine and Chandra, Amitabh.** "The Consequences of the Growth of Health Insurance Premiums." *The American Economic Review*, 2005, 95(2), pp. 214-18.
- Bodaken, Bruce G.** "Where Does the Insurance Industry Stand on Health Reform Today?" *Health Affairs*, 2008, 27(3), pp. 667-74.
- Brown, Lawrence D. and Sparer, Michael S.** "Window Shopping: State Health Reform Politics in the 1990s." *Health Affairs*, 2001, 20(1).
- Burkhauser, Richard and Simon, Kosali.** "Who Gets What from Employer Pay or Play Mandates?," *NBER Working Paper Series*. Cambridge MA: NBER, 2008.
- Cawley, J. and Philipson, T.** "An Empirical Examination of Information Barriers to Trade in Insurance." *American Economic Review*, 1999, 89(4), pp. 827-46.
- Chernew, M; Frick, K. and McLaughlin, KC.** "The Demand for Health Insurance by Low Income Employees: Can Reduced Premiums Achieve Full Coverage? ." *Health Services Research*, 1997, 32(4), pp. 453-70.
- Cutler, David M. and Madrian, Brigitte C.** "Labor Market Responses to Rising Health Insurance Costs: Evidence on Hours Worked." *The RAND Journal of Economics*, 1998, 29(3), pp. 509-30.
- Dick, Andrew W.** "State Report: Will Employer Mandates Really Work? Another Look at Hawaii." *Health Affairs*, 1994, 13(1), pp. 7.
- Dor, Avi; Sudano, Joseph J. and Baker, David W.** "The Effects of Private Insurance on Measures of Health: Evidence from the Health and Retirement Study," *Working Paper Series*. National Bureau of Economic Research, 2003.
- Dow, W. H.; Philipson, T. J. and Sala-I-Martin, X.** "Longevity Complementarities under Competing Risks." *American Economic Review*, 1999, 89(5), pp. 1358-71.
- Flynn, Patrice; Wade, Martcia and Holahan, John.** "State Health Reform: Effects on Labor Markets and Economic Activity." *Journal of Policy Analysis and Management*, 1997, 16(2), pp. 219-36.



- Foster, D. P. and Young, H. P.** "On the Impossibility of Predicting the Behavior of Rational Agents." *Proceedings of the National Academy of Sciences of the United States of America*, 2001, 98(22), pp. 12848-53.
- Frech, H. E. and Ginsburg, Paul B.** "Imposed Health Insurance in Monopolistic Markets: A Theoretical Analysis." *Economic Inquiry*, 1975, 13, pp. 55-70.
- Furman, Jason.** "Health Reform through Tax Reform: A Primer." *Health Affairs*, 2008, 27(3).
- Gaynor, Martin; Li, Jian and Vogt, William B.** "Is Drug Coverage a Free Lunch? Cross-Price Elasticities and the Design of Prescription Drug Benefits." *National Bureau of Economic Research*, 2006, Working papers w12758.
- Geweke, John.** "Macroeconometric Modeling and the Theory of the Representative Agent." *The American Economic Review*, 1985, 75(2), pp. 206-10.
- Gilleskie, D. B.** "A Dynamic Stochastic Model of Medical Care Use and Work Absence." *Econometrica*, 1998, 66(1), pp. 1-45.
- Gilleskie, D. B. and Lutz, B. F.** "The Impact of Employer-Provided Health Insurance on Dynamic Employment Transitions." *Journal of Human Resources*, 2002, 37(1), pp. 129-62.
- Ginsburg, Paul B.** "Employment-Based Health Benefits under Universal Coverage." *Health Affairs*, 2008, 27(3), pp. 675-85.
- Glied, Sherry A.; Hartz, Jacob and Giorgi, Genessa.** "Consider It Done? The Likely Efficacy of Mandates for Health Insurance." *Health Affairs*, 2007, 26(6).
- Goswami, G.; Grace, M. F. and Rebello, M. J.** "Experimental Evidence on Coverage Choices and Contract Prices in the Market for Corporate Insurance." *Experimental Economics*, 2008, 11(1), pp. 67-95.
- Gruber, Jonathan.** "Covering the Uninsured in the U.S." *NBER Working Paper Series*, 2008, (w13758).
- Gruber, Jonathan and Krueger, Alan B.** "The Incidence of Mandated Employer-Provided Insurance: Lessons from Employees' Compensation Insurance," *NBER Working Paper Series*. Cambridge, MA: NBER, 1990.
- Gruber, Jonathan and Rodriguez, David.** "How Much Uncompensated Care Do Doctors Provide?" *Journal of Health Economics*, 2007, 26(6), pp. 1151-69.
- Gruber, Jonathan and Simon, Kosali.** "Crowd-out Ten Years Later: Have Recent Public Insurance Expansions Crowded out Private Health Insurance?," *NBER Working Paper Series*. Cambridge MA: NBER, 2007.
- Gruber, Jonathan and Washington, Ebonya.** "Subsidies to Employee Health Insurance Premiums and the Health Insurance Market," *NBER Working Paper Series*. Cambridge, MA: NBER, 2003.
- \_\_\_\_\_. "Subsidies to Employee Health Insurance Premiums and the Health Insurance Market." *Journal of Health Economics*, 2005, 24(2), pp. 253-76.
- Heiss, F.; McFadden, D. and Winter, J.** "Who Failed to Enroll in Medicare Part D, and Why? Early Results." *Health Affairs*, 2006, 25(5), pp. W344-W54.



- Holzgraefe, John Richard.** “Controlling Health Care Costs through Commercial Insurance Companies.” *Duke Law Journal*, 1978, 1978(2), pp. 728-52.
- Kaestner, Robert and Simon, Kosali Ilayperuma.** “Labor Market Consequences of State Health Insurance Regulation.” *Industrial and Labor Relations Review*, 2002, 56(1), pp. 136-59.
- Kirman, Alan P.** “Whom or What Does the Representative Individual Represent?” *The Journal of Economic Perspectives*, 1992, 6(2), pp. 117-36.
- Krueger, Alan B.** “Observations on Employment-Based Government Mandates, with Particular Reference to Health Insurance,” *CEPS Working Paper Series*. Princeton, NJ: Princeton University, 1994.
- Kupiec, P.H. and Sharpe, S.A.** “Animal Spirits, Margin Requirements, and Stock Price Volatility.” *Journal of Finance*, 1991, 46(2), pp. 717-31.
- Lewbel, Arthur.** “Aggregation with Log-Linear Models.” *The Review of Economic Studies*, 1992, 59(3), pp. 635-42.
- Lewin, J.C. and Sybinsky, P.A.** “Hawaii’s Employer Mandate and Its Contribution to Universal Access.” *Journal of the American Medical Association*, 1993, 269(19), pp. 2538-43.
- The Lewin Group.** “Attachment B: Summary Description of the Health Benefits Simulation Model (Hbsm),” 2007, 23.
- Lichtenberg, Frank R. and Sun, Shawn X.** “The Impact of Medicare Part D on Prescription Drug Use by the Elderly.” *Health Affairs*, 2007, 26(6), pp. 1735-44.
- Lucas, Robert E. Jr.** “Econometric Policy Evaluation: A Critique,” K. Brunner and A. H. Meltzer, *The Phillips Curve and Labor Markets*. 1976, 19-46.
- MaCurdy, Thomas E.** “An Empirical Model of Labor Supply in a Life-Cycle Setting.” *Journal of Political Economy*, 1981, 89(6), pp. 1059-63.
- McFadden, D.** “Free Markets and Fettered Consumers.” *American Economic Review*, 2006, 96(1), pp. 5-29.
- Neubauer, Deane.** “Hawaii: A Pioneer in Health System Reform.” *Health Affairs*, 1993, 12(2), pp. 31-39.
- Plott, C. R.** “Laboratory Experimental Testbeds: Application to the PCS Auction.” *Journal of Economics & Management Strategy*, 1997, 6(3), pp. 605-38.
- Rivlin, Alice M.** “Social Experiments: Promise and Problems.” *Science*, 1974, 183(4120):35
- Roth, A. E.** “The Economist as Engineer: Game Theory, Experimentation, and Computation as Tools for Design Economics.” *Econometrica*, 2002, 70(4), pp. 1341-78.
- Schoen, Cathy; Davis, Karen and Collins, Sara R.** “Building Blocks for Reform: Achieving Universal Coverage with Private and Public Group Health Insurance.” *Health Affairs*, 2008, 27(3), pp. 646-57.
- Smith, Vernon L.** “Constructivist and Ecological Rationality in Economics.” *American Economic Review*, 2003, 93(3), pp. 465-508.



\_\_\_\_\_. "Trust the Customer!" *Wall Street Journal*, 2006, pp. A20.

**So, Ying and Kuhfeld, Warren F.** "Multinomial Logit Models," SUGI 20.

**Steuerle, C Eugene.** "Implementing Employer and Individual Mandates." *Health Affairs*, 1994, 13(2), pp. 15.

**Stoker, Thomas M.** "Simple Tests of Distributional Effects on Macroeconomic Equations." *The Journal of Political Economy*, 1986, 94(4), pp. 763-95.

**Summers, Lawrence H.** "Some Simple Economics of Mandated Benefits." *The American Economic Review*, 1989, 79(2), pp. 177-83.

**Thurston, Norman K.** "Labor Market Effects of Hawaii's Mandatory Employer-Provided Health Insurance." *Industrial and Labor Relations Review*, 1997, 51(1), pp. 117-35.

**Weil, Alan.** "How Far Can States Take Health Reform?" *Health Affairs*, 2008, 27(3), pp. 736-47.

**Wharam, J. Frank and Daniels, Norman.** "Toward Evidence-Based Policy Making and Standardized Assessment of Health Policy Reform." *Journal of the American Medical Association*, 2007, 298(6), pp. 676-79.

**Winter, J.; Balzal, R.; Caro, F.; Heiss, F.; Jun, B. H.; Matzkin, R. and McFadden, D.** "Medicare Prescription Drug Coverage: Consumer Information and Preferences." *Proceedings of the National Academy of Sciences of the United States of America*, 2006, 103(20), pp. 7929-34.

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**Stephen Rassenti** is a professor of economic system design and the Director of the Economic Science Institute at Chapman University. After working at Bell Laboratories in the early 80's modeling communication systems, he joined forces with Nobel Laureate Vernon Smith to found a laboratory dedicated to conducting economics experiments that test the viability of alternative and novel institutional arrangements. Dr. Rassenti has been a frequent principal investigator and the author of over 50 papers on designing market-based mechanisms to maximize social welfare. His current research interests include: testing the viability of employer-sponsored health insurance programs, assessing the impact of a "dual track" alternative to the FDA drug approval process, designing a market based approach to Navy personnel reassignment, evaluating government sponsored auctions intended to increase the capacity of utilities to deliver electric power at competitive prices, and designing a combinatorial auction process for the allocation of inter-related space capsule resources amongst competing users. Dr. Rassenti holds a Ph.D. in Systems Engineering from the University of Arizona.

rassenti@chapman.edu  
714.628.2830

Economic Science Institute (ESI)  
Chapman University  
One University Drive,  
Orange, CA 92866

**Carl A. Johnston, Ph.D.**, is an affiliated post-doctoral research fellow at the Interdisciplinary Center for Economic Science at George Mason University where he studies health care and public economic institutions using economic laboratory and agent-based computer simulation techniques. He received his Ph.D. from George Mason University in 2007. His dissertation, "Medicare Part D: an institutional analysis," used experimental and simulation techniques to examine aspects of the program's design as an economic system. Current work focuses on health care finance, but also includes economic system design for defense agencies and public utilities. Prior to graduate school, Dr. Johnston was a research associate at Harvard Business School, and was a former journalist. He received his B.A. from Stanford in 1982.

cjohnstl@gmu.edu  
703.993.4856

Interdisciplinary Center for Economic Science (ICES)  
George Mason University  
4400 University Drive, MSN 1B2,  
Fairfax, VA 22030



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1201 "F" Street, NW  
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