Labor Market Effects of Employer-Provided Health Insurance

Katerina Sherstyuk,
Yoav Wachsman
and
Gerard Russo*

RRH: SHERSTYUK, WACHSMAN & RUSSO: HEALTH INSURANCE

*This research was funded in part through a U.S. Health Resources and Services Administration, State Planning Grant to the Hawaii State Department of Health, Prime Contract No. 1 P09 OA 00046-01. *Sherstyuk:* Corresponding author. Department of Economics, University of Hawaii at Manoa, 2424 Maile Way, Honolulu, HI 96822; Phone: (808)-956-7851; Fax: (808)-956-4347; Email: katyas@hawaii.edu. *Wachsman:* Wall College of Business, Coastal Carolina University; Phone: (843)-349-2683; Fax: (843)-349-2455; Email: yoav@coastal.edu. *Russo:* Department of Economics, University of Hawaii at Manoa; Phone: (808)-956-7065; Fax: (808)-956-4347; Email: russo@hawaii.edu.

JEL classification codes: C92, I18, J2.

Labor Market Effects of Employer-Provided Health Insurance

Abstract

This is an experimental study in economics of mandated benefits. Most individuals who have health insurance in the US obtain it through their employer. Some states either have or are considering government mandates that require employers to provide insurance to all full-time workers. We use an experimental laboratory to investigate possible effects of alternative health insurance regulations on the competitive labor market performance. We find that mandating the insurance for all workers creates labor market distortions; whereas mandating the insurance only for full-time workers leads to a higher coverage then under no mandate, an increased number of part-time workers, but does not necessarily lower market efficiency.

Katerina Sherstyuk
Department of Economics
University of Hawaii at Manoa

Yoav Wachsman
Wall College of Business
Coastal Carolina University

Gerard Russo
Department of Economics
University of Hawaii at Manoa

I INTRODUCTION

Increasing health insurance coverage is arguably an important policy goal. The Congressional Budget Office (2003) estimates that in 1998 20 to 30 million Americans had no health insurance for the entire year, approximately 40 million were uninsured at a specific point in time in the year and nearly 60 million were without coverage some time during the year. Most individuals who have health insurance in the US obtain it through their employer. In 1999, 65.8% of non-elderly Americans had employer-provided insurance, also called group insurance or employer-sponsored insurance, either through their own employer or through the employer of another household member; see Gruber (2001). Employer-provided insurance plans generally have lower premiums and offer more benefits than individual insurance plans. Health insurance providers can offer cheaper and better plans to company employees for at least two reasons. First, the average administrative cost of such plans is lower than individual plans. Second, employment-based plans are typically subject to less adverse selection than individual plans, particularly so for large employers. Furthermore, the tax-subsidy afforded employment-based health insurance renders the effective consumer price substantially lower than the cost; see Pauly (1986) and Gruber (2001). Together these various factors give a strong incentive for employers to offer and employees to accept coverage as part of their employment contract. As employer-provided insurance is by far the most prevalent form of coverage in the private sector, policy makers look to further expansion of this base as a way to insure the uninsured while avoiding direct public financing.

As a way to increase employer-based health insurance coverage, some states either have or are considering government mandates that require employers to provide insurance to certain types of workers.[1] The state of Hawaii requires private-sector employers to offer health insurance to all workers who work for more than 20 hours a week, and requires these workers

[1]There are other types of employer mandates in the United States. The Consolidated Omnibus Budget Reconciliation Act of 1985 (COBRA) mandates that employers continue offering insurance to former employees, at the employee's expense; see Gruber and Madrian (1995). Some state governments also mandate what benefits employers who offer health insurance must provide.

to have insurance. The state of California is currently considering a similar mandate. There is a considerable interest from policy makers on the effects of such mandates on labor market outcomes.

In this paper we report on an experiment that was designed to provide some insights about possible effects of alternative health insurance regulations on the competitive labor market, with a particular focus on mandates. Since we only consider a competitive market setting with complete contracts and no wage rigidities, our results may not be directly applicable to all labor market situations.[2] However, the study provides useful insights about the interaction of health insurance benefit provision, wages and employment structure for labor markets where the competitive wage setting and the complete contracts assumptions are reasonable. With these limitations in mind, our results can be also generalized to other types of employer-provided fringe benefits such as paid vacations or pension plans.

As any government intervention, health insurance regulation may affect the labor market. Theory predicts that in perfectly competitive labor markets, health insurance creates no distortionary effects on labor market equilibrium as long as the coverage is not mandated and there are no wage rigidities.[3] All workers who value insurance above its cost of provision are offered insurance and accept it; the wages are adjusted downwards; see Rosen (1986) and Gruber (2000). Summers (1989) uses a simple supply and demand analysis to show that the effect of increases in premiums on equilibrium labor hours and wage depends both on the elasticity of labor demand and labor supply, and on how fully workers value changes in the cost of health insurance. If the demand or the supply of labor are completely inelastic, or if workers fully value the insurance, then an increase in the premium would result in an equal decrease (shift) in wages. Empirically, Gruber (1994) finds full shift in wages. Gruber and Krueger (1991) and Eberts and Stone (1985) find 83% to 86% shift in wages and no effect

[2]Several recent experimental studies of labor markets focus on the incomplete contracting framework; e.g., Fehr and Falk (1999). Our emphasis, however, is on the economics of mandated benefits, and the traditional complete contracts framework is chosen for this purpose. See more discussion on the limitations of the study at the end of this section.

[3]Employment-based insurance may, however, embody a distortion due to the favorable tax treatment. We hold this phenomenon aside in order to isolate the effects of mandates.

on total employment.

In addition to effects on equilibrium wages and employment levels, health insurance may have an effect on the structure of employment, as discussed in Currie and Madrian (1999) and Gruber (2000).[4] Two features of health insurance are relevant. First, from the employer's perspective, health insurance is a fixed cost of employment and not a variable cost. If an increased costs of insurance coverage does not translate in the corresponding hourly wage reduction (due to a market imperfection), employers will hire fewer workers but demand increased work hours from those hired. Second, part-time and temporary workers are more readily excludable from health insurance coverage.[5] This may create a countervailing effect on the employer side, with full-time workers being replaced with uninsured part-time and temporary workers. These forces are working in different direction; Currie and Madrian (1999) report that the empirical evidence on the tradeoff between full-time and part-time employment is mixed.

The effect of health insurance mandates on the labor market has been discussed in the literature using theoretical and empirical methods. Summers (1989) suggests an efficiency argument for mandating employee benefits rather than providing insurance publicly. He shows that mandated benefits programs avoid the deadweight loss of public (tax-financed) provision. Requiring employers to provide health insurance to workers will not lead to welfare losses if the insurance is fully valued by workers. However, in reality, some workers may under-value insurance. Currently, Hawaii is the only state that mandates employer-provided health insurance for full-time workers; yet, part-time and temporary workers are excluded. The effect of such type of mandate is not discussed in the theoretical literature. Emprically, Thurston (1997) estimates that the industries in Hawaii that were most affected by the implementation of the health insurance mandate saw the greatest shift from full-time

[4]Market imperfections such as different insurance plans offered by different employers, and wage rigidities (e.g., minimum wage laws), may also lead to labor market distortions in the form of "job locks" and "employment locks".

[5]Government non-discrimination rules stipulate that if the firm is to provide health insurance, it must make it widely available to all employees. However, these rules do not apply to part-time, temporary or seasonal workers.

to part-time employment.

We use an experimental approach to consider possible effects of various health insurance (or other fringe benefits) mandates on the competitive labor market equilibrium. We study a competitive labor market with voluntary provision of health insurance (no mandate) and compare its performance with labor markets where the insurance is mandated to all workers (full mandate), or only to full-time workers (partial mandate, as in Hawaii). We demonstrate that these regulations may result in different labor market outcomes and employment composition even in a competitive setting with no wage rigidities. If some workers value the insurance below its cost of provision, full mandate may lead to labor market inefficiencies. "Hawaii-type" partial mandate may result in a higher share of part-time workers, not only because firms may try to avoid paying the cost of health insurance, but also because workers who under-value insurance may opt for higher cash wages and no insurance, which they can get by working several part-time jobs rather than one full-time job. If there are no productivity losses due to part-time employment as compared to full-time employment, this supply side effect may help to avoid market inefficiency.

Experimental research has been used extensively to evaluate market outcomes and design policies in many fields, such as industrial organization and monopoly regulation (Isaac and Plott (1981); Smith (1981)); environmental regulation (Cason (1995); Muller et al. (2002)), and auction design (Banks, Ledyard and Porter (1989); Plott (1997)); see also Eckel and Lutz (2003). However, to the best of our knowledge, the effects of health insurance policies on the labor markets have not been studied in the experimental laboratory. Many labor market experiments, such as Bull, Schotter and Weigelt (1987), Fehr and Falk (1999), and Gneezy (2003), focus on incentive contracting issues, or on the wage formation and relation between wage and effort in the presence of market imperfections or incomplete contracts. In this study we consider a perfectly competitive labor market with complete labor contracts, both because this is in line with the cited above theoretical analysis of effects of health insurance on the labor market, and because it allows us to concentrate on the effects of health

insurance regulations per se, without other labor market distortions. Since other factors, such as wage rigidities, worker or employer market power, and contract incompleteness may have a significant effect on the labor market outcomes, this study should not be taken as a direct guide for policy making. However, it provides useful insights into the discussed policy alternatives within the competitive markets and complete contracts framework. The analysis is particularly applicable to sectors of the economy which have many low-skilled, low-wage jobs, with wages sufficiently above the minimum wage, such as in service industries. Competitive labor markets and complete contracts assumptions often apply there. Note that low-wage workers are often the ones who prefer cash wages to health insurance coverage. Part-time employment is quite common in services industries (e.g., restaurant services and retail trade). Furthermore, service industries account for an increasing proportion of GDP and are less likely to be subject to collective bargaining.

Theoretical model and its predictions are presented in Section II. Section III describes experimental design. In Section IV, we present experimental results. Section V discusses limitations and possible extensions of the model.

II THEORETICAL PREDICTIONS

We present a simple model of a competitive labor market, where employer-provided health insurance may be offered either on a voluntary basis, or is mandated for certain types of workers. The model is constructed to address the following questions:

1. Do the wages in a competitive labor market with insurance adjust downwards, so that the cost of insurance is indeed shifted from employers to workers?

2. Under voluntary provision of health insurance, does competitive labor market result in efficient sorting of workers, so that workers who fully value insurance obtain it, and workers who under-value insurance are employed at higher cash wages with no insurance benefit?

3. How does the presence of health insurance regulations, such as various types of mandates, affect the labor market efficiency?

4. Can the nature of an insurance mandate, if present, affect the structure of employment, even if there are no productivity differences between part-time and full-time labor? In particular, what is the effect of mandating insurance for full-time workers, but not for part-time workers?

5. How can health insurance mandates affect the insurance coverage rates among employed workers?

Accordingly, our model has the following features: (1) To be able to use the price-taking assumption in deriving equilibrium wages, we assume many firms and workers. (2) To address question 1, we consider labor markets with no wage rigidities such as minimum wage laws or union contracts. (3) To address questions 2-5, we assume that workers differ in their benefits from health insurance: some fully value insurance, while others under-value it. (4) To address question 4 and isolate the effects of health insurance regulations on the structure of employment, we assume that worker per unit labor cost is the same, whether he takes one full-time job or several part-time jobs. Further, we ignore possible external social benefits of health insurance, and assume that all benefits from health insurance are private. Throughout the analysis, we assume complete labor contracts. [6]

Formally, consider a competitive labor market with N workers, $i = 1, .., N$, and M firms, $j = 1, .., M$. Each worker is characterized by a constant marginal disutility (private cost) of labor e_i, and a fixed lump-sum private benefit b_i if he is given health insurance coverage. Worker health insurance benefit, expressed in monetary terms, may include his assessment of future medical expenses, gains or losses from risk reduction due to insurance, tax benefits, and possibly other factors.[7] If worker i supplies l_{ij} units of labor to firm j, is paid a per unit

[6] In section V, we will discuss how relaxing these assumptions may change the model predictions.

[7] We emphasize that health insurance benefit is defined more broadly than expected cost of health care, and therefore does not translate directly into the insurance premium charged by insurance companies.

wage $w_{ij} \geq 0$, and firm j provides the share y_{ij} of his health insurance benefits, then this worker's utility from employment at this firm is $((w_{ij} - e_i)l_{ij} + b_i y_{ij})$.[8] Assuming the worker may work for more than one firm, his total utility from employment is:

$$U_i = \sum_j ((w_{ij} - e_i)l_{ij} + b_i y_{ij}). \tag{1}$$

Suppose that each worker can supply up to $\bar{l}^w$ units of labor (the same for all workers). Then feasibility requires that $l_{ij} \geq 0$, $\sum_j l_{ij} \leq \bar{l}^w$, $y_{ij} \geq 0$, $\sum_j y_{ij} \leq 1$. We constrain our attention to employer-provided health insurance, which implies an additional feasibility constraint:

$$\text{if } l_{ij} = 0, \text{ then } y_{ij} = 0. \tag{2}$$

Each firm j receives a constant marginal revenue v_j from each unit of labor hired, and it can hire a maximum of $\bar{l}^f$ units of labor (for technological reasons, or due to capacity constraints); this capacity constraint is the same for all firms. The cost of providing insurance for the firm is c_j per worker; for simplicity, we assume that this cost does not depend on the total number of workers insured and it does not vary across firms, $c_j = c$.[9] Firm j total profit from employment is then given by

$$\pi_j = \sum_i ((v_j - w_{ij})l_{ij} - c \cdot y_{ij}) \tag{3}$$

with $\sum_i l_{ij} \leq \bar{l}^f$.

A labor market outcome is efficient if the allocation of workers across firms and the health insurance coverage matrices $\{l_{ij}\}$, $\{y_{ij}\}$ maximize the total surplus in the labor market, which is[10]

$$S = \sum_{ij} (v_j - e_i)l_{ij} + \sum_{ij} (b_i - c)y_{ij}. \tag{4}$$

[8] Our notation is somewhat different from the the experimental literature on the wage-effort games, where e usually denotes a non-contractible choice of effort by worker, and $c(e)$ denotes the corresponding disutility of effort (e.g., Fehr and Falk, 1999). In our setting, the contracts are complete, and since effort is not a choice variable, e is used to denote worker's constant marginal disutility of effort (labor), while c is used to denote firm's cost of providing health insurance to worker.

[9] It has been shown empirically that bigger firm can generally provide better health insurance benefits at lower cost, i.e., per worker cost of health insurance decreases with an increased number of covered workers. We abstract away from this aspect by assuming that all firms are comparable in size. See also footnote 7.

[10] We take a partial equilibrium approach and focus on the performance of the labor market. Hence the insurance premium c charged by insurance companies is treated as an exogenous variable, and the profits of insurance companies are not accounted for in the efficiency analysis.

Given the assumptions of the model, it is obvious that an allocation is efficient only if a worker is provided with insurance if he values the health insurance above its cost, and is not provided otherwise; any firm can provide the insurance. Formally, efficiency requires that, for employed workers, $\sum_j y_{ij} = 1$ if $b_i \geq c$, and $\sum_j y_{ij} = 0$ if $b_i < c$. For each worker i, define insurance-benefit-adjusted worker disutility of labor as

$$\tilde{e}_i = \min\{e_i, e_i - (b_i - c)/\bar{l}^w\} \tag{5}$$

Then an allocation of workers across firms is efficient only if it maximizes

$$\tilde{S} = \sum_{ij}(v_j - \tilde{e}_i)l_{ij}. \tag{6}$$

Now suppose health insurance is mandated for all employed workers. Then a firm's mandate-adjusted per unit revenue from employment is $(v_j - c/\bar{l}^w)$, and a worker disutility of labor net of insurance benefit is $(e_i - b_i/\bar{l}^w)$. To make the efficiency analysis comparable with the no mandate case, let $\tilde{\tilde{e}}_i$ denote worker disutility of labor adjusted for mandated health insurance:

$$\tilde{\tilde{e}}_i = e_i - (b_i - c)/\bar{l}^w \tag{7}$$

The mandate-constrained efficient allocation of workers across firms maximizes

$$\tilde{\tilde{S}} = \sum_{ij}((v_j - c/\bar{l}^w) - (e_i - b_i/\bar{l}^w))l_{ij} = \sum_{ij}(v_j - \tilde{\tilde{e}}_i)l_{ij}. \tag{8}$$

It is then obvious that $\tilde{\tilde{e}}_i \geq \tilde{e}_i$, and hence the full health insurance mandate may reduce labor market efficiency.

We can use simple supply and demand analysis to represent efficient and mandate-constrained-efficient allocation of workers across firms. Given the constant marginal disutility of labor for workers and constant marginal revenue function for firms, efficiency prescribes that each worker either sells all his labor, or does not sell at all; and each firm either operates at a maximal capacity, or does not operate at all (except, possibly, for marginal firms and workers). Workers whose insurance-adjusted disutility of labor ($\tilde{e}_i$ for the no mandate case, and $\tilde{\tilde{e}}_i$ for the full insurance mandate case) is below a certain threshold trade with firms

whose revenue is above the threshold. (In a competitive market, this threshold level is equal to the competitive insurance-adjusted wage rate.) The allocation of worker labor units across participating firms does not affect efficiency.

The following numerical example with $M = 5$ firms and $N = 5$ workers illustrates. Let $\bar{l}^w = \bar{l}^f = 2$. The parameter values, chosen in view of questions 1 - 5 stated at the beginning of this section, are given in Table 1. (The same parameters will be used in the experimental design). Figure 1 illustrates the fully efficient labor market outcome, and Figure 2 illustrates the case of mandated health insurance.[11]

TABLE1 AND FIGURES 1, 2 AROUND HERE

Efficiency dictates that workers 1-4 should sell their labor to firms 6-9, and workers 1 and 2 should get insurance (since $b_i \geq c$ for them), while workers 3 and 4 should stay uninsured (since $b_i < c$). As can be inferred from the table and the figures using equation 6, the labor market surplus achieved at the fully efficient allocation is $\tilde{S} = 224$. If, however, insurance is mandated for all workers, then insurance-adjusted disutility of labor rises for workers 3 and 4. Although the composition of the employed workers remains unchanged, from equation 8, the mandate-constrained labor market surplus decreases to $\tilde{\tilde{S}} = 200$.

Our research objective is to consider competitive labor market outcomes and equilibrium wages that will prevail under the following four institutions:

1. **No mandate** Unregulated competitive labor markets. Labor is traded, and insurance is offered and accepted, on a voluntary basis. In addition to all previous feasibility constraints on insurance provision, we assume that health insurance is traded as a discrete good:

$$y_{ij} \in \{0, 1\} \text{ for all } i, j. \tag{9}$$

[11] In Figure 1 (left) and Figure 2, for the markets with insurance, demand for labor is constructed using firm insurance-adjusted marginal revenues ($v_j - c/\bar{l}^w$), and the supply of labor is constructed using worker insurance-adjusted disutilities of labor ($e_i - b_i/\bar{l}^w$). Both firm's cost of insurance c and worker benefit of insurance b_i are pro-rated per unit of labor, based on full-time employment. For the market without insurance (Figure 1, right), the demand and supply of labor are constructed using firm unadjusted marginal revenues from employment v_j and worker unadjusted marginal disutilities of labor e_i. Such representation will further allow us to use the same graphs to illustrate market equilibrium wage rates.

2. **Full mandate** Firms are mandated to offer, and workers are mandated to accept health insurance. If a worker sells his labor to several firms (takes up several part-time jobs), then he should buy full health insurance from one of the firms. Insurance coverage cannot be split among several employers. Hence the full mandate translates into the following additional constraints on the health insurance provision: constraint 9, and:

$$\text{if } l_{ij} > 0 \text{ and } \sum_{l \neq j} y_{il} = 0, \text{ then } y_{ij} = 1, \text{ for all } i, j. \tag{10}$$

3. **Partial mandate** Firms are mandated to offer health insurance to all workers whom they hire for more than half-time, unless these workers already have health insurance from another employer. For part-time workers (employed less than half time), insurance is offered on voluntary basis. Insurance costs cannot be split among several employers. Additional feasibility constraints are then constraint 9, and:

$$\text{if } l_{ij} > \bar{l}^w/2 \text{ and } \sum_{l \neq j} y_{il} = 0, \text{ then } y_{ij} = 1 \text{ for all } i, j. \tag{11}$$

4. **Sliding scale** [12] Firms are mandated to provide insurance coverage to each worker in proportion to the number of labor units they hire from this worker. Hence the constraint 9 is relaxed, and is replaced with:

$$y_{ij} = l_{ij}/\bar{l}^w \text{ for all } i, j. \tag{12}$$

It is obvious from the above supply-demand analysis that competitive labor market equilibrium will exist under both the no mandate and the full mandate institutions, and will implement an efficient (or, correspondingly, mandate-constrained efficient) allocation of labor across firms, and health insurance provision (Figures 1, 2, and Table 1). In a competitive equilibrium, all workers employed with insurance will be paid at the same per unit wage rate w^I, and all workers employed without insurance will be paid at a different (higher) wage rate w^N. In terms of labor market efficiency, the two institutions compare as follows.

[12] This policy has been discussed as an alternative to the full mandate that may guarantee some minimal coverage for part-time workers, and not over-burden firms with full insurance costs.

Prediction 1 *If some workers under-value health insurance, $b_i < c$ for some i, then the Full Mandate institution will result in a lower labor market efficiency than the No Mandate, since under the former all employed workers will be forced to take health insurance.*

It is left to note that, under our assumptions, the No Mandate and the Partial Mandate institutions are equivalent in terms of predicted efficiency, equilibrium wages and health insurance coverage rates; similarly, the Full Mandate and the Sliding Scale institutions are also equivalent in these respects.

Prediction 2 *If there are no efficiency losses from a worker taking several part-time jobs as compared to one full-time job, then the No Mandate and the Partial Mandate institutions are equivalent in terms of predicted efficiency, equilibrium wages and insurance coverage rates. Under the Partial Mandate, workers who under-value health insurance will split their employment among several part-time jobs to avoid the health insurance coverage and to get higher cash wages. Thus, the Partial Mandate may lead to a higher share of part-time workers.*

Prediction 3 *If it is mandate-constrained-efficient to employ each worker either full-time or not to employ him at all, then the Full Mandate and the Sliding Scale institutions are equivalent in terms of predicted labor market efficiency, equilibrium wages and insurance coverage rates.*

We continue with our numerical example to illustrate the above predictions. To characterize the equilibrium outcomes under each institution, we derive the equilibrium wages that support efficient (for the No Mandate or the Partial Mandate), or mandate-constrained-efficient (for the Full Mandate and the Sliding Scale) allocations. For the No Mandate or the Partial Mandate institutions, there are two equilibrium wages (w^I, w^N), depending on whether a worker is employed with or without insurance. Straightforward calculations yield

the equilibrium per unit wage ranges[13]

$$w^I \in (42, 48), \quad w^N \in (58, 64), \text{ with } w^N = w^I + 16. \tag{13}$$

Two out of four employed workers are employed without insurance, and two out of four workers are employed with insurance. Therefore the insurance coverage rate among the employed is 50%. Market equilibrium outcomes under No Mandate and Partial Mandate may be also inferred from Figure 1.[14]

For the Full Mandate and the Sliding Scale institutions, there is a unique insurance-adjusted equilibrium wage w^I, which is

$$w^I \in (42, 48). \tag{14}$$

All four employed workers are employed with insurance; hence the insurance coverage rate among the employed is 100%. The equilibrium outcomes under the Full Mandate and the Sliding Scale may be inferred from Figure 2.

Below we describe a laboratory experiment designed to test the above predictions.

III EXPERIMENTAL DESIGN

Groups of ten subjects participated in non-computerized double auction markets for a fictitious good (labor). There were five buyers (firms) and five sellers (workers). We chose the double auction institution with the roles of buyers and sellers trading a fictitious good because of the double auction's robust equilibrium convergence properties (e.g., Davis and Holt, 1993). Trading occurred in a sequence of 10 trading periods. In each period, each buyer could buy, and each seller could sell, up to two units of the good. One unit of the good represented part-time employment, and two unit sold to the same buyer – full-time

[13]Expressions 13 and 14 are derived in Appendix A. These are per unit averages based on full-time employment. In equilibrium for the given parameter values, each worker is either employed full-time, or not employed at all.

[14]It may appear from Figure 1 that the equilibrium wage range in the market without insurance is $w^N \in (58, 66)$. However, in equilibrium of our model, all firms are indifferent between trading in markets with and without insurance, which translates into an additional constraint on wages: $w^N = w^I + 16$. Since $w^I \in (42, 48)$, we then obtain $w^N \in (58, 64)$.

employment. Units of the good could be traded separately or in packages of two. In addition, each seller could (or had to, depending on the treatment) request, and each buyer could (had to) offer, to provide a fictitious service (insurance) in exchange for the good(s). The service was beneficial to the sellers but was costly for the buyers to provide.

Parameter values for the buyers (firms) and sellers (workers) were as given in Table 1. They remained unchanged for the first five periods and then were rotated across subjects after period 5 to equalize expected earnings. Each subject stayed in the role of either a buyer or a seller for the whole duration of the session.

We considered four treatments, corresponding to four policy alternatives discussed in section II: (1) No Mandate, (2) Partial Mandate, (3) Full Mandate, and (4) Sliding Scale. Depending on the treatment, in each period there were up to four interdependent concurrent double auction markets which differed in how the good (labor) was traded:

Market A: separate units, no service (part-time labor without insurance);

Market B: separate units, with service (part-time labor with insurance);

Market C: packages of 2 units, no service (full-time labor without insurance);

Market D: packages of 2 units, with service (full-time labor with insurance).

Buyers (i.e., firms) and sellers (i.e., workers) could submit bids and asks in any or all markets, except for treatment-specific rules that follow; in addition, each trader could trade no more than the total of 2 units in each period (representing the workers' endowments of labor, and the firms' capacity constraints). In the No Mandate treatment, all four markets were operational. In the Partial Mandate treatment, market C was absent, and no seller was allowed to sell two units in market in A to the same buyer (full-time employment without insurance was ruled out). In the Full Mandate treatment, market C was also absent, and each seller had to sell one unit in market B before they were allowed to sell in market A (both full-time and part-time employment without insurance were ruled out). In the above three treatments, each seller could benefit from the service (insurance) only once in a period, and therefore in each period they could sell at most one unit in market B. In the Sliding

Scale treatment, only markets B and D were present (only employment with insurance was allowed), and sellers' benefits and buyer's costs of service were proportional to the number of units traded.

Design-specific predictions for equilibrium trades and price (i.e., wage) ranges, per treatment, are given in Table 2. The market prices given in Table 2 take into account the discrete nature of the service (health insurance) provision in all treatments other than the Sliding Scale (the service is either provided in full, or not provided at all); this explains slight differences between the predictions in Table 2 and expressions 13-14. Detailed derivations of price ranges for Table 2 are given in Appendix B.

TABLE 2 AROUND HERE

Each period lasted for the maximum of 5 minutes, and was closed earlier if there was no bidding activity for 20 seconds. All bids, asks and transactions were recorded on an overhead in front of the subjects. In addition to required record sheets to keep track of own transactions, the subjects were given optional record sheets to record all market transactions and price history.[15]

The total of 16 sessions, 4 for each treatment, were conducted at the University of Hawaii. Most subjects were undergraduate students recruited through class announcement. Each session had a trial period before the actual experiment began. Subjects were paid at the exchange rate of 0.08 dollars per experimental pesos. The average earnings in the experiment, including a 5 dollar show-up fee, were 20.39 dollars. The average earnings were the highest in the No Mandate treatment (21.49 dollars), and the lowest in the Full Mandate treatment (19.52 dollars).

[15]Experimental instructions and sample record sheets for the No Mandate treatment are included in Appendix C.

IV RESULTS

Since trading in each treatment involved complex systems of inter-dependent markets with package trading, our first objective is to check whether overall market performances in terms of the market efficiency and prices (i.e., wages) were close to the equilibrium predictions. We then compare relative performances of experimental labor markets across the four treatments (policy scenarios) of interest.

General theoretical predictions were discussed in section II. Table 3 reports overall efficiency of experimental markets, measured as the ratio of the actual labor market surplus to the maximal attainable surplus by treatment,[16] and provides some insight into possible sources of efficiency losses for each session and treatment. Tables 4 and 5 give detailed information on market prices (wages) by market and by treatment. Table 6 presents comparison of market outcomes under alternative policy regulations.

TABLE 3 AROUND HERE

Result 1 (Overall market performance) *Overall, the markets in each treatment reached high levels of efficiency: the actual market surplus was close to the maximal attainable surplus. Most of the trades were at prices close to equilibrium.*

Support: Table 3. For all treatments, the actual labor market surplus was within 13% of the maximal attainable surplus (i.e., the unconstrained optimum for the No Mandate and Partial Mandate treatments, and mandate-constrained optimum for the Full Mandate and the Sliding Scale treatments). It was 89.68% for the No Mandate treatment, 87.49% for the Partial Mandate treatment, 91.35% for the Full Mandate treatment, and 93.93% for the Sliding Scale treatments. Even though in many cases the average trading prices(wages) were outside the equilibrium range (Table 4), the shares of trades that fell within 5 pesos of equilibrium price ranges averaged over 65% for all treatments (Tables 3, 5).[17] □

[16]The maximal attainable surplus is calculated using equation 6 for the No Mandate and the Partial Mandate treatments, and equation 8 for the Full Mandate and the Sliding Scale treatments.

[17]The prices fell within the exact equilibrium price ranges only in 33% of all cases. However, this may

TABLES 4, 5 AROUND HERE

Result 2 (Market wages with and without insurance) *As predicted, the prices (wages) in the markets with insurance were lower than those in the markets with no insurance, in all treatments. In the Full Mandate treatment, the prices in the markets with insurance adjusted downward fully by the cost of insurance. However, in the No Mandate and in the Partial Mandate treatments, the price adjustment was not complete; the prices in the markets with insurance stayed above the equilibrium level in many cases.*

Support: Tables 4, 5. In all treatments, the average prices in market B were significantly below the prices in market A, according to the t-test. Per unit prices in market D were significantly below per unit prices in market C (No Mandate treatment; p-value is 0.014), or those in market A, if market C was excluded by design (Partial Mandate and Full Mandate treatments).[18] However, for the No Mandate and the Partial Mandate treatments, the hypothesis of $p_B = p_A - 32$, and that of $p_D = p_C - 32$ (for the No Mandate), or $p_D = 2p_A - 32$ (for the Partial Mandate and Full Mandate treatments) is rejected (t-test, two-sided). For the Full Mandate treatment, the hypothesis of $p_B = p_A - 32$ cannot be rejected for two out of four sessions (sessions 1 and 3); the hypothesis of $p_D = 2p_A - 32$ cannot be rejected for all four sessions and overall (p-value is 0.47). □

Result 3 (Sorting of workers across markets with and without insurance) *In the treatments with voluntary provision and acquisition of insurance, there were some instances*

be due to narrow equilibrium price ranges. We are considering the prices within 5 pesos of equilibrium to evaluate the share of trades "close" to equilibrium.

[18] Due to a very low volume of trades in market B under the No Mandate treatment (see Table 4), the hypothesis of the average trading price in market B (45.67 pesos) being different from the average trading price in market A (56.96 pesos) can be rejected at 5% confidence level, but not 10% level (p-value is 0.086). In all other cases, the hypotheses of no difference between the average prices in market A and in market B, and in markets C and D (or market A and per unit price in market D, if market C is excluded by design), is rejected at any conventional confidence level. Non-parametric Wilcox-Mann-Whitney rank sum tests on the session level average prices confirm the results of the t-test: For the hypothesis of no difference between prices in markets A and B, the p-values are 0.100, 0.014 and 0.014 for the No Mandate treatment, the Partial Mandate and the Full Mandate treatments, respectively. For the hypothesis of no difference between average prices in markets C and D in the No Mandate treatment, the p-value is 0.014.

of under-insurance and over-insurance by workers. However, most of the workers who fully valued insurance obtained the insurance, and most of the workers who under-valued insurance stayed uninsured.

Support: Table 3. In the No Mandate treatment, on average, only 0.28 employed workers who fully valued insurance did not buy insurance, and only 0.23 workers who under-valued insurance did get insurance (Table 3). In the Partial Mandate Treatment, there were no under-insured workers (those who fully valued insurance and did not get it), and the average number of over-insured workers (those who under-valued insurance but got insured) was 0.23 (Table 3). □

Since our experiment is among the very few that involved non-computerized auctions with package trading, it is of interest to note that apparently the experimental subjects were not overwhelmed by the market complexity, and were able to trade quite efficiently in up to four concurrent interdependent markets.[19] Consideration of the bidding data suggests that, indeed, many subjects were placing bids in several markets at the same time. For example, a buyer (firm) who entered a bid in market A (single unit, without insurance) would typically enter another, lower bid in market B (single unit, with insurance). Trading in the markets for packages (markets C and D, representing full-time labor) was also very popular; see Table 5 for the number of trades in each market, session and treatment. For example, Table 5 reports that in the No Mandate Treatment overall, 77 and 62 package trades were carried out in market C (without insurance) and market D (with insurance), respectively, as compared to only 27 and 12 single-unit trades in market A (without insurance) and market B (with insurance), respectively. This shows that most of the subjects were not only able to trade in the "right" markets (with or without insurance), but, unless there were special reasons not to (as in the Partial Mandate treatment; see below), they used package trading, most likely to "economize" on internal transaction costs of bidding.

Thus, based on the experimental evidence, our answers to questions 1 and 2 of section

[19]We are grateful to the anonymous referee for bringing up this point.

II are largely positive. Next we compare relative performances of markets across the four treatments. In view of questions 3-5 of section II, we look at three main aspects in comparing alternative health insurance policy scenarios: (1) Labor market efficiency; (2) Share of part-time workers; (3)Insurance coverage rates among employed.

Table 6 summarizes experimental results by treatment, along with the design-specific predictions, focusing on the above issues of interest.

TABLE 6 AROUND HERE

Result 4 (Efficiency comparison across treatments) *In line with the theoretical predictions, the No Mandate and the Partial Mandate treatments result in higher efficiency than the Full Mandate and the Sliding Scale treatments. The differences between the No Mandate and the Full Mandate, and the Partial Mandate and the Full Mandate is statistically significant. That is,*

No Mandate $\approx$ *Partial Mandate* $>$ *Full Mandate* $\approx$ *Sliding Scale*

Support: Table 6. The average per treatment efficiency was 89.68% for the No Mandate and 87.49% for Partial Mandate, as compared to 81.56% for the Full Mandate and and 83.86% for the Sliding Scale. The difference between the No Mandate and the Partial Mandate is not significant according to the Wilcoxon-Mann-Whitney test (p-value is 0.343), while the differences between the No Mandate and the Full Mandate, and the Partial Mandate and the Full Mandate are both highly significant (p-values are 0.014 in both cases). Efficiency under the Sliding Scale is significantly below that of the No Mandate (p-value is 0.057), and is not statistically different from the Full Mandate (p-value is 0.343). $\square$

Result 5 (Share of part-time workers) *In line with the theoretical predictions, the Partial Mandate had a higher share of part-time workers than any other treatment. The difference between the Partial Mandate treatment and all other treatment is highly significant.*

Support: Table 6. The share of part-time workers in the Partial Mandate treatment was 63.39%, as compared to 12.92% under the the No Mandate, 41.69% under the Full Mandate, and 24.05% under the sliding scale. The corresponding p-values are 0.014, 0.057, and 0.014. □

We also note that the No Mandate, Full Mandate and the Sliding Scale treatment differed across each other substantially in the share of part-time workers. However, this is quite acceptable, since in our model there is no efficiency reason for a worker to take one full-time job rather than several part-time jobs. What matters, however, is a significant increase in the part-time workers in the Partial Mandate treatment as compared to other treatments.

Result 6 (Insurance coverage rates) *In contrast with the theory, the Partial Mandate treatment led to a higher insurance coverage rate than the No Mandate treatment. Some worker in the No Mandate treatment were under-insured, while none were under-insured in the Partial Mandate treatment.*

Support: Tables 6, 3. The average insurance rate among employed workers in the No Mandate Treatment was 44.0% as compared to the theoretical prediction of 50%; for the Partial Mandate, it was 60.46% (with the same theoretical prediction of 50%). The difference between the No Mandate and the Partial Mandate insurance rates is highly significant (p-value is 0.014). From Table 3, we infer that in the no Mandate treatment, some workers who fully valued insurance did not get it, while there were no such instances in the Partial Mandate treatment. In both treatments, there were comparable numbers of instances of insurance by workers who under-valued it. □

We now come back to questions 1-5 and to the theoretical predictions of section II. We conclude that, overall, most theoretical predictions are confirmed in our data. Experimental labor markets were characterized by reasonably high efficiency. Average prices (wages) in markets with insurance were lower than in the markets without insurance, indicating that the cost of health insurance was passed over from firms to workers. Unless prohibited by regulations, most workers were able to sort themselves efficiently across markets with and without

insurance. However, there were two distinct sources of efficiency losses: (1) behavioral imperfections, such as trading by extra-marginal players, over-insurance and under-insurance; and (2) efficiency distortions due to health insurance regulations. We note that efficiency losses due to behavioral imperfections were smaller, and prices were closer to equilibrium predictions, under the Full Mandate and the Sliding Scale treatments than under the other two treatments (see Table 3); this was probably due to a lower complexity (because of fewer choices) of decision-making under the Full Mandate and the Sliding Scale treatments as compared to the No Mandate and the Partial Mandate treatments. However, regulatory distortions outweighed the behavioral aspect and resulted in a lower labor market surplus under the Full Mandate and the Sliding Scale treatments than under the No Mandate and the Partial Mandate treatments (Table 6). As predicted, the Partial mandate led to a higher percentage of part-time workers, due to some workers' desire to substitute heath insurance benefits for higher cash wages. Interestingly, in contrast with the theoretical prediction, we also find that the Partial Mandate resulted in a higher insurance rate than the No Mandate: none of the workers under-insured under the Partial Mandate, while some did under the No Mandate. However, we did not find that the Partial Mandate resulted in a higher efficiency than the No Mandate, most likely because of a higher number of extra-marginal trades in the Partial Mandate treatment (Table 3). Finally, as predicted, we did not find any differences in labor market performances between the Full Mandate and the Sliding Scale treatments.

V DISCUSSION

This research confirms some earlier predictions on the effects of health insurance provisions on the competitive labor market, and provides new insights into several important real-world phenomena. First, we provide experimental support for substitution between wage and non-wage benefits, as discussed in Woodbury (1983). We demonstrate that the wages in the competitive labor markets with insurance adjust downward relative to the wages in the markets without insurance. Further, we suggest a theoretical explanation for why, and confirm

experimentally, that Hawaii-type partial mandate may lead to an increased number of part-time workers, a phenomenon that has been earlier reported in the empirical literature, as in Thurston (1997).[20] Finally, if the policy objective is to increase health insurance coverage, we suggest that a partial mandate may have some advantages over an unregulated health insurance market. Our experiments show that in the presence of behavioral imperfections, workers are less likely to under-insure under a partial health insurance mandate than under no mandate.

One should be aware that some of the conclusions of this study are sensitive to the modeling assumptions, and the discussed policy alternatives may compare differently if the assumptions of the model are altered. If workers are less productive on part-time jobs than on full-time jobs, then a high share of part-time workers may lead to efficiency losses. The presence of incomplete labor contracts and other sources of wage rigidities (such as minimum wage laws, or presence of labor unions) may have a significant effect on outcomes. Further, if there are external social benefits of having workers insured, then the full mandate may be a desirable policy alternative even if some workers' private benefits are below insurance costs. These issues are to be considered in further research but are outside the scope of this paper.

Appendix A: Equilibrium per unit wages in markets with and without insurance

Here we derive equilibrium wage ranges given by expressions 13 and 14. In order to support an efficient allocation of workers and firms in labor market with and without insurance in the No Mandate or the Partial Mandate treatment, the following conditions have to be satisfied:

- Workers 1 and 2 prefer to be employed with insurance than employed without insur-

[20] Of course, there may be other phenomena that contribute to an increased the number of part-time workers under the partial mandate. For example, eligibility avoidance on the part of employers may play an important role if wages cannot fully adjust downwards; see, for example, Lee et al., 2003.

ance, and prefer to be employed with insurance than not employed at all:

$$2(w^I - e_i) + b_i \geq 2(w^N - e_i), \quad i = 1, 2; \tag{15}$$

$$2(w^I - e_i) + b_i \geq 0, \quad i = 1, 2; \tag{16}$$

- Workers 3 and 4 prefer to be employed without insurance than employed with insurance, and prefer to be employed without insurance than not employed at all:

$$2(w^N - e_i) \geq 2(w^I - e_i) + b_i, \quad i = 3, 4; \tag{17}$$

$$2(w^N - e_i) \geq 0, \quad i = 3, 4; \tag{18}$$

- Worker 5 prefers not to be employed than to be employed, with or without insurance:

$$0 \geq 2(w^I - e_5) + b_5; \tag{19}$$

$$0 \geq 2(w^N - e_5); \tag{20}$$

- Firms 6-9 prefer to employ at full capacity (two labor units per firm) than not to employ, and are indifferent between employing with or without insurance:

$$2(v_i - w^I) - c = 2(v_i - w^N), \quad i = 6, .., 9; \tag{21}$$

$$2(v_i - w^I) - c \geq 0, \quad i = 6, .., 9; \tag{22}$$

- Firm 10 prefers not to employ workers at all, than to employ them with or without insurance:

$$0 \geq 2(v_5 - w^I) - c; \tag{23}$$

$$0 \geq 2(v_5 - w^N). \tag{24}$$

Using parameter values from Table 1, and getting rid or redundancies, the worker constraints 15-20 reduce to:

$$w^N - 20 \leq w^I \leq w^N - 10; \tag{25}$$

$$30 \leq w^I \leq 48; \tag{26}$$

$$50 \leq w^N \leq 68. \tag{27}$$

The firm constraints 21-24 reduce to:

$$w^N = w^I + 16; \tag{28}$$

$$42 \leq w^I \leq 50. \tag{29}$$

Combining inequalities 25-29 yields the equilibrium wage ranges as given in 13.

Under the Full Mandate and the Sliding Scale, workers may not seek, and firms may not offer, employment without insurance. Hence the only equilibrium constraints on wages are participation constraints. For workers, these constraints are:

$$2(w^I - e_i) + b_i \geq 0, \quad i = 1, .., 4; \tag{30}$$

$$0 \geq 2(w^I - e_5) + b_5. \tag{31}$$

The participation constraints for firms are:

$$2(v_i - w^I) - c \geq 0, \quad i = 6, .., 9; \tag{32}$$

$$0 \geq 2(v_5 - w^I) - c. \tag{33}$$

Using parameter values from Table 1 and combining the above constraints, we obtain the equilibrium wage range as given in expression 14.

Appendix B: Derivations for Table 2

Here we derive equilibrium price (i.e., wage) ranges for each of the markets A, B, C and D, by treatment, as given in Table 2. As mentioned in the main text, these predictions differ slightly from those given by expressions 13-14 (except for the Sliding Scale treatment), since expressions 13-14 give per labor unit averages assuming full-time employment, whereas in the actual experiments the full benefit (cost) of service (i.e., insurance) could be obtained (borne) by trading just one unit of labor, as in Market B. This adds a number of extra selection and participation constraints on the prices (wages) as compared to those derived in Appendix A, and separate prices have to be determined for all four markets A-D.

No Mandate treatment. Here all four markets are operational. Let p_A, p_B, p_C and p_D be the corresponding prices (wages) in the four markets. The following constraints need to be satisfied to support an efficient allocation of workers across firms.

- Workers 1 and 2 are indifferent between selling a package in market D, or one unit in A and one unit in B. They prefer to sell in D than to sell in C, or only in A (one or two units), or only in B (one unit), or not to sell at all:

$$p_D + b_i - 2e_i = p_A + p_B + b_i - 2e_i, \quad i = 1, 2; \tag{34}$$

$$p_D + b_i - 2e_i \geq p_C - 2e_i, \quad i = 1, 2; \tag{35}$$

$$p_D + b_i - 2e_i \geq 2p_A - 2e_i, \quad i = 1, 2; \tag{36}$$

$$p_D + b_i - 2e_i \geq p_A - e_i, \quad i = 1, 2; \tag{37}$$

$$p_D + b_i - 2e_i \geq p_B + b_i - e_i, \quad i = 1, 2; \tag{38}$$

$$p_D + b_i - 2e_i \geq 0, \quad i = 1, 2. \tag{39}$$

- Workers 3 and 4 are indifferent between selling a package in market C, or two units in A. They prefer to sell in C than to sell in D, or in A and in B, or just one unit in A, or just one unit in B, or not to sell at all:

$$p_C - 2e_i = 2p_A - 2e_i, \quad i = 3, 4; \tag{40}$$

$$p_C - 2e_i \geq p_D + b_i - 2e_i, \quad i = 3, 4; \tag{41}$$

$$p_C - 2e_i \geq p_A + p_B + b_i - 2e_i, \quad i = 3, 4; \tag{42}$$

$$p_C - 2e_i \geq p_A - e_i, \quad i = 3, 4; \tag{43}$$

$$p_C - 2e_i \geq p_B + b_i - e_i, \quad i = 3, 4; \tag{44}$$

$$p_C - 2e_i \geq 0, \quad i = 3, 4. \tag{45}$$

- Worker 5 prefers not to sell at all than to sell in any of the markets:

$$0 \geq p_A - e_5; \tag{46}$$

$$0 \geq p_B + b_5 - e_5; \tag{47}$$

$$0 \geq p_C - 2e_5; \tag{48}$$

$$0 \geq p_D + b_5 - 2e_5. \tag{49}$$

- Firms 6-9 are willing to buy in any of the four markets, and are indifferent between buying in C, or D, or two units in A or B in any combination:

$$v_i - p_A \geq 0, \quad i = 6, .., 9; \tag{50}$$

$$v_i - p_B - c \geq 0, \quad i = 6, .., 9; \tag{51}$$

$$2v_i - p_C \geq 0, \quad i = 6, .., 9; \tag{52}$$

$$2v_i - p_D - c \geq 0, \quad i = 6, .., 9; \tag{53}$$

$$2v_i - p_A - p_B - c = 2(v_i - p_A), \quad i = 6, .., 9; \tag{54}$$

$$2v_i - p_A - p_B - c = 2(v_i - p_B - c), \quad i = 6, .., 9; \tag{55}$$

$$2v_i - p_A - p_B - c = 2v_i - p_C, \quad i = 6, .., 9; \tag{56}$$

$$2v_i - p_A - p_B - c = 2v_i - p_D - c, \quad i = 6, .., 9. \tag{57}$$

- Firm 10 prefers not buy at all, than to buy in any of the markets:

$$0 \geq v_5 - p_A; \tag{58}$$

$$0 \geq v_5 - p_B - c; \tag{59}$$

$$0 \geq 2v_5 - p_C; \tag{60}$$

$$0 \geq 2v_5 - p_D - c. \tag{61}$$

Combining the above constraints and using the parameter values from Table 1, we obtain that the equilibrium prices (wages) in the four markets are given by:

$$58 \leq p_A \leq 60; \tag{62}$$

$$p_B = p_A - 32; \tag{63}$$

$$p_C = 2p_A; \tag{64}$$

$$p_D = 2p_A - 32. \tag{65}$$

This also implies the equilibrium price ranges in markets B, C and D, as given in Table 2.

(Note that if we relax the constraint 62 to $58 \leq p_A \leq 64$, in parallel to the per unit wage range without insurance as given by condition 13, then almost all the equilibrium conditions would hold, except Worker 5 would want to trade in Market B. This explains why the equilibrium price range for the experimental markets is narrower than the one given by 13.)

Partial Mandate treatment. Here market C is absent. All constraints related to markets A, B and D are analogous to the No Mandate treatment. Similarly to the above, this again gives the equilibrium price relationships given by 62, 63 and 65.

Full Mandate treatment. Here market C is absent, and a worker has to trade in market B before he is allowed to trade in market A. The constraints for workers 3 and 4 are now slightly different since they require that these workers prefer selling in market D, or one unit in B and and one unit in A, to any other feasible option. Yet, the equilibrium price relationships still stay as given by 62, 63 and 65.

Sliding Scale treatment. Only markets B and D are present, and trading one unit in market B yields half the benefit of the service to workers, and half the cost of the service to firms. The equilibrium price range for market B is thus obtained from the conditions identical to 30-33, and the indifference requirement for workers 1-4 and firms 6-9 to trade two units in B or a package in D yields $p_D = 2p_B$. Hence we obtain:

$$42 \leq p_B \leq 48; \tag{66}$$

$$p_D = 2p_B. \tag{67}$$

Appendix C: Instructions (No Mandate)

General Information

This is an experiment in the economics of market decision making. Based on your decisions in this experiment, you can earn a significant amount of money that will be paid to you IN CASH at the end of the experiment. During the experiment all units of account will be in experimental pesos. At the end of the experiment the amount of experimental pesos that you earn will be converted into dollars at the conversion rate of .08 dollars per pesos. Your earnings plus a lump sum amount of 5 dollars will be paid to you in private.

From this point onwards you are NOT allowed to communicate with any other participant except according to the rules specified below. If you have any questions raise your hand and we will answer your questions in private. From this point onwards, you will be referred to by your participant number. You are participant number ____.

In this experiment we are going to conduct a market in which some of you will be buyers and some of you will be sellers of a fictitious good. Participants 1 through 5 will be sellers and participants 6 through 10 will be buyers. Attached to the instructions you will find a sheet labeled "Seller" or "Buyer", which describes the value to you of any decisions you might make. YOU ARE NOT TO REVEAL THIS INFORMATION TO ANYONE. It is your own private information.

Trading will occur in a sequence of market days, or trading periods. In each period, each buyer is free to buy, and each seller is free to sell, up to two units of the good. Units of the good can be traded separately or in packages of 2 units. In addition, each seller may request, and each buyer may offer, to provide a fictitious service in exchange for the good(s). There will be four separate markets depending on how the goods are traded:

Market A: separate units, no service;
Market B: separate units, with service;
Market C: packages of 2 units, no service;
Market D: packages of 2 units, with service.

Trading in each period will close after 5 minutes or when there is no activity for 20 seconds (whichever occurs first). At the end of every period you will be required to record your earnings for that period on your record sheet to be described below. This procedure will repeat for a number of periods.

Specific Instructions for Buyers

During each period you are free to buy up to two units of the good from any seller or sellers in any of the markets A, B, C or D. For each unit you buy, you will receive a *resale value*, which is listed in row I of your record sheet. You may buy units of the good separately (in markets A and B), or in a package (in markets C or D). In addition, you may offer to provide a fictitious service to sellers, which costs you the amount listed in row III of your record sheet. Your earnings from a purchase (which are yours to keep) equal to the difference between the resale values of the units sold and the purchase price you paid, minus the cost of service if you provide it.

Your Earnings = Resale Value – Price – Cost of Service if Provided

Your total earnings in a period equal the sum of the earnings from all of the units that you purchase in that period. (All the numbers used in the examples below are hypothetical.)

Example 1: Suppose, for example, that your resale value for each of the two units of the good is 65, and the cost of providing service to sellers is 30. Suppose you buy one unit in Market A (separate units, no service) for 50 pesos and another unit in Market B (separate units, with service) for 10. Then your earnings are:

Earnings [Market A, one unit, no service] = 65 – 50 = 15
Earnings [Market B, one unit, with service] = 65 – 10 – 30 = 25
Total earnings = 15 + 25 = 40

Example 2: Suppose, instead of the above, that you buy both units as a package in Market D (2-unit package, with service) for 80 pesos. Then your earnings are:

Earnings [Market D, package, with service] = 2*65 – 80 – 30 = 130 – 80 – 30 = 20

Remember, you can buy no more than 2 units in total per period. You can buy two units in Market B, but you will have to pay the cost of providing the service for each of the units.

Specific Instructors for Sellers

During each period you are free to sell up to two units of the good to any buyer or buyers in any of the markets A, B, C or D. For each unit that you sell you will receive the unit's price minus your *production cost*, which is listed in row II of your record sheet. You may sell units of the good separately (in markets A and B), or as a package (in markets C or D). In addition, you may request to receive a fictitious service from buyers. If you obtain the service you will receive an extra pay, listed in row III of your record sheet. You can only receive one extra pay per period. Therefore, if you sell one unit in market B (separate units, with service) you cannot sell another unit in market B you can only sell your second unit in market A (separate units, no service). Your earnings from a sale (which are yours to keep) equal to the difference between the price you receive for the unit and production cost, plus the extra pay from service if you receive it.

Your Earnings = Price – Production Cost + Pay from Service if Received

Your total earnings in a period equal the sum of the earnings from all of the units that you sell in that period. (All the numbers used in the examples below are hypothetical.)

Examples 3: Suppose, for example, that your production cost for each of the two units of the good is 30, and the extra pay from receiving service from a buyer is 20. Suppose you sell one unit in Market A (separate units, no service) for 45 and one unit in Market B (separate units, with service) for 50. Then your earnings are:

Earnings [Market A, one unit, no service] = 45 – 30 = 15
Earnings [Market B, one unit, with service] = 50 – 30 + 20 = 40
Total Earnings = 15 + 40 = 55

Example 4: Suppose, instead of the above, that you sell both units as a package in Market C (2-unit package, no service) for 95 pesos. Then your earnings are:

Earnings [Market C, package, no service] = 95 – 2*30 = 95 – 60 = 35

Remember, you can sell no more than 2 units in total per period. Also note, you cannot sell 2 units in Market B.

Market Organization

The market for this good is organized as follows. During each trade period each buyer is free to buy up to 2 units and each seller is free to sell up to 2 units of the good. Any buyer (seller) is free at any time during the period to raise his hand and make a verbal bid (ask) to buy (sell) a unit or units of the good in any of the markets A, B, C or D. The buyer (seller) must specify which market he will buy (sell) the unit(s) in and at (for) what price. For instance, if buyer 7 wishes to buy a unit in Market A (separate units, no service) for 35 pesos, he should call out "Market A, buyer 7 bids 35". If seller 3 wishes to sell a 2-unit package in Market D (2-unit package, with service) for 70 pesos, he should call out "Market D, seller 3 asks 70". The price in markets A and B is the price per unit, while the price in markets C and D is the price for the 2-unit package.

Each new bid (ask) in a given market must be higher (lower) than the highest (lowest) outstanding bid (ask) in that market. For example, if the highest bid in Market A is 35 pesos, any new bids in Market A must be higher than 35. Similarly, if the lowest ask in Market C is currently 60 pesos, any new asks in Market C must be lower than 60. Any buyer (seller) is free at any time to accept an outstanding ask (bid). The buyer (seller) must specify which market he is accepting the ask (bid) in. For example, if buyer 7 wishes to accept the outstanding ask in market B he should calls out "Market B, buyer 7 accepts ask." If a bid (ask) is accepted a binding contract is closed between the buyer and the seller, and each of them will record the contract price in their record sheet. Any ties in acceptance will be resolved by a random choice of buyer or seller. Buyers (sellers) are free to simultaneously place bids (asks) in as many markets as they wish. However, once a buyer (seller) buys (sells) a unit in markets A or B he can no longer buy (sell) in markets C or D. Consequently, any bids (asks) that the buyer (seller) has in markets C or D will be automatically removed. Once a buyer (seller) buys (sells) 2 units he can no longer participate in the market until the next trading period. You also have the option to record the transactions in each period in the transaction sheet attached.

ARE THERE ANY QUESTIONS?

Please complete the following exercises. Use the tables below to help you solve them.

Exercises for Sellers

Exercise 1: Suppose that a seller sells a unit in Market A (separate units, no service) for 50 pesos and another unit in Market B (separate units, with service) for 50. Assume that the seller's production cost and extra pay from service are 20 and 30 respectively. What are the total earnings of the seller?

Exercise 2: Suppose that a seller sells a 2-unit package in Market D (package, with service) for 90. Assume that the seller's production cost is 35 per unit and his extra pay from service is 44. What are the total earnings of the seller?

Table 1 (Use this table to calculate the earnings for sellers)

	Row		Market A		Market B	Market C	Market D	Total Earnings
Ex. 1	I	*Price*						
	II	*– Cost*	20	20	20	40	40	
	III	*+ Extra Pay*	–	–	30	–	30	
	IV	***= Earnings***						
Ex. 2	I	*Price*						
	II	*– Cost*	35	35	35	70	70	
	III	*+ Extra Pay*	–	–	44	–	44	
	IV	***= Earnings***						

Exercises for Buyers

Exercise 1: Suppose that a buyer purchases one unit in Market A (separate units, no service) for 50 pesos and another unit in Market B (separate units, with service) for 50. The buyer's resale value is 85 per unit and it costs him 40 to provide the service. What are the total earnings of the buyer?

Exercise 2: Suppose that a buyer purchases a 2-unit package in Market D (package, with service) for 90. The buyer's resale value is 65 per unit and it costs him 20 to provide a service. What are the total earnings of the buyer?

Table 2 (Use this table to calculate the earnings for buyers)

	Row		Market A		Market B		Market C	Market D	Total Earnings
Ex. 1	I	*Resale Value*	85	85	85	85	170	170	
	II	*– Price*							
	III	*– Cost of service*	–	–	40	40	–	40	
	IV	***= Earnings***							
Ex. 2	I	*Resale Value*	65	65	65	65	130	130	
	II	*– Price*							
	III	*– Cost of service*	–	–	20	20	–	20	
	IV	***= Earnings***							

ARE THERE ANY QUESTIONS?

Period 0 will be used for practice. It will not count towards your earnings.

Record Sheet (N)

Seller: ID # 1

Period	Row		Market A		Market B	Market C	Market D	Total Earnings
			Unit 1, No Service	Unit 2, No Service	1 Unit, with Service	2 Unit Package, No Service	2 Unit Package, with Service	
0	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
1	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
2	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
3	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
4	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
5	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
6	I	*Price*						
	II	*– Cost*	45	45	45	90	90	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						
7	I	*Price*						
	II	*– Cost*	68	68	68	136	136	
	III	*+ Extra Pay*	–	–	40	–	40	
	IV	***= Earnings***						

Optional Transactions Sheet (N)

Period	**Market A**			**Market B**			**Market C**			**Market D**		
	Seller	Buyer	Price	Seller	Buyer	Price	Seller	Buyer	Price	Seller	Buyer	Price

References

[1] Banks, Jeffrey, John Ledyard, and David Porter, 1989. Allocating uncertain and unresponsive resources: an experimental approach, Rand Journal of Economics, 20 (1), 1-25.

[2] Bull, C., A. Schotter and K. Weigelt, 1987. Tournaments and piece rates: an experimental study. Journal of Political Economy, 95, 133.

[3] Cason, Timothy, 1995. An Experimental investigation of the seller incentives in EPA's emission trading auction. American Economic Review, 85, 905-922.

[4] Congressional Budget Office, 2003. How Many People Lack Health Insurance and For How Long? Washington, DC: The Congress of the United States, Congressional Budget Office.

[5] Currie, J., and B.C. Madrian, 1999. Health, Health Insurance and the Labor Market. In the Handbook of Labor Economics, 3, 3309-3416, eds. Ashenfelter, O., and D. Card, Elsevier Science, Amsterdam: North-Holland.

[6] Davis, D., and C. Holt, 1993. Experimental Econmics. Princeton University Press.

[7] Eberts, R., and J. Stone, 1985. Wage, Fringe Benefits, and Working Conditions: An Analysis of Compensating Differentials. Journal of Southern Economics, 52, 274-280.

[8] Eckel C, Lutz N. 2003. What role can experiments play in research on regulation? Introduction. Journal of Regulatory Economics 23 (2): 103-107.

[9] Fehr, E. and A. Falk, 1999. Wage rigidity in a competitive incomplete contract market. Journal of Political Economy, 107, 106134.

[10] Gneezy, U., 2003. Do High Wages Lead to High Profits? An Experimental Study of Reciprocity Using Real Effort. Mimeo, The University of Chicago GSB, Chicago.

[11] Gruber, J., 1994. The Incidence of Mandated Maternity Benefits. American Economic Review, 84, 622-641.

[12] Gruber, J., 2000. Health Insurance and the Labor Market. In the Handbook of Health Economics, eds. Culyer, A.J., and J.P. Newhouse, Elsevier Science, Amsterdam: North-Holland.

[13] Gruber, J., 2001. Taxes and Health Insurance. NBER Working Paper 8657, 1-43.

[14] Gruber, J., and A. Krueger, 1991. The Incidence of Mandated Employer-Provided Insurance: Lessons from Workers' Compensation Insurance. Princeton Industrial Relations Section Working Paper, 279, 1-47.

[15] Isaac, Mark, and Charles Plott, 1981. Price controls and the behavior of auction markets: An experimental evaluation. American Economic Review, 71, 448-459.

[16] Lee, S.-H., G. Russo and L. Nitz. 2003. The impact of Hawaii's mandatory employer-provided health insurance coverage on employment. Mimeo, University of Hawaii.

[17] Muller, R. Andrew, Stuart Mestelman, John Spraggon and Rob Godby. 2002. Can Double Auctions Control Monopoly and Monopsony Power in Emissions Trading Markets? Journal of Environmental Economics and Management, 44 (1), 70-92.

[18] Pauly, M.. 1986. Taxation, health insurance, and market failure in the medical economy. Journal of Economic Literature, 24, 629-675.

[19] Plott, Charles, 1997. Laboratory experimental testbeds: Application to the PCS auction. Journal of Economics and Management Strategy 6 (3): 605-638.

[20] Rosen, S., 1986. The Theory of Equalizing Differences. In Handbook of Labor Economics, 2, 641-92, eds. Orley Ashenfelter and Richard Layard, Elsevier Science, Amsterdam: North-Holland.

[21] Smith, Vernon, 1981. Theory, experiment and antitrust policy. In Strategy, Predation, and and Antitrust Analysis, ed. S. Salop. Washington, D.C.: Federal Trade Commission, Bureau of Economics. 579-603.

[22] Summers, L., 1989. Some Simple Economics of Mandated Benefits. American Economic Review, 79, 177-183.

[23] Thurston, N., 1997. Labor Market Effects of Hawaii's Mandatory Employer-Provided Health Insurance. Industrial and Labor Relations Review, 51, 117-135.

[24] Woodbury, S., 1983. Substitution Between Wage and Nonwage Benefits. American Economic Review, 73, 166-182.

LIST OF FIGURES

Table 1: Worker and firm costs and benefits.

Workers (sellers of labor)					Firms (buyers of labor)		
ID	Labor cost e_i per unit	Insurance benefit b_i per worker	Adjusted labor cost no mandate $\tilde{e}_i$ per unit	Adjusted labor cost mandate $\tilde{\tilde{e}}_i$ per unit	ID	Revenue v_i per unit	Insurance cost c per worker
$1^{*\diamond}$	45	40	41	41	6^{*}	81	32
$2^{*\diamond}$	50	40	46	46	7^{*}	76	32
3^{*}	45	20	45	51	8^{*}	71	32
4^{*}	50	20	50	56	9^{*}	66	32
$5^{\diamond}$	68	40	64	64	10	58	32

$*$–efficiency prescribes that this worker (firm) should sell (buy) labor;
$\diamond$–efficiency prescribes that, if employed, this worker should buy insurance.

Table 2: Equilibrium Predictions

Treatment	Employed Workers	Markets that workers will trade in	Equilibrium Prices (Wages)		
			Market	**Price Range**	**Price Relations**
No Mandate	1, 2	2-unit pacakge in D, or 1 unit in B and 1 in A	Market A	58-60	
			Market B	26-28	$P_B = P_A - 32$
	3, 4	2-unit pacakge in C or 2 separate units in A	Market C	116-120	$P_C = 2P_A$
			Market D	84-88	$P_D = 2P_A - 32$
Partial Mandate	1, 2	2-unit pacakge in D or 1 unit in B and 1 in A	Market A	58-60	
			Market B	26-28	$P_B = P_A - 32$
	3, 4	2 separate units with two different firms in A	Market D	84-88	$P_D = 2P_A - 32$
Full Mandate	1, 2, 3, 4	2-unit pacakge in D or 1 unit in B and 1 in A	Market A	58-60	
			Market B	26-28	$P_B = P_A - 32$
			Market D	84-88	$P_D = 2P_A - 32$
Sliding Scale	1, 2, 3, 4	2-unit package in D or 2 separate units in B	Market B	42-48	
			Market D	84-96	$P_D = 2P_B$

In all treatments, 8 labor units are traded. Worker 5 and firm 10 are extra-marginal and do not trade.

P_A, P_B, P_C, P_D: Prices (wages) in markets A, B, C, D respectively
Market A: Separate units (part-time employment), without insurance
Market B: Separate units (part-time employment), with insurance
Market C: Two-unit package (full-time employment), without insurance
Market D: Two-unit package (full-time employment), with insurance

Table 3: Labor market efficiency and sources of efficiency loss

Treatment	Session	Actual labor market surplus, as % of maximal attainable surplus	% of trades within equilibrium price range*	Sources of Efficiency Loss		
				No. of units traded by extra-marginal traders	No. of workers who were under-insured	No. of workers who were over-insured
No Mandate	1	91.43	80.00	1.00	0.50	0.00
	2	83.93	53.33	0.80	0.30	0.20
	3	94.38	72.73	1.00	0.10	0.10
	4	88.97	54.55	1.30	0.20	0.60
	All	**89.68**	**65.17**	**1.03**	**0.28**	**0.23**
Partial Mandate	1	83.17	63.16	0.70	0.00	0.20
	2	84.33	76.47	1.70	0.00	0.30
	3	91.88	83.10	1.30	0.00	0.20
	4	90.58	95.45	2.30	0.00	0.20
	All	**87.49**	**80.15**	**1.50**	**0.00**	**0.23**
Full Mandate	1	89.95	81.03	1.00	~	~
	2	92.75	47.92	1.30	~	~
	3	90.45	62.50	2.70	~	~
	4	92.25	76.92	1.00	~	~
	All	**91.35**	**68.28**	**1.50**	~	~
Sliding Scale Mandate	1	99.20	100.00	0.20	~	~
	2	92.05	87.04	1.80	~	~
	3	95.10	93.48	0.40	~	~
	4	89.35	91.67	1.10	~	~
	All	**93.93**	**92.86**	**0.88**	~	~

* Including trades within 5 pesos of the equilibrium price range

Table 4: Market prices (wages), experimental pesos

Treatment	Session	Market A		Market B		Market C		Market D	
		Mean (stddv)	# of obs.	Mean (stddv)	# of obs.	Mean (stddv)	# of obs.	Mean (stddv)	# of obs.
No Mandate	**Theory**	**58-60**		**26-28**		**116-120**		**84-88**	
	1	48.43* (12.95)	7	38.33 (15.28)	3	117.05 (4.17)	22	88.54 (10.75)	13
	2	63.25* (3.86)	12	61.00* (21.33)	5	124.38* (6.78)	16	99.25* (7.66)	12
	3	56.67 (5.77)	3	27.00 (2.82)	2	113.30* (4.47)	20	84.74 (7.18)	19
	4	54.00* (2.23)	5	37.00 (2.82)	2	116.00 (4.86)	19	93.94* (6.49)	18
	All	**56.96 (9.37)**	**27**	**45.67* (20.20)**	**12**	**117.34 (6.30)**	**77**	**91.01* (9.47)**	**62**
Partial Mandate	**Theory**	**58-60**		**26-28**		**---**		**84-88**	
	1	62.03* (2.79)	30	36.27* (4.47)	11	---	---	102.13*	16
	2	55.32* (4.02)	44	31.93* (3.95)	14	---	---	82.6 (6.67)	10
	3	59.07 (2.69)	44	29.69* (0.48)	13	---	---	95.29* (7.15)	14
	4	58.51 (3.24)	37	29.56* (2.13)	9	---	---	88.35 (5.56)	20
	All	**58.45 (3.98)**	**155**	**31.87* (4.08)**	**47**	---	---	**92.68* (10.35)**	**60**
Full Mandate	**Theory**	**58-60**		**26-28**		---		**84-88**	
	1	61.33 (8.32)	18	30.57* (6.06)	21	---	---	87.37 (9.84)	19
	2	59.17 (6.74)	6	36.25* (9.84)	12	---	---	95.30* (8.36)	30
	3	56.40 (10.23)	10	27.93 (4.50)	15	---	---	81.77* (5.90)	31
	4	57.55 (8.18)	22	30.00* (4.16)	29	---	---	81.93* (3.34)	14
	All	**58.73 (8.49)**	**56**	**30.73* (6.35)**	**77**	---	---	**87.24 (9.41)**	**94**
Sliding Scale Mandate	**Theory**	---		**42-48**		---		**84-96**	
	1	---	---	46.31 (1.25)	16	---	---	91.56 (4.04)	32
	2	---	---	39.44* (2.40)	25	---	---	82.55* (2.20)	29
	3	---	---	43.15 (5.80)	13	---	---	92.21 (3.58)	33
	4	---	---	49.64 (8.27)	22	---	---	87.23 (4.57)	26
	All	---	---	**44.47 (6.63)**	**76**	---	---	**88.63 (5.34)**	**120**

*Either significantly below the lower bound of prediction, or significantly above the upper bound, at 5% significance level (t-test, one-sided)

Market A: Separate units (part-time employment), without insurance
Market B: Separate units (part-time employment), with insurance
Market C: Two-unit package (full-time employment), without insurance
Market D: Two-unit package (full-time employment), with insurance

Table5: Shares of trades within equilibrium price (wage) range*

Treatment	Session	Market A		Market B		Market C		Market D		All	
		Total no. of trades	% of trades within eqm range	Total no. of trades	% of trades within eqm range	Total no. of trades	% of trades within eqm range	Total no. of trades	% of trades within eqm range	Total no. of trades	% of trades within eqm range
No Mandate	1	7	57.14	3	33.33	22	90.91	13	84.62	45	80.00
	2	12	91.67	5	20.00	16	62.50	12	16.67	45	53.33
	3	3	66.67	2	100.00	20	75.00	19	68.42	44	72.73
	4	5	80.00	2	100.00	19	73.68	18	33.33	44	54.55
	All	**27**	**77.78**	**12**	**33.33**	**77**	**76.62**	**62**	**51.61**	**178**	**65.17**
Partial Mandate	1	30	100.00	11	36.36	---	---	16	12.50	57	63.16
	2	44	79.55	14	71.43	---	---	10	70.00	68	76.47
	3	44	97.73	13	100.00	---	---	14	21.43	71	83.10
	4	37	97.30	9	100.00	---	---	20	90.00	66	95.45
	All	**155**	**92.90**	**47**	**76.60**	---	---	**60**	**50.00**	**262**	**80.15**
Full Mandate	1	18	77.78	21	80.95	---	---	19	84.21	58	81.03
	2	6	50.00	12	58.33	---	---	30	43.33	48	47.92
	3	10	30.00	15	80.00	---	---	31	64.52	56	62.50
	4	22	63.64	29	82.76	---	---	14	85.71	65	76.92
	All	**56**	**60.71**	**77**	**77.92**	---	---	**94**	**64.89**	**227**	**68.28**
Sliding Scale Mandate	1	---	---	16	100.00	---	---	32	100.00	48	100.00
	2	---	---	25	76.00	---	---	29	96.55	54	87.04
	3	---	---	13	76.92	---	---	33	100.00	46	93.48
	4	---	---	22	86.36	---	---	26	96.15	48	91.67
	All	---	---	**76**	**84.21**	---	---	**120**	**98.33**	**196**	**92.86**

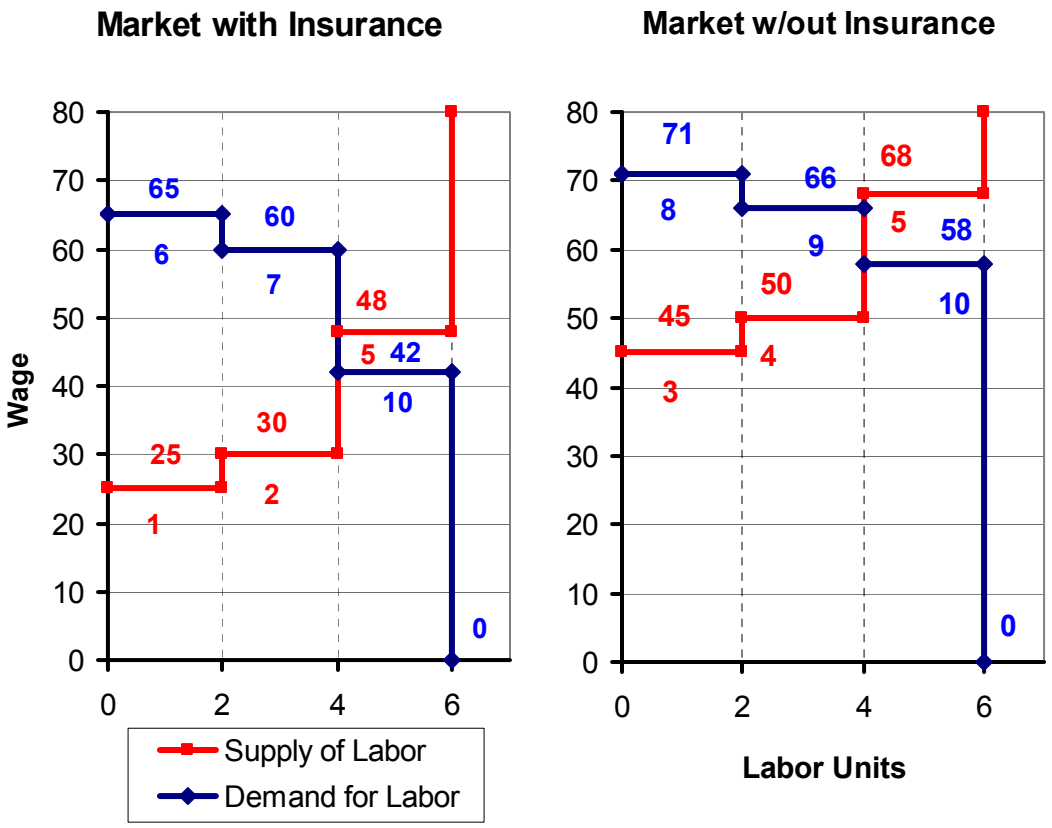
*Including trades within 5 pesos from equilibrium prices

Market A: Separate units (part-time employment), without insurance
Market B: Separate units (part-time employment), with insurance
Market C: Two-unit package (full-time employment), without insurance
Market D: Two-unit package (full-time employment), with insurance

Table 6: Market outcomes under alternative policy scenarios

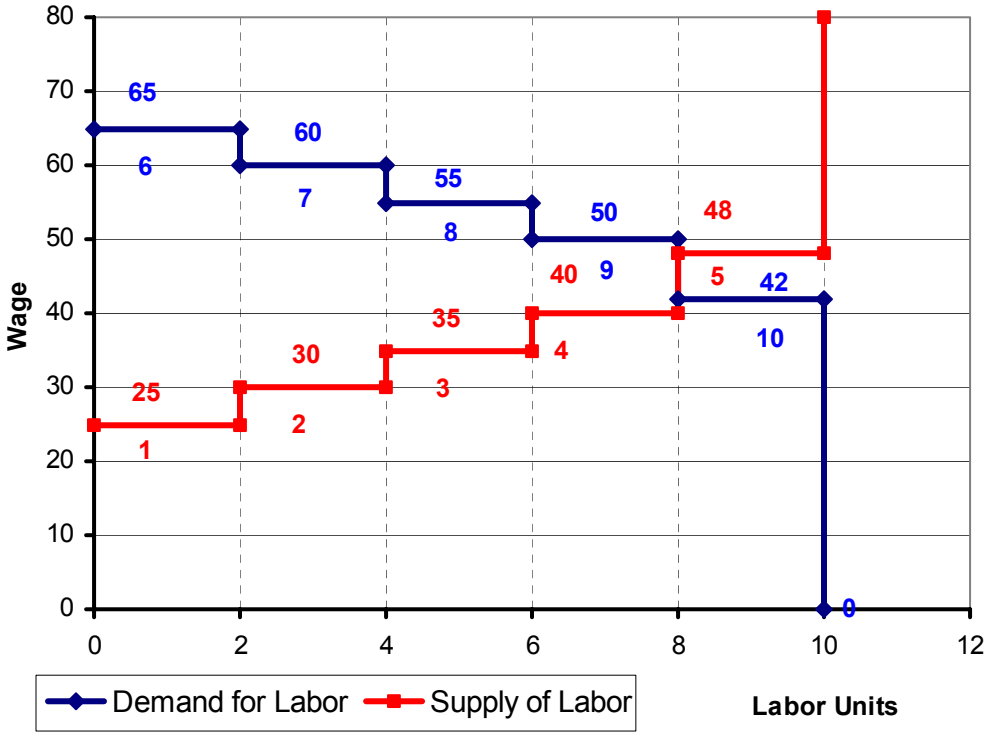
Treatment	Session	Labor market efficiency, %		Share of part-time workers out of all workers, %		Insurance coverage rate among employed, %	
		Predicted	Actual	Predicted	Actual	Predicted	Actual
No Mandate	1	100.00	91.43	0-100	12.26	50.00	38.00
	2	100.00	83.93	0-100	24.57	50.00	41.50
	3	100.00	94.38	0-100	4.50	50.00	50.50
	4	100.00	88.97	0-100	10.36	50.00	46.00
	All	**100.00**	**89.68**	**0-100**	**12.92**	**50.00**	**44.00**
Partial Mandate	1	100.00	83.17	50-100	57.18	50.00	66.50
	2	100.00	84.33	50-100	75.56	50.00	53.33
	3	100.00	91.88	50-100	67.20	50.00	61.50
	4	100.00	90.58	50-100	53.61	50.00	60.50
	All	**100.00**	**87.49**	**50-100**	**63.39**	**50.00**	**60.46**
Full Mandate	1	89.29	80.31	0-100	50.71	100.00	100.00
	2	89.29	82.81	0-100	23.25	100.00	100.00
	3	89.29	80.76	0-100	28.32	100.00	100.00
	4	89.29	82.37	0-100	65.28	100.00	100.00
	All	**89.29**	**81.56**	**0-100**	**41.89**	**100.00**	**100.00**
Sliding Scale	1	89.29	88.57	0-100	20.00	100.00	100.00
	2	89.29	82.19	0-100	29.77	100.00	100.00
	3	89.29	84.91	0-100	15.83	100.00	100.00
	4	89.29	79.78	0-100	30.60	100.00	100.00
	All	**89.29**	**83.86**	**0-100**	**24.05**	**100.00**	**100.00**

Figure 1: Fully Efficient Market Outcome



Numbers 1 through 5 represent workers, while number 6 through 10 represent firms. Workers 1 and 2 sell their labor with insurance, while workers 3 and 4 sell their labor without insurance. Worker 5 and firm 10 are extra-marginal and do not trade in the market. Firm revenues and worker labor costs in the market with insurance are insurance-adjusted.

Figure 2: Mandate-Constrained Market Outcome



Numbers 1 through 5 represent workers, while number 6 through 10 represent firms. Workers 1 through 4 sell their labor to firms 6 though 9, all with insurance. Firm revenues and worker labor costs are insurance-adjusted. Worker 5 and firm 10 are extra-marginal and do not trade in the market.