Lecture Note: Efficiency wages, Neoclassical and Non-Neoclassical Evidence

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1 Introduction

There have been a number of notable efforts to test efficiency wage models in the Shapiro-Stiglitz vein. These include:

1. Krueger (1991, QJE) "Ownership, Agency and Wages: A Study of the Fast-Food Industry."

2. Cappelli and Chauvin (1991, QJE): "An Interplant Test of the Efficiency Wage Hypothesis."

3. Holzer, Katz and Krueger (1991, QJE): "Job Queues and Wages."

I will discuss each of these papers briefly. Why did these all appear in the QJE? Chicago economists don't believe in efficiency wages.

But in this literature, there is a persistent sense that the neoclassical story is somehow missing the mark, even if it seems to fit the facts. There is an intuition that norms and fairness are an important part of the effort equation. Akerlof's 1982 (QJE) paper on Gift Exchange is the first to articulate this formally. The 1986 AER article by Kahneman, Knetsch, and Thaler presents startling evidence that perceptions of fairness have little to do with opportunity cost – which is exactly the point where the neoclassical and the gift exchange views part ways.

Economists have been so troubled by the suspicion that the neoclassical models are wrong, they've actually taken to asking business managers what they think. Three papers/books that do this are:

1. Blinder (AER, 1991), Blinder and Choi (QJE, 1990).

2. Campbell and Kamlani, QJE 1997.

3. Bewley, 2000, Harvard University Press (an entire book of survey evidence from a theorist!)

All of these authors appear less convinced of the neoclassical view after talking to non-economists about it.

Most recently, a combination of theory and laboratory work has begun to structure an alternative view of fairness and cooperation.

2 Neoclassical evidence

2.1 Krueger, 1991: "Ownership, Agency and Wages: A Study of the Fast-Food Industry."

- Q: How do you go about testing efficiency wage theory? Many empirical angles are possible:
  - Shirking and wages
  - Monitoring and wages
  - Existence of involuntary unemployment
  - Worker flows and shirking behavior
  - Survey evidence on employer motivations
- Krueger 1991 explores the notion that monitoring and wages are substitutes.
- Franchising in the fast food industry:
  - Identical products
  - Different ownership structures
  - Franchising: Closer monitoring, few agency problems
  - Company stores: Greater agency problems
- See evidence in Table I that supervision less adequate in company jobs.
- Q: What would efficiency wage model predict for wages across these two settings?
- Aside: Greenberger and Steinberg (1986) cited by Krueger found that 62% of first time workers in Orange county did at least one of the following in first 9 months of employment:
  - Gave away goods

  - Falsely claimed to be sick
  - Stole
  - Damaged property
  - Worked while intoxicated

- Shirking could be even more important in managerial jobs where there is more opportunity to exercise discretion.
- Perhaps for line jobs, shirking is easier to detect and less costly in terms of foregone output.
- Note: Bonding model would predict back-loaded compensation (i.e., Lazear contracts). Hence, the Present Value of contracts would be the same at both types of jobs. See Krueger Figure I.

2.1.1 Findings

- The Present Value of wage differences at company-owned versus franchise stores is $1,250 for assistant managers, $75 for full-time workers.
- Company owned restaurants more likely to start part-time workers above the minimum wage.
- Company owned restaurants also more likely to give free meals, paid vacation, paid sick leave, paid holidays, and health insurance.
- An alternative interpretation: Agency problems – "expense preference." Maybe managers make their own lives easier by paying higher wages at the expense of the company. This has the same empirical implications as efficiency wages except for what? It's not efficient.

2.2 Cappelli & Chauvin: An Interplant Test of the Efficiency Wage Hypothesis

- Krueger tested implication that $\frac{\partial \hat{w}}{\partial q} < 0$, i.e., better monitoring technology $\Rightarrow$lower wages set by firm.

- Another implication we'd like to test: $\frac{\partial e}{\partial \hat{w}} > 0$? Do workers shirk less if they are paid more?

- This question has identification problem: Higher wages could be the cause or the result of higher productivity.

- The test here: Internal wages at a large manufacturing company, 1982:

  - All workers in United Auto Workers, which standardizes work and wages across plants. Same labor agreement for all.
  - All production workers in identically specified jobs within categories.
  - Personnel policies on shirking and discipline virtually identical across plants and centrally adjudicated by unions.
  - Wages set by company-wide collective bargaining. Hence, cannot be affected by plant level productivity.
  - Wages can however cause differences in productivity across plants.
  - Premiums 0-100 percent above local wages. Note: may not be efficient "efficiency wages" but should still impact shirking.
  - Shirking measure: Rate of dismissal across plants for disciplinary reasons.

- These results sign that the wage-effort elasticity is positive. They do not tell us:

  - Magnitude of wage-effort elasticity
  - Whether firms actually take this into account when setting wages. Variation we see here is due to firm *not* having control of its wage policies
  - What share of variation in observed wages this explains – if any.

- Yet, this is about as good as it gets

- [Also see Ichino and Riphahn working paper on "Employment Protection and Worker Effort." This paper is an odd type of 'experiment' because workers are effectively 'investing'

in good behavior in the hopes of securing a flow of quasi-rents in the near future. So, this does not tell use what shirking would be in the absence of employment protection. But it again suggests that effort is a choice variable affected by rents at jobs.]

2.3 Efficiency Wages: Holzer, Katz and Krueger

2.3.1 Motivation

- Evidence in Krueger and Summers (1988) – not discussed in class – suggests the existence of *ex post* rents in certain jobs: lower turnover, longer tenure in high wage 'premium' jobs.
- Evidence on *ex ante* rents would potentially be more convincing. Do we see applicants behaving as if some jobs offer rents?
- Idea: Use binding minimum wages as source of rents. Do applicants queue for these jobs?
- Problem: This approach may be less than compelling. Employers may offset some or all of the minimum wage impact with cuts in benefits and/or non-pecuniary aspects of work (e.g., safety, working conditions).
- But if wages and benefits are *imperfect substitutes*, many efficiency wage models suggest that employers will not fully offset mandated wage increases with cuts in other forms of compensation. In this case, employment rents will *increase* where minimum wages bind.

2.3.2 Setup

- Consider the following basic competitive wage model:
- The worker's value of compensation is:

$$u(w, b) = w + v(b), \tag{1}$$

where:

  - w is the wage paid.
  - b is the firm's expenditures on non-wage compensation.

- $v()$ is increasing, concave with $v'(0) > 1$ (i.e., the first dollar of benefits more valuable than wages).

- In the absence of minimum wages, firms choose: w^*, b^* such that $v'(b^*) = 1$ and $w^* + b^*$ is the market clearing compensation level (i.e., worker's marginal productivity).

2.3.3 Introduction of a binding minimum wage in a basic competitive model

- Assume the government imposes a binding minimum wage such that $w_m > w^*$.

- If firms increased wages without reducing benefits we would have $w = w_m + v(b^*)$, which would attract too many applicants. Queues form.

- So firms will choose benefits $b^{**} < b^*$ until the market clears.

- This implies that $v(b^{**}) > 1$.

- Note the inefficiency. Employees would gladly trade a \$ in wages for a \$ dollar in benefits, but they are unable to do so. $\Rightarrow$ Minimum wage unambiguously reduces welfare.

2.3.4 Introduction of a binding minimum wage in a model with costly turnover

Competitive case

- The firm has a quit rate of $Q(w + v(b))$ where $Q' < 0, Q'' > 0$. Turnover is declining in wages at a decreasing rate.

- Firms' net cost of turnover is T.

- Firms will therefore choose w to minimize the cost per efficiency unit of labor:

$$\min_{w,b} c = w + b + TQ(w + v(b)). \tag{2}$$

and the FOCs are:

$$\begin{aligned} \frac{\partial c}{\partial w} &= 1 + TQ'(w^* + \nu\,(b^*)) = 0, \\ \frac{\partial c}{\partial b} &= 1 + TQ'(w^* + \nu\,(b^*)) \cdot v'(b^*). \end{aligned}$$

- Simplifying:

$$TQ'(w^* + \nu(b^*)) = -1 \tag{3}$$

$$v'(b^*) = \frac{-1}{TQ'(w^* + \nu(b^*))} = 1 \tag{4}$$

- Substituting (3) into (4) gives

$$v'(b^*) = 1.$$

At the unconstrained optimum, a \$1 increase in either wages or benefits reduces turnover costs by \$1.

Adding binding minimum wage

- Now consider imposition of $w_m > w^*$.
- The firm will still want to choose b to satisfy 4, i.e.,

$$v'(b^{**})TQ'(w_m + \nu(b^{**})) = -1. \tag{5}$$

- In other words, it is still equating the marginal costs of non-wage benefits with the marginal gains in efficiency units of labor.
- Notice if the firm fully offsets the minimum wage such that $b_m = b^* - (w_m - w^*)$, then this gives

$$TQ'(w_m + b_m) = -1,$$

and

$$v'(b_m) > 1, \tag{6}$$

which means that 5 *would not* be satisfied.

- If the firm had chosen b_m, it would find that the next \$1 in benefits would more than pay for itself with a reduction in turnover.
- Hence, to satisfy 5, it must be the case that $b^* > b^{**} > b_m$, which implies that:

$$\begin{aligned} \text{ABS}\,|TQ'(w^* + \nu(b^{**}))| &< 1, \\ v'(b^{**}) &> 1. \end{aligned}$$

- In other words, the firm does *not fully offset* minimum wage increases with one-for-one benefit reductions. If it did, the next dollar in benefits would have reduced turnover costs by more than a dollar.

- These implies that worker utility in minimum wage jobs has unambiguously increased. Wages rise, benefits fall, but the total attractiveness of the job is higher:

$$w_m + v(b^{**}) > w^* + v(b^*).$$

- What is happening here is the following:

  - Wages are forced to rise by some amount by the binding minimum.
  - Fully offsetting the ensuing rents would be inefficient because this would induce too much costly turnover.
  - The reason is that the benefits and wages are imperfect substitutes. The first dollar of benefits costs the firm less than workers value it. If the benefits function were not concave with $v'(0) > 1$, this result would not hold.

2.3.5 Implications

- Workers earn rents at binding minimum wage jobs $\Rightarrow$ Queues of applicants.

- Other possible reasons why minimum wages induce rents in the labor market:

  - Fairness/equity. Employers are constrained by fairness from 'taking back' the entire wage increase with benefit reductions.
  - Non-negativity constraints on benefits.
  - Non-excludability. Cannot reduce benefits to minimum wage workers without harming other workers too, e.g., shutting off the heat.

- Assume that job offer odds are equal to one over the application rate p.

- Applicants will want to equate expected utility across jobs i, j, so $p_i[w_i + v(b_i)] = p_j[w_j + v(b_j)]$

- So, jobs paying rents will attract longer queues.
- Note that if a job is paying *compensating differentials,* this would not necessarily be true.
- Caveat: If high wage jobs also attract many unqualified applicants, this would also give rise to queues in the absence of efficiency wage considerations.
- But it's not clear why this queuing would cluster at minimum wage jobs.
- Another caveat: Let's say firms did fully offset minimum wage hikes with benefits cuts. Workers might not realize this, and so still queue for minimum wage jobs in incorrect expectation that they'll receive rents.

2.3.6 Results on minimum wages

- Table I
  - More applicants at minimum wage jobs than jobs slightly above or below.
  - Characteristics of applicants at minimum and subminimum jobs are similar.
  - Firms paying subminimum are smaller.
- Table II
  - Regression estimates of minimum wage differential are large and significant (about 25%).
  - Robust to inclusion of geographic, firm size and industry dummies.
  - Would have been great to do this across jobs within companies.

2.3.7 Are industry and/or union premia also rents?

- Let A equal ln applicants per job. We'd like to estimate

$$A = W\alpha_w + X\alpha_x + \epsilon_A,$$

where

$$W = A\beta_A + Z\beta_Z + X\beta_X + \epsilon_W,$$

and

$$\text{plim } Z'\epsilon_A = 0.$$

In this system of equations, α_w is the elasticity of applications with respect to the wage, and Z is a vector of (valid) instruments.

- Since W and A are simultaneously determined in this system, we want to instrument W with Z.
- Table III
  - Surprisingly weak evidence that industry wage premia are rents.
  - Minimum wage dummy remains robust.
- Figure I:
  - Relationship between wage premia and apps appears quite visible.
  - Notice the Mining industry. What's going on here? Possibly a compensating differential.
- Table IV
  - Use union and firm size dummies along with industry dummies as wage instruments.
  - Firm size fails the over-ID test, suggesting that it's not a good instrument.
  - Using industry and union as instruments while including firm size in the applications equation gives weak results.
- "A larger proportion of the interindustry wage structure than previously believed may be attributable to compensating wage differentials for non-wage conditions of work."

2.3.8 Conclusions

- Some evidence of rents in labor market.
- Interindustry wage structure looks more or less robust depending on the approach used (Krueger/Summers vs. HKK).
- Is HKK a high power test of rents? No. But works surprisingly well.

3 Theory and evidence on norms, reciprocity and effort

3.1 Fehr and Gachter, 2002, "Do Incentive Contracts Undermine Voluntary Cooperation

Once you begin to suspect that "fairness" regulates labor market contracts, you are theoretically at sea. Economists know a great deal about opportunity costs as a normative concept and little about other possible regulators of behavior. Therefore, norms are going to be hard to "test" in observational setting – it's not exactly clear what to look for. This is why a laboratory experiments so useful: can specify what types of incentives are to be used (standard economic incentives, and non-incentive-comptabile alternatives) and see how these contracts perform in:

1. Eliciting effort
2. Generating profits.

Fehr and Gachter's smart and subtle paper (2002, AER forthcoming) performs some tests.

3.1.1 The setup.

Two types of contracts: Incentive and Trust. In both contracts:

1. The buyer's offer labor contracts – Specifying a price and a quality
2. Sellers accept or refuse contracts. No other negotiations are possible.
3. These are one shot deals transacted anonymously. There is no possibility of developing an individual reputation.

4. After agreement, the seller 'produces' by generating output at some quality level. In practice, this just means selecting a quality level to deliver.

5. The buyer's gain: rising in quality and declining in price

6. The seller's gain: only a function of price, not of quality

7. There is always an excess supply of sellers (more sellers than buyers); sellers do not have power to hold up buyers for a contract

8. In the Trust Treatment, there is no opportunity for punishment if the seller 'shirks' by producing less than the agreed quality.

9. In the Incentive Treatment, buyer can penalize seller if seller is detected shirking. Shirking is detected $1/3^{rd}$ of time.

3.1.2 Trust Treatment (TT)

Buyer offers a contract $\{p, \hat{q}\}$ where p is the price and $\hat{q}$ is the desired quality level. In this treatment, $\hat{q}$ is never enforceable. Buyer's profit is

$$\pi = \left\{ \begin{array}{ll} vq - p & \text{If contract accepted} \\ 0 & \text{If no contract} \end{array} \right\},$$

with $v = 100$, $0 \leq p \leq 100$,and $q \{.1, .2, ..., 1\}$. q is delivered quality.

Seller's payoff is

$$u = \left\{ \begin{array}{ll} p - c(q) & \text{If contract accepted} \\ 0 & \text{If no contract} \end{array} \right\}.$$

where the cost of quality is

q	.1	.2	.3	.4	.5	.6	.7	.8	.9	1
$c(q)$	0	1	2	4	6	8	10	12	15	18

.

In this treatment, there is no subgame perfect incentive to provide any level of quality exceeding $q = 0.1$. Given this, there is no reason to offer a price exceeding $p = 1$ (or potentially $p = 0$). So, the incentive compatible equilibrium of this game is $\{1, .1\}$.

This is not socially efficient. Given that the marginal cost of q to the seller less is always less than its marginal value to the buyer, efficiency requires that $q = 1$.

3.1.3 Incentive Treatment (IT)

The basic difference between TT and IT is that in IT, the seller can be punished if caught shirking. Shirking is detected with probability $s = 1/3$, and the shirker is fined the amount $f \in [0, 13]$, specified in the contract, which is now stipulated as $\{p, \hat{q}, f\}$. Hence, the payoffs become:

$$\pi = \left\{ \begin{array}{ll} vq - p & \text{if contract accepted and } q \geq \hat{q} \\ vq - p + sf & \text{if contract accepted and } q < \hat{q} \\ 0 & \text{if no contract} \end{array} \right\},$$

and similarly for the buyer

$$u = \left\{ \begin{array}{ll} p - c(q) & \text{if contract accepted and } q \geq \hat{q} \\ p - c(q) - sf & \text{if contract accepted and } q < \hat{q} \\ 0 & \text{if no contract} \end{array} \right\}.$$

A selfish seller will accept the contract if the participation constraint is met

$$p \geq c(q^*),$$

where q^* is the quality level that maximizes the seller's payoff. The seller will provide quality $\hat{q}$ if the No Shirking Constraint (NSC) is satisfied:

$$c(\hat{q}) \leq sf$$

Assuming linearity of buyer utility, the highest quality level that can be enforced (using $f = 13$) is $c(\hat{q}^*) = 4.33$, which corresponds to $\hat{q}^* = .4$. The price associated would be 5 (or 4 depending on the assumption about what an indifferent seller does). So, the highest power incentive compatible contract is simply $\{p = 5, \hat{q} = .4, f = 13\}$.

Notice that this contract is inefficient for the same reasons as above. But it would be predicted to outperform TT given that it is enforceable.

3.1.4 The Bonus Treatment (BT)

A concern is that fines f designed to elicit high quality levels may be perceived as hostile per se. More generally, explicit incentives may be viewed as a sign of distrust – and if that is viewed as unkind, it may generate an adverse response. So, re-frame the issue: Bonus Treatment (BT) instead of IT:

- In the IT, a seller pays a fine f if caught shirking.
- In the BT, a buyer pays the seller a bonus if he is detected not shirking. That is, in $2/3^{rd}$ of cases where $q \geq \hat{q}$, the seller pays $b \in [0, 13]$, which is stipulated in the contract $\{p_0, \hat{q}, b\}$.
- Hence, these contracts are isomorphic with $p = p_0 + b$.

Note that they F/G do not use value laden language in the experiment framing. In the IT, the fine is called "A potential price deduction." In the BT, it's called a "potential supplementary price."

3.1.5 A TINY BEHAVIORAL MODEL

F&G discuss 'reciprocal' and 'inequity averse' sellers. These concepts probably have similar predictions but different behavioral mechanisms. Reciprocal sellers play tit-for-tat strategies. Hence, two reciprocal players who meet will outperform two purely selfish players. But the behavior is still arguably selfish. Inequity averse sellers get direct disutility from outcomes that do not benefit both sides equally.

A simple inequity averse utility function might look like:

$$U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\},$$

with $\alpha_i \geq \beta_i$ and $0 \leq \beta_i \leq 1$. In this formulation, i places negative weight on any deviation from an 'equitable' outcome for either party. But $\alpha_i \geq \beta_i$ means that i weakly prefers inequity favoring herself. Assuming $\alpha = \beta = 0.5$, seller utility is maximized when

$$\pi = 100q - p = p - c(q) = u,$$

(assuming p is high enough to support an equilibrium with both players benefiting).

Notice that

$$\partial q / \partial p = 2/(100 + c'(q)) > 0.$$

Higher offered prices yield higher quality from inequity averse players. Hence, if you were a selfish buyer facing inequity averse players, you might rationally offer a price above $p^{\min} = 5$. Denote the 'payoff equalizing' quality level as q^e.

This model is developed further in the paper, but it turns out not to be too relevant. Why? Even where sellers are offered non-incentive compatible contracts in the IT, they still perform like selfish players in general. Moreover, when the IT payoffs are re-framed as a "bonus treatment" instead of a "punishment treatment" later in the study, sellers behave much less selfishly in the IT with punishment treatment. This suggests that something about framing – threats are perceived as slights even if not carried out – rather than inequity aversion is a better explantation for off-equilibrium-path behavior in both treatments. In other words, sellers don't act as if they are inequity averse when faced with incentive contracts.

3.1.6 Results

The results here are quite rich. It's a credit to the authors that they are as good as extracting deductions from experiments as at designing them.

1. In the TT, buyers offer on average higher prices and demand higher quality than in the IT.

2. The average fine in the IT is close to the maximum of 13 (and the median is 13).
   See Table 2
   See Figure 2

3. Quality and voluntary cooperation are lower in the IT than the TT. This is because

   - A fraction of sellers shirks in the IT even when the NSC is met! (risk loving?)
   - Voluntary cooperation ($q - q^* > 0$) vanishes almost completely in the IT. Almost no one performs beyond the minimum.
     - **In 62 percent of NIC (non-incentive compatible) IT contracts, sellers deliver the minimum quality.**
     - **In 69 percent of TT contracts, they deliver above minimum.**
   - If the NSC is violated, sellers generally select the minimum quality
   - In the TT, voluntary cooperation responds strongly to the price level. In the IT, there is no gradient.

See Table 3.

See Figure 3.

4. Total surplus is on average higher in TT than IT, whether comparing to IC or NIC incentive contracts.

5. But the profit for buyers is highest for incentive compatible IT contracts, second highest for TT-contracts, and lowest for NIC incentive contracts.
   See Table 6.

6. It appears that the reduction of voluntary cooperation in the IT was not caused by low price offers. Rather, low price offers were a response to a lack of sellers' voluntary cooperation in the IT. Even in the 1st period – where sellers did make offers well above $p^{\min}$, the vast majority of buyers still provided only q^*.
   See Figure 4.
   See Figure 5A, 5B

7. When the problem was re-framed using the Bonus Treatment (BT), cooperation was much higher than in the IT (though still lower than the TT), and there was a significant quality-price gradient.
   See Figure 6.

3.2 Conclusions

In my assessment, the efficiency wage literature speaks positively about the intellectual health of the Economics profession. Although economists might have concluded 'problem solved' after Shapiro-Stiglitz was published (and some did), apparently many other economists suffered from a troubled conscience. The problem was sufficiently important – and the proposed solution sufficiently unsatisfactory – that they kept pushing. Akerlof was early – of course. But twenty plus years after publication of Akerlof's Gift Exchange article, experimental economists are providing rigorous evidence potentially supporting what Akerlof intuited as an alternative explanation for Shapiro-Stiglitz. A healthy tendency in labor economics in particular has been the close interaction between theory and facts, and this has served both disciplines well. I

suspect that a considerable amount of empirical work in labor economics over the next decade will explore how norms shape labor market interactions, and this will change our conception of 'efficient' labor contracts.

TABLE I

SUPERVISION IN COMPANY-OWNED AND FRANCHISED RESTAURANTS[a]

	Proportion of employees agreeing[b]	
	Company-owned	Franchisee-owned
Manager provides adequate supervision to workers	0.326	0.452
	(0.010)	(0.014)
Assistant manager provides adequate supervision to workers	0.332	0.405
	(0.010)	(0.013)
Supervisor provides adequate supervision to workers	0.360	0.468
	(0.011)	(0.014)
Sample size	2,043	1,346

a. Data set is the National Institute of Work and Learning's survey of fast food employees. The data set is described in Section III. Tabulations were made by the author.

b. Figures represent the proportion of workers who strongly agree with each statement. Standard errors are shown in parentheses.

Krueger 1991 QJE

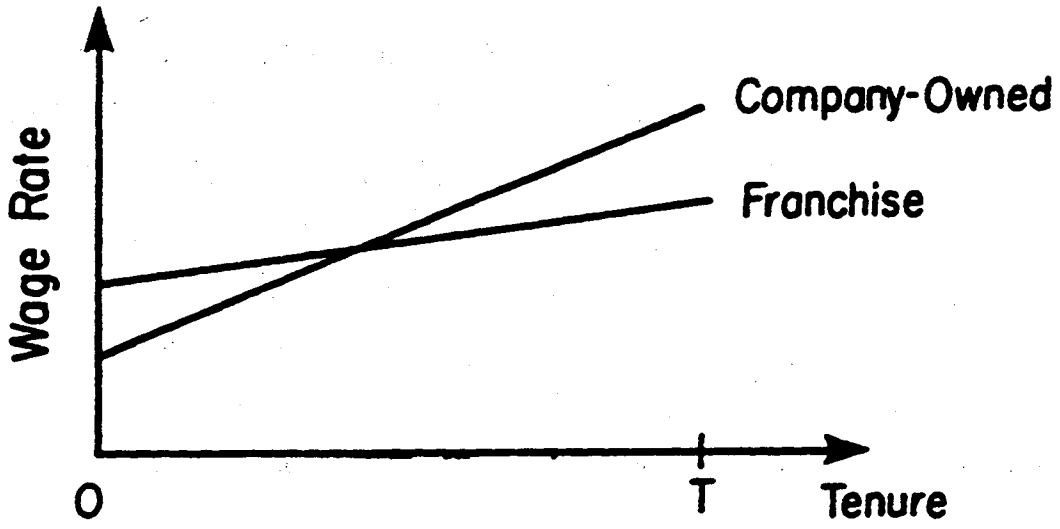

FIGURE IA
Hypothetical Tenure-Earnings Profile: Delayed-Payment Model

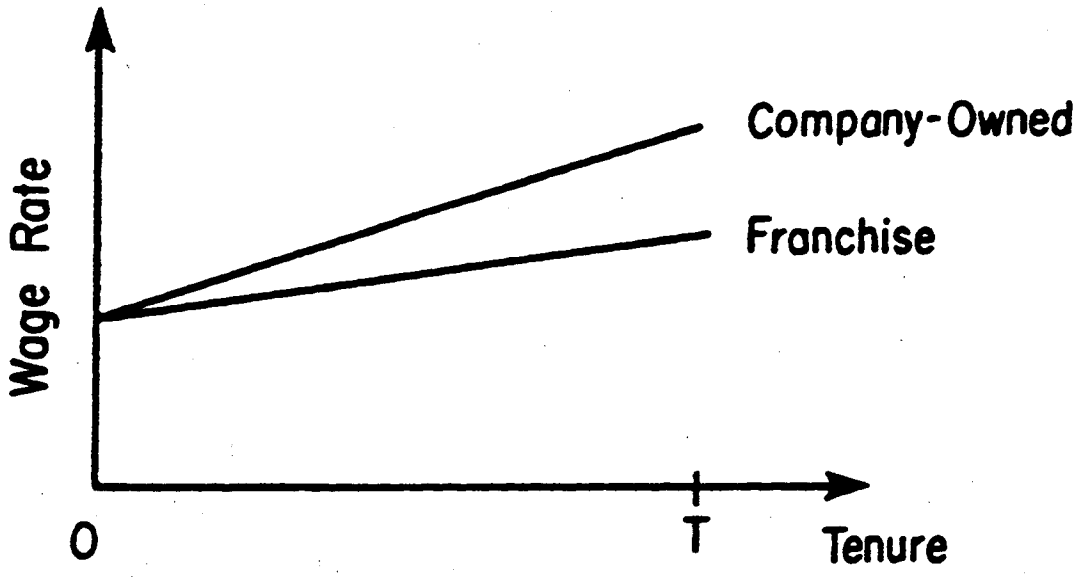

FIGURE IB
Hypothetical Tenure-Earnings Profile: Efficiency Wage Model

Krueger 1991 QJE

TABLE II
MEANS AND STANDARD DEVIATIONS OF THE NIWL DATA SET, BY TYPE OF OWNERSHIP

Variable	Sample		
	All	Franchisee-owned	Company owned
Asst. and shift mgr. hourly wage	4.59	4.35	4.75
	(1.03)	(0.71)	(1.17)
Crew worker hourly wage	3.59	3.57	3.61
	(0.35)	(0.31)	(0.38)
Years of education	11.99	11.95	12.01
	(1.40)	(1.39)	(1.40)
Tenure	1.56	1.51	1.59
	(1.35)	(1.25)	(1.41)
Age	20.10	20.13	20.08
	(5.57)	(5.80)	(5.41)
GPA	84.59	84.81	84.43
	(5.90)	(5.84)	(5.94)
Proportion part-time	0.64	0.67	0.62
	(0.48)	(0.47)	(0.48)
College prep. high school	0.46	0.46	0.46
	(0.50)	(0.50)	(0.50)
Proportion black	0.13	0.08	0.16
	(0.33)	(0.27)	(0.36)
Proportion hispanic or other race	0.07	0.08	0.07
	(0.26)	(0.27)	(0.25)
Proportion female	0.64	0.66	0.63
	(0.48)	(0.47)	(0.48)
Proportion student	0.52	0.53	0.51
	(0.50)	(0.50)	(0.50)
Round-trip commute time	14.22	14.46	14.06
	(9.45)	(9.37)	(9.50)
Establishment size	39.80	46.11	35.43
	(27.10)	(38.07)	(13.97)
Log local annual wage	9.62	9.60	9.65
	(0.15)	(0.15)	(0.14)
Log city size	11.69	11.53	11.80
	(1.78)	(1.78)	(1.76)
Log population density	8.26	8.26	8.27
	(0.76)	(0.81)	(0.73)
Sample size	2,087	852	1,235

Krueger 1991 QJE

TABLE III

RANDOM EFFECTS ESTIMATES OF THE DETERMINANTS OF WAGES IN THE FAST FOOD INDUSTRY

(DEPENDENT VARIABLE: LOG HOURLY WAGE[a])

Independent Variables	Sample					
	Assistant and shift managers		Full-time crew workers		Part-time crew workers	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	−0.411	−0.114	−0.115	−0.146	0.637	0.651
	(1.007)	(0.975)	(0.298)	(0.311)	(0.191)	(0.193)
Company-owned (1 = yes)	0.083	0.013	0.017	−0.015	0.005	−0.002
	(0.038)	(0.054)	(0.009)	(0.013)	(0.005)	(0.007)
Company-owned × tenure	—	0.025	—	0.020	—	0.006
		(0.014)		(0.006)		(0.003)
Tenure	0.042	0.025	0.032	0.020	0.028	0.024
	(0.007)	(0.012)	(0.003)	(0.005)	(0.002)	(0.002)
Education	0.011	0.010	0.005	0.005	0.005	0.005
	(0.008)	(0.008)	(0.003)	(0.003)	(0.001)	(0.001)
GPA + 100	0.027	0.025	0.057	0.073	0.068	0.066
	(0.220)	(0.221)	(0.070)	(0.069)	(0.029)	(0.029)
College prep. high school curriculum	0.017	0.012	0.003	0.006	0.003	0.003
	(0.024)	(0.025)	(0.009)	(0.009)	(0.003)	(0.003)
Student	−0.053	−0.055	−0.022	−0.022	−0.006	−0.006
	(0.029)	(0.029)	(0.009)	(0.009)	(0.004)	(0.004)
Age	0.004	0.006	0.001	0.002	0.0011	0.0011
	(0.002)	(0.002)	(0.001)	(0.001)	(0.0004)	(0.0004)
Married	0.025	0.013	0.034	0.033	0.006	0.007
	(0.032)	(0.033)	(0.012)	(0.012)	(0.006)	(0.006)
Black	−0.087	−0.081	−0.015	−0.015	−0.010	−0.011
	(0.041)	(0.041)	(0.011)	(0.011)	(0.006)	(0.006)
Hispanic and other	−0.000	0.006	−0.009	−0.008	−0.003	−0.003
	(0.046)	(0.046)	(0.015)	(0.015)	(0.006)	(0.006)
Female	−0.029	−0.029	−0.006	−0.006	−0.010	−0.010
	(0.025)	(0.025)	(0.011)	(0.011)	(0.005)	(0.005)
Round-trip commute time + 100	0.378	0.353	0.071	0.076	−0.021	−0.021
	(0.104)	(0.105)	(0.040)	(0.040)	(0.017)	(0.017)
Weekly hours	0.003	0.003	0.0005	0.0007	0.0005	0.0005
	(0.001)	(0.001)	(0.0007)	(0.0007)	(0.0002)	(0.0002)
Log establishment size	0.009	0.019	0.011	0.003	0.003	0.003
	(0.038)	(0.038)	(0.012)	(0.012)	(0.007)	(0.007)
Log local annual wage	0.162	0.134	0.127	0.127	0.044	0.043
	(0.113)	(0.109)	(0.033)	(0.035)	(0.021)	(0.022)
Log city size	0.016	0.019	−0.008	−0.009	−0.003	−0.003
	(0.013)	(0.012)	(0.003)	(0.004)	(0.007)	(0.002)
Log population density	−0.057	−0.062	0.012	0.012	0.003	0.003
	(0.030)	(0.030)	(0.009)	(0.009)	(0.005)	(0.005)
Assistant manager[b]	0.178	0.177	—	—	—	—
	(0.064)	(0.062)				
Job task dummies (11)[c]	Yes	Yes	Yes	Yes	Yes	Yes
Parent company dummies (3)	Yes	Yes	Yes	Yes	Yes	Yes
Census region dummies (8)	Yes	Yes	Yes	Yes	Yes	Yes
σ_ϵ^2	0.012	0.012	0.007	0.007	0.003	0.003
σ_u^2	0.005	0.004	0.001	0.001	0.001	0.001

a. Data set is NIWL survey of fast food employees. Standard errors are shown in parentheses. Sample size is 198 for columns 1 and 2,615 for columns 3 and 4, and 1,274 for columns 5 and 6.

b. Dummy variable that equals one if the worker is an assistant manager and zero if he is a shift manager. All assistant and shift managers are hourly, nonexempt employees.

c. Job tasks that are performed all or most of the time are coded 1; job tasks that are performed only sometimes, seldom, or never are coded 0. The eleven job tasks include cooking, preparing food (noncooking), packing orders, taking orders, handling money, hosting dining area, suggestive selling, unloading trucks, cleaning the restaurant, cleaning equipment, and training workers.

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TABLE IV

PROBIT ESTIMATES OF PROBABILITY OF PAYING THE MINIMUM WAGE[a]

Independent variables	Mean (SD)	Sample coefficient (SE) Full-time	Part-time
Intercept	1.00	3.207	4.642
	(0.00)	(2.831)	(3.296)
Company-owned restaurant	0.53	0.183	−1.396
	(0.50)	(0.483)	(0.586)
Log estab. size	3.71	0.881	−0.694
	(0.64)	(0.730)	(0.828)
City dummies (4)	—	Yes	Yes
Parent company dummies (3)	—	Yes	Yes
Log likelihood fn.		−26.44	−20.36

a. The dependent variable equals one if the starting wage equals the minimum wage, and zero if the starting wage exceeds the minimum wage. Sample size is 47. Data are from BNA survey of establishments. The proportion of restaurants that pay the minimum wage to newly hired part-time workers is 0.745, and the proportion of restaurants that pay the minimum wage to newly hired full-time workers is 0.468.

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1991 QJE

TABLE I

VARIABLE DEFINITIONS, MEAN VALUES, AND STANDARD DEVIATIONS

Variable	Definition	Mean	S.D.
DISL	Rate of worker dismissals for disciplinary reasons	0.0968	0.076
W_a	Average hourly wage in 1982 for production workers in each plant's SMSA	$ 10.58	1.5
WPREM	The wage premium for each plant defined as the average hourly company wage—W_a	$ 2.92	1.5
WPREM'70	The wage premium for each plant in 1970 as defined above	1.03	0.4
UE	Unemployment rate in the SMSA in which the plant is located	13.06	4.0
LAIDOFF	Percentage of workers on layoff	25.47	14.7
SEN	Percentage of workers with less than ten years of seniority	45.08	18.8
VOICE	Corporate assessment of cooperative relations/problem-solving at plant (1 = least cooperative; 10 = most)	6.96	1.4
ASSMBLY	Dummy variable for assembly plants	0.23	0.4
MICHIGAN	Dummy variable for plants in Michigan	0.60	0.5
SOUTH	Dummy variable for plants in the South	0.06	0.2
UIBEN	Maximum state unemployment insurance benefits by plant location	$4,928.31	1,044.3

SMSA data from U. S. Bureau of Labor Statistics 1982 Area Wage Surveys. Unemployment data are from *Employment and Earnings* [1982] and from *Highlights of State Unemployment Compensation Laws* [1983]. All other data are from internal company records for 1982.

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TABLE II

REGRESSION RESULTS FOR RATES OF DISCIPLINARY LAYOFFS ACROSS PLANTS

	[(Dependent variable = ln DISL/1 − DISL)]		
	Weighted least squares		Elasticity[a]
	(1)	(2)	(3)
Intercpt	−1.071	−1.20	—
	(0.96)	(1.16)	
WPREM	−0.21**	−0.24*	0.547
	(0.10)	(0.13)	
UE	−0.03	−0.012	0.330
	(0.04)	(0.045)	
LAIDOFF	−0.009*	−0.008*	0.207
	(0.005)	(0.005)	
SEN	0.007*	0.008*	0.285
	(0.004)	(0.004)	
VOICE	−0.14***	−0.14***	0.908
	(0.054)	(0.05)	
ASSMBLY	1.008***	1.02***	0.210
	(0.182)	(0.18)	
MICHIGAN	0.09	0.289	0.053
	(0.238)	(0.24)	
SOUTH	0.054	−0.057	0.003
	(0.336)	(0.36)	
UIBEN	−0.00004	−0.00006	0.178
	(0.00009)	(0.00009)	
WPREM'70		0.37	0.291
		(0.54)	
S.E.E. =	0.62	0.61	
F =	6.43	6.32	
n =	78	78	

* = significant at 10 percent.
** = significant at 5 percent.
*** = significant at 1 percent (two-tailed tests).

All of the values for DISL lie between zero and one. Standard errors are in parentheses. The proportion of the variance in DISL explained by regressions 1 and 2 is 46 and 49 percent, respectively.

a. Evaluated at the mean from the weighted regression in equation (2).

Protected-sector jobs can be readily identified because so many people want them. Companies paying wages higher than market levels for equivalent skills and working conditions tend to have very low labour turnover and long lists of applicants waiting for an opening to arise. Unprotected-sector companies tend to have more normal (i.e. higher) labour turnover and shorter waiting lists of applicants . . . [Harberger, 1971, p. 563].

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TABLE I

MEANS (STANDARD DEVIATIONS) BY STARTING HOURLY WAGE RATE FOR SUBSAMPLE OF WORKERS WITH WAGE RATE LESS THAN $5 PER HOUR[a]

Variable	Subsample		
	Less than minimum wage	Minimum wage	More than minimum wage
Log applications per opening	1.28	1.59	1.40
	(1.07)	(1.20)	(1.16)
Applications per opening	6.60	11.49	9.18
	(9.19)	(26.06)	(20.43)
Male	0.40	0.42	0.48
	(0.49)	(0.50)	(0.50)
Age	24.57	24.11	26.68
	(10.94)	(8.62)	(8.90)
High school graduate	0.67	0.71	0.80
	(0.48)	(0.45)	(0.40)
College graduate	0.05	0.05	0.11
	(0.21)	(0.21)	(0.32)
Years of relevant experience	0.43	0.87	1.94
	(0.93)	(1.77)	(3.99)
Hours of on-the-job training	49.78	45.85	68.26
	(81.84)	(92.79)	(109.18)
Weekly hours >35	0.30	0.53	0.74
	(0.46)	(0.50)	(0.44)
Temporary job	0.16	0.13	0.11
	(0.37)	(0.34)	(0.31)
Seasonal job	0.11	0.06	0.05
	(0.32)	(0.23)	(0.21)
Establishment size	24.59	43.96	46.34
	(67.11)	(85.37)	(152.13)
Proportion union	0.01	0.03	0.07
	(0.07)	(0.14)	(0.23)
White collar	0.57	0.42	0.50
	(0.50)	(0.49)	(0.50)
Vacancy duration[b]	7.75	12.19	15.31
	(1.04)	(1.57)	(32.51)
Sample size	63	192	691

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TABLE II

APPLICATION DIFFERENTIALS FOR MINIMUM WAGE AND SUBMINIMUM WAGE JOBS[a]
(SUBSAMPLE OF WORKERS WITH WAGE RATE LESS THAN $5 PER HOUR)

Other independent variables	Minimum wage effect[b]	Subminimum wage effect[c]	R^2
1. Occupation dums. (8), hours of formal training, hours of informal training, age, sex, experience, high school dum., college dum., full-time dum., weekly hours betw. 20 and 35 dum., seasonal job dum., temporary job dum., year dums. (4), log duration of vacancy	0.226	0.013	0.127
	(0.098)	(0.152)	
2. Row 1 plus 27 site dums.	0.228	0.013	0.168
	(0.099)	(0.156)	
3. Row 2 plus proportion union	0.245	0.030	0.172
	(0.099)	(0.156)	
4. Row 3 plus 4 firm size dums. and log plant size	0.230	0.101	0.195
	(0.098)	(0.156)	
5. Row 4 plus 35 industry dums.	0.260	0.119	0.216
	(0.101)	(0.163)	

a. Dependent variable is ln (applications per last job filled). Sample size is 946. Standard errors are in parentheses. Regressions also include a constant.

b. Estimated coefficient for a dummy variable that equals one if the worker's starting wage equaled the minimum wage that was in effect in the year the worker was hired, and zero otherwise.

c. Estimated coefficient for a dummy variable that equals one if the worker's starting wage was less than the minimum wage that was in effect in the year the worker was hired, and zero otherwise.

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TABLE III

2SLS ESTIMATES OF THE DETERMINANTS OF JOB APPLICATIONS USING INDUSTRY DUMMY VARIABLES AS INSTRUMENTS FOR THE WAGE RATE[a]

Independent variable	Mean [SD]	Equation[b] 1	2	3
Intercept	1.00	−2.104	−1.264	−0.521
	[0.00]	(1.499)	(1.743)	(1.750)
Log (wage)	1.54	0.492	0.337	0.144
	[0.39]	(0.264)	(0.304)	(0.313)
Minimum wage (1 = yes)	0.14	0.315	0.304	0.249
	[0.35]	[0.113]	[0.114]	[0.114]
Log (vacancy duration)	2.07	0.225	0.230	0.227
	[1.27]	(0.026)	(0.026)	(0.026)
Proportion union	0.11	—	0.310	0.123
	[0.28]		(0.148)	(0.147)
Log (estab. size)	2.82	—	—	0.133
	[1.50]			(0.025)
Firm size:				
50–99	0.07	—	—	0.043
	[0.26]			(0.118)
100–499	0.03	—	—	0.216
	[0.17]			(0.073)
500–1,999	0.07	—	—	0.154
	[0.26]			(0.127)
> 2,000	0.03	—	—	0.127
	[0.17]			(0.186)
Demographic:				
Male (1 = yes)	0.56	−0.042	−0.019	0.015
	[0.50]	(0.090)	(0.093)	(0.093)
Age	26.99	−0.004	−0.004	−0.002
	[9.13]	(0.003)	(0.004)	(0.004)
Experience	28.96	−0.001	−0.001	−0.000
	[53.70]	(0.001)	(0.001)	(0.001)
High school grad	0.76	−0.049	−0.031	−0.030
	[0.43]	(0.107)	(0.108)	(0.107)
College grad	0.13	−0.202	−0.167	−0.165
	[0.34]	(0.146)	(0.150)	(0.147)
Occupation dummies (8)		Yes	Yes	Yes
Hours training:				
Formal	10.00	0.0021	0.0021	0.0020
	[44.62]	(0.0007)	(0.0007)	(0.0007)
Informal	54.74	−0.0001	−0.0001	−0.0000
	[91.55]	(0.0003)	(0.0003)	(0.0003)
Full time	0.72	0.176	0.186	0.166
	[0.45]	(0.103)	(0.103)	(0.101)
Hours 20 to 35	0.16	0.218	0.213	0.224
(1 = yes)	[0.37]	(0.121)	(0.120)	(0.118)

TABLE III
(CONTINUED)

Independent variable	Mean [SD]	Equation[b] 1	2	3
Temporary job (1 = yes)	0.10 [0.30]	−0.293 (0.107)	−0.289 (0.106)	−0.241 (0.105)
Seasonal job (1 = yes)	0.05 [0.22]	−0.116 (0.145)	−0.114 (0.144)	−0.048 (0.142)
σ_ϵ		1.116	1.109	1.088
χ^2 statistic for GMM specification test of industry exclusion restrictions (DF = 33)		43.46	45.46	40.26
Prob. value for Hausman test of simultaneity between starting wage and applications		0.045	0.108	0.247

a. Asymptotic standard errors are in parentheses. Sample size is 1,333. Mean of log (applications) is 1.452 [1.175]. Industry is measured at the two-digit Census level.
b. Each equation also includes 27 site dummy variables and 4 year dummy variables.

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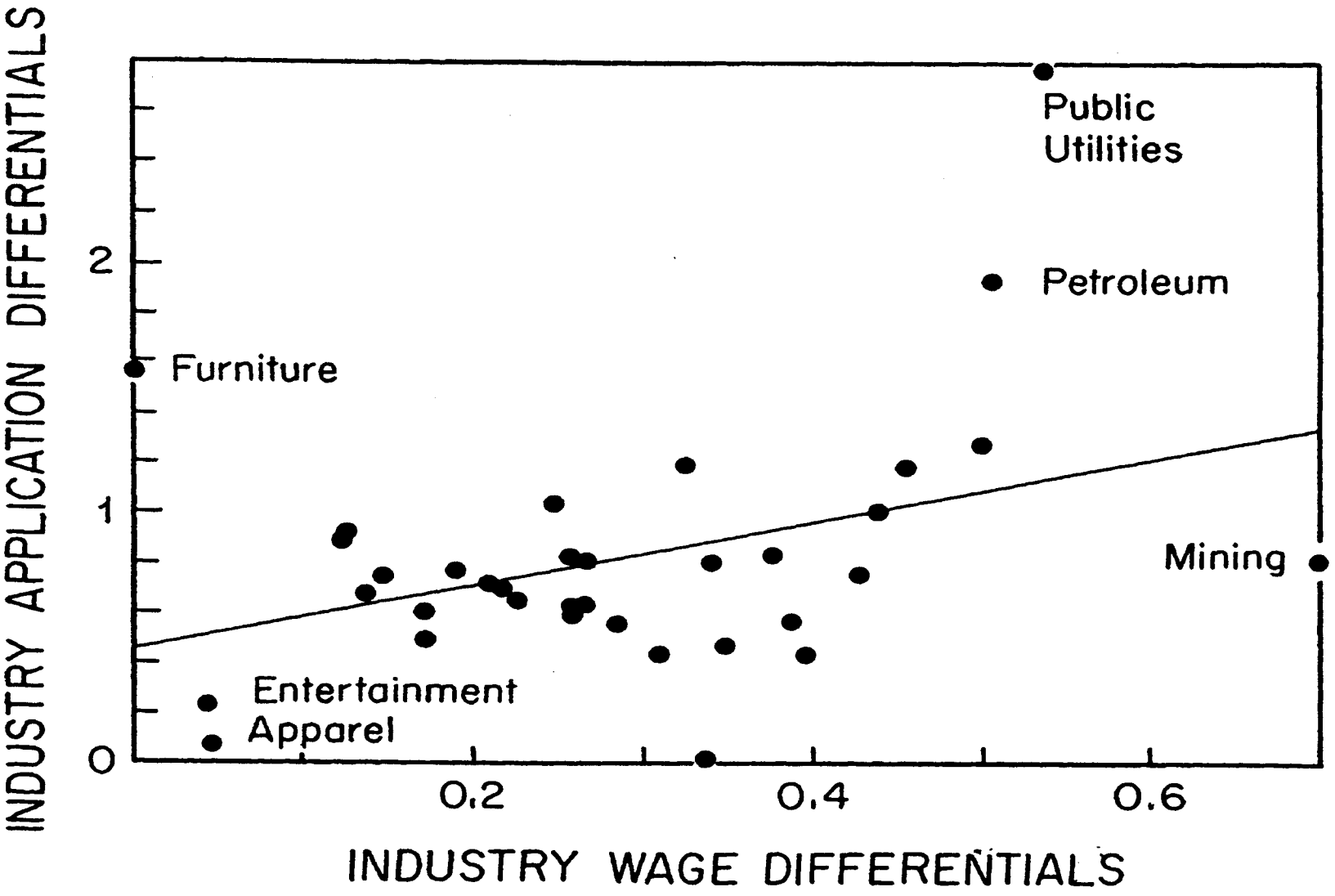

FIGURE I
Plot of Reduced-Form Coefficients

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TABLE IV

2SLS ESTIMATES OF THE DETERMINANTS OF JOB APPLICATIONS USING ALTERNATIVE INSTRUMENTS[a]

Independent variables	Equation[b]					
	1	2	3	4	5	6[c]
Intercept	−6.870	−3.559	−22.518	−4.276	−4.391	−1.379
	(2.207)	(1.381)	(4.954)	(1.475)	(1.381)	(1.419)
Log (wage)	1.351	0.754	4.170	0.883	0.904	0.299
	(0.393)	(0.242)	(0.889)	(0.259)	(0.242)	(0.253)
Minimum wage (1 = yes)	0.512	0.375	1.159	0.405	0.409	0.275
	(0.135)	(0.111)	(0.248)	(0.115)	(0.112)	(0.110)
Log vacancy duration	0.215	0.222	0.180	0.221	0.220	0.224
	(0.028)	(0.026)	(0.040)	(0.027)	(0.027)	(0.026)
Log (estab. size)	—	—	—	—	—	0.137
						(0.002)
Male	−0.188	−0.087	−0.665	−0.109	−0.112	−0.010
(1 = yes)	(0.106)	(0.089)	(0.190)	(0.091)	(0.090)	(0.088)
Age	−0.006	−0.005	−0.011	−0.005	−0.005	−0.002
	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.004)
Experience	−0.002	−0.001	−0.007	−0.002	−0.002	−0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
High school grad	−0.138	−0.076	−0.427	−0.090	−0.092	−0.048
	(0.117)	(0.108)	(0.179)	(0.109)	(0.109)	(0.105)
College grad	−0.368	−0.253	−0.914	−0.278	−0.282	−0.197
	(0.163)	(0.146)	(0.266)	(0.148)	(0.147)	(0.143)
Occupation dummies (8)	yes	yes	yes	yes	yes	yes
Hrs. formal training	0.0020	0.0021	0.0018	0.0021	0.0021	0.0020
	(0.0007)	(0.0007)	(0.0010)	(0.0007)	(0.0007)	(0.0007)
Hrs. informal	−0.0000	−0.0001	0.0004	−0.0001	−0.0001	−0.0000
	(0.0003)	(0.0004)	(0.0005)	(0.0003)	(0.0003)	(0.0003)
Full time	0.118	0.158	−0.072	0.149	0.148	0.155
(1 = yes)	(0.110)	(0.104)	(0.162)	(0.105)	(0.105)	(0.101)
Hours 20–35	0.204	0.214	0.156	0.212	0.211	0.224
(1 = yes)	(0.128)	(0.122)	(0.180)	(0.123)	(0.123)	(0.119)
Temporary job	−0.267	−0.285	−0.180	−0.281	−0.280	−0.239
(1 = yes)	(0.112)	(0.108)	(0.160)	(0.109)	(0.109)	(0.105)
Seasonal job	−0.110	−0.114	−0.093	−0.113	−0.113	−0.045
(1 = yes)	(0.152)	(0.114)	(0.214)	(0.147)	(0.148)	(0.142)
χ^2 Overident. statistic [*DF*]	—	47.2 [34]	1.37 [4]	75.9 [38]	77.0 [39]	34.6 [35]
σ_ϵ	1.169	1.123	1.452	1.131	1.132	1.087
Z-vector	union	union and ind. dums.	5 emp. size vars.	5 emp. size vars. and ind. dums.	5 emp. size vars., union and ind. dums.	union and ind. dums.

a. Asymptotic standard errors are in parentheses. Sample size is 1,333. Mean of log (applications) is 1.452 [1.175]. Industry is measured at the two-digit Census level.

b. Each equation also includes 27 site dummy variables and 4 year dummy variables.

c. This equation also contains four firm-size dummy variables.

From Kahneman, Knetsch and Thaler, *AER,* 1986

Q2A: A small photocopying shop has one employee who has worked in the shop for six months and earns $9 per hour. Business continues to be satisfactory, but a factory in the area has closed and unemployment has increased. Other small shops have now hired reliable workers at $7 an hour to perform jobs similar to those done by the photocopy shop employee. The owner of the photocopying shop reduces the employee's wage to $7.

(N=98) Acceptable 17% Unfair 83%

Q2B: A small photocopying shop has one employee... [as in Question 2A] ... The current employee leaves and the owner decides to pay a replacement $7 an hour.

(N=125) Acceptable 73% Unfair 27%

Q3: A house painter employs two assistants and pays them $9 per hour. The painter decides to quit house painting and go into the business of providing landscape services, where the going wage is lower. He reduces the workers' wages to $7 per hour for the landscaping work.

(N=94) Acceptable 63% Unfair 37%

Q6A: A small company employs several people. The workers' incomes have been about average for the community. In recent months, business for the company has not increased as it had before. The owners reduce the workers' wages by 10 percent for next year.

(N=100) Acceptable 39% Unfair 61%

Q6B: A small company employs several people. The workers have been receiving a 10 percent annual bonus each year and their total incomes have been about average for the community. In recent months, business for the company has not increased as it had before. The owners eliminate the workers' bonus for the year.

(N=98) Acceptable 80% Unfair 20%

"In recent years economists have developed several theories to explain why firms normally do not cut wages to the lowest level at which they can find the necessary number of qualified applicants during a recession. The questions below are related to these various theories. If your firm does not cut wages as low as possible during a recession, please indicate how important each of these theories is in explaining why you do not."

TABLE I

THEORIES OF WAGE RIGIDITY

Theory	Source of wage rigidity
Contract theory	Long-term contracts between firms and workers set wages in advance and are negotiated on a staggered basis [Fischer 1977; Taylor 1979].
Implicit contract theory	Workers are risk averse, preferring a real wage that is stable over the business cycle to one that rises in expansions and falls in recessions. A firm offering its workers a steady wage could therefore pay an average wage below what it would otherwise have to pay because it would be giving workers a compensating differential in return for the lower average wage. This risk aversion gives firms and workers an incentive to reach an implicit understanding that the wage will be kept stable over the business cycle [Baily 1974; Gordon 1974; Azariadis 1975; Stiglitz 1986].
Efficiency wage theory	Workers' productivity depends positively on the wage [Solow 1979; Yellen 1984; Stiglitz 1986].
a. Shirking model	The cost of losing one's job depends positively on the wage, so that a higher wage will induce fewer workers to shirk and risk dismissal [Shapiro and Stiglitz 1984].
b. Gift-exchange model	Workers view a higher wage as a gift from the firm, inducing them to work harder as a gift to the firm [Akerlof 1982, 1984].
c. Adverse selection model	A higher wage raises the average quality of a firm's applicant pool. In addition, adverse selection may also apply to quits, since a firm's most productive workers are the most likely to quit if it cuts wages [Weiss 1980, 1990].
d. Turnover model	Workers' quit rates depend negatively on the firm's wage. Thus, a firm paying higher wages will have lower costs of hiring and training new workers. In addition, its workers on average will have acquired more firm-specific human capital, making them more productive than similar individuals with no experience at the firm [Stiglitz 1974; Schlicht 1978; Salop 1979; Hashimoto and Yu 1980].
Fair wage-effort hypothesis	If workers' wages are below their perceived fair wage, then their effort depends on the ratio of their wage to their perceived fair wage [Akerlof and Yellen 1990].
Insider-outsider theory	Firms do not dismiss their current workers (i.e., insiders) and hire the unemployed (i.e., outsiders) at a lower wage because of the cost of hiring and training new workers and because of the ability of insiders to harass or not cooperate with new entrants hired to replace dismissed insiders. The costs of replacing insiders with outsiders gives insiders a great deal of power in setting their own wage [Lindbeck and Snower 1988].

1. Economists have discussed two reasons why cutting wages might lower workers' effort. One is that workers will feel less gratitude and loyalty to the firm and will not work as hard in return. A second is that workers who are paid less will be less concerned about losing their jobs and thus will not work as hard. Which reason bests explains why effort would fall if you were to cut wages?

	Overall	BW	NBW
* Gratitude and loyalty	69.2%	79.2%	51.7%
Less concern about job loss	4.4%	1.0%	10.3%
* Both reasons about equally important	26.4%	19.8%	37.9%

TABLE IV

AVERAGE SCORE RECEIVED FOR EACH STATEMENT (4 = VERY IMPORTANT, 3 = MODERATELY IMPORTANT, 2 = OF MINOR IMPORTANCE, 1 = NOT IMPORTANT) AND PERCENTAGE OF RESPONDENTS RATING EACH STATEMENT AS THE MOST IMPORTANT REASON (RANK IS IN PARENTHESES)

	Average score			Percentage ranking each statement as most important
	Overall	Business Week	Non-Business Week	
a. Labor union contracts prevent wages from being cut.				
White-collar[u]	1.35 (9)	1.32 (9)	1.39 (9)	4.7% (7t)
Blue-collar[u,l,*]	2.40 (7)	2.64 (5)	1.94 (9)	22.9% (2)
Less skilled[u,l,*]	2.05 (8t)	2.29 (6)	1.64 (9)	13.2% (4)
b. Workers dislike unpredictable changes in income. Therefore, workers and firms reach an implicit understanding that wages will neither fall in recessions nor rise in expansions.				
White-collar[u,l]	2.59 (5)	2.72 (5)	2.38 (5)	9.6% (5)
Blue-collar	2.79 (3)	2.76 (3)	2.85 (3t)	11.7% (4t)
Less skilled	2.60 (3)	2.69 (3)	2.44 (5)	16.2% (2)
c. If your firm were to cut wages, people in the community would hear about it, making it more difficult to hire workers in the future.				
White-collar[l]	2.30 (7)	2.56 (7)	1.87 (8)	5.5% (6)
Blue-collar[l]	2.36 (8)	2.53 (6)	1.97 (8)	2.1% (7t)
Less skilled[l]	2.20 (7)	2.47 (5)	1.71 (8)	3.4% (7)

TABLE IV
(CONTINUED)

	Average score			Percentage ranking each statement as most important
	Overall	Business Week	Non-Business Week	
d. A cut in wages would decrease workers' effort, resulting in less output or poorer service.				
White-collar	2.77 (4)	2.77 (4)	2.77 (4)	10.3% (4)
Blue-collar*	2.99 (2)	2.94 (2)	3.12 (1)	15.4% (3)
Less skilled	2.88 (2)	2.86 (2)	2.92 (2)	15.4% (3)
e. A cut in wages would increase number of workers who quit, increasing the cost of hiring and training new workers in the future.				
White-collar**	2.96 (2)	2.95 (2)	2.97 (2)	11.6% (3)
Blue-collar	2.73 (4)	2.68 (4)	2.85 (3t)	11.7% (4t)
Less skilled[s]	2.56 (4)	2.56 (4)	2.55 (4)	9.4% (5)
f. If your firm were to discharge some of its current workers and to hire new workers at a lower wage, the workers who remain would harass and refuse to cooperate with the newly hired workers.				
White-collar	1.82 (8)	1.77 (8)	1.91 (7)	0.7% (9)
Blue-collar[u,*]	2.16 (9)	2.20 (9)	2.09 (7)	1.1% (9)
Less skilled[u,*]	2.05 (8t)	2.11 (8)	1.94 (7)	1.7% (8t)

TABLE IV
(CONTINUED)

	Average score			Percentage ranking each statement as most important
	Overall	Business Week	Non-Business Week	
g. If your firm were to cut wages, your most productive workers might leave, whereas if you lay off workers, you can lay off the least productive workers.				
White-collar	3.27 (1)	3.35 (1)	3.13 (1)	40.8% (1)
Blue-collar	3.13 (1)	3.16 (1)	3.07 (2)	26.6% (1)
Less skilled[n,s]	3.10 (1)	3.13 (1)	3.04 (1)	34.6% (1)
h. Workers who have been with the firm for a long time have learned how the firm operates and have formed relationships with coworkers and clients. A cut in wages may cause some of your long-time employees to leave, and their replacements would not have this inside knowledge of the firm.				
White-collar[s,**]	2.85 (3)	2.81 (3)	2.93 (3)	12.9% (2)
Blue-collar[s,sm,*]	2.50 (5)	2.35 (8)	2.82 (5)	6.4% (6)
Less skilled[s,sm]	2.24 (5)	2.05 (9)	2.57 (3)	3.8% (6)

TABLE IV
(CONTINUED)

	Average score			Percentage ranking each statement as most important
	Overall	Business Week	Non-Business Week	
i. Independent of the effect of wage cuts on profits, people in management positions would be reluctant to cut wages in order to avoid employees' resentment toward them.				
White-collar[u,l,*]	2.52	2.64	2.33	4.8%
	(6)	(6)	(6)	(7t)
Blue-collar[u,*]	2.48	2.50	2.44	2.1%
	(6)	(7)	(6)	(7t)
Less skilled[u]	2.23	2.28	2.15	1.7%
	(6)	(7)	(6)	(8t)

[u]Significantly greater (at the 5 percent level) for heavily unionized than for less unionized firms.
[l]Significantly greater for less unionized firms than for heavily unionized firms.
[l]Significantly greater for large firms than for small and midsized firms.
[s]Significantly greater for small and midsized firms than for large firms.
[*]Significantly greater for firms producing services than for firms producing goods.
[t]Significantly greater for this occupational group than for the group receiving the lowest average score.
[tt]Significantly greater for this occupational group than for both other occupational groups.

6. Suppose you were to cut wages by 10%. By approximately what percentage (if at all) would you expect workers' effort to fall as a result of this cut in wages?

	White-collar			Blue-collar			Less skilled		
	Overall	BW	NBW	Overall	BW	NBW	Overall	BW	NBW
Mean	15.4%	15.0%	16.9%	19.4%	19.3%	19.8%	22.7%	21.1%	27.7%
Median	10.0%	10.0%	15.0%	15.0%	15.0%	20.0%	20.0%	18.0%	20.0%
>0%	85.8%	89.5%	72.0%	92.0%	95.7%	76.5%	91.3%	93.7%	84.0%
≥10%	61.7%	61.6%	64.0%	74.7%	77.1%	64.7%	78.8%	78.5%	80.0%

7. Suppose you were to raise wages by 10%. By approximately what percentage (if at all) would you expect workers' effort to rise as a result of the wage increase?

	White-collar			Blue-collar			Less skilled		
	Overall	BW	NBW	Overall	BW	NBW	Overall	BW	NBW
Mean	6.6%	6.5%	7.1%	6.4%	6.7%	5.2%	6.9%	6.2%	8.9%
Median	2.5%	2.2%	3.75%	1.75%	0.0%	5.0%	1.0%	0.0%	2.5%
>0%	55.8%	54.5%	60.7%	52.1%	46.7%	71.4%	53.2%	46.4%	74.1%
≥10%	19.4%	18.8%	21.4%	18.7%	18.7%	19.0%	22.5%	19.0%	33.3%

TABLE 2

Contracts and actual quality levels in the Trust and the Incentive Treatment

	Trust-Treatment (TT) N = 356			Incentive-Treatment (IT) N = 280			
Predictions:	(p^*=1, q^*=0.1)			(p^*=5, f^*=13, $\hat{q}^*$=0.4, q^*=0.4)			
Actual:	p	$\hat{q}$	q	p	f	$\hat{q}$	q
Mean	30.2	0.65	0.37	19.7	11.7	0.49	0.27
Median	34.0	0.70	0.30	15.0	13.0	0.50	0.30
Std.dev.	17.6	0.27	0.26	12.6	2.6	0.17	0.17

FIGURE 2
Distribution of sellers' actual quality choices

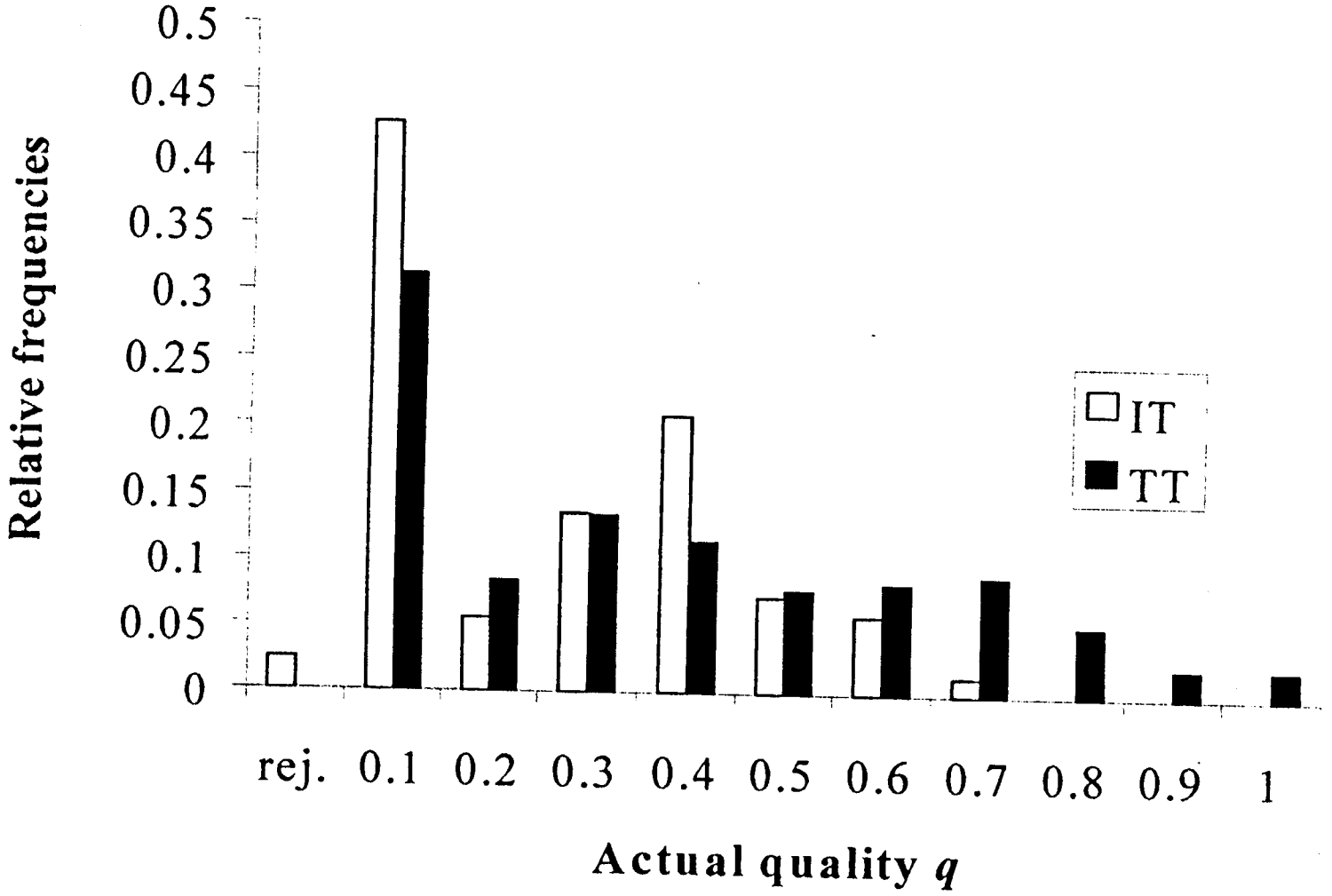

TABLE 3

Sellers' deviation from the best reply quality level q^* in the IT and the TT

		$q < q^*$	$q = q^*$	$q > q^*$	Sum
Treatments:		N	N	N	N
IT	no	-	102	63	165
NSC (7) *met?*	yes	19	94	2	115
	Sum	19	196	65	280
TT			112	244	356

Note: Entries are number of cases in the respective category. q^* denotes the best reply quality choice according to (8).

FIGURE 3

Voluntary cooperation ($q - q^*$) as a function of prices

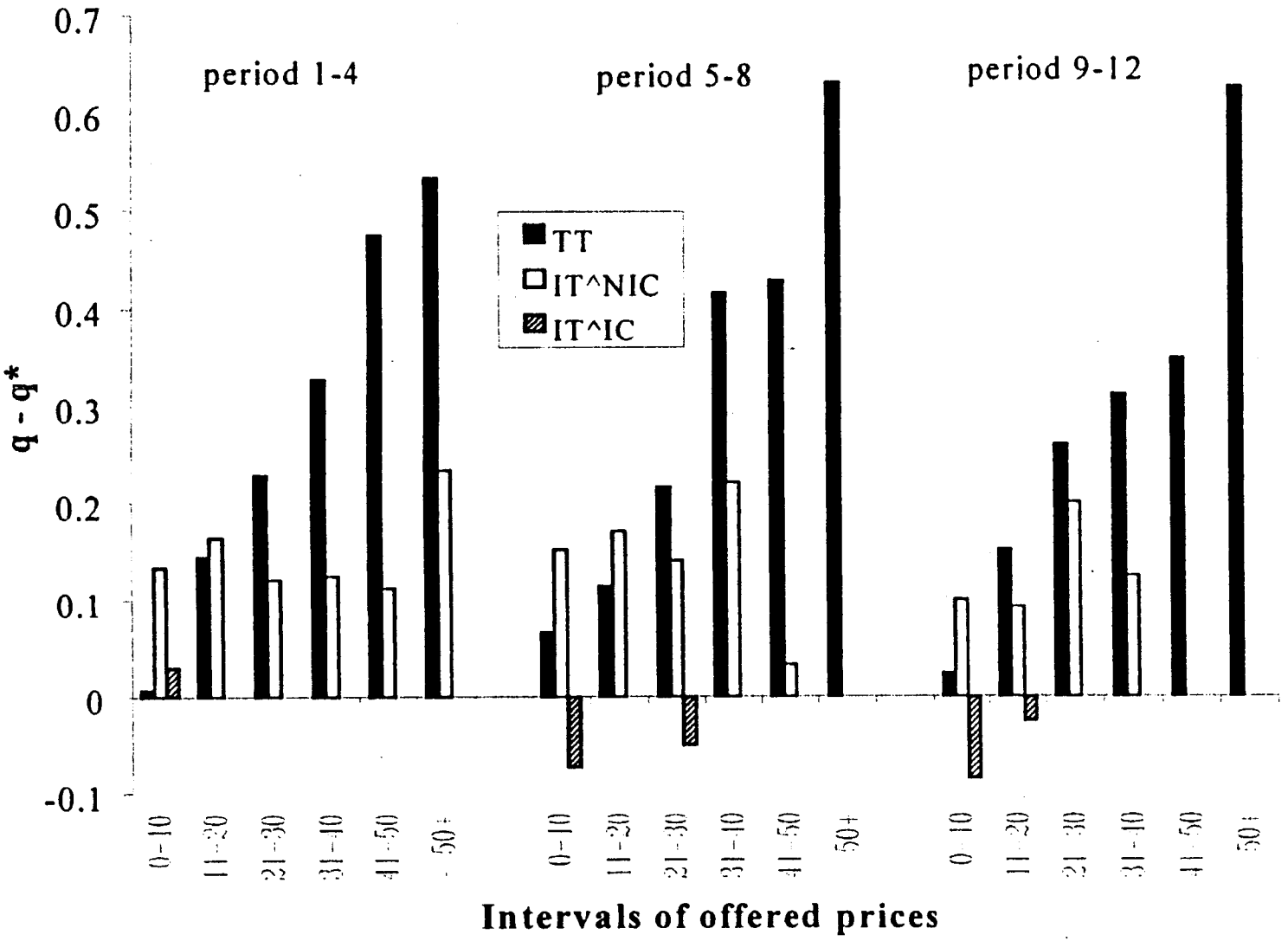

TABLE 6

Average profits and average total gains per contract.

	Trust-Treatment	Incentive-Treatment	
		NSC violated	NSC holds
Predicted surplus S* (*according to the standard model*)	$vq^{min} - c(q^{min}) = 10$	$vq^{min} - c(q^{min}) = 10$	$v\hat{q}^* - c(\hat{q}^*) = 36$
Realized Surplus S	33.0	21.5	27.5
Profit Buyer	7.1	1.9	18.2
Profit Seller	25.9	19.6	9.2

FIGURE 4
Evolution of prices in Trust and Incentive Treatment

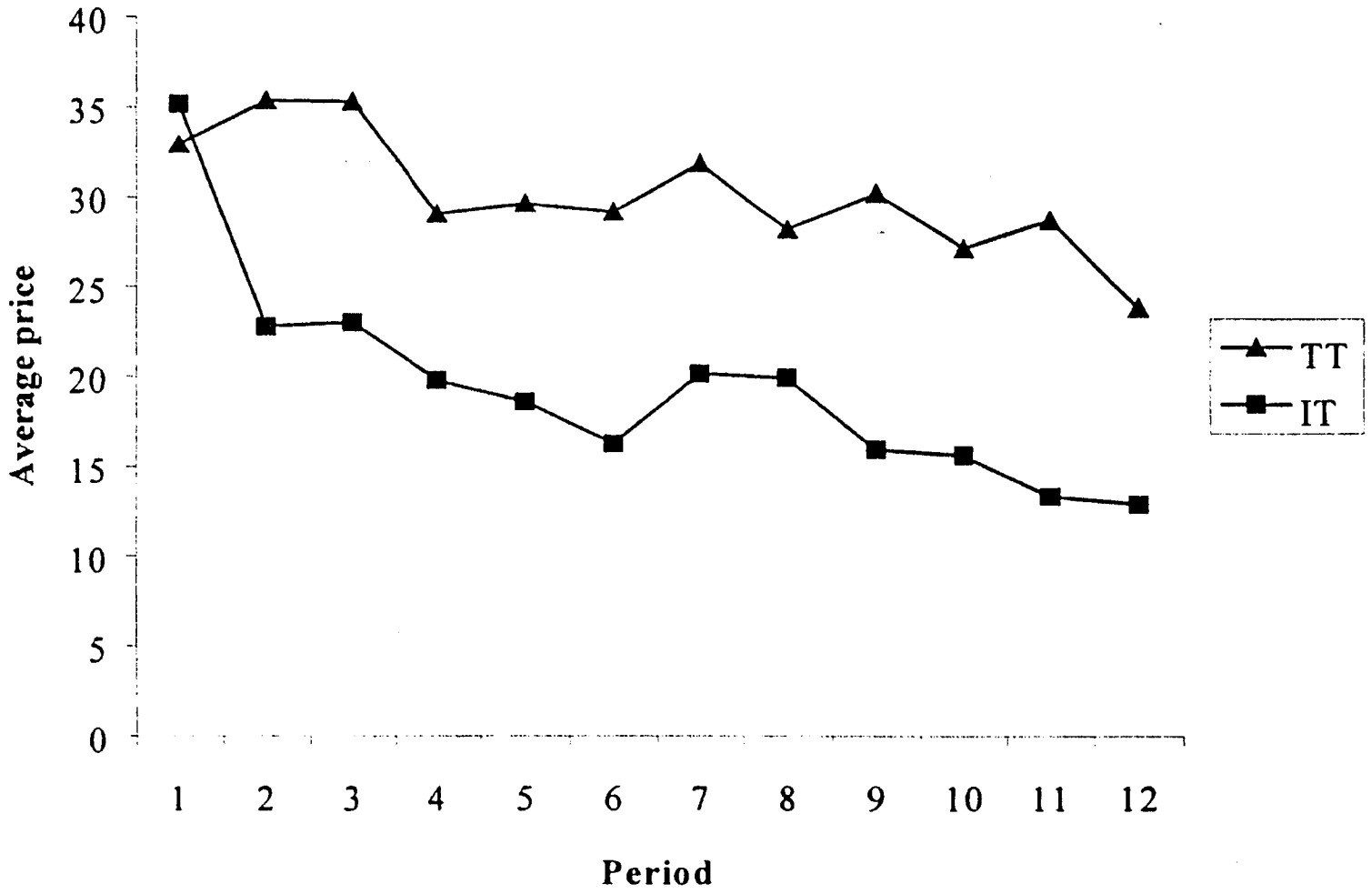

FIGURE 5A
Voluntary cooperation in period 1 of the Incentive Treatment[23]

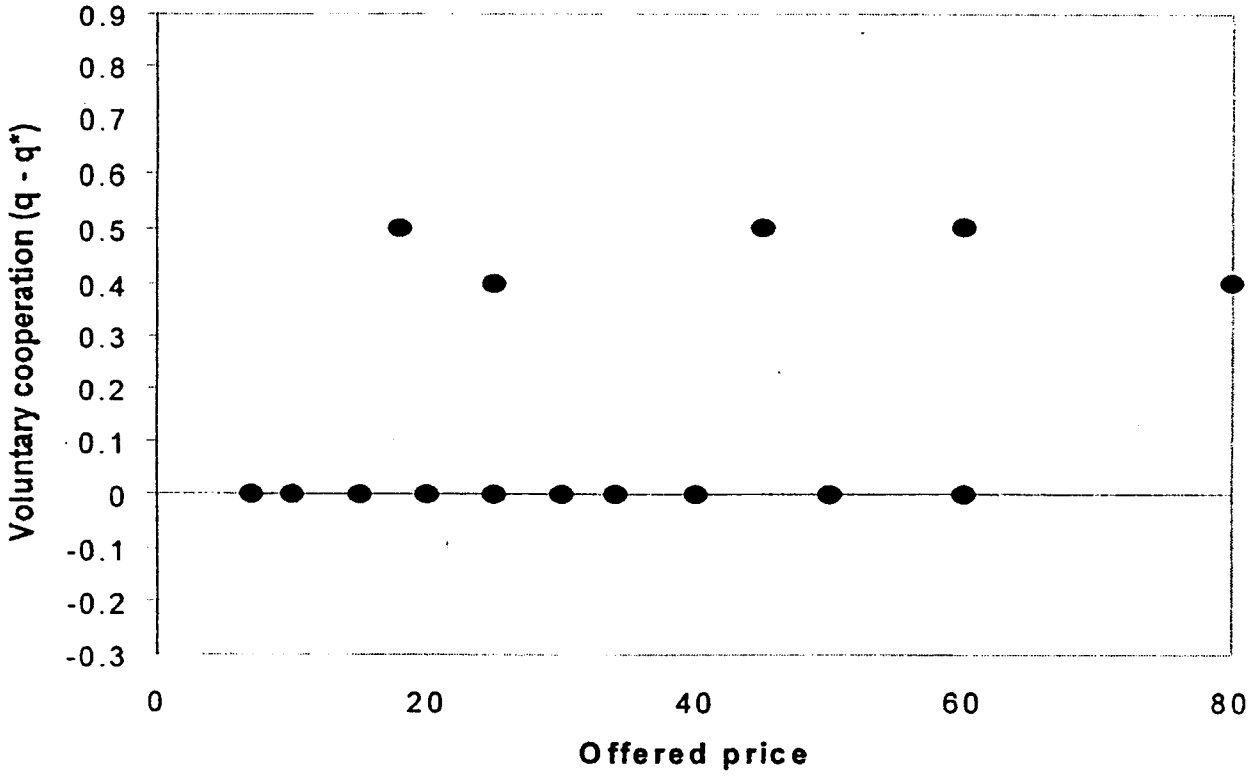

FIGURE 5B
Voluntary cooperation in period 1 of the Trust Treatment