

Relational Contracts and the Nature of Market Interactions

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(Econometrica 72(3): 747-780)

Motivation 1

- In many markets obligations of the contracting parties are imprecisely specified.
- Neutral third parties are often unable to verify whether contractual obligations have been met.
- Generates important moral hazard problems.
- **How do markets function that are characterized by these moral hazard problems?**

Motivation 2

- The employment relation is a key feature of modern firms.
- Most employment relations are open-ended long term relations. They persist until one of the parties quits or is fired.
- Average duration of employment relations is several (5) years.
- **How do markets function in which the trading parties are engaged in repeated long-term relations? Which forces shape the terms of trade in these relations?**
- Answers to these questions are related.

Main Message of the Paper

- In markets with moral hazard problems the contracting parties tend to form long-term relations and this fundamentally changes the functioning of the market relative to a situation where no moral hazard problem exists.
- The moral hazard problem is solved through appeals to **fairness** and the establishment of **reputation** in long-term relations.
- In the **presence** of a moral hazard problem trades are initiated by private offers and the parties share the gains from trade equally. Low effort (quality) is punished by the termination of the relationship.

- The market resembles a collection of bilateral trading islands rather than a competitive market.
- If the moral hazard problem is **absent**, rent-sharing and long-term relations are absent, most trades take place in one-shot interactions and the contracting parties are indifferent with regard to their trading partner.
- The Theory of Fairness by Fehr and Schmidt (1999) organizes the experimental data rather well and provides interesting insights into how the moral hazard problem is solved.

- There is a large theoretical literature that suggests that reputation and long-term relations can provide effective solutions to the moral hazard problem.

Klein & Leffler (1981)

Shapiro & Stiglitz (1984)

Bowles (1985)

Bull (1987)

Hart and Holmström (1987)

MacLeod & Malcolmson (1989, 1998)

Baker, Gibbons and Murphy (1994, 2002)

etc., etc..

- but there is surprisingly little evidence that this is in fact so.
- Very difficult to test in the field because exogenous variation of the moral hazard problem is difficult to find.

- Theory does not make very precise predictions because often there are a large number of equilibria.
- Important pieces of evidence suggest that long-term relations are important.

Ellison and Chevalier (1999) identify implicit incentives from performance sensitive contract terminations.

Hong, Kubik and Solomon (2000) and Hong and Kubik (2003) report similar results.

McMillan and Woodruff (1999) report results in line with the importance of long-term relations (e.g. more trade credit for customers with no or little alternatives).

Banerjee and Duflo (2000) show the importance of reputation in the Indian software industry

Experiment design

First stage

- 10 workers and 7 firms all with an identification number $\{F1, \dots, F7; W1, \dots, W10\}$
- Trades take place in a one-sided continuous auction
- Firms make offers including:
 - a binding wage $w \in [0, 100]$
 - a desired effort $\tilde{e} \in [1, 10]$
 - the firm's ID

- Two types of offers
 - private offers: offer to a specific worker, unknown to anybody else
 - public offers: known to all participants

Second stage

- Workers who have concluded a contract have to choose $e \in [1, 10]$

Table 1: Cost of effort levels

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

- Firms report their expected effort.

Payoffs

i) firms

$$\pi = \begin{cases} 10 \times e - w \\ \text{if contract concluded} \\ \\ 0 \\ \text{if no contract concluded} \end{cases}$$

ii) workers

$$\pi = \begin{cases} w - c(e) \\ \text{if contract concluded} \\ \\ 5 \\ \text{if no contract concluded} \end{cases}$$

Treatments

- Incomplete contract treatment with fixed IDs (**ICF**)
 - \tilde{e} non-binding
- Complete contract treatment (**C**)
 - \tilde{e} binding
- Incomplete contract treatment with random IDs (**ICR**)
 - \tilde{e} non-binding
- Total of 15 periods (plus 2 practice periods)
- Total of 14 sessions (238 participants)
- Experiments lasted about 90 minutes
- Average earnings: CHF 62,30 (~ \$42)

Predictions based on Self-Interest

- A1: Money maximizing behavior and rationality are common knowledge.
 - A2: Posted contract institution.
 - Complete contract treatment (**C**)
 - Highest effort $e = 10$
 - $w = 23$
 - Total surplus reaped by the firms
 - Incomplete contract treatment (**ICF** and **ICR**)
 - Lowest effort $e = 1$
 - $w = 5$
 - Total surplus reaped by the firms
- ⇒ Long-run relations have no value and arise only by coincidence, i.e., no systematic difference between treatments.

Predictions based on Social Preferences (Fehr and Schmidt 1999)

- A1': There is a fraction of inequity averse workers (60% fair, 40% selfish) who dislike advantageous and disadvantageous inequality.
- Inequity averse workers reciprocate to high wages with high (egalitarian) effort levels → positive correlation between offered wage and chosen effort.
- There is a perfect Bayesian equilibrium in the ICF in which there are seven trades in each period and the same seven workers always trade.

for $t = 1-13$: maximum effort and egalitarian wage

for $t = 14$: $e = \tilde{e} = 7$ with the associated egalitarian wage ($w = 40$)

$(w, \tilde{e}) = (32, 6)$ in $t = 15$ is offered by the selfish firms and $(w, \tilde{e}) = (5, 1)$ by the fair firms.

Intuition

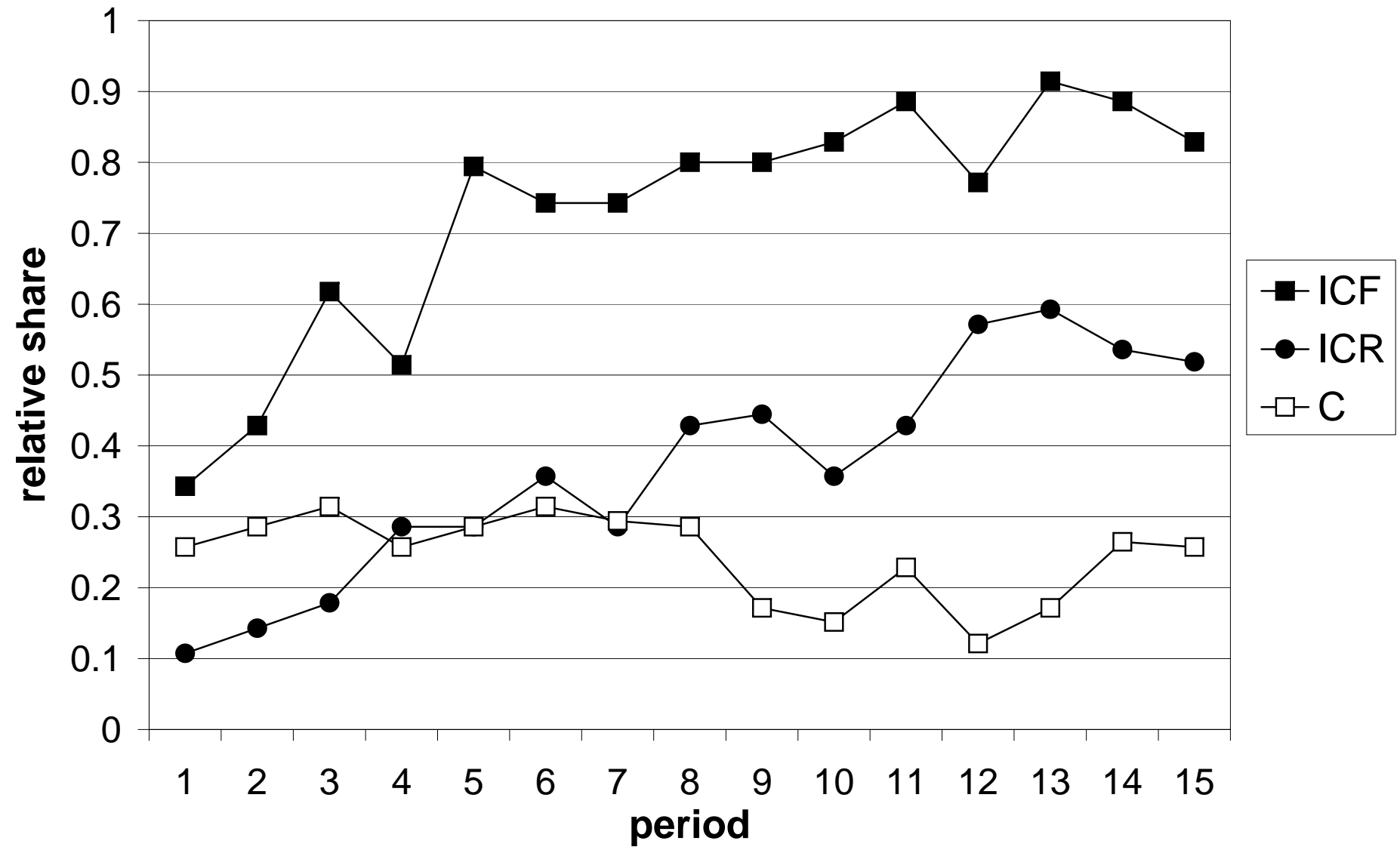
- Incentive for selfish firms to offer rents [$w - c(e) > 5$] to all workers in the final period (if sufficiently many inequity averse workers exist).
- In $t=14$ firms can threaten to not renew the contract \rightarrow selfish workers are disciplined in $t = 14$ because if they shirk they are “fired”.
- Why do the selfish firms not extract the worker’s period-15 rent by making a “bad” offer in $t=14$?
- Note that rent in $t = 14$ is irrelevant for the worker’s performance in $t = 14$ as long as the worker believes he gets the rent in $t = 15$.
- If the worker believes that he will not get the rent in $t = 15$ (e.g. because he is fired) in case he does not get the fair offer in $t = 14$, the selfish firm has an incentive to make the fair offer also in $t = 14$.

Testable Hypotheses

- 1) To solve effort enforcement in the ICF firms trade repeatedly with the same workers.
- 2) Therefore, there is a larger share of private offers in the ICF compared to the C and the ICR treatment.
- 3) Larger share of trades takes place in long-term relations in the ICF compared to C.
- 4) In the ICF workers who provide low effort are fired.
- 5) Firing is associated with an income loss and constitutes a punishment.

- 6) The punishment arises from the fact that firms pay very high (egalitarian) wages in the ICF.
- higher wages than in C because effort enforcement requires fair sharing
 - higher wages than in ICR because selfish types can be disciplined so that the surplus that can be shared is higher.
- 7) Average effort in the ICF is higher than in the ICR

Relative share of trades initiated by private offers

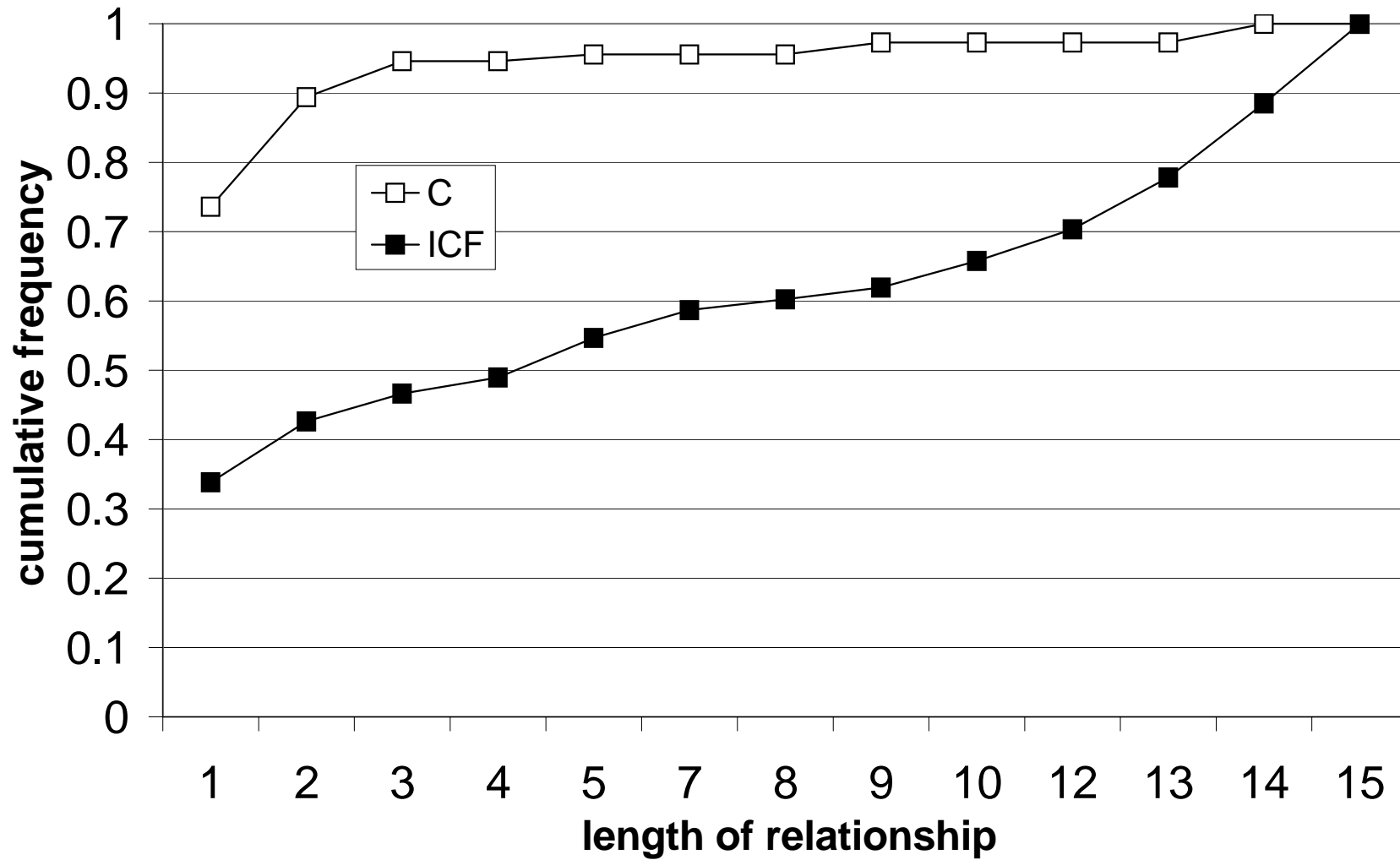


- In the ICF the majority of private offers are addressed to the firm's previous employee.

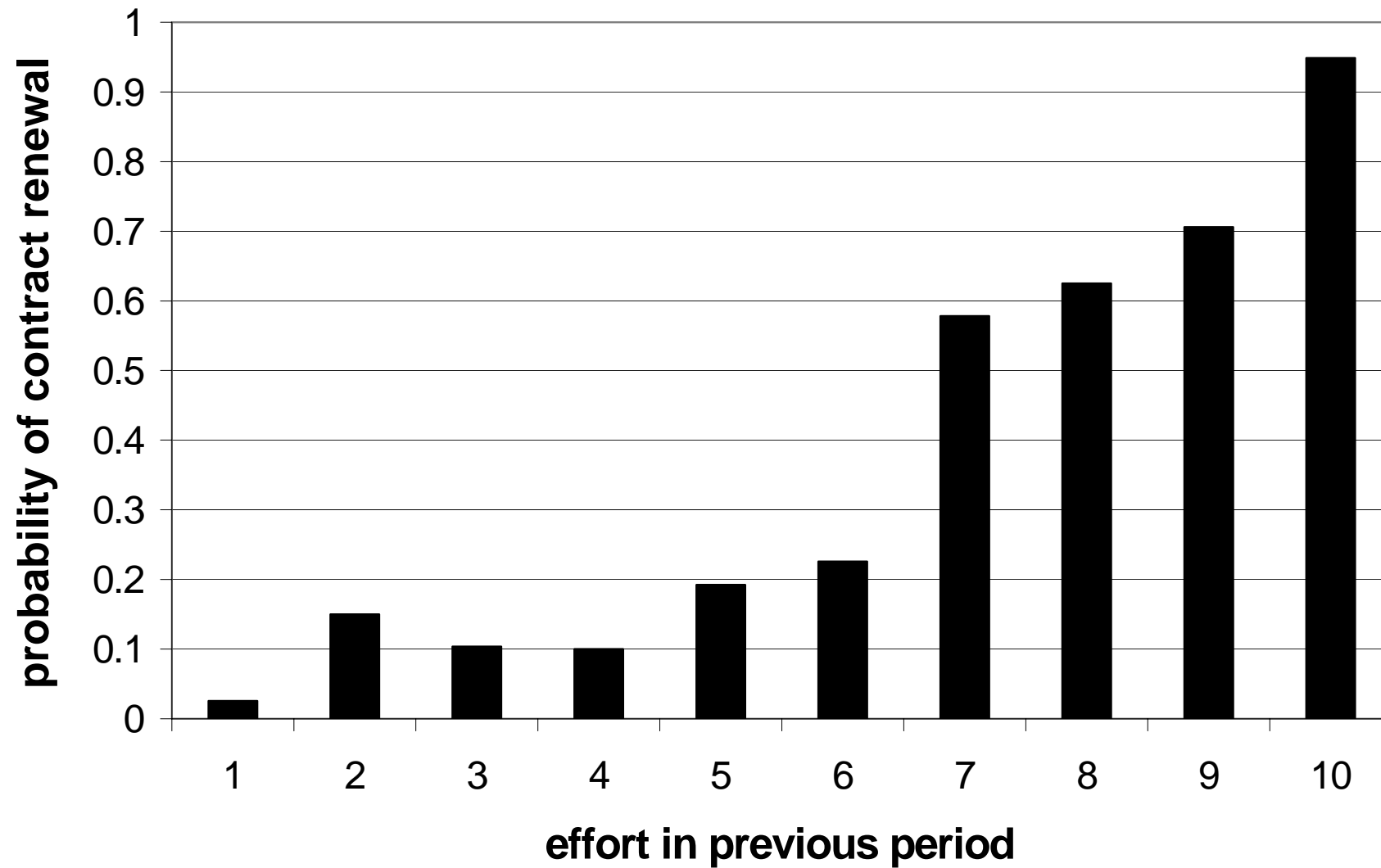
Evolution of private offers to the previous employee relative to all the private offers

Period	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Percent	57	38	54	47	68	73	63	73	66	73	79	74	63	69

Cumulative frequency of trades in relationships of different lengths in the C- and the ICF-treatment



Probability of contract renewal as a function of previous effort



Probability of Contract Renewal in the ICF-treatment

Effort in previous period	.125** (.052)
Positive surprise	.192** (.077)
Negative surprise	-.836** (.381)
Previous length	2.449*** (.653)
constant	-5.045*** (1.535)

N = 488
LL = -41.93
Wald $\chi(3) = 11.89$
Prob = .000
Pseudo R² = .8747

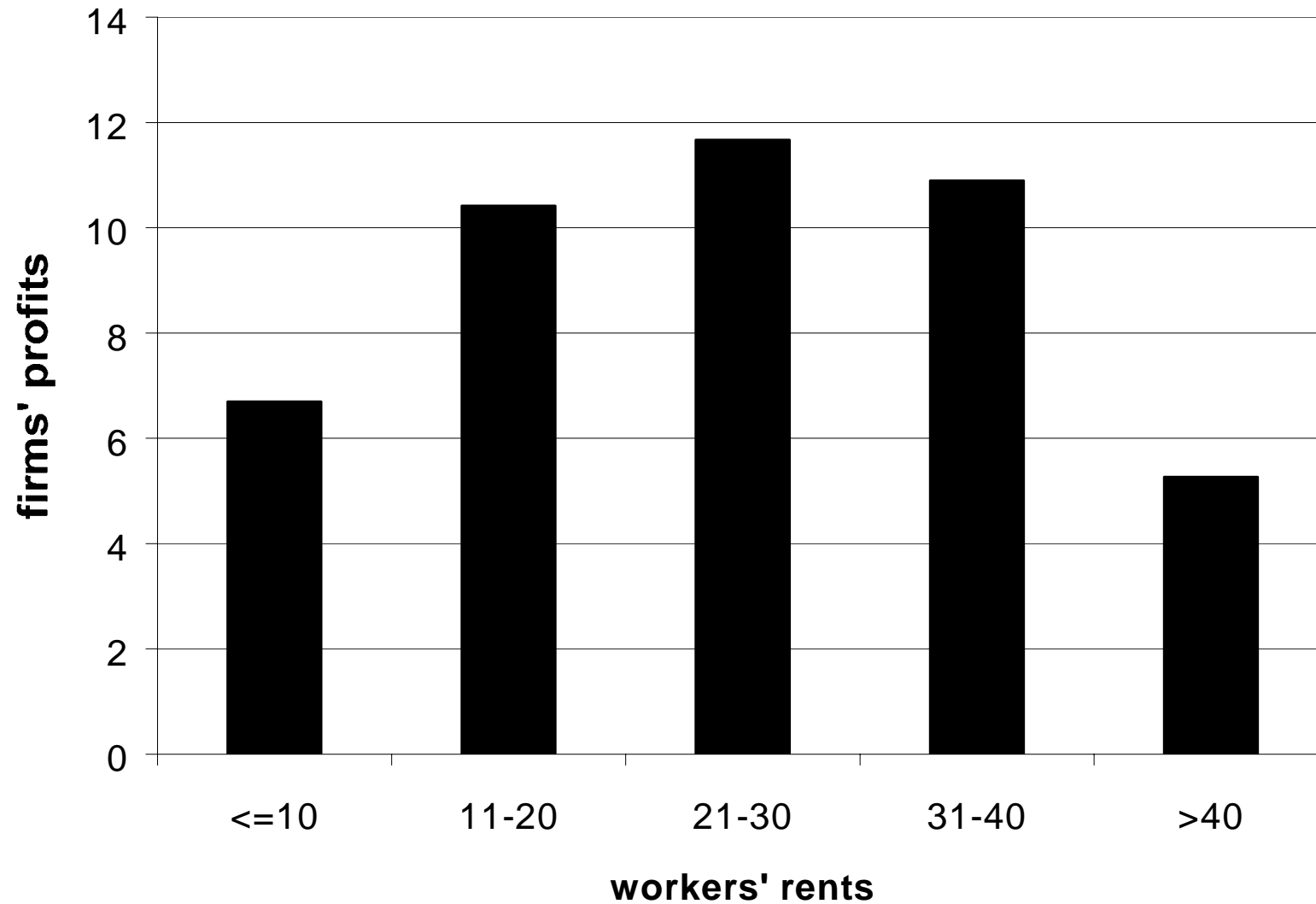
Note: The estimation procedure is a probit regression with robust standard errors (in parentheses). The regression includes dummies to control for session effects. *** indicates significance at the 1-percent level, ** at the 5-percent level and * at the 10-percent level, respectively.

- In all periods of the ICF the denial of contract renewal imposed considerable costs on the worker.

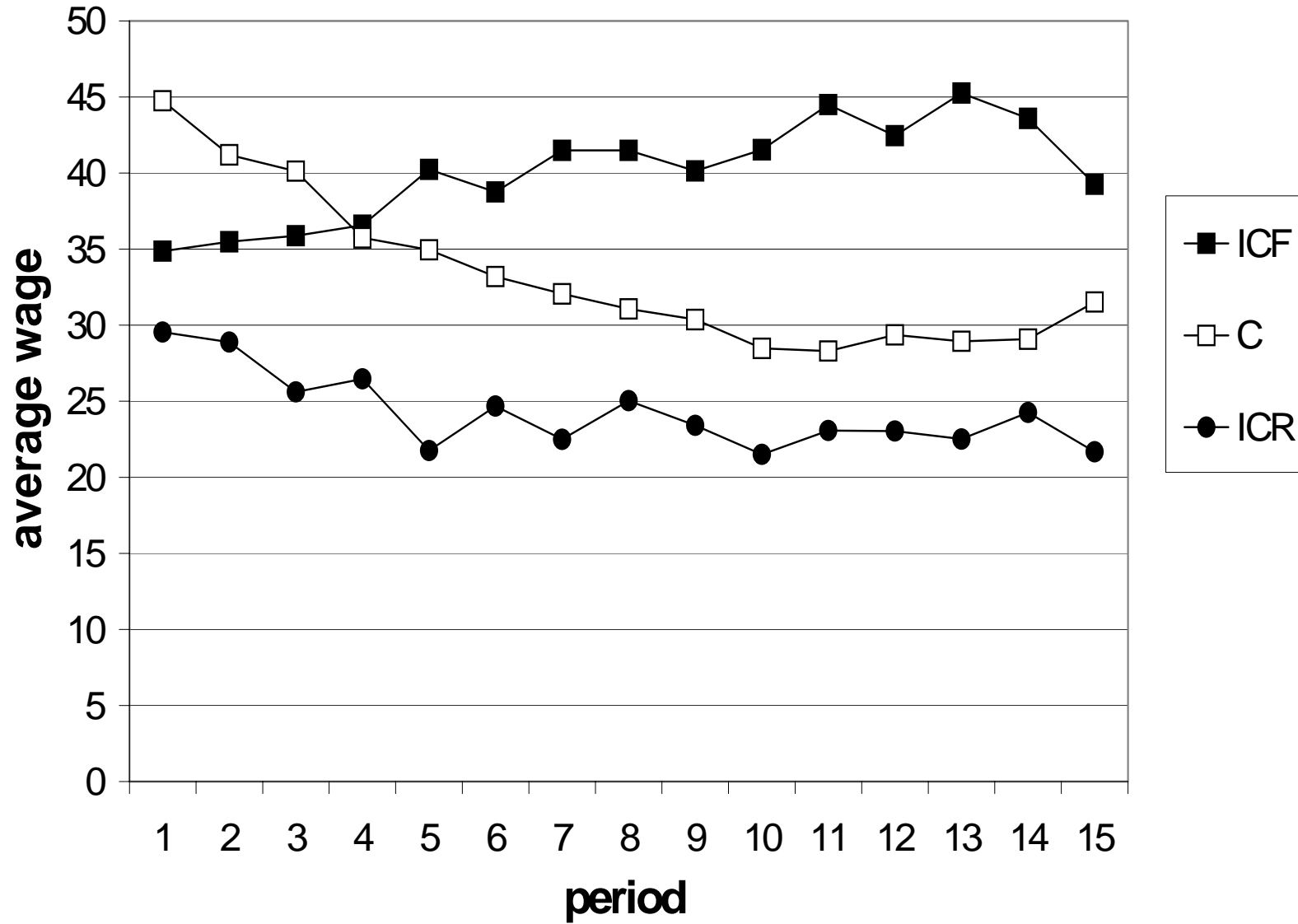
Total rents of trading workers

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$V_t^e - V_t^u$	102	50	66	113	148	105	139	110	99	95	91	79	71	42	27

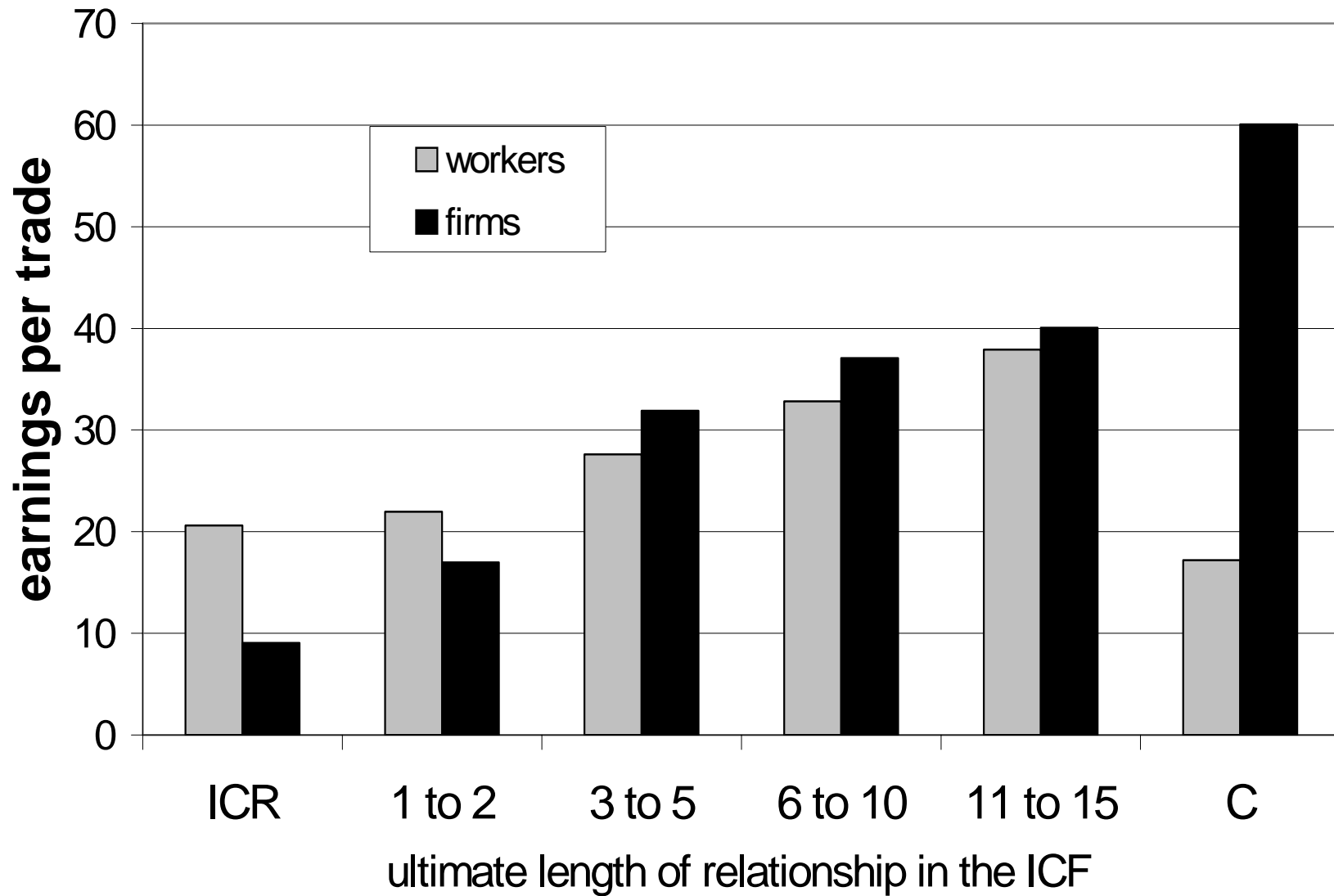
Relation between firms' profits and workers' rents in the ICR-condition



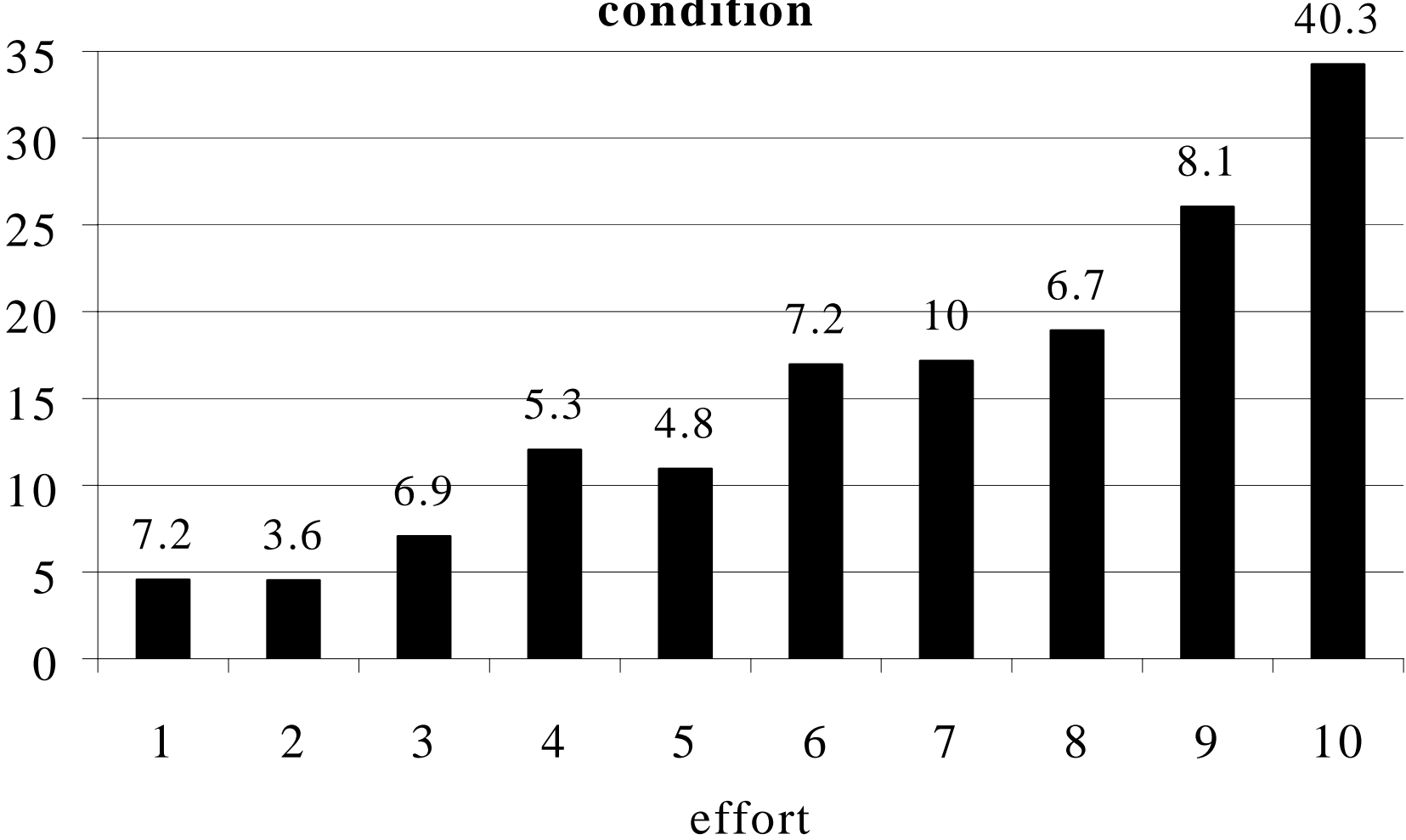
The evolution of wages over time



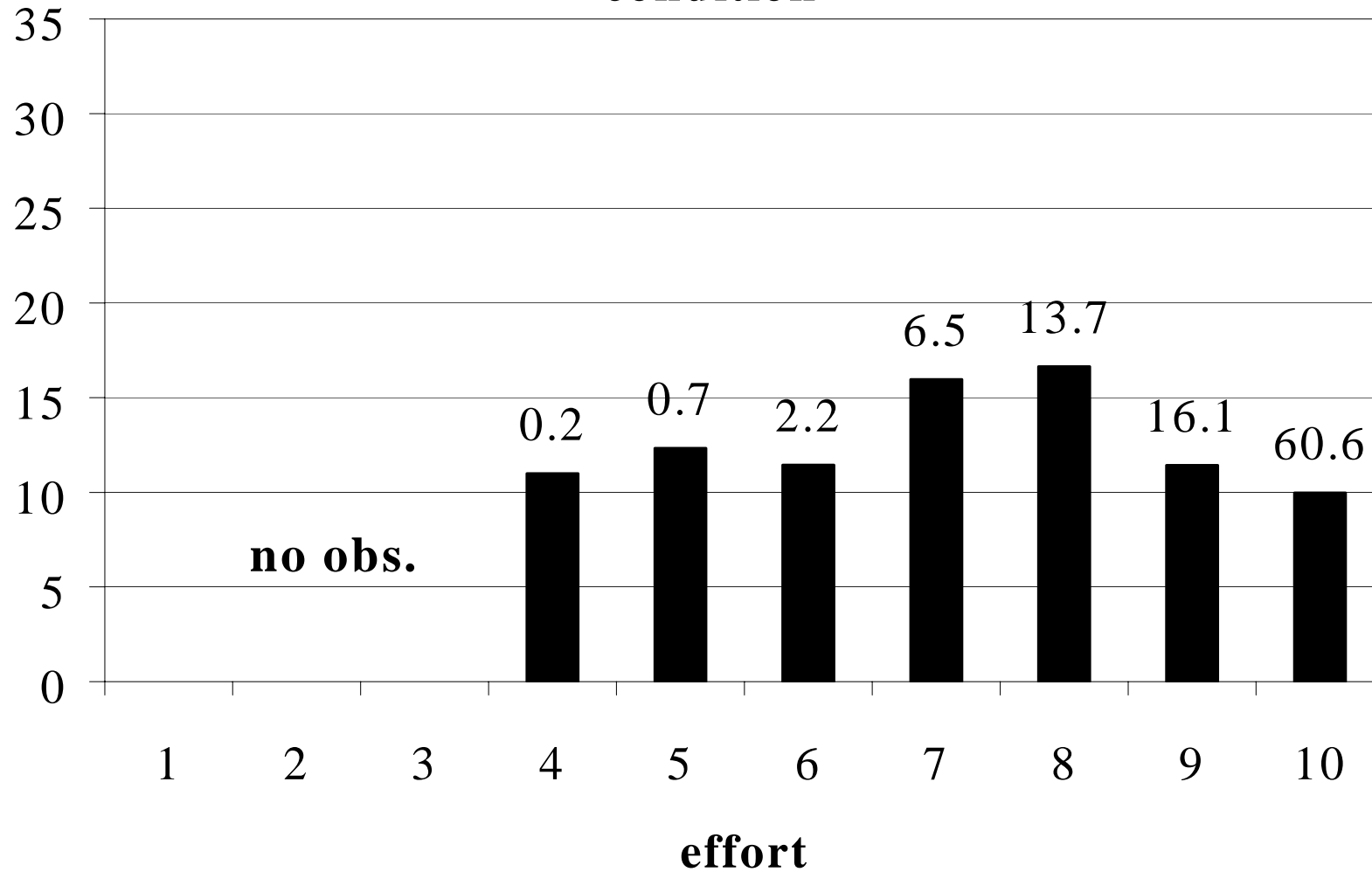
Distribution of the earnings per trade



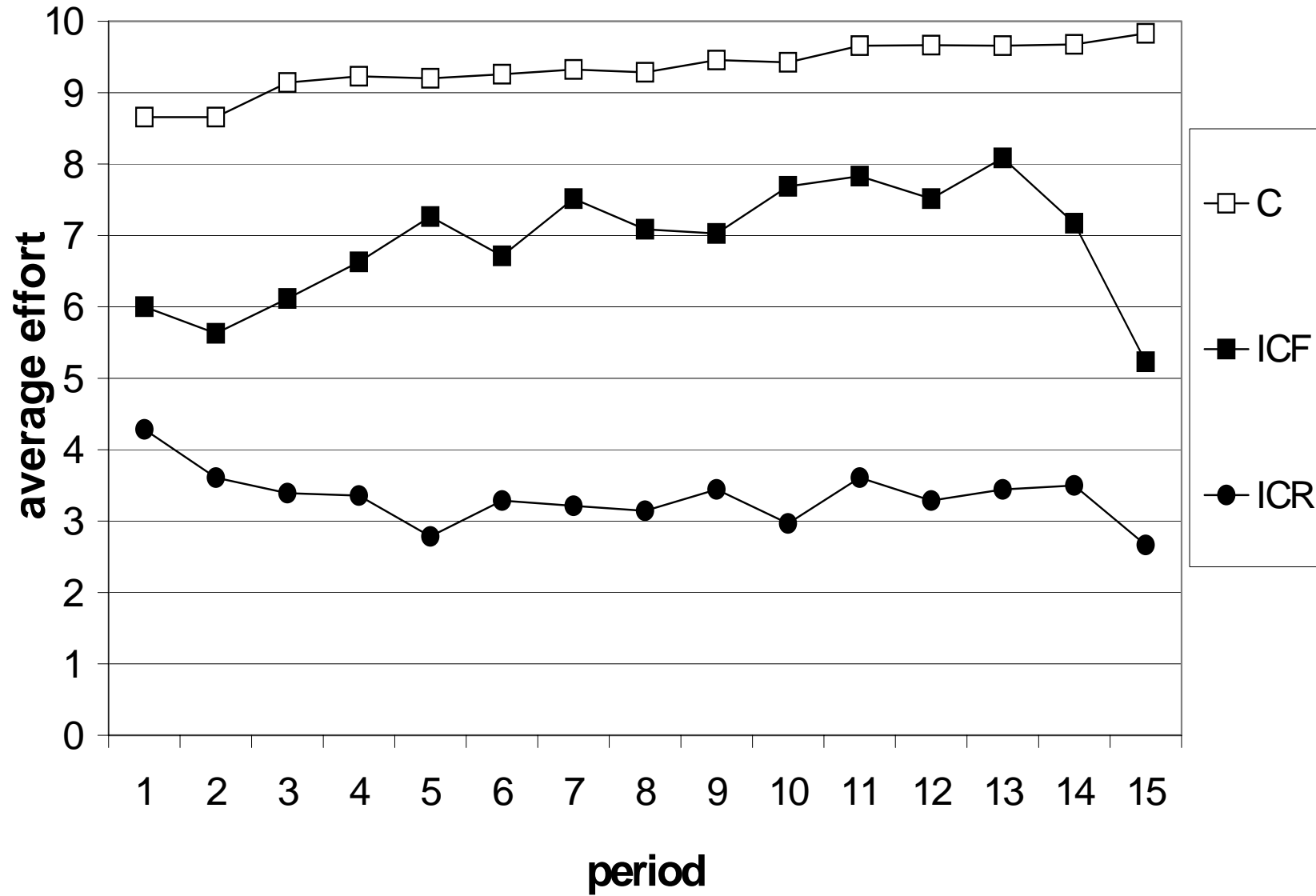
Hedonic Pricing: Average rents in the ICF-condition



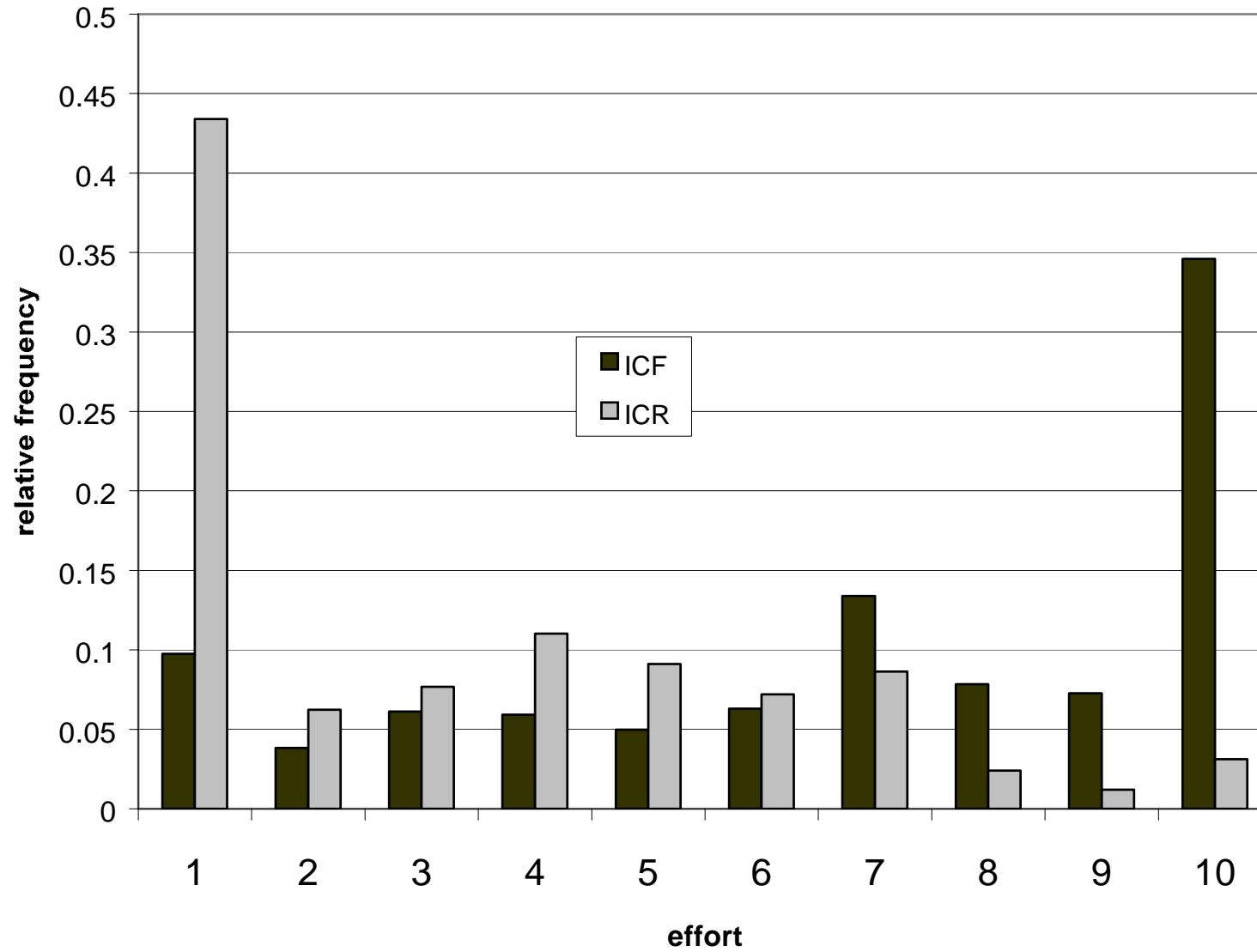
Hedonic Pricing: Average rents in the C-condition



The evolution of average effort over time



Distribution of effort in the ICF- and the ICR-condition

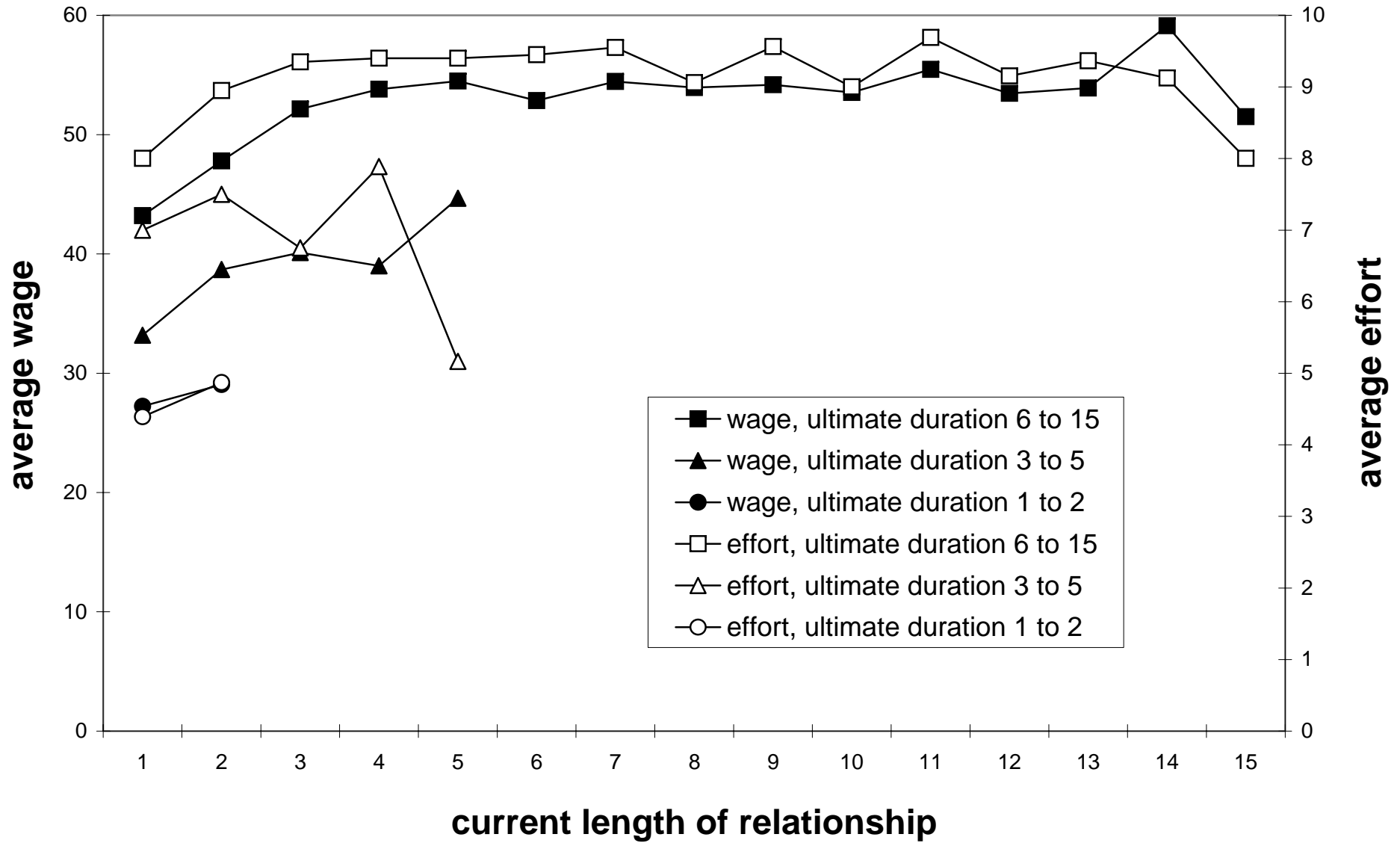


**DETERMINANTS OF EFFORT AND TREATMENT DIFFERENCES BETWEEN
ICF AND ICR^a**

	(1)	(2)	(3)	(4)
	all periods	all periods	all periods	period 15 only
ICF-Dummy	5.919*** (1.869)	1.978*** (.577)	1.332*** (.462)	.597 (1.691)
Period	.433 (.338)	.319* (.182)	.229 (.158)	
Period ²	-.026 (.019)	-.022* (.011)	-.018* (.010)	
Wage		.215*** (.011)	.203*** (.009)	.256*** (.033)
Private offer			.598*** (.199)	1.548** (.702)
Private offer × ICF-Dummy			.829** (.362)	-1.124 (1.559)
Constant	.515 (1.610)	-3.737*** (.892)	-3.192*** (.737)	-6.516*** (1.197)
	N = 940	N = 940	N = 940	N = 62
	Wald χ (3) = 12.22	Wald χ (4) = 927.68	Wald χ (6) = 823.07	Wald χ (4) = 140.29
	Prob = .007	Prob = .000	Prob = .000	Prob = .000

^aThe estimation procedure is a censored regression with robust standard errors adjusted for clustering on sessions (in parentheses). *** indicates significance on the 1-percent level, ** on the 5-percent level and * on the 10-percent level, respectively.

High wages and effort initiate successful relationships



Conclusions

- 1) Reputation formation in endogenous bilateral long-term relations constitutes a powerful solution for the problem of effort (quality) enforcement.
- 2) Effort enforcement is based on the firing (punishment) of shirkers and on the payment of fair wages that share the available cake equally.
- 3) Markets with an effort enforcement problem function in a fundamentally different manner compared to markets without the enforcement problem.
- 4) When there is an enforcement problem:
 - markets resemble bilateral trading islands rather than competitive markets.
 - firms voluntarily restrain the set of trading partners by making private offers to the previous employee.
 - rent-sharing and long-term relations prevail.

Third Party Enforcement	No Third Party Enforcement
Public offers more profitable	Private offers more profitable
Firms do not care about the worker's identity	Offers go to the previous worker in case of satisfactory effort
One-shot interactions	Long-term interactions with performing workers
Firms use excess supply to appropriate the surplus	Firms use excess supply to enforce high effort
Wages converge to competitive level	Wages embody a sizeable rent
Higher effort is just compensated	Higher effort associated with higher rents