

Relational Incentive Contracts with Collusion

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Corruption, Tax Evasion and Institutions, 12th May, 2017

Relational contracts

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- ▶ A wide range of important economic activities depend on self-enforcing contracts (Gibbons and Henderson, 2013, Antras and Foley 2015, Macchiavello and Miquel-Florensa 2016)

Relational contracts: The good

Valuable when formal not possible



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Responsibility for relational contracts is frequently **delegated** to intermediaries \implies can give rise to **corruption**

Relational contracts: The bad

Corruption is built on trust and reciprocity...

...long-term relationships are an especially advantageous environment for bribery to emerge, Abbink 1999

Corrupt contracts are primarily relational contracts,
Lambsdorff & Teksoz 2005



How do the good and bad interact?

- ▶ Is it always the case that a more valuable relationship sustains more effort and more corruption?
- ▶ Should we then encourage or dampen "dual relational contracts"?
- ▶ How should a principal delegate relational contracts when there is the risk of corruption?

This paper

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 - ▶ In particular, the supervisor is self-interested, strategic and carries out payments without commitment just as the principal would
 - ▶ Key difference: she receives a share of the principal's payoff

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- ▶ Supervisor can engage in taking (relational) bribes from agent

Questions and answers

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Explanation:

Large surplus allows bonuses to be paid in exchange for kickbacks, even when performance is low

⇒ This discourages effort

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Explanation:

- ▶ **Key insight:** supervisor is more credible than principal when paying bonuses
 - ▶ Supervisor cares less than the principal about paying bonuses
 - ▶ Kickbacks provide an incentive to the supervisor to maintain relationship
- ▶ When credibility is scarce, agent is willing to work harder under the supervisor, so it is optimal for the principal to delegate

Literature

Relational contracts

- ▶ Extend Levin (2003) by adding a supervisor
- ▶ Literature focuses on delegation to agent (Goldlucke & Kranz 2012; Li et.al., 2014)
- ▶ Exception: in Fong and Li (2016) a non-strategic supervisor can garble agent's evaluations intertemporally

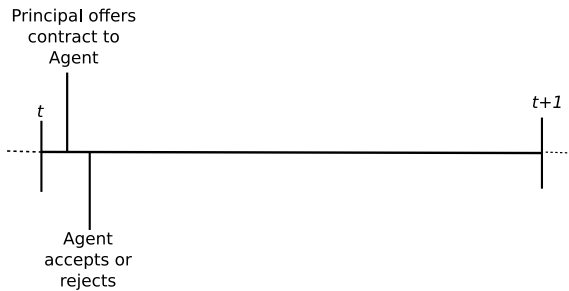
Collusion in hierarchies

- ▶ Many models assume enforcement of collusion (e.g. Tirole, 1986; Banerjee, 2012). Few exceptions (Martimort 1999, Buccirosi and Spagnolo 2001). None considers good side of repeated interaction (new role for bribes).
- ▶ Supervisor has the same "technology" as principal, but a different payoff as in the **delegation** literature (e.g. Vickers, 1985; Katz 1991). First to consider corruption as a tool to influence the supervisor's payoff

Model

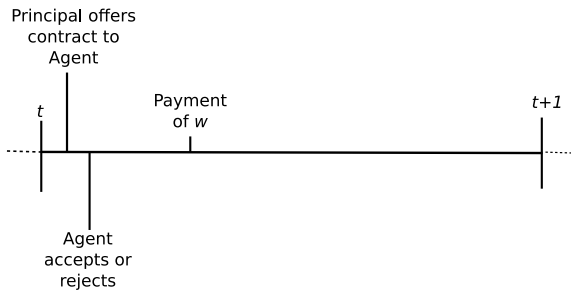
No delegation

Principal and agent interact repeatedly as in Levin (2003)



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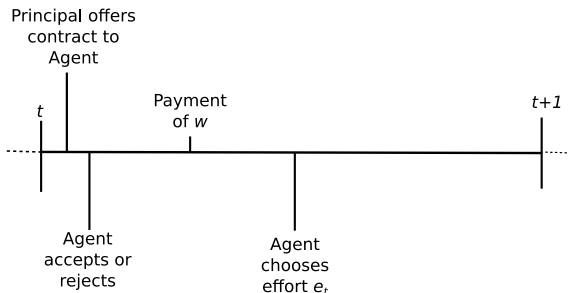
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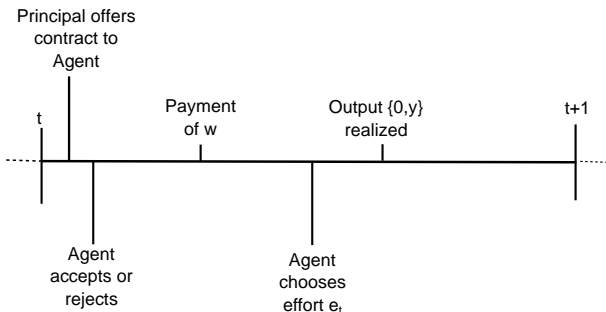
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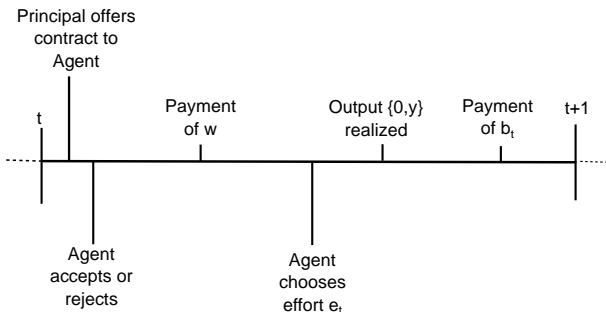
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- ▶ Principal/agent makes discretionary payments b_t

Delegation: initial period

Principal hires a supervisor to incentivize the agent

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At time $t = 0$:

- ▶ Principal chooses some parameters of the contract:
 - ▶ Share of her profits that the supervisor receives α
 - ▶ Bound on agent's payment: fixed wage to agent w , and cap on the bonus that supervisor can pay \bar{b}

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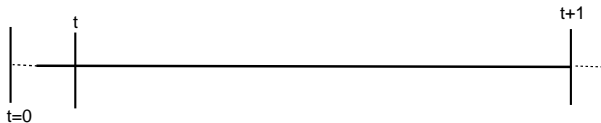
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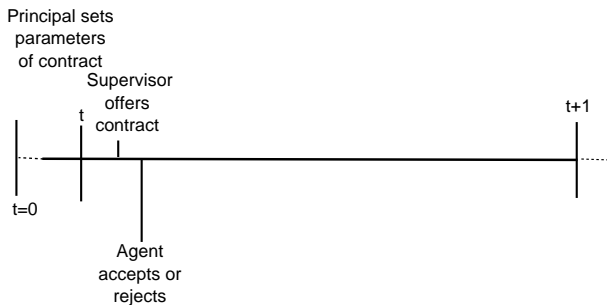
- ▶ Principal chooses some parameters of the contract:
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 - ▶ Bound on agent's payment: fixed wage to agent w , and cap on the bonus that supervisor can pay \bar{b}
- ▶ All these are assumed to be stationary and can be enforced by the court
- ▶ Principal takes no further action
- ▶ In the model we have N agents but for today's presentation focus on one agent

Delegation: relational contract

Principal sets
parameters
of contract

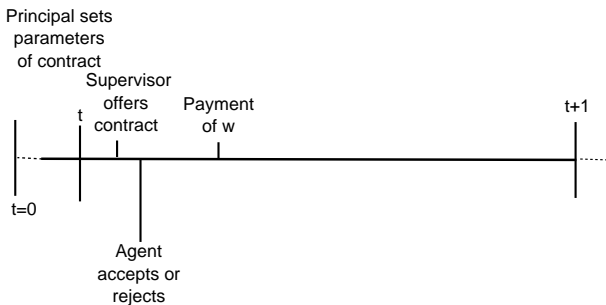


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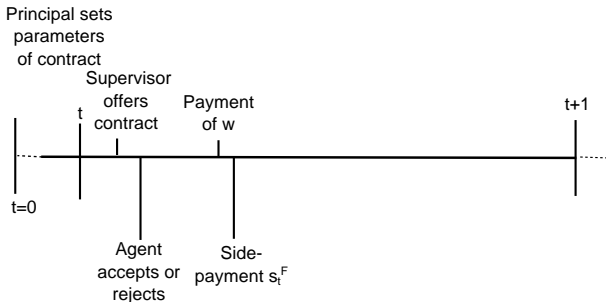
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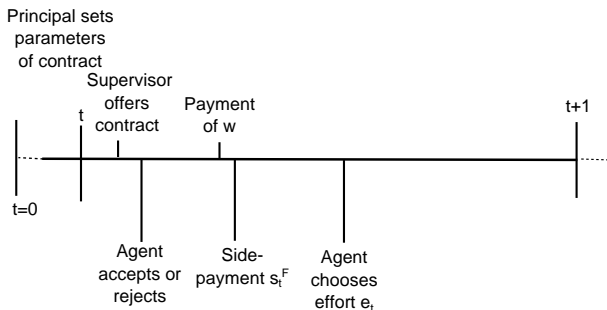
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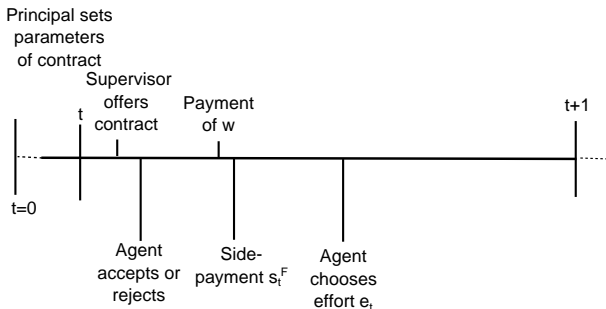
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- ▶ Agent receives upfront wage w
- ▶ Supervisor/agent makes upfront side-payment s_t^F

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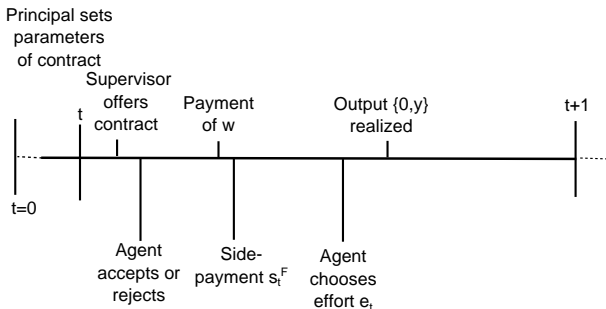


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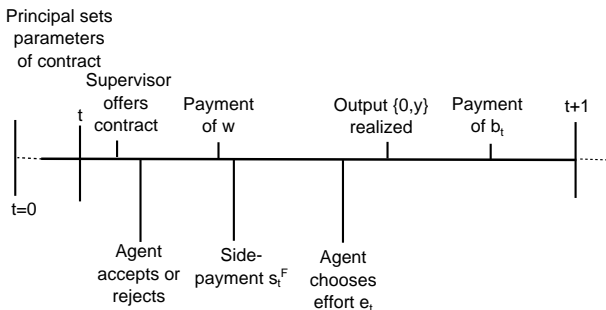


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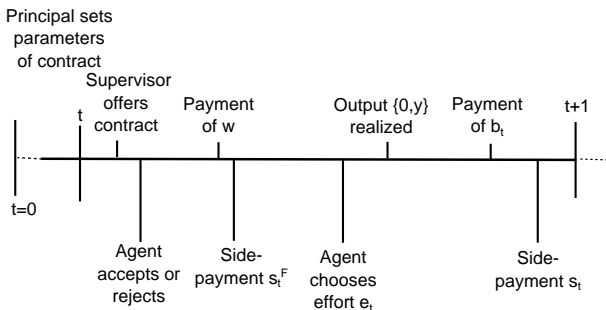
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- ▶ Agent receives discretionary payments $b_t \leq \bar{b}$ chosen by the supervisor
- ▶ Supervisor/agent make discretionary kickbacks s_t

Payoffs with delegation

Principal's payoff:

$$\pi_t = E [(1 - \delta)(1 - \alpha)(y_t - (w + b_t)) + \delta\pi_{t+1}]$$

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Agent's payoff when accepting contract:

$$u_t = E \left[(1 - \delta) \left[w + b_t - (s_t^F + s_t) - c(e_t) \right] + \delta u_{t+1} \right]$$

and outside option \underline{u} otherwise

Results

No delegation (Levin, 2003)

Direct principal-agent relational contracting if $\alpha = 1$:

- ▶ Optimal contract is stationary, $b_t \in \{b_l, b_h\}$:

$$c'(e) = b_h - b_l \quad (IC)$$

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- ▶ Honoring the bonus payments

$$-b_h + \frac{\delta \pi}{1 - \delta} \geq 0 \text{ and } b_l + \frac{\delta u}{1 - \delta} \geq \frac{\delta \underline{u}}{1 - \delta} \quad (DE_{bonus})$$

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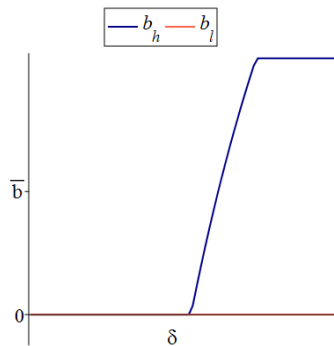
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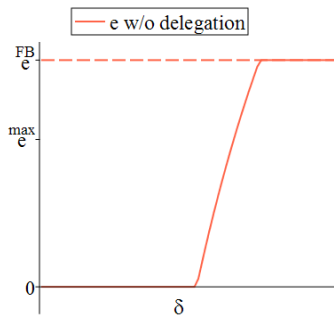
- ▶ Effort e depends on future value of relationship:

$$c'(e) \leq \frac{\delta(\pi + u)}{1-\delta}$$

No delegation



Bonuses



Effort

Delegation to a supervisor

Supervisor can motivate agent by increasing the difference in bonuses AND bribes

$$c'(e) = b_h - b_l - s_h + s_l \quad (IC)$$

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No delegation case:
 $c'(e) = b_h - b_l$

- ▶ Agent must pay bribe when output is low:

$$-s_l + \frac{\delta u}{1 - \delta} \geq \frac{\delta \underline{u}}{1 - \delta} \quad (DE_{bribe})$$

- ▶ Supervisor must pay bonus when output is high:

$$-\alpha b_h + s_h + \frac{\delta v}{1 - \delta} \geq 0$$

No delegation case:
 $-b_h + \frac{\delta \pi}{1 - \delta} \geq 0$

Kickbacks as an enforcing mechanism

Cole and Tran (2011) document the kickbacks paid by different firms (agent) who provide goods to other organizations. The kickbacks are paid to intermediaries (supervisor) within the purchasing organization (principal)

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*When relational contracts are needed because **quality is not contractible**, "the supplier allows the client to hold back roughly 20 percent of the contract value until one month after delivery, until the client is satisfied that the product meets the specified quality". To encourage the discretionary transfer, the **"kickback is paid only after all contract payments have been made"***

Solving the model: first step

- ▶ Given the parameters chosen by the principal (α , w and \bar{b}), we characterize the optimal supervisor-agent relational contract as a function of δ , a measure of their surplus
- ▶ E.g. the supervisor's rotation is an anti-corruption policy that decreases δ

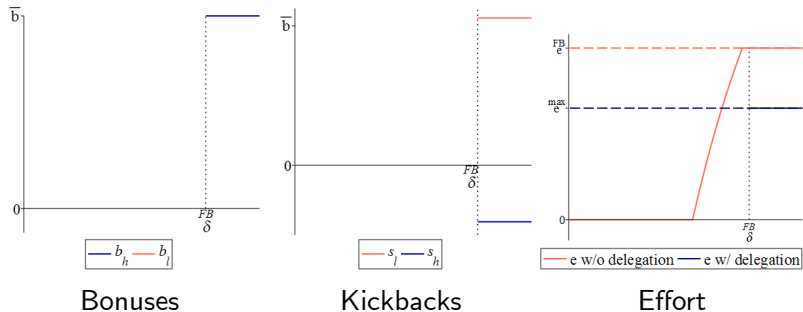
Types of contracts

Proposition

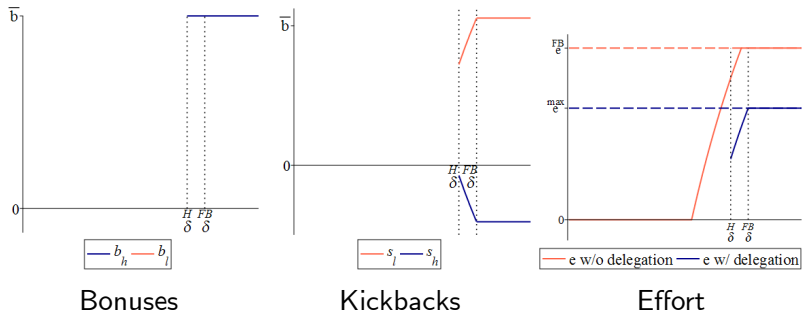
For a given α , w and \bar{b} , $\exists (\delta^L, \delta^H)$ s.t. optimal supervisor-agent relational contract is characterized as follows:

- ▶ If $\delta \geq \delta^H$: Bonuses are not used to induce effort and effort is weakly increasing in δ
- ▶ If $\delta^H > \delta > \delta^L$: Both bribes and bonuses are used to induce effort. If $b_l > 0$, then effort is decreasing in δ , and otherwise it is increasing in δ
- ▶ If $\delta \leq \delta^L$: Bribes are not used to induce effort and effort is weakly increasing in δ

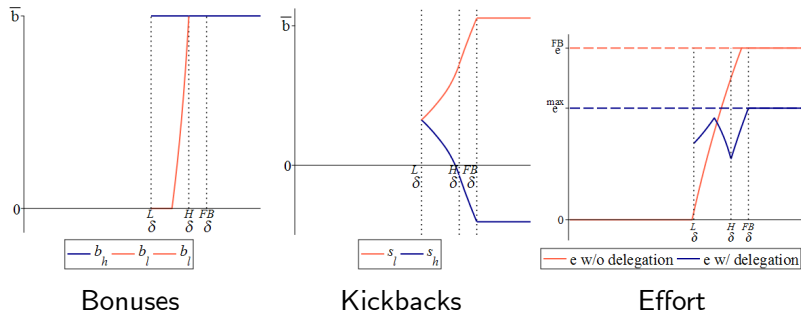
Delegation: no credibility problems



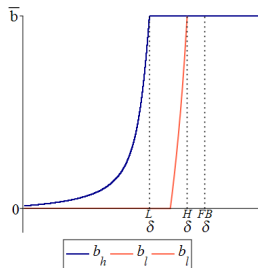
Delegation: high surplus contract



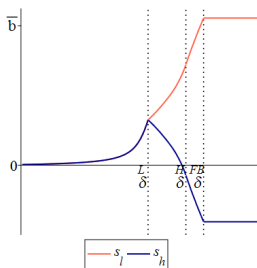
Delegation: intermediate surplus contract



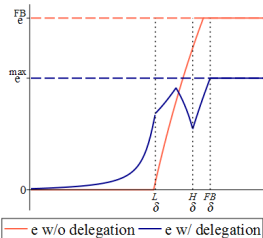
Delegation: low surplus contract



Bonuses



Kickbacks



Effort

How should the principal delegate?

Low surplus contract

Principal chooses parameters so that the optimal contract is 'low surplus' \implies effort induced only through bonuses, where the supervisor has a comparative advantage (i.e. it is cheaper for the principal)

Setting a low surplus contract

- ▶ $\bar{b} = b_h = \frac{1}{\alpha} \frac{\delta g}{1-\delta}$ such that $s_l = s_h$
- ▶ Smallest α such that $b_l = 0$
- ▶ w so that there is enough surplus

Proposition

The principal sets w and \bar{b} such that $b_l = 0$, $b_h = \bar{b}$ and $s_l = s_h$

How should the principal delegate?

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Proposition

If there is positive effort, the optimal α lies strictly between 0 and 1

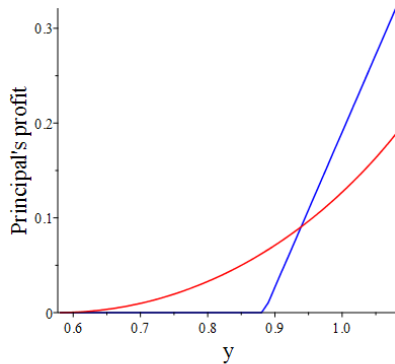
Partially aligned preferences:

- ▶ If $\alpha = 0$, supervisor always pays \bar{b} and no effort induced
- ▶ If $\alpha = 1$, principal gives away enough surplus to have e^{FB} but she strictly prefers to reduce surplus (first order) at the expense of lower effort (second order)

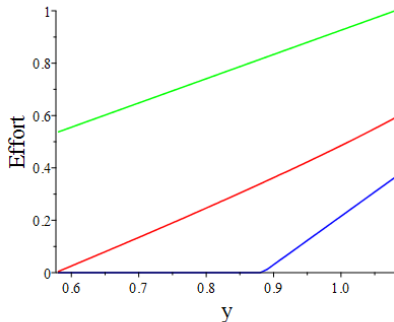
When should the principal delegate?

Proposition

The principal benefits from delegating if relational contracting is difficult: δ or y is low or \underline{u} is high



— π without delegation — π with delegation



— First Best — Principal — Supervisor

Take-away messages

- ▶ Good and bad aspects of delegated relational contracts:
 - ▶ **The bad:** The supervisor may over-pay the agent in order to extract kickbacks
 - ▶ **The good:** Relational contracting is easier for the supervisor than the principal
- ▶ The principal should delegate when relational contracting is difficult
- ▶ A larger surplus/wage may not lead to a higher effort because it can sustain bonuses being paid regardless of the output
- ▶ By choosing the agent's compensation scheme, the principal can control (and deliberately allow) how much corruption (over-reporting & bribes) takes place

Extensions

Richer contract for the supervisor

- ▶ Trade-off in the choice of α :
 - ▶ (+) $\uparrow \alpha$: supervisor cares more about effort
 - ▶ (-) $\uparrow \alpha$: supervisor + concerned about paying bonus \rightarrow more surplus is needed for relational contracts
 - ▶ (+) $\uparrow \alpha$: less likely supervisor pays bonus for low output

New contract: supervisor cares differently about output α_Y and bonuses α_b and is paid a fixed wage w^S :

$$v = (1 - \delta) E \left[\alpha_Y y_t - \alpha_b b_t + w^S + s_t^F + s_t \right] + \delta v$$

where the shares are assumed to be nonnegative

Richer contract for the supervisor

Proposition

*The principal optimally implements a low surplus contract.
The principal sets $\alpha_Y = 1$, $\alpha_Y > \alpha_b \geq 0$ and $w^S < 0$.*

- ▶ Principal makes the supervisor care more about the output than the bonuses
- ▶ She sets α_Y as high as possible and extracts back the surplus through the wage
- ▶ She sets α_b to make sure that $b_l = 0$. If $\alpha_b = 0$, then:
 - ▶ Relational contracting costless and supervisor and agent get their outside options
 - ▶ But imposes a bound on the maximum achievable e

Advantage of bribes

- ▶ The principal can remove kickbacks by paying a wage to the supervisor conditional on the agent relationship being maintained
- ▶ Same results as before and principal indifferent between alternatives
- ▶ However, direct payments are more difficult to implement:
 - ▶ The principal must know relative bargaining powers to get rid of kickbacks
 - ▶ Hermalin (2015) argues that principal may not observe cooperation with the agent → wage increases the supervisor outside option
 - ▶ More likely to be renegotiated → Katz (1991) shows that then advantage of delegation diminishes

Costly corruption

- ▶ Suppose that when the agent pays S , the supervisor only receives κS for $0 < \kappa \leq 1$
- ▶ Supervisor has bargaining power and receives w^S

Proposition

When side-payments are more costly ($\kappa \downarrow$), principal shares less profit with the supervisor, delegation is more attractive, and it involves greater effort.

- ▶ If risk of corruption $\downarrow \implies$ principal can set a lower α and still avoid $b_l > 0$
- ▶ Since α is lower, supervisor-agent relational contracting is easier \implies principal can transfer less surplus to the supervisor
- ▶ Bloom, Sadun and Van Reenen (2012): firms delegate more when there is stronger rule of law or better monitoring practice