

# Using Financial Contracts to Reduce Regulatory Capture

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**Introduction**

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**Model: Benefits of Forward Contracts**

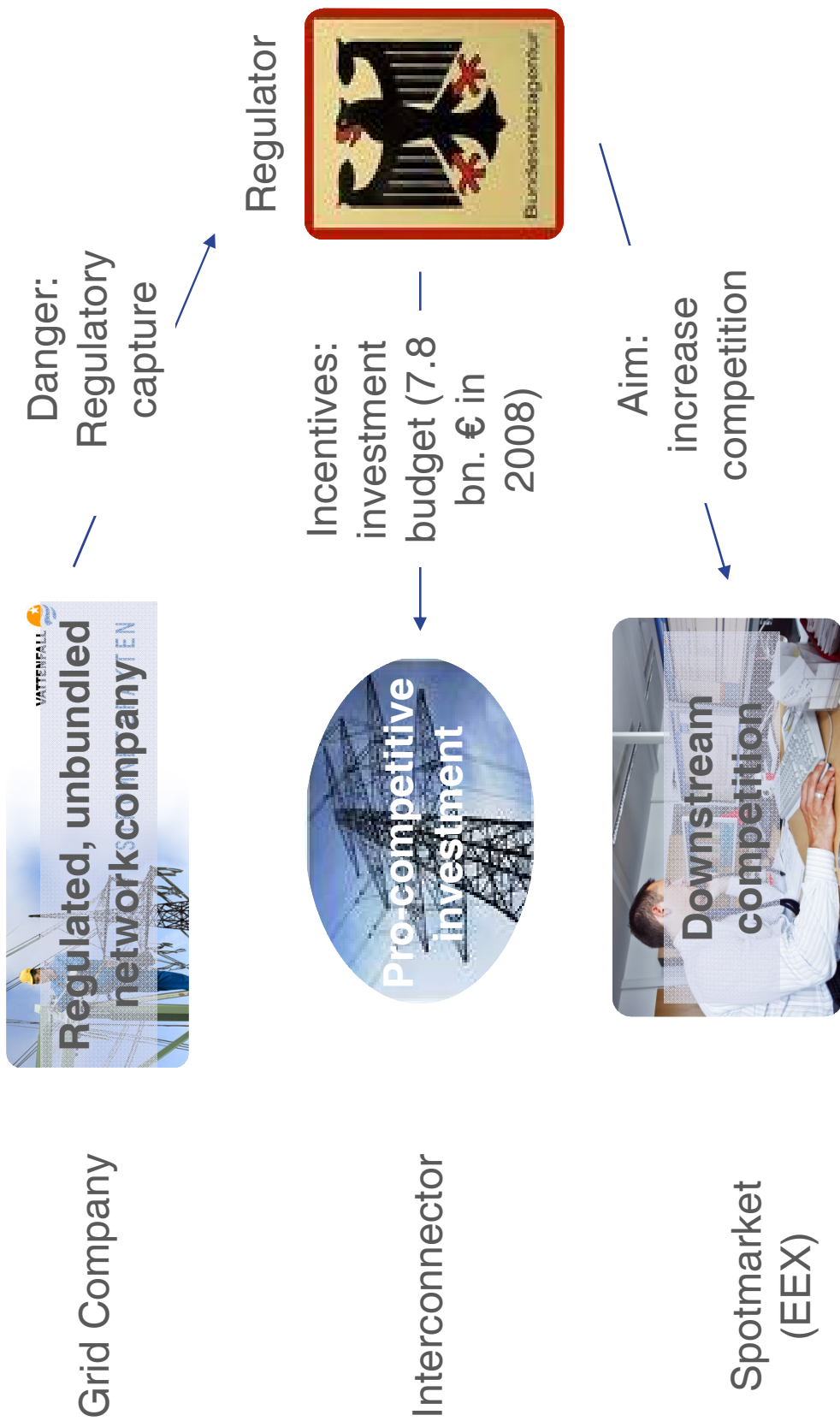
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**Adverse selection problems**

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**Discussion**

# Today, important regulatory decisions rather deal with investments than with access pricing.



# Are “forward contracts” regulatory tools which are robust against regulatory capture?

## Forward contracts in regulatory practice

- Compensation for „stranded cost“ in Spain:
  - Energy companies receive a transfer from the state that is decreasing in the electricity price
- Firms receive a **put option** in merger cases:
  - Gas Natural/Union Fenosa (2009)
  - EDF/British Energy (2008)
  - GDF/Suez (2006)
  - Nuon/Reliant (2003)

Buyer receives a **call option**

## Forward contracts in our approach

- Contracts oblige the emitting party to pay the (future) commodity price
- Purely financial transaction
- Regulator can force the firms to emit such contract
- Emission of contract in a (competitive) auction



What impact do such contract have?

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# We consider a stylized model of a network industry.

## Basic Model

An unbundled network firm controls an essential input



Competition in downstream market: regulation wants low commodity prices



- Network company's profit  $\pi = \pi_0 - ce$ ,  $e \in \{0,1\}$ .
- Commodity prices:  $p \in \{p_L, p_H\}$ .
- Probability of high commodity prices:

$$\Pr (p = p_H) = x + \eta(1 - e) \quad x \in \{x_L, x_H\}.$$

baseline prob. of high prices      effect of pro-competitive effort

- Three tier model:
  - Firm: undertakes the unobservable action  $e$ , can bribe the regulator
  - Regulator: “corrupt”, receives a signal on  $x$  which it can misrepresent
  - Legislator: wants the firm to operate, likes low prices, sets the “regulatory rule”

# We want to compare pure outcome dependent transfers to forward contracts.

## Comparison of regulatory regimes

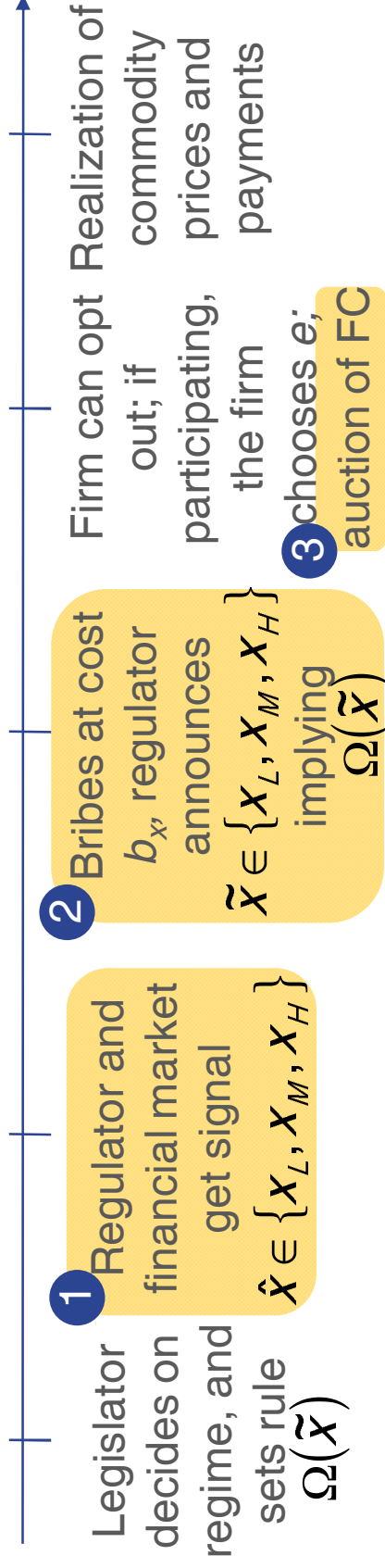
### Outcome contingent Transfers

Payments  $t_H, t_L$  conditional on commodity prices  $p_H, p_L$



### Forward Contracts (FC)

Amount  $q$  of FCs for which the firm has to pay  $p$



1. Financial market and regulator have the same information.
2.  $x_M$  means „no signal“; regulator can only hide information.
3. Forward contracts are sold in a competitive auction; expected profit = 0.

# We use the Laffont-Tirole (1991) approach to model regulatory capture.

## Objective Functions

1. Firm maximizes expected profits; outside option = 0.
2. Regulator: reports truthfully, unless bribed.
3. Legislator: maximizes welfare, according to:

$$W = S(p) - (1 - \beta)t + \beta\pi - \varepsilon b; \quad 0 < \beta < 1, \varepsilon > 0.$$

Surplus from  
downstream  
market (CS + PS)

weight on  
network firm's  
profits

transfer paid to  
the firm

welfare loss from  
bribes  $b$



Without forwards contracts, the firm will have an incentive to bribe the regulator.

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## No forward contracts

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- $t_H$  ( $t_L$ ) = transfers if prices are low (high), denote as “bonus” for low prices:

$$\Delta_r = t_L - t_H$$

- Incentive compatibility requires:

$$\eta\Delta_r \geq c \leftrightarrow \Delta_r \geq \frac{c}{\eta}$$

- Participation constraint, if the regulator is uninformed (i.e.,  $\hat{x} = x_M$ ) and reports truthfully, requires:

$$t_H(x_M) + (1 - x_M)\Delta_r - (\pi_0 - c) \geq 0$$

- “average type” must get payments sufficient to ensure participation
  - But: If  $x = x_L$ , the firm would participate also with lower levels of transfers
  - Thus: if  $x = x_L$ , the firm has an incentive to bribe to avoid the reduction in payments
  - Return on bribing: if regulator announced  $x_M$ :  $(x_M - x_L)\Delta_r$

With forward contracts the financial market's information can be used to achieve the first best.

### With forward contracts

- Given a signal to the financial market and the regulator of  $\hat{x}$ , auction revenues will be:

$$Y = q(\hat{x}p_H + (1 - \hat{x})p_L).$$

- The “bonus” for low price with financial contracts: the reduction in payments of the firm on the financial contracts:

$$\Delta_f = q(p_H - p_L)$$

- The legislator will find it optimal to set

$$\Delta_f = \frac{c}{\eta}$$

$$t_L(\vec{X}) = t_H(\vec{X}) = -(\pi_0 - c).$$

- First best implemented.
- Regulator cannot influence the payments, no incentive to bribe.
- Information of financial market ensures participation.

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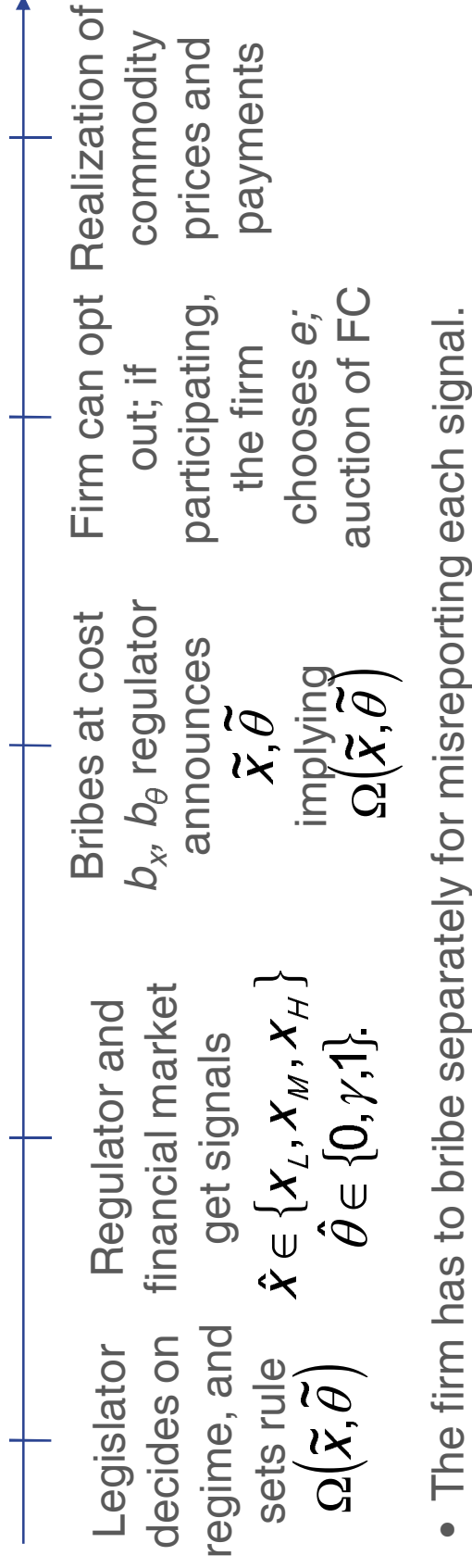
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# Additionally, the firm could have private information.

## Adverse Selection Problem

- Private information of the firm about probability of high prices: “type” of the firm  
 $\Pr (p = p_H) = x + \eta(1 - e) + \tau(1 - \theta) \quad \theta \in \{0,1\}$
- Probability of the “efficient” type is  $\gamma$ .
- The firm knows its type. With some probability, the regulator and the financial market learn the type. They receive the signal:  $\hat{\theta} \in \{0, \gamma, 1\}$ .



- The firm has to bribe separately for misreporting each signal.

With adverse selection, auction revenues do not always equal the payments on forward contracts.

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## Forward Contracts

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- Auction revenues:  $Y = q(p_L + (\hat{x} + \tau(1 - \hat{\theta}))(p_H - p_L))$
- Problem: if inefficient type is not revealed to the financial market...
  - inefficient type knows that he will probably pay a higher price
  - the financial market pays only the average price



- To ensure participation of the inefficient type, a lump sum transfer is required
- The lump sum transfer depends on the regulator's information
- The lump sum transfer implies rents
- This sets incentives to bribe the regulator
- Consequently, forward contracts can no longer implement the first best

# Regulation seeks to minimize to kinds of rents: from moral hazard and from adverse selection.

## Characterizing optimal forward contract regulation

- In general, the regulator may use state dependent transfer and forward contracts
- Both types of bonus can be used to induce high effort:  $\Delta_r + \Delta_f = \frac{c}{\eta}$ .
- The minimum rents that induce no bribes satisfy:

$$R^f(\hat{x}, \hat{\theta}, \theta | \Delta_r, \Delta_f) = R_x(\hat{x} | \Delta_r, \Delta_f) + R_\theta(\hat{\theta}, \theta | \Delta_r, \Delta_f)$$

$$R_\theta(\hat{\theta}, \theta | \Delta_r) = \begin{cases} \tau(\Delta_r + \Delta_f) & \text{if } \theta = 1 \quad \hat{\theta} = \gamma \text{ info. rent eff. type} \\ \max\{\tau(\Delta_r + \gamma\Delta_f) - b_\theta, 0\} & \text{if } \theta = 1 \quad \hat{\theta} = 1 \text{ "no bribe" eff. type} \\ 0 & \text{if } \theta = 0 \quad \hat{\theta} = \gamma \text{ no info. rent ineff. type} \\ \max\{\tau\Delta_f - b_\theta, 0\} & \text{if } \theta = 0 \quad \hat{\theta} = 0 \text{ "no bribe" ineff. type} \end{cases}$$

- Hence, the legislator solves:

$$\min_{\Delta_r, \Delta_f} E_{\hat{x}, \hat{\theta}, \theta} [R^f(\hat{x}, \hat{\theta}, \theta | \Delta_r, \Delta_f)] \quad \text{s.t.} \quad \Delta_r + \Delta_f = \frac{\eta}{c}$$



# Using forward contracts only is second best.

## Optimality of using forward contracts only

- (i) The optimal regulatory regime uses no price dependent transfers, but only forward contracts.
  - (ii) The firm obtains a rent, i.e., the first best can not be realized.
  - (iii) The firm is better off under forward contracts compared to price dependent transfers.
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- Forward contracts solve the moral hazard problem, but not the adverse selection problem.
  - Due to the adverse selection problem, the firm receives an information rent.
  - The firm's total rent is higher under optimal contracting than under price contingent transfers.
  - Forward contracts are nevertheless welfare superior, because a part of the rent is paid by the financial market (which is a pure transfer).

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# Forward contracts could augment the regulatory toolbox.

## Policy implications

### Forward contracts are

- **suitable**, to provide incentives for pro-competitive actions by a regulated input provider which benefit the consumers;
- **robust**, against regulatory capture, since they use information of the financial markets and circumvent the discretionary decisions by the regulator;
- **realistic**, to implement in particular in the energy industry, where liquid wholesale markets for commodities exist (electricity, gas);
- **complementary**, to the existing instruments of cost plus, or outcome dependent regulation.



**Main application for investment incentives for infrastructure providers.**

Thank you very much for  
your attention