

Using Financial Contracts to Reduce Regulatory Capture

WHU 
Otto Beisheim School of Management

joint work with Sebastian Kranz, Bonn

Wirtschaftsuniversität Wien, November 20, 2009

Prof. Dr. Felix Höfler
Regulatory Economics
Stiftungslehrstuhl der Deutsche Post Stiftung
WHU – Otto Beisheim School of Management

Excellence in
Management
Education

1

Introduction

2

Model: Benefits of Forward Contracts

3

Adverse selection problems

4

Discussion

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

Grid Company



Danger:
Regulatory
capture

Regulator

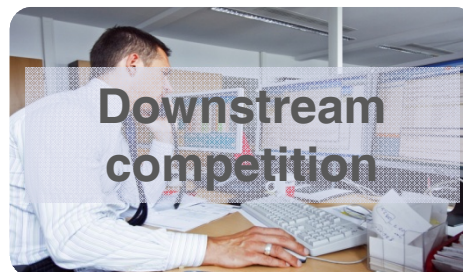
Interconnector



Incentives:
investment
budget (7.8
bn. € in
2008)



Spotmarket
(EEX)



Aim:
increase
competition


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 priceFirms receive a **put option**
- „Virtual Power Plants“ as remedies 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?

1 Introduction

2 **Model: Benefits of Forward Contracts**

3 Adverse selection problems

4 Discussion

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

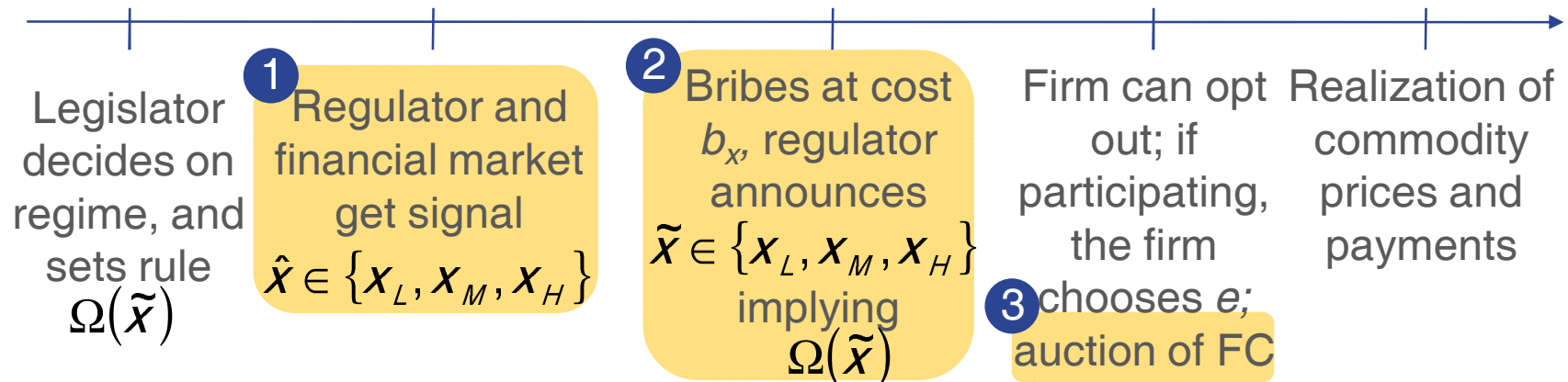
Outcome contingent Transfers

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)

transfer paid to the firm

weight on network firm's profits

welfare loss from bribes b

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

No forward contracts

- $t_H (t_L)$ = 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 uniformed (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

$$\Delta_f = \frac{c}{\eta}$$
$$t_L(\tilde{x}) = t_H(\tilde{x}) = -(\pi_0 - c).$$

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

1 Introduction

2 Model: Benefits of Forward Contracts

3 Adverse selection problems

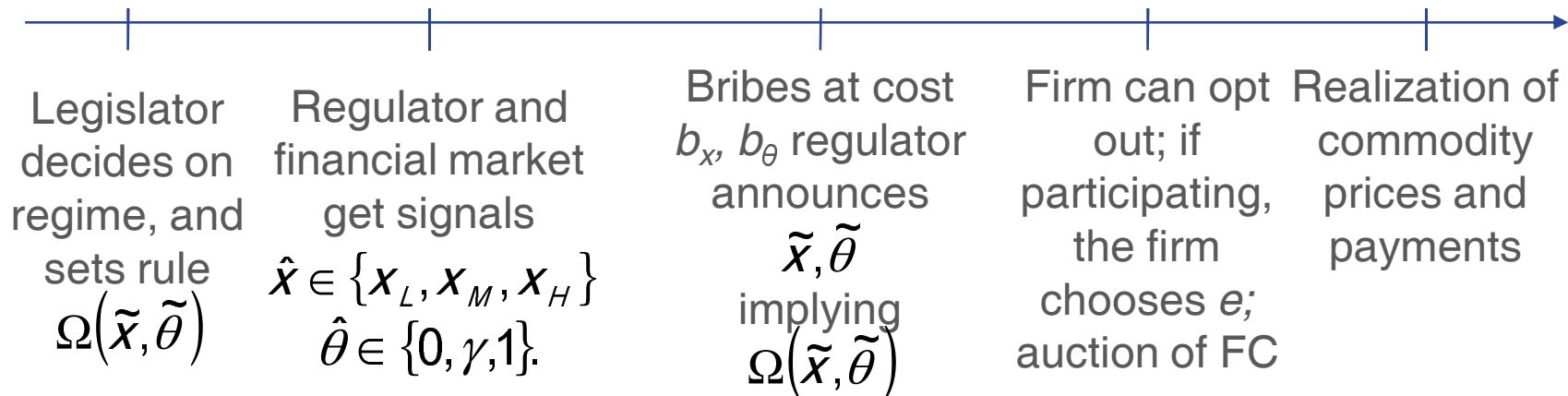
4 Discussion

Additionally, the firm could have private information.

Adverse Selection Problem

- Private information of the firm about probability of high prices:

$$\Pr (p = p_H) = x + \eta(1 - e) + \tau(1 - \theta) \quad \theta \in \{0, 1\}.$$
 ← “type” of the firm
- Probability of the “efficient” type is γ .
- 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.

Forward Contracts

- Auction revenues: $Y = q(p_L + (\hat{x} + \tau(1 - \hat{\theta}))(p_H - p_L))$.
- Problem: if inefficient type if 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:

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

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

- Hence, the legislator solves:

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

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.

- 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).

1 Introduction

2 Model: Benefits of Forward Contracts

3 Adverse selection problems

4 Discussion

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