



# Regulation of two-part tariffs and quality choice under uncertainty

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# Agenda



- Quality regulation in theory and practice
- Four “new” regulation regimes
- Regime 1 vs regime 2
- Regime 2 vs regime 3
- Regime 3 vs regime 4
- Conclusions

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# Quality regulation in theory and practice



- With linear tariffs monopolies tend to overcharge welfare optimal prices
- Quality behavior is ambiguous (e.g. Spence 1975)
- With two-part tariffs it is possible that monopolies maximize welfare
- Lump-sum taxes can then be used for distribution matters
- In practice, regulators want to distribute welfare by controlling monopoly behavior directly (e.g. by incentive regulation)
- In the case of incentive regulation this leads to quality concerns

# Bad quality leads to ...



... angry customers:



# Quality regulation in theory and practice



- Monopolies tend to overcharge welfare optimal prices
- Quality behavior is ambiguous (e.g. Spence 1975)
- With two-part tariffs it is possible that monopolies maximize welfare
- Lump-sum taxes can then be used for distribution matters
- In practice, regulators prefer to address distribution matters by controlling monopoly behavior (e.g. by incentive regulation)
- In the case of incentive regulation this leads to quality concerns
- Quality is therefore addressed by additional regulation measures (for a survey of the literature on quality regulation see Sappington 2005)
- For instance: Bonuses in the price-cap (Energy, air navigation)

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# Four “new” regulation regimes



All regulation regimes are based on two-part tariffs\*:

- Regime 1: Standards on quantities and quality, plus a fixed fee cap
- Regime 2: Standards on prices and quality, plus a fixed fee cap
- Regime 3: Standards on prices and quality bonuses in the fixed fee cap
- Regime 4: Standards on quantities and quality bonuses in the fixed fee cap

⇒ All regimes can lead to welfare optimal results and address distributional objectives at the same time

\* Regulation regimes based on two-part tariffs have also been analyzed by Sappington and Sibley 1988.

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# Regime 1 vs regime 2



Once quality standards are chosen what is better: quantity or price standards?

## Basic model structure:

- Quantity  $x \geq 0$
- Quality  $s \geq 0$  (verifiable)
- Inverse demand  $P(x,s)$ ,  $\partial P(x,s)/\partial x < 0$ ,  $\partial P(x,s)/\partial s \geq 0$
- Marginal cost of  $x$  is zero
- Quality cost  $C(s)$ ,  $C'(s) > 0$ ,  $C''(s) > 0$
- Inverse demand and quality cost are stochastic, shocks are independent

## Result:

Regime 2 is preferred. Once quality standards are chosen price standards are better than quantity standards.

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# Regime 2 vs regime 3



Once price standards are chosen what is better: quality standards or bonuses?

Refined model structure:\*

- $P(x,s) := \max \{ 0, s (a - b x + \theta) \}$  with  $\theta \sim (0, \sigma_\theta^2)$
- $C(s) := s^2 c \kappa / 2$  with  $\kappa \sim (1, \sigma_\kappa^2)$

Result:

Regime 3 is preferred. Once (zero) price standards are chosen bonuses in the fixed fee cap are better than quality standards.

\*The form of the inverse demand function follows Tirole (Tirole 88). In contrast to Tirole's specification we add a stochastic term.

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# Regime 3 vs regime 4



Once bonuses are chosen what is better: price or quantity standards?

More refined model structure:

- Uniform distribution of demand shocks  $\theta$

Result:

Regime 4 is preferred. Once bonuses in the fixed fee cap are chosen quantity standards are better than (zero) price standards.

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# Conclusions



- Bonuses are useful from a welfare perspective
- Quantity standards can lead to further welfare enhancements...
- ...and to happy customers!



**Thank you!**