



# **A theory of regulatory cycles in public transport**

**Andrei Dementiev**  
Higher School of Economics

Workshop 1. Models of Mainstream Public Transport Provision

# A regulatory cycle (Gwilliam, 2008)

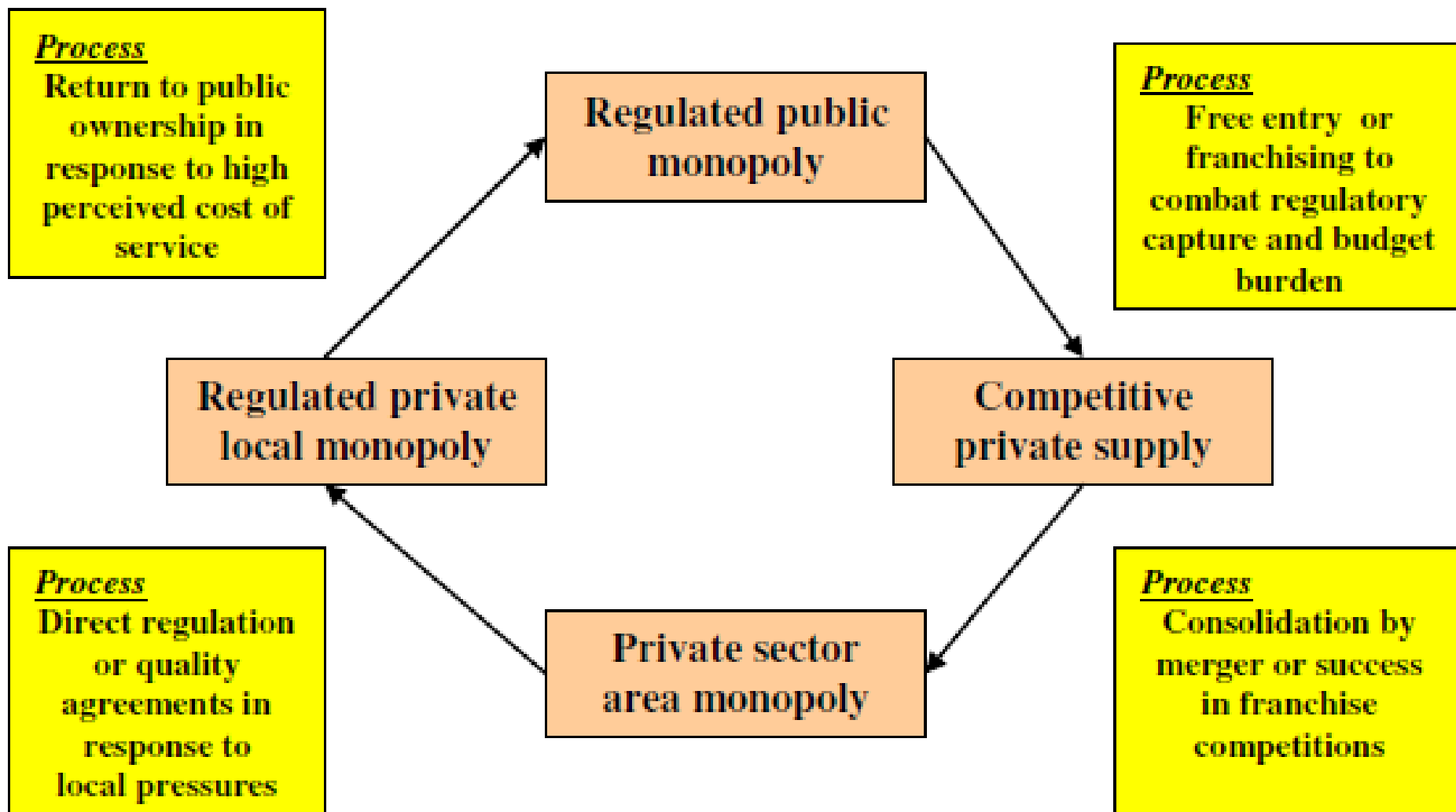


Fig. 1. The industrialized country regulatory cycle.

# A regulatory cycle (Gwilliam, 2008)

## Process

Re-establishment  
of formal company  
supply by forced  
consolidation

Private regulated  
monopoly

## Process

Withdrawal or  
nationalization of  
private suppliers  
due to stringent  
fare controls

Informal sector  
cartel

Public /municipal  
monopoly

## Process

Self regulation of  
informal sector  
suppliers to share  
revenue and avoid  
damaging conflict

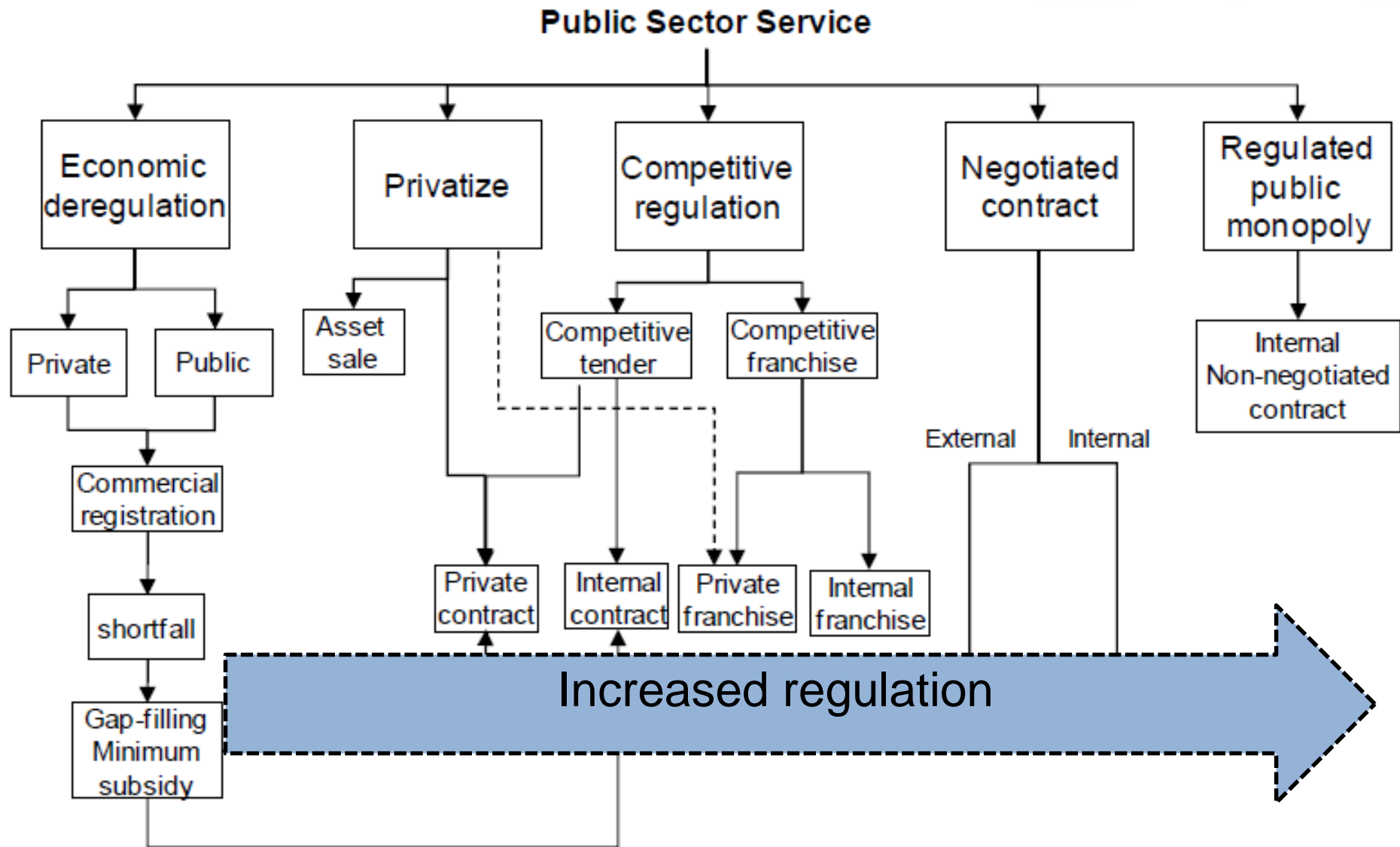
Fragmented  
informal supply

## Process

Decline and failure of  
formal suppliers due  
to fare restraint.  
Emergence of frag-  
mented informal

Fig. 2. The post-colonial regulatory cycle.

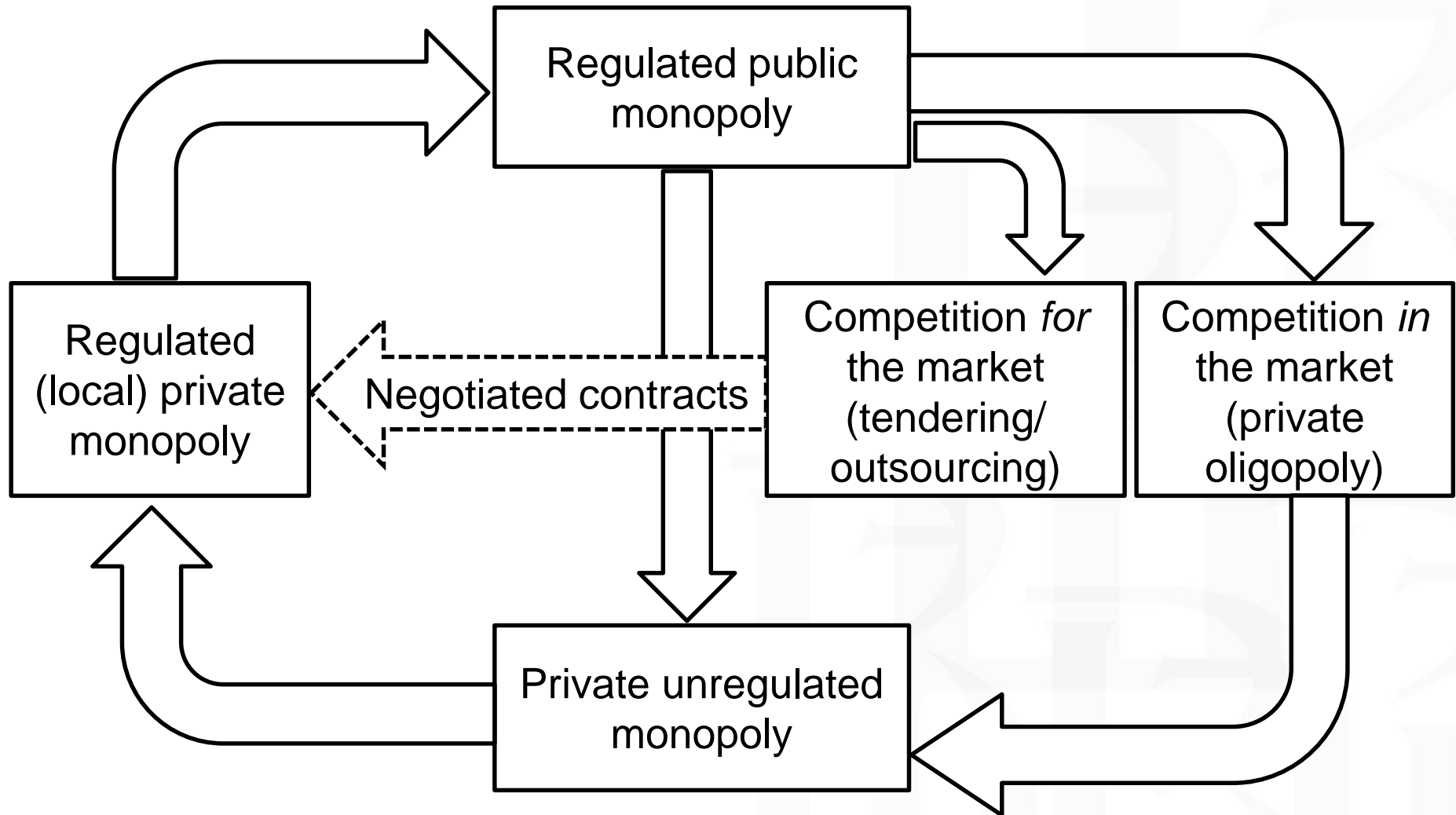
# Regulatory models (Currie, 2016)



# Competition and ownership apart

Competition		Regulation		
IN the market	FOR the market	No	Yes	
Cournot duopoly	Outsourcing via competitive tendering or franchising	Unregulated laissez faire monopoly	Regulated private monopoly / asymmetric info	Regulated public monopoly / symmetric info
Private ownership				Public ownership

# A regulatory cycle reconsidered



## 4 regimes (Auriol and Picard, 2009)

- **Regulated public monopoly** with symmetric info (1st best)
- **Regulated private monopoly** with asymmetric info – the government controls the investment and production decisions and is therefore accountable for even high-cost (inefficient) firm's profits and losses
- **Competition FOR the market** (outsourcing regime) – the franchise fee (as a result of CT or NC) is paid by a private monopoly having full cash-flow rights but once the investment is sunk the government can contract ex post to secure that the firm meet individual rationality constraint
- **Unregulated private monopoly** - *laissez faire* – an extreme case of NOT offering ex post contracts (to high-cost firms)

# Is there a regulatory cycle?

## The missing regime

- **Competition IN the market** – (Ferreira & Ferreira, 2010) - a private duopoly with asymmetric info on cost

### This paper

- Offers a unified theoretical framework for all five regimes
- Obtains closed form solutions for direct welfare comparison
- Analyses comparative statics to factor in 1) technological progress, 2) fiscal constraints and 3) institutional capacity
- Fuels the debate on regulatory reform in post-communist countries



# Model setup

- Linear demand function:  $P(Q) = a - bQ$
  - Gross consumer surplus:  $S(Q) = \int_0^Q P(x)dx = aQ - \frac{b}{2}Q^2$
  - Linear cost function:  $C(\beta, Q) = K + \beta Q$
  - Marginal cost is private info uniformly distributed  $\beta \sim [0, \bar{\beta}]$
  - Fixed cost (investment) is known
  - The market demand is sufficiently large  $a > 2\bar{\beta}$
- The firm's maximises:  $\Pi(\beta, Q, t, F) = P(Q)Q - C(\beta, Q) + t - F$
- $t$  – transfer to the firm,  $F$  – franchise fee
- The gov-t maximizes  $EW = E\{S[Q(\beta)] - \beta Q(\beta) - K - \lambda t(\beta)\}$
- $\lambda$  – social (shadow) cost of public funds

# Closed form solutions for regulation

Public  
monopoly

$$EW^p = \frac{(1 + \lambda)^2 (\bar{\beta}^2 - 3a\bar{\beta} + 3a^2)}{6b(1 + 2\lambda)} - (1 + \lambda)K$$

Regulated  
private  
monopoly

$$EW^r = \frac{3(a(1 + \lambda))^2 - 3a\bar{\beta}(1 + \lambda)(1 + 2\lambda) + (1 + 2\lambda)^2 \bar{\beta}^2}{6b(1 + 2\lambda)} - (1 + \lambda)K$$

Private  
monopoly

$$EW^m = \frac{\bar{\beta}^2 + 3a^2 - 3a\bar{\beta}}{8b} - K$$

# Closed form solutions for competition

FOR the  
market  
outsource

$$EW^o = \begin{cases} \frac{6a^2 + 9a^2\lambda - 6a\bar{\beta}(1 + 2\lambda) + \bar{\beta}^2(2 + \lambda)(1 + 2\lambda)}{12b(1 + 2\lambda)} - K + \lambda F & \text{if } \lambda < \lambda_0 \\ \frac{a^3 + 3\bar{\beta}(\bar{\beta}^2 - 3a\bar{\beta} + 3a^2)(1 + 2\lambda)^2}{24b\bar{\beta}(1 + 2\lambda)^2} - K + \lambda F & \text{if } \lambda \geq \lambda_0 \end{cases}$$

IN the  
market

$$EW^c = \frac{12b\left(\sqrt{1+\frac{a}{b}}-1\right)\left(a-b\left(\sqrt{1+\frac{a}{b}}-1\right)\right)-3a\bar{\beta}+\bar{\beta}^2}{6b} - \frac{2K}{3}$$

# Welfare comparison

## Private monopoly vs competition IN the market

$$\Delta EW^{mc} = EW^m - EW^c.$$

- Low demand

$$\Delta EW^{mc}(a = 3, b = 1) = \frac{-15 + 9\bar{\beta} - \bar{\beta}^2}{24} - \frac{1}{3}K$$

- High demand

$$\Delta EW^{mc}(a = 8, b = 1) = \frac{24\bar{\beta} - \bar{\beta}^2}{24} - \frac{1}{3}K$$

# Whither outer regulatory cycle?

1. When the **fiscal burden** is an issue, governments opt for structural reform to demonopolise the public transport service and allow competition (Cournot duopoly in our model) in the market if the demand is high
2. In an **efficiency drive** competitive industry with increasing returns to scale tends to evolve to a more concentrated structure
3. Better **technologies** may lower entry barriers (sunk cost) to make competition in the market sustainable
4. Low **institutional capacity** (poor regulatory oversight) leads to a cartelization and improvements in productive efficiency at the expense of allocative efficiency

# Whither outer regulatory cycle?

5. When the public transport **demand is shrinking** a single regulated firm serving the whole market would be relatively more cost efficient industry structure than private unregulated monopoly
6. Private regulated monopoly is inferior to public monopoly since the latter eliminates **information rent**
7. However, public ownership of the assets becomes a **fiscal burden** in unprofitable markets
8. Low-power cost-reimbursement regulatory rules often result in **cost inflation**. When full cost recovery is not guaranteed the regulated private monopoly goes bankrupt and has to be nationalized! The cycle is over!

# Whither inner regulatory cycle?

1. Since public monopoly is unable to control cost governments introduce competition FOR the market to reveal the most efficient firm for the whole market requiring the **lowest subsidy from the budget**
2. But such fiscally constrained but institutionally matured governments should be able to extract monopoly rent through **efficient tendering procedures**
3. The hold-up problem makes competitive tendering evolve to the system of renegotiated contracts which essentially resembles much of regulatory environment for private monopoly with unknown cost
4. The regulatory cycle thus **bypasses** the monopoly regime

# No regulation – no cycle!

1. A direct move from public procurement to private unregulated monopoly is viable when  $\lambda$  is high
2. The government is unable to finance the investment disbursement of infrastructure project which has the cost  $(1 + \lambda)K$  for the society. Hence, a financially unconstrained private monopoly is preferred to public monopoly when variable profit covers fixed cost

Example: Unregulated minibuses and motorcycles in some African capital cities are completely private and highly monopolized services that manage to break-even without any subsidies (Kumar and Barrett, 2008). Cashless governments leave the transportation sector for private companies to fill the service gap and let the free market to be highly concentrated to enjoy the scale economy



# A regulatory cycle reconsidered

