

**Poster title:**

Effectiveness of feed-in tariff and renewable portfolio standard under strategic pricing in network access

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# Effectiveness of feed-in tariff and renewable portfolio standard under strategic pricing in network access

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## Motivation

- Some policies are implemented worldwide to promote production from renewable energy sources.
  - Price based: feed-in tariffs (FIT)
  - Quantity based: renewable portfolio standards (RPS)
- Especially, fixed-price FIT policy is considered to be the most effective to increase production from renewable energy source.
- However, strategic pricing in network access may possibly offsets the effectiveness of these policies

The purpose of this study is to

- investigate the effectiveness of
  - fixed-price FIT,
  - premium-tariff FIT,
  - RPS,
 explicitly considering strategic pricing in network access.
- investigate the impacts of vertical structure, i.e., vertical integration (VI) and separation (VS).
- compare market outcomes between policies.

## Outline of the Model

**Market structure:**

a monopolist and a fringe, where the fringe produces electricity from renewable energy sources

**Network sector:**

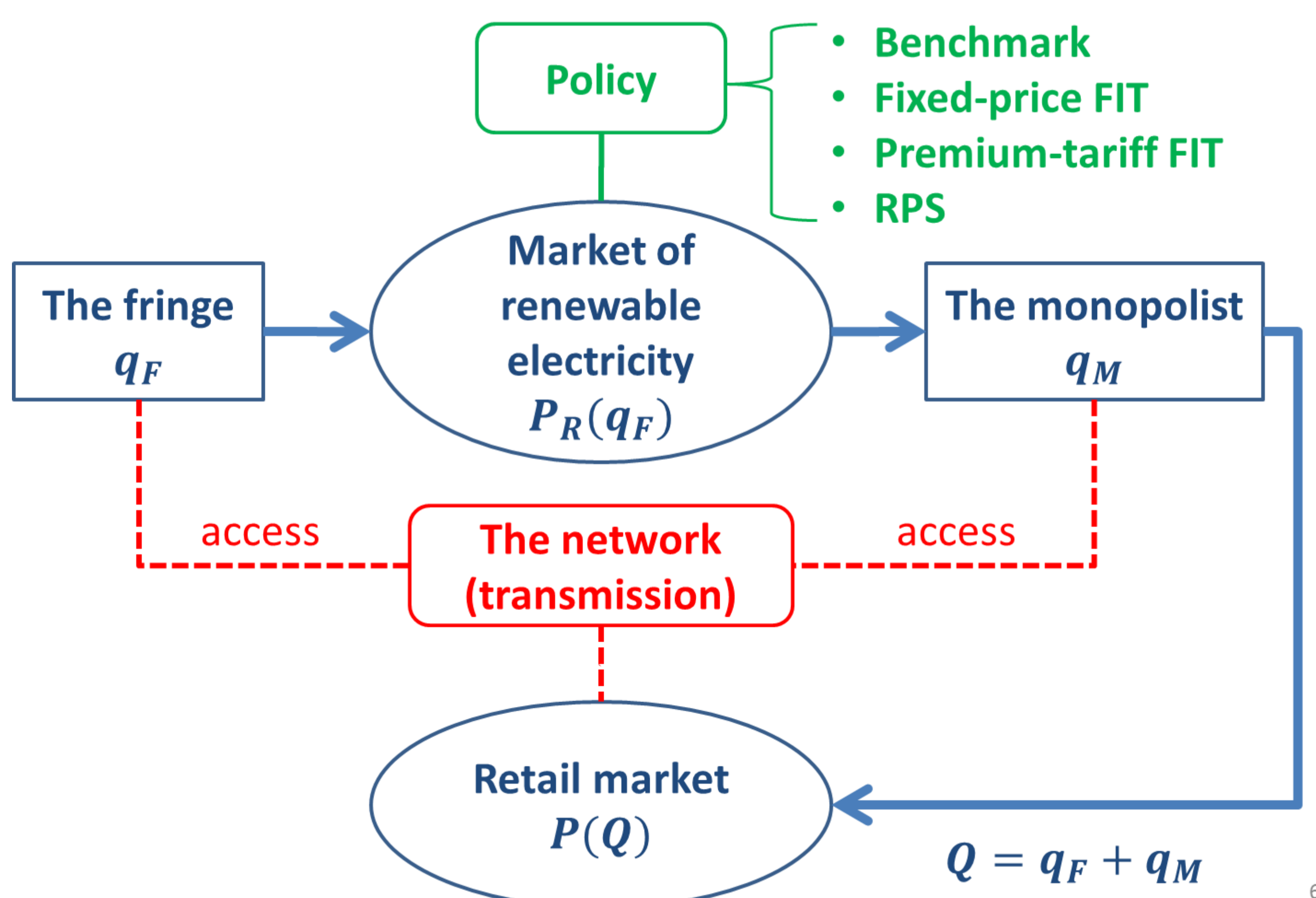
strategic pricing in network access

**Policies investigated:**

fixed-price FIT, premium-tariff FIT, RPS

**Vertical structures:**

vertical integration, vertical separation



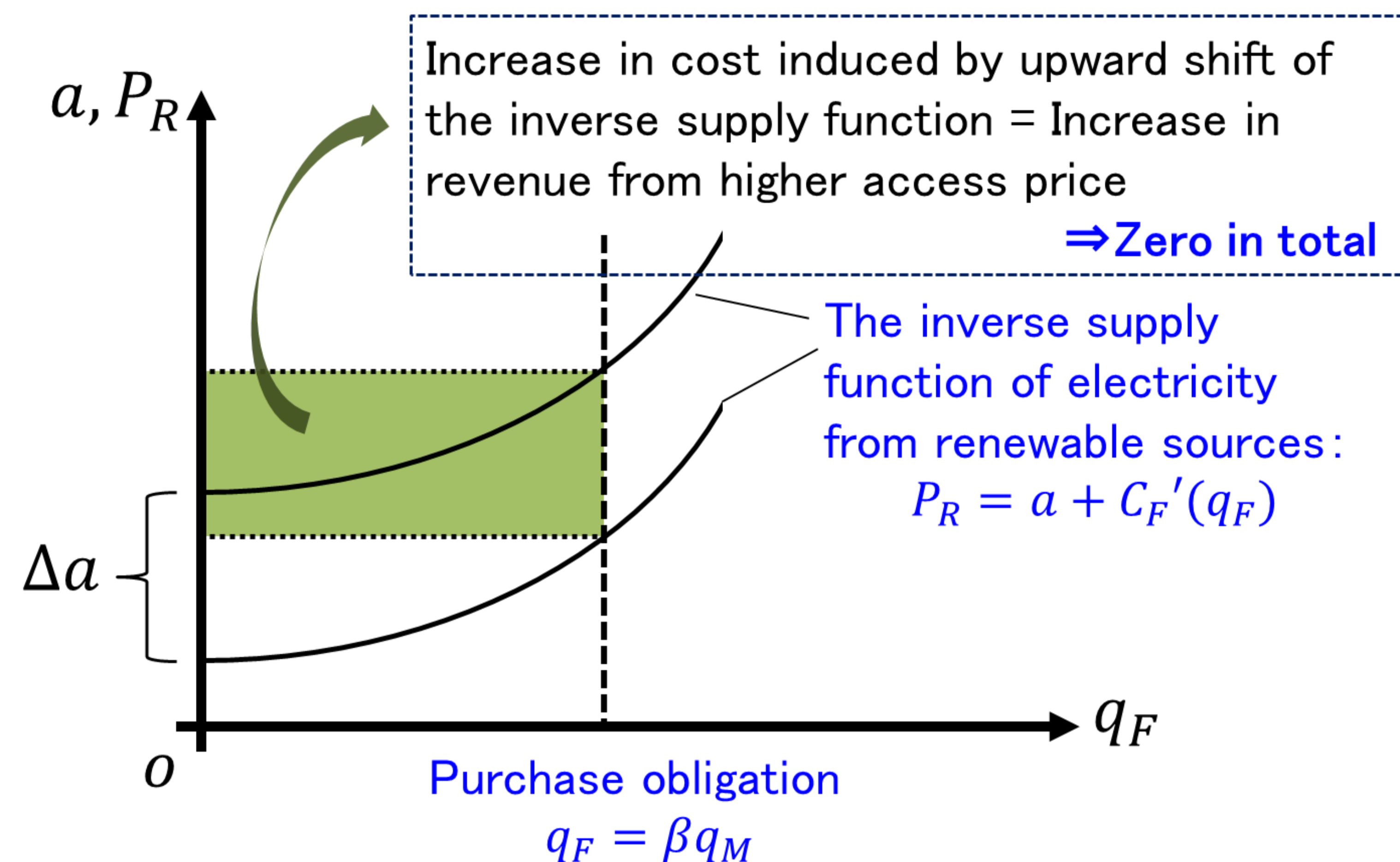
The monopolist's behavior under vertical integration:

$$\max_{a, q_M} PQ - C_M(q_M) - (P_R - a)q_F - F_T$$

The monopolist's behavior under vertical separation:

$$\max_{q_M} PQ - C_M(q_M) - P_R q_F - a q_M$$

## RPS under vertical integration



## FITs under vertical integration

The vertically integrated monopolist is practically able to set  $q_F$  and  $q_M$ :

$$\text{FOC1: } \frac{\partial \pi_M(q_M, q_F)}{\partial a} = \frac{\partial \pi_M}{\partial q_F} \frac{dq_F(a; P_R)}{\partial a} = 0$$

$$\text{FOC2: } \frac{\partial \pi_M}{\partial q_M} = 0$$

FITs fail to increase outcome of the fringe renewable producer, because the monopolist offsets the effects of higher renewable price by rising network access cost.

## Main results and impacts of VS

**Under vertical integration,**

- the effectiveness of fixed-price FIT and premium-tariff FIT are fully offset by the strategic pricing in network access,
- RPS does not motivate the vertically integrated monopolist to manipulate the access price, because higher access price induces higher cost for the vertically integrated monopolist to meet purchase obligation of RPS.
- RPS is potentially more effective to increase production from renewable sources than the other two policies.

**Vertical separation**

- improves effectiveness of fixed-price FIT and premium-tariff FIT,
- adversely reduces that of RPS

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