

Economic Theory and Practices

Telecommunication Policy and Regulation for Competition

Workshop on Telecommunication Policy and Regulation for Competition
Bangkok, Thailand, 11-15 July 2005

Part I

Jino Kim

Topics

- Competition in telecommunication sector
 - Network Externalities
 - Game Theory
- Regulatory impact analysis and cost & benefit analysis
- Competition indicator
- Case studies of other countries

Topics

Potential Regulatory Objectives

- Support of universal service
- Maintaining just and reasonable rates
- Price cap for 1) flexibly-priced services and 2) non-price regulated services
- Price reduction for residential, business and access rates
- Promoting fair and reasonable competition for all telecom services
- Maintaining or improving quality of service
- Investment: upgrading of facilities, the provision of advanced digital services, and the use of new technology in its infrastructure development

Key Questions

- What are network externalities and how can the regulators create an efficient market within the context of the externalities?
- Does gaming lead to inefficient outcome? Second-best outcome? What can regulators do?
- What are some of the tools useful in Cost/Benefit analyses in conjunction with determining policies?
- What are some of the lessons from other country examples?

Competition in the Telecommunications Sector

- **Promoting Competition vs. Forcing Competition**

FCC's present unbundling rules are unlawful because they do not sufficiently reflect or explore this other side of the unbundling coin.... Were that the Act's objective... would Congress have so emphasized the importance of competition? A totally unbundled world -- a world in which competitors share every part of an incumbent's existing system, including, say, billing, advertising, sales staff, and work force (and in which regulators set all charges) -- is a world in which competitors would have little, if anything, to compete about.

U.S. Supreme Court
TRANSLATION, PAPER

Competition in the Telecommunications Sector

- **Economic Theory**
 - Generally Applicable
 - One-size-fits-all?
 - Network Externalities
 - Gaming
 - Experience
 - Regulatory Impact
 - Cost/Benefit Analysis

Competition in the Telecommunications Sector

- **Key Questions**
 - What are the network externalities and how can the regulators create an efficient market within the context of the externalities?
 - Does gaming lead to inefficient outcome? Second-best outcome? What can regulators do? **Network Externalities**
 - What are some of the tools useful in Cost/Benefit analyses in conjunction with determining policies?
 - What are some of the lessons from other country examples?

TRANSLATION

Competition in the Telecommunications Sector

- The fundamental economic issue for the Regulator
 - Create an environment for the industry that promotes the development of *competition*
 - A healthy development of the industry **Network Externalities**
 - **Social agenda**
 - Not necessarily the interests of particular competing firms **Regulatory Impact**
 - **Convergence—blurring of the lines services and products**

TRANSLATION

Review of Network Externalities

- **Definition**
 - Amount that one party is willing to pay for access to a network depends on who or how many other parties are connected to it. One-size-fits-all?
 - Telecom industry is believed to exhibit externality features that makes the value of a network as a square of the number of users (n^2).
 - Economics of networks have traditionally viewed the telecommunications networks as having a downward sloping cost curve **Cost/Benefit Analysis**
 - **Value of networks increase exponentially and average cost decreases as a function of number of users**

TRANSLATION

Economic Externality

- **Definition**
 - Economic externalities in broad terms describe costs or benefits that do not directly affect the economic agents involved in a transaction or any economic activity

Example 1. Company A buys from Company B thereby benefiting both companies. However, in this transaction, Company A pollutes a river, killing fish. The fishermen will be harmed because there will be less fish to be caught. However, Company A does not care if there is no law prohibiting water pollution. Here, there is a negative externality.

TRANSLATION, QUESTION, WHAT CAN A REGULATOR DO?

Economic Externality

Example 2.

- Telco A's footprint = 50% of households the country, leaving the rest of the country unconnected.
- Start-up wireless Company B covers 100% of the country.
- The customers of Telco A can now call their relatives in previously unserved areas.
- Telco A's revenues go up despite not investing in wireless Company B's network.
- A positive externality to Telco A. Wireless Company B also receives positive externality from Telco A's existing network.
- Telcos A and B provide **network externalities** to each other.

TRANSLATION

Types of Network Externalities

- **Communication Network:** Markets where the benefit of consumers comes from the ability to communicate with other consumers via the network.
- **Systems Network:** Complementary markets such as computers and software (or nuts and bolts).
- **Network:** Combination of Communications and Systems Networks.

TRANSLATION, QUESTION

Types of Network Externalities

Externalities between carriers' "sub-markets" or "sub-networks".

- In systems and in mixed networks, there is an "up" market (services) and a "down" market (customers)
- The sizes of the "up" and of the "down" markets affect the benefits of the customers in the "down" market.
- Moreover, the size of the "down" market will determine the incentives for service providers in the "up" market to join a given system.

Types of Network Externalities

Externality exists when: there is the ability to communicate on-net (i.e., inside the network that is chosen) and the ability to communicate off-net (i.e., with customers of other networks).

TRANSLATE

Types of Network Externalities

Modern Telecommunications and Applications

- network externalities between carriers' "sub-markets" or "sub-networks" In systems
- In mixed networks, there is an "up" market (services) and a "down" market (customers)
- the sizes of the "up" and of the "down" markets affect the benefits of the customers in the "down" market.
- the size of the "down" market will determine the incentives for service providers in the "up" market to join a given system.

TRANSLATE, EXAMPLE?

Implications of Network Externalities

- Incompatibility of networks to any degree may lead to anti-competitive situation
 - carriers with larger sizes of installed bases derive competitive advantage If the quality of communication on-net is superior to the quality of communication off-net
 - Promote competition**
 - In the extreme case, if the networks are not compatible the network with the largest installed base holds the greatest competitive advantage

Implications of Network Externalities

- Reliance and affinity for the promotion of network externalities can have unintended consequences
 - the desire to build on existing technologies to ensure the greatest short-term network externalities for the new network can possibly steer the evolution of the industry in the wrong direction
 - regulators must be mindful of not being unduly enticed by the short-term gains of realizing the maximum network externalities

TRANSLATE

Implications of Network Externalities

Issues to consider:

Compatibility between networks (domestic and global)

- Switching costs (between networks or service)
- Long-term growth

Foreign Direct Investment and Network Externalities

As the technology evolves (e.g., in mobile, from 2G, 2.5G to 3G), some of the issues to consider are:

- interoperability between the systems,
- international compatibility,
- foreign investments via new operators or acquisitions and equipment providers

Foreign Direct Investment and Network Externalities

- FDI under de novo entry -- tends to have a positive effect on competition when FDI is through a de novo entry,
- FDI under acquisition(s) -- the network externality benefit tends to be greater,
- Given these assumptions, regulators may be in a position to create incentives to maximize social benefit in either case.

TRANSLATE

Game Theory

- Every policy enacted will be met by reaction behavior of firms that can impact the results of policy objectives.
- As firms react to new policies, their profit maximization behavior will take on a form of gaming behavior according to their reaction-function.
- Additionally, firms react to each other in a gaming behavior as they seek to increase their profits.

Game Theory -- Basic Economic Theory

Game theory provides a theory of economic and strategic behavior.

People or firms interact directly, rather than in a price-taking, perfectly competitive environment.

Game theory may be about various interactions:

- Chess, poker
- market competition,
- arms races
- environmental pollution

TRANSLATE, QUESTION

The Game between Firms

Firm A and B compete on pricing. The two pricing or output choices are Duopoly and Competitive where Duopoly prices are greater than Competitive prices. Profits possibilities:

		Firm B	
		Duopoly	Competitive
Firm A	Duopoly	120, 120	30, 150
	Competitive	150, 30	100, 100

The Game between Firms

Prerequisites:

- no communication/collusion between the firms
- one-time decision by the firms

Such assumptions may be unrealistic in real life and the game theory model needs to be adjusted accordingly..

TRANSLATE

The Game between Firms

Different Equilibriums

Dominant Strategy: If the same strategy is chosen for each of the different combinations of strategies the player might face.

Dominant Strategy Equilibrium: Each player has a dominant strategy, and each player plays the dominant strategy.

Nash Equilibrium: In coordination game there might be more than one Nash equilibrium.

The Game between Firms

Nash Equilibrium: Carriers A and B choose between Standard A and B, A being newer. Each carrier benefits from network externalities when same standard is used. Here the Nash equilibria are (A, A) and (B, B). QUESTION.

		Carrier B	
		Standard A	Standard B
Carrier A	Standard A	100, 100	0, 0
	Standard B	0, 0	50, 50

Game Theory -- Basic Economic Theory

Assumptions of the models.

- the payoffs are known and certain
- no communication between the two firms
- The two firms interacted only once
- complete rationality of the firms

TRANSLATE

Coordination Problem

Leading toward Pareto-efficient outcome

- Consumers affect the decisions of the firms and governments
- Formation of knowledge, information, and expectations
- Government and firms can affect the formation

Coordination Problem

Firms

- Innovate faster
- Introductory Pricing (create installed base)
- Work with consumers
- Work with existing and developing systems
- Work with international standards organizations

Coordination Problem

Governments

- No adoption (slow movement to new technology)
- Second-best equilibrium (inefficient technology)
- Diminished Social Welfare

Governments are interested in participating in the "coordination".

TRANSLATE

The Game between Firms and Regulators

Reaction of Firms to Policy Change

Lucas Critique:

- prediction based on historical data (in this case firm behavior) would be invalid
- some policy change alters the relationship between relevant variables (such as firms' rational expectation of competitive forces).

The Game between Firms and Regulators

Reaction of Firms to Policy Change

- Firms will act according to their reaction function that will allow them to maximize their profits.
- the policy maker must anticipate the reaction of the firms before making a policy change.
- firms will attempt to skirt the intent of the policy if no deterrence of gaming is provided with the new policy.

Intersection of Network Externalities and Game Theory

The intersection of network externalities and game theory can have significant implications for the regulators in their policy decisions.

- Anticipate and analyze the behaviors of firms
- Gaming with respect to network externalities affect firms' decisions to invest or not invest
- If a firm can benefit free from an investment of another company, it has incentive to freeload

TRANSLATE, QUESTIONS?