

Rational for Regulation

Course: The Economics of Regulation and Competition (IKT3700)

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- Regulation broadly defined to be government intervention to change market outcomes.
- Direct intervention: the intervention can directly affect market outcomes, such as prices, quality, product variety, or the number of service providers, by changing market institutions.
 - E.g., local distributors of natural gas not free to set their own prices
 - It is not typically the case that a firm is free to enter the local gas distribution business by constructing its own distribution network.
 - Instead, typically one local distributor of natural gas and the price and services that it offers must be approved by, or are determined by, a regulatory board.
 - The reg. board has the power to determine the # of firms providing the service

- Indirect intervention: regulation can indirectly affect market outcomes by changing or imposing constraints on market participants, either firms or consumers.
- This changes their incentives, their behavior, as well as the market outcome
 - *price-cap regulation*
- Two explanations for the existence of regulation:
 - **Public interest**
 - regulation response to market failure: when unregulated market outcomes are inefficient, regulation is potentially warranted
 - regulatory intervention—in theory—could be socially beneficial
 - **Economic**
 - there is a demand for regulation from groups who can benefit from the redistribution of income and wealth resulting from regulation

Public Interest Justifications for Regulatory Intervention

- Justifications are often termed *normative* since based on the premise that regulation leads to an improvement in social welfare.
 - Regulation in this view is a legitimate (meşru) response to market failure.
- **Recall** that markets fail when the market outcome is inefficient. On their own, markets do not exhaust all of the gains from trade
 - Total surplus not maximized
 - Potential Pareto improvements
 - Winners from regulation can compensate the losers and still be winners

Market failure test:

Regulation in the public interest is typically justified on the basis of a market failure test.

1. Determination of the existence and magnitude of the inefficiencies if the market is not regulated
2. Determination of the feasibility of intervention to correct market inefficiencies.
 - Identify a regulatory mechanism or framework such that profit maximization within that framework by the regulated firm reduces or eliminates the inefficiencies
3. Show that the benefits of regulation justify the costs.

- Typically two types of costs associated with regulation.
 - Direct costs are associated with the implementation of the regulatory mechanism.
 - Indirect costs include any regulation-induced inefficiencies. The regulatory mechanism is likely to induce a misallocation of resources since it typically does not result in a complete harmonization between the objective of the firm (profit maximization) and society (maximization of total surplus).

The cure can be worse than the disease.

The usual causes of market failure that justify price and entry regulation are

- Natural monopoly.
 - Large sunk/specific investments.
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- ❖ We do not (YET) consider other sources of market failure justifying regulation; e.g., information asymmetries and externalities (e.g., environmental externalities).
 - ❖ These sources of market failure typically result in health, safety, and environmental (HSE) regulation.

Natural monopoly

- Maybe the most important and widely-accepted market failure
- Provides the rationale for regulating
 - Electric power
 - Natural gas distribution
 - Local internet and telephone services
 - Water supply
 - Transportation services

Natural monopoly

- It arises because a single firm can supply a good or service to an entire market at a smaller cost than could two or more firms can do.
- It is, therefore, a market in which competition is not possible as well as desirable
- An industry is a NM if the production of a particular good or service by a single firm minimizes cost
- Typically, natural monopolies are characterized by steeply declining long-run AC and MC curves such that there is room for only one firm to fully exploit available economies of scale and supply the market.
- **FIGURE 1**

Natural monopoly

- Note that a NM arises out of the properties of productive technology, often in association with market demand, and not from the activities of governments or rivals.

Natural monopoly

- Important to distinguish between natural monopoly in the **positive** sense—*a prediction that there will only be a single firm in the industry*—and using it in the **normative** sense—*industry average cost of production is minimized when there is a single producer*
- The two uses are related, but not necessarily overlap
 - possible that a natural monopoly in a normative sense, if unregulated, would be an oligopoly, not a monopoly.

Natural monopoly

- In perfectly competitive markets
 - demand is large relative to the extent of economies of scale
 - means there is no conflict between cost minimization (at the level of the industry) and the # of firms (or market power)
- In the long-run,
 - in a perfectly competitive equilibrium firms produce where $P=MC$ @ the min. of their LR average cost functions.
- The equilibrium is both allocative and cost-efficient

Allocative efficiency (AE):

- *Allocative efficiency* results when an efficient level of output is produced.
- The industry or market is allocatively efficient when the (social mar. benefit) SMB of the last unit produced equals its SMC.
- Failure to achieve allocative efficiency is usually due to either market power or externalities.

Cost efficiency (CE):

- *Cost efficiency* means output is produced at minimum opportunity cost.
- Requires not only technical efficiency (TE) but also that the firm minimizes the opportunity cost of the resources used.
 - (TE: firm uses only the minimum physical amount of resources necessary to produce the level of output)
- Requires that the inputs are used in correct proportions—where the MRTS equals the factor-price ratio
 - MRTS measures the rate at which the firm can substitute inputs, holding the level of production constant

- Cost efficiency is also relevant at the industry level
- Even though every firm in the industry is cost efficient, average industry cost can be above its minimum level
- Cost efficiency at the level of the industry requires that the distribution of the # and size of firms is such that AC in the industry is minimum
- When there are extensive EoS,
 - **more** competitors or **more** competition may deteriorate welfare
- Industry average cost and even prices might be lower with fewer firms operating farther down their cost curves than with more firms each producing less.
- The optimal number of firms will depend on the trade-off between more market power and lower average costs as the number of firms decreases.

Considering a single firm – NM

- If minimization of production costs requires production by a single firm: **market failure.**
- Allocative efficiency requires many competitors, but cost efficiency requires a single firm.
- Market forces are not going to bring about the socially desirable outcome.

- Let's illustrate this for a single-product firm where the technology of production is characterized by EOS (**FIGURE 2**)
- Clear that in such a market, competition will not be sustainable, even if the market initially has many firms.
 - Price taking would result in negative profits. Why?
- Since MC is declining \rightarrow each firm has an incentive to expand production
- The industry would be characterized by a period of consolidation and rationalization involving exit and merger until the remaining firms have enough market power to raise P at least up to AC
- Depending on the extent of EOS and the nature of the competition between these price makers, the equilibrium could be either an oligopoly or a monopoly.

- In the oligopoly case, the industry ends up with neither AE nor CE.
- In the monopoly case, the industry is a natural monopoly in both a positive and a normative sense.
- While economies of scale limit the number of firms, they do not necessarily mean that there will be only one producer. Henceforth when we refer to a natural monopoly, we mean in a normative sense.

Natural monopoly and Subadditivity

- A market is a natural monopoly if costs are minimized with a single firm.
- Natural monopoly exists if, over the relevant range of output, the cost function is **subadditive**.
- The cost function is subadditive at output level q if

$$C(q) \leq \sum_{i=1}^N C(q_i)$$

where $\sum q_i = q$ and $N \geq 2$.

- any division of the output level q among N firms results in greater industry costs

Single-Product Firms and Economies of Scale

- In the case of a single-product firm
 - a sufficient condition for the cost function to be subadditive is that the technology of production is fully characterized by EOS (EOS occur if average costs decrease as output expands.)
- The existence of economies of scale over the entire relevant range of output is not necessary for subadditivity.
- Provided the desired level of output is not too much greater than the level at which EOS end, the cost function will continue to be subadditive for output greater than minimum efficient scale (MES).
- The upper bound on subadditivity will depend on the extent to which average costs decrease over the range characterized by EOS and the rate at which they increase when there are D-EOS.
- **FIGURE 3**

Single-Product Firms and Economies of Scale

- For single-product firms it is the interaction of the size of the market (demand) and the extent of EOS that determines if the market is subadditive.
- In particular, as demand grows or the extent of economies of scale diminishes, a market may cease to be a NM.
 - Airline service for some smaller cities and towns might be a natural monopoly.
 - Airline service where population (and demand) is larger clearly is not.

Exercise: *Natural Monopoly and the Size of the Market*

Multiple-Product Firms and Subadditivity

- In the multiproduct case, EOS is neither necessary nor sufficient for costs to be subadditive.
- Interdependence among the outputs is important.
- Although various ways exist for measuring these interdependencies, the concept of **economies and diseconomies of scope** is appealing intuitively.
- Economies of Scope (EOSc) means it is cheaper to produce, say, **X cars** and **Y trucks**, by a single firm than it is for single firms to produce these goods separately.
- As an example, think of peak-period and off-peak period as distinct commodities. **EOSc are clearly present**. The two commodities share the same power plant and transmission/distribution system.

Multiple-Product Firms and Subadditivity

- **Example:** The following cost function possesses EOS for output but not is subadditive. Why?

$$C(Q_1, Q_2) = Q_1 + Q_2 + (Q_1 Q_2)^{\frac{1}{3}}$$

Pricing and Natural Monopoly

- Marginal Cost Pricing: Pricing at marginal cost by a natural monopolist need not be unprofitable
 - Economies of scale will need to be exhausted
 - **FIGURE 4**
- Sustainability.
 - A feasible industry configuration consists of an output for each firm and price such that the firms at least break even and the market clears—supply equals demand.
 - A feasible industry configuration is sustainable if an entrant with access to the same technology as the incumbent(s) cannot *profitably* enter by charging lower price(s) and serve either all or a fraction of demand at its lower price(s).

Pricing and Natural Monopoly

- *Sustainability.*
 - If a monopolist charged price p_1 in the figure and demand was given by D_1 , it would earn zero profits and produce to meet demand. This price is **sustainable**, since an entrant with access to the same technology could not profitably undercut the monopolist.
 - Not the case if demand is D_2 . The lowest price a monopolist who served the entire market could charge and still break even is p_2 . Even though the monopolist produces efficiently, earns zero profits, and meets demand when it charges this price, this feasible configuration is **not sustainable**.
 - An entrant with access to the same technology could undercut the monopolist by charging a price between c^* and p_2 , but instead of meeting demand, only produces and sells q^{MES} . Such entry is necessarily inefficient since the market is NM.

Pricing and Natural Monopoly

- *Sustainability.*
 - Though the entrant and those consumers fortunate enough to be served by the entrant win, their gains are less than the increase in costs by the incumbent to supply those consumers not served by the entrant.

Natural Monopoly and Regulation

- Whether an industry is a natural monopoly depends on the interaction of demand and technology
 - If production costs are minimized when there is a single firm, there is some justification to regulate with price and entry controls
 - Restricting entry keeps competitors out of the industry, providing for the possibility that industry costs will be minimized
 - If the industry is a natural monopoly, entry by more than one firm will be inefficient
 - The imposition of entry controls needs to be complemented with the addition of price controls since the imposition of entry controls creates a monopoly
 - Price regulation is required to avoid the allocative inefficiency associated with monopoly pricing
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Natural Monopoly and Regulation

- Subadditivity means that there will be a trade off in determining the optimal governance alternative.
- The unregulated-market outcome will involve market power and cost inefficiency at the level of the industry (unless it is a positive natural monopoly).
- The regulated outcome—assuming that regulation is perfect—will be a potential Pareto improvement.
- Regulation is unlikely to be perfect since
 - the regulator will not have perfect information
 - any regulatory mechanism will not completely align the objectives of the firm and society.
- The choice of the governance instrument will be between imperfect regulation and imperfect markets.

Natural Monopoly and Regulation

- The efficiency losses associated with not regulating will depend on the extent of market power and the degree of cost inefficiency.
- The extent of market power depends on barriers to entry.
- Nat. monopoly can also arise from indivisibilities associated with capital investment that is also sunk.
- In these circumstances we would anticipate that relatively low variable costs (indicating credible aggressive pricing post-entry) and extensive economies of scale may well interact to deter or limit entry.
- If entry is in fact deterred, then a normative natural monopoly will also be a positive natural monopoly.
- Cost inefficiency arises when the unregulated equilibrium market structure is not a monopoly.

Natural Monopoly and Regulation

- The extent of cost inefficiency at the level of the industry also depends on the extent of EOS. The larger the EOS, the more likely the industry is a (positive) natural monopoly and the less likely there will be entry and failure to realize economies of scale.
- Relatively significant EOS mean that the rationale for regulation will be to control the market power of an incumbent monopolist.
 - means that regulation, not competition, may be the preferable—less costly—instrument to mitigate market power.

Does Natural Monopoly Really Demand Regulation?

The conclusion that natural monopoly creates a rationale for regulation has been challenged from three different perspectives

1. *Auctioning of a Monopoly Franchise.*

- Just because a market is a natural monopoly does not mean that regulation is required (Demsetz, 1968).
- If competition is not possible or is undesirable, as in the case of NM, replacing competition in the market with competition for the market might eliminate the necessity for regulation.
- Competition for the market can arise if the government auctioned off a monopoly franchise contract.
- The bids by firms would be the price at which they are willing to serve the market.
- The firm that **bids the lowest price** would win the monopoly franchise and be awarded a contract to serve.

Does Natural Monopoly Really Demand Regulation?

The conclusion that natural monopoly creates a rationale for regulation has been challenged from three different perspectives

1. *Auctioning of a Monopoly Franchise.*

- Suppose the franchise is for a market with a single product and that there are EOS.
- **How would firms bid?**
- **FIGURE 6**

Does Natural Monopoly Really Demand Regulation?

2. *Contestability.*

- Idea similar to that of auctioning of (short-term) monopoly contracts
- If a NM like the previous figure is contestable, regulation is not required because **hit-and-run entry** will ensure that the incumbent charges p^* , the second-best price.
- A key requirement for a market to be contestable is that there be no sunk costs of exit and absolutely free entry.
- Unfortunately, in many cases the factor responsible for natural monopoly is sunk investments in capacity

Does Natural Monopoly Really Demand Regulation?

3. *Intermodal Competition.*

- Intermodal competition might be sufficient to eliminate the need for regulation (Braeutigam, 1979, 1989).
- Consider freight transportation. Suppose that point-to-point service between two cities is provided by a railroad that is a natural monopoly.
- Regulation may not be required if competition from other modes, such as motor carriers, pipelines, air freight, and water carriers, is strong enough to substantially limit the market power of the railroad.
- In such circumstances the industry outcome might be close to the second best.

Does Natural Monopoly Really Demand Regulation?

- Even if any one of these three alternatives was in fact sufficient in a particular case to bring about the second-best outcome, there still might be a case for regulation.
- A case for regulation remains if the inefficiency associated with the second best is large relative to the first best (MC pricing) and under regulation it is possible to implement a regime under which the first best can be realized.

First Best: In the first-best allocation, the price is chosen to maximize total surplus. It is, however, a problematic outcome since it involves setting the price equal to MC (and paying a subsidy to firms so that they break even or the firm is able to practice price discrimination)

Second-Best: In this allocation, prices are chosen to maximize total surplus subject to the constraint that firms break even. The regulator or social planner chooses prices and the free-entry condition of zero profits determines the number of firms.

The Economic Theories of Regulation

- The seminal contribution made by Stigler (1971).
- Stigler observed that an economic theory of regulation should predict the following:
 - Who will receive the benefits and who will bear the burden of regulation.
 - The form and nature of regulatory intervention.
 - The effect of regulation on resource allocation.

The Economic Theories of Regulation

- Stigler's starting premise is that
 - the govt has a monopoly on the scarce resource of legal coercion (baskı)
 - demand from firms makes it valuable
 - The demand for this resource comes from firms that understand that it can be used to raise their profits in the following ways:
 - Imposing taxes on others and using the proceeds to provide subsidies to the firms.
 - Making entry illegal and otherwise raising entry barriers into an industry to reduce competition.
 - Regulating producers of substitute products and thereby restricting competition.
 - Regulating prices to eliminate price competition within an industry.

The Economic Theories of Regulation

- The political process provides incentives for the government to supply regulation.
- Politicians are willing to supply regulation in return for help in **attaining** and **maintaining** political power.
- In return for using regulation to restrict competition and deter entry,
 - firms provide politicians and political parties with what they need to win elections: **money and votes**.
- Stigler observed that this process works (even though it leads to an inefficient allocation of resources)
 - because the benefits are concentrated and significant, but the costs are small and their distribution diffuse.
- It is inefficient because the benefits to the few are less than the costs to the many.

The Economic Theories of Regulation

Stigler's analysis provides theoretical underpinnings for the notion that regulators are "captured" by the very firms they are supposed to control!

The following **FIGURE 7** shows the distributional and efficiency implications of regulation, which effectively monopolizes a perfectly competitive industry.

The Economic Theories of Regulation

- Stigler's analysis was extended by Posner (1971).
- He observes that the form and existence of regulation cannot be explained only by the hypothesis that it is demanded by industry.
- Regulation is also used by politicians to redistribute income.
- Regulatory pricing structures often involve cross-subsidies.
 - Some groups of customers pay more than the cost of providing them with service in order that other consumer classes can pay less than their cost of service. More generally, regulation is used not only by politicians to win votes by creating and distributing economic rents to firms, but it is also used to gain the support of other groups with influence, including some consumer groups and some factors of production.

Explaining Regulation Using a Principal-Agent Approach

- One view of the political process, which highlights the importance of imperfect information and transaction costs, is that there is implicitly a principal-agent relationship between **voters (the principals)** and **politicians (their agents)**.
- Voters elect politicians to act on their behalf in the formulation of
 - policy in general
 - regulatory policy and outcomes in particular.
- The threat of defeat in the next election provides a mechanism to ensure that politicians respect the preferences of the electorate.
- However, the degree to which politicians (the agents) will in fact act in the interest of their constituents (the principals) depends on three factors:

Explaining Regulation Using a Principal-Agent Approach

1. The extent to which the objectives or preferences of the principal and the agents differ.
 2. The ability of the principals to monitor the activities of the agent.
 - The incentives or effectiveness of monitoring will be reduced if it is either costly or inaccurate.
 3. The extent to which the principal can align its interests/objectives with the interests of the agent.
 - Depends on the set of available enforcement mechanisms and their effectiveness.
- If interests diverge, and enforcement and monitoring are not perfect, then agents will have some latitude (serbestlik) to pursue their interests

Explaining Regulation Using a Principal-Agent Approach

In summary;

- The economic theory of regulation assumes that regulators and politicians are self-interested utility maximizers.
- Politicians supply regulation in return for political support (campaign contributions and votes) and future employment opportunities.
- Interest groups organize to provide these in return for regulation that creates and transfers to them surplus/rents.
- The existence of **asymmetries of information and transaction costs** implies that groups with lower costs of organizing will be able to impose costs on groups with higher costs of organizing even if the result is inefficient.
 - The regulatory and political process will create rents or surplus and redistribute them among those groups who are effectively organized, while it will impose costs on, and reduce the surplus of, those that are not as well organized.