Are Markets Efficient?

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Welfare theorems in economics and Pareto efficiency

Welfare theorems

First Welfare Theorem

Under perfect competition, utility-maximizing behavior by individuals and profit-maximizing behavior by firms leads to a Pareto-efficient outcome.

Second Welfare Theorem

Any Pareto optimum can be supported as a competitive equilibrium for some initial set of endowments.

- An allocation is Pareto Optimal if there is no way to rearrange production or reallocate goods so that someone is made better off without making someone else worse off.
- When the assumptions hold, the allocation resulting from a competitive equilibrium and that of a benevolent social planner are the same.
- Often cited as a formalization of Adam Smith's "invisible hand."

Some key assumptions

- Each actor has perfect information.
- Firms and consumers are price takers (no “market power”).
- No externalities.

Limitations of Pareto efficiency

- Too stringent.
  - A re-allocation is a **Kaldor-Hicks improvement** if those that are made better off could hypothetically compensate those that are made worse off and lead to a Pareto-improving outcome.
- Ignores potential distributional concerns.
  - If one person has everything and everybody else has nothing, it is still Pareto optimal.
  - What about making one individual a little bit worse off if many get a lot better?

Market failures

Market failures

- How robust is the First Welfare theorem?
- There are plenty of reasons that the market may deviate from a (strict) Pareto optimality:
  1. Public goods.
  2. Problems of adverse selection.
  3. The tragedy of the commons.
  4. Externalities

Public goods

- A public good is a good that is:
  1. Non-rival in consumption.
  2. Non-excludable.
- Classic examples:
  - Broadcast TV and Radio.
  - Lighthouses.
  - National defense.
- Free-rider problem:
  - Individuals have an incentive to free-ride on others' contributions.
  - If everyone free-rides, the public good will not be provided.

Provisioning public goods

- Government provision:
  - Funded by taxes or government revenue.
  - Addresses the free-rider problem through coercion.
- Private-sector provision:
  - Bundling.
  - A port can bundle fees for the lighthouse with those for docking at a particular wharf. The port, as it possesses to refuse docking, can exclude shipowners from both using the wharves and the lighthouse.

Technology and public goods

- Technological innovations can make some goods excludable.
  - Example: Encrypted digital content can be restricted to paying subscribers.
  - Cable box, TV box.
- Subscription-based models can turn public goods into club goods.

The problem of asymmetric information

- In some markets, buyers and sellers have different information.
- This asymmetric information can lead to a market where only low-quality goods are sold.
- Example: The used car market (Akerlof's "Market for Lemons").

The market for lemons

- Sellers have better information about the quality of the car than buyers.
- Thus, buyers cannot distinguish between good and bad (lemon) cars.
- Buyers will only be willing to pay a price based on the average quality of cars on the market.

Adverse selection

- At the average price, sellers of good cars (on the margin) leave the market.
- So now a higher proportion of cars is a lemon, which drives the price even further down.
- This dynamic leads to the market "unraveling," where only lemons are on the market (and likely go unsold).

Potential solutions

- Signaling: Sellers of good cars use warranties, certifications, etc.
- Screening: Buyers use inspections, tests, etc., to identify good cars.
- Government intervention: Regulations, "lemon laws," etc.

Adverse selection in healthcare

- Health insurance markets face asymmetric information.
- Individuals have better information about their health risks.
- Insurers cannot perfectly distinguish high-risk and low-risk individuals.
- At a given premium, only high-risk individuals may buy insurance .. and the dynamic outlined begins.

Potential solutions for adverse selection in healthcare

- Signaling:
  - Individuals can undergo medical examinations or provide detailed health histories.
  - Helps insurers better assess individual risk profiles.
- Screening:
  - Insurers can use risk-adjustment models, predictive analytics, and data analysis.
- Government intervention:
  - Regulations mandating community rating (same premiums regardless of risk).
  - Subsidies or risk-pooling mechanisms to stabilize insurance markets.
  - Individual mandate or automatic enrollment to ensure broad participation.

The tragedy of the commons

- Concept introduced by Garrett Hardin in 1968.
- Describes a situation where individuals, acting independently and rationally according to their own self-interest, behave contrary to the broader group's long-term best interests.
- Results in the depletion or destruction of a shared resource.

Example: Common grazing land

- Shared grazing land used by multiple herders.
- Each herder has an incentive to add more animals to increase their personal gain.
- But the shared resource (grazing land) becomes overgrazed and degraded.
- Leads to the depletion of the common resource.

Other examples

- Overfishing in open-access fisheries.
- Air pollution and greenhouse gas emissions.
- Deforestation and habitat destruction.
- Overuse of public parks and recreational areas.

Causes of the tragedy of the commons

- Lack of well-defined property rights.
- Incentive to maximize personal gain at the expense of the common resource.
- Difficulty in excluding users from the resource..
- Absence of effective regulation or management..

Potential solutions

- Privatization: Establishing private property rights.
- Government regulation: Restricting access and use of the resource.
- Community-based management: Local governance and collective action.
- Market-based solutions: Tradable permits, taxes, or subsidies.

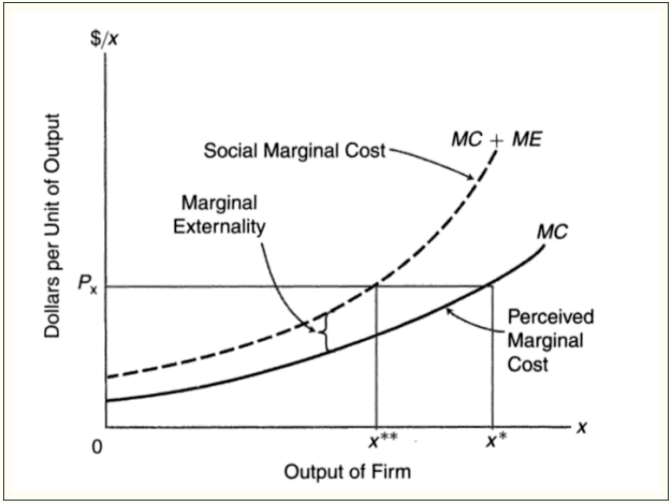
Elinor Ostrom (1933-2012)

Elinor Ostrom and the commons

- First woman to receive the Nobel Prize in economics (2009).
- Challenged the conventional view that common resources must be privatized or regulated by the government.
- Studied successful examples of community-based management of common resources.
- Identified key principles for effective governance of common-pool resources:
  - Clearly defined boundaries and membership.
  - Congruence between rules and local conditions.
  - Collective-choice arrangements.
  - Monitoring and sanctioning mechanisms.
  - Conflict resolution mechanisms.
- Demonstrated the potential for self-organization and collective action in managing common resources.

Externalities

- An externality arises when the production or consumption of a good or service imposes a cost or benefit on a third party, outside the market transaction between the producer and consumer,



Types of externalities

- Negative externality: Cost imposed on others.
  - Example: Cigarette smoking, noisy neighbors, pollution from a factory.
- Positive externality: Benefit to others.
  - Example: Education, Beautification of one's property.

Some illustrative examples

- The tragedy of the commons.
- The noisy confectioner and the doctor.
- Railroad sparks and crop fields.

Consequences of externalities

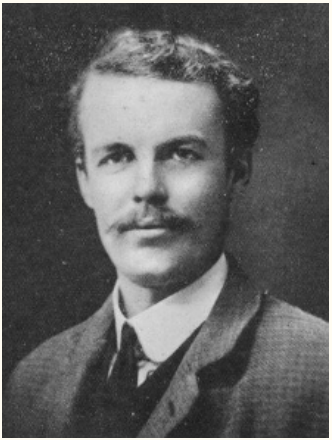
- Negative externalities lead to overproduction of harmful goods/activities.
- Positive externalities lead to underproduction of beneficial goods/activities.
- Inefficient allocation of resources.
- Market prices do not reflect the full social costs or benefits.

Addressing externalities

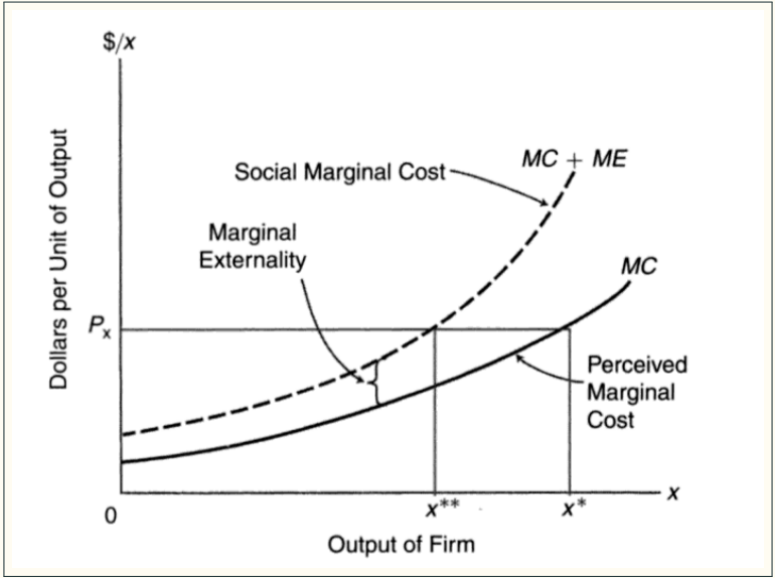
- Government intervention:
  - Taxes or subsidies (Pigouvian taxes/subsidies).
  - Regulations and standards.
- The enforcement of property rights and Coasian bargaining.

Arthur Pigou (1877-1959)

- First formulated the concept of externality in The Economics of Welfare (1920).
- Pigouvian Tax: a tax on any market activity that generates negative externalities.
  - A tax of negative externalities would induce firms to reduce the damage imposed on others.
  - Correspondingly, for a positive externality, a corrective subsidy would induce an increase in the externality-generating activity.



Pigouvian taxation



Ronald Coase and larger questions of efficiency

Ronald Coase (1910-2013)

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THE PROBLEM OF SOCIAL COST

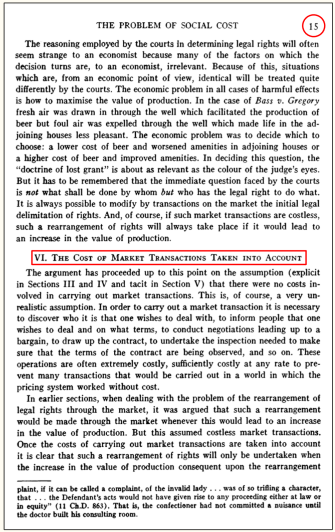
R. H. COASE
University of Virginia

Ronald Coase and "The Problem of Social Cost" (1960)

- **The Coase Theorem**: If property rights are well-defined, and if the parties involved can reach and enforce agreements at zero transactions costs, then the final outcome will be efficient regardless of the initial assignments of property rights.
- Coasean Bargaining:
  - Parties can negotiate and make side payments to internalize externalities.
  - Example: A factory that pollutes nearby residents can compensate them for the pollution.
- Implications:
  - Highlights the importance of well-defined property rights and low transaction costs.
  - Suggests private solutions to externalities may be possible.
  - Challenges the need for government intervention in some cases.

The zero transactions costs world, I

- A common interpretation of the Coase Theorem is to assume zero transactions costs, and then point out that we do not, in fact, live in such a world and conclude that the Coase theorem is wrong and/or useless.
- Coase only assumes zero transactions costs in his analysis from pages 1-15.
- But for the majority of the article (pp. 15-44), Coase considers a positive transaction costs world.



THE PROBLEM OF SOCIAL COST 15

The reasoning employed by the courts in determining legal rights will often seem strange to an economist because many of the factors on which the decision turns are, to an economist, irrelevant. Because of this, situations which are, from an economic point of view, identical will be treated quite differently by the courts. The economic problem in all cases of harmful effects is how to maximise the value of production. In the case of *Bass v. Gregory* fresh air was drawn in through the well which facilitated the production of beer but foul air was expelled through the well which made life in the adjoining houses less pleasant. The economic problem was to decide which to choose: a lower cost of beer and worsened amenities in adjoining houses or a higher cost of beer and improved amenities. In deciding this question, the "doctrine of lost grant" is about as relevant as the colour of the judge's eyes. But it has to be remembered that the immediate question faced by the courts is *not* what shall be done by whom *but* who has the legal right to do what. It is always possible to modify by transactions on the market the initial legal delimitation of rights. And, of course, if such market transactions are costless, such a rearrangement of rights will always take place if it would lead to an increase in the value of production.

VI. The Cost of Market Transactions Taken into Account

The argument has proceeded up to this point on the assumption (explicit in Sections III and IV and tacit in Section V) that there were no costs involved in carrying out market transactions. This is, of course, a very unrealistic assumption. In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on. These operations are often extremely costly, sufficiently costly at any rate to prevent many transactions that would be carried out in a world in which the pricing system worked without cost.

In earlier sections, when dealing with the problem of the rearrangement of legal rights through the market, it was argued that such a rearrangement would be made through the market whenever this would lead to an increase in the value of production. But this assumed costless market transactions. Once the costs of carrying out market transactions are taken into account it is clear that such a rearrangement of rights will only be undertaken when the increase in the value of production consequent upon the rearrangement

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plaint, if it can be called a complaint, of the invalid lady . . . was of so trifling a character, that . . . the Defendant's acts would not have given rise to any proceeding either at law or in equity" (11 Ch.D. 863). That is, the confectioner had not committed a nuisance until the doctor built his consulting room.

The zero transactions costs world, II

- In Pigou's discussion of taxes and subsidies, he assumes perfect competition implying zero transaction costs.
    - Under equilibrium in perfect competition, the full costs of a choice are fully incorporated into the price of the good or service being sold.
- Coase's analysis in a zero transaction cost world was to counter Pigou in showing that private actors would internalize the externality through negotiations.
- Therefore, there would be no need for the government to tax or subsidize any externality.

Key Point # 1

The Reciprocal Nature of the Problem

The question is commonly thought of as one in which A inflicts harm on B, and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm (1960, p. 2).

- The doctor's work would not have been disturbed if the confectioner had not worked his machinery, but the machinery would have disturbed the doctor had he not set up his consulting room in that particular room.
- Who is at "fault"?

Key Point # 2: Look at the total effect

It would seem desirable to summarize the burden of this long section. The problem which we face in dealing with actions which have harmful effects is not simply one of restraining those responsible for them. What has to be decided is whether the gain from preventing the harm is greater than the loss which would be suffered elsewhere as a result of stopping the action which produces the harm. (1960, p. 27)

Key Point # 2: The optimal is rarely zero

It is enough for my purpose to show that, from an economic point of view, a situation in which there is "uncompensated damage done to surrounding woods by sparks from railway engines" is not necessarily undesirable. Whether it is desirable or not depends on the particular circumstances. (1960, 34)

Key Point # 2: Pigou and others miss the point

The question at issue is not whether it is desirable to run an additional train or a faster train or to install smoke-preventing device; the question at issue is whether it is desirable to have a system in which the railway has to compensate those who suffer damage from the fires which it causes or one in which the railway does not have to compensate them. When an economist is comparing alternative social arrangements, the proper procedure is to compare the total social product yielded by these different arrangements. (Coase, 1960)

Efficiency

Coase and Knight on efficiency

As Frank H. Knight has so often emphasized, problems of welfare economics must ultimately dissolve into a study of aesthetics and morals. (Coase 1960, 43)

Government failures

- It is often assumed the state can solve market failures (in fact, I've done some of that today).
- But the state is not all-knowing, all-powerful. It often does not know "the answer" to market failures.
- It is also by no means obvious that the state is a benevolent, public-welfare maximizing entity.
- Do not fall victim to the "second singer" fallacy, and remember to consider the total effect.