(1) The ‘market failure’ rationale for collective action

What is ‘the state’ and why do we need it?

- Judicial, Legislative, and Executive institutions
- Authority to make decisions that are binding for all members of the polity
- Authority to use violence / coercion to enforce those decisions
- Financed through taxation (non-voluntary payments)

Question:

- (Why) do we need 'the state'?
- What can the state do that the private market cannot?

Economic perspective:

- Society composed of rational, self interested, sovereign individuals
- Pareto optimality as normative criterion

Definition: Pareto efficiency / optimality

- Situation B is a *Pareto improvement* relative to Situation A if moving from A to B makes at least one person better off without making anyone else worse off.
- In this case we say that A is *Pareto dominated* by B.
- A given situation is *Pareto optimal / Pareto efficient* if it is not Pareto dominated by any other situation. That is, the only way to make any person better off is to make at least one other person worse off.

Pareto optimality and unanimous consent

- If a situation is Pareto dominated, *unanimous agreement* on change is possible - at least *in principle*.
- If a situation is Pareto optimal, any change is opposed by at least one person.

Decentralized market exchange

- Individual property rights over private goods (ownership)
- Voluntary exchange (trade by mutual consent)
- Competitive (free to choose trading partner)
- Use of money (common medium of exchange)

Voluntary consent and information

- Each trade reveals information about individual preferences
  - If I purchase a banana for 50 cents, you know that it is worth *at least* 50 cents to me and *at most* 50 cents to the seller.
  - This crucially depends on the fact that the transaction is *voluntary*.

Model: General Equilibrium Theory

- General Equilibrium Theory is a *model* of decentralized market exchange.
- Individuals are described by *preferences* (utility functions) and *endowments* (initial allocation / status quo)
- Individuals decide *independently*: how much do I want to buy or sell given the (relative) prices of all goods?
- Perfect competition
  - All trades occur at *the same* relative prices p^*
  - The trading *partner* is irrelevant (and unspecified)
- Equilibrium
  - Prices clear markets

Properties of general equilibrium

- Since each individual is selling and buying *voluntarily*, she is made better off by participating in the market. I.e. she prefers the bundle of goods she obtains in equilibrium to her initial endowment.
- Starting from an *equilibrium* allocation, no mutually advantageous *bilateral* trades are possible. That is, no two individuals can mutually benefit by reallocating goods between them.
- In fact, no mutually advantageous *multilateral* trades are possible. That is, no group of *any size* can mutually benefit from reallocating goods among its members. (In technical terms: An equilibrium allocation is part of the 'core'.)
- The **interesting point** is that all of these properties hold even though all individuals are *independently* deciding how much they want to buy or sell.
  - No centralized decision making or even communication between individuals is required.
  - All decisions are purely voluntary, no hierarchy or coercion is involved.
  - All plans are coordinated exclusively via the impersonal price mechanism.

Efficiency of market equilibrium

- *1st Welfare Theorem:* Market equilibrium achieves a Pareto optimal allocation of private goods. (This follows from the fact that an equilibrium allocation is 'in the core' - see previous slide.)
- *2nd Welfare Theorem:* Any Pareto optimal allocation of private goods can be achieved as a market equilibrium after making appropriate 'lump sum transfers'.
  - Lump sum transfers can be interpreted as cash transfers which are not tied to any decisions that a household makes (e.g. buying or selling).
  - Taxes on income or consumption are *not* lump sum, because they depend on decisions to earn money or purchase goods.

Take-away from General Equilibrium Theory

- Selfish individuals can mutually benefit from market exchange.
- *Independent individual decisions* achieve overall efficiency.
- Implicit coordination exclusively via the *price mechanism*

  (However, the process by which prices adjust towards equilibrium is *unmodeled*.)
- No explicit coordination / joint decision making is necessary.
- Redistribution best achieved through *lump sum* transfers followed by market exchange.

Implicit assumptions underlying the Welfare Theorems

- Minimal state
  - Property rights (initial endowments) are well defined
  - Goods can be obtained only through *trade*
  - Theft is prohibited and prevented / punished
- Purely private goods
  - Goods affect only those who own / possess them
  - Each trade affects only the consenting parties
- Each individual is small (replaceable, irrelevant)
  - Anyone proposing to trade at non-equilibrium prices can be replaced by another trading partner.
  - Therefore everyone takes prices as given.
- Perfect information
  - No uncertainty as to the properties of goods being trades
  - However this can be relaxed (as long as no *asymmetric* information)

Traditional arguments for going beyond the 'minimal' state:

- Correcting market failure (to achieve Pareto optimality)
  - Public Goods / common pool resources
  - Externalities
  - Asymmetric Information
  - Market power
- Redistribution (goals beyond Pareto optimality)

Public Goods

Definition: A good is **non-rival** if one person's consumption does not reduce the amount available to others.

Definition: A good **excludable** if people can be (practically / legally) prevented from consuming it.

This gives rise to a typology of goods:

	Excludable	Not excludable
Rival	private	commons
Non-rival	club	public

Public goods are non-rival and not excludable.

A partial equilibrium model with a public good

- **Two consumers:** Mr. 1 and Mr. 2
- **Private good (dollars):** m_i (specific to Mr. i)
- **Public good (defense):** G (same for both i)
- **Cost of public good:** one unit costs c dollars
- **'Quasilinear' Preferences:**

$$u_i(m_i, G) = m_i + \phi_i(G),$$

  Assume: $\phi_i' > 0$, $\phi_i'' < 0$
- **Endowments:** Consumer i has ω_i dollars to start
- **Simplifying assumption:** We allow $m_i < 0$

Definition: An **allocation** is a level of public good provision G and an amount of money m_i for each consumer. An allocation is **feasible** if

$$m_1 + m_2 \leq \omega_1 + \omega_2 - c \cdot G$$

Definition: A feasible allocation (G, m_1, m_2) is **Pareto efficient** if there is no other feasible allocation $(\tilde{G}, \tilde{m}_1, \tilde{m}_2)$ such that

$$u_i(\tilde{m}_i, \tilde{G}) > u_i(m_i, G) \text{ for at least one } i \text{ and}$$
$$u_i(\tilde{m}_i, \tilde{G}) \geq u_i(m_i, G) \text{ for both } i$$

FACT:
In this 'quasilinear' model, an allocation is Pareto efficient *if and only if* the level of public good provision G maximizes "**Marshallian aggregate surplus (MAS)**"

$$S(G) = \phi_1(G) + \phi_2(G) - c \cdot G$$

Proof

- Suppose we confiscate the endowments and purchase *some* amount G.
- Then we have $\omega_1 + \omega_2 - cG$ units of money left over.
- If we divide this money in any way between Mr. 1 and Mr. 2, the resulting sum of their utilities is

$$\phi_1(G) + \phi_2(G) + (\omega_1 + \omega_2 - c \cdot G) = \omega_1 + \omega_2 + S(G)$$

- If G does not maximize this sum, we can choose a different G and achieve a larger sum of utilities. Then money can be reallocated such that *both* consumers achieve a higher level of utility.
- If G does maximize the surplus, then we cannot achieve a larger sum of utilities, and therefore any increase in one consumer's utility must go along with a decrease in the other's.

Pareto efficient allocation:

Any Pareto efficient allocation involves a level of G that maximizes MAS:

$$\max_{G \geq 0} \ \phi_1(G) + \phi_2(G) - c \cdot G$$

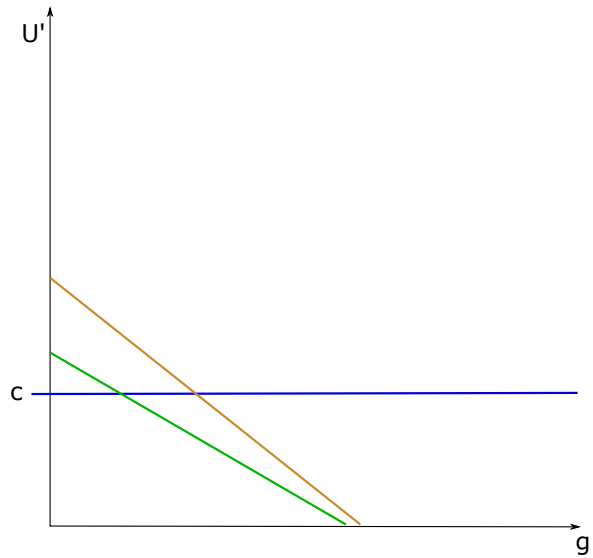
A Pareto efficient level of the public good is therefore characterized by

$$\phi_1'(G^o) + \phi_2'(G^o) \leq c \ (= \text{ if } G^o > 0)$$

This is the *Samuelson condition*. The marginal cost of producing a public good should be equal to the *sum* of consumers' marginal utilities (i.e. the *sum* of everyone's willingness to pay for another unit).

Graphical example

- Let MU's be linear decreasing functions
- Suppose $\phi_2'(G) > \phi_1'(G)$ for all G
- Suppose $\phi_i'(0) > c$



EXERCISE (now):

- Complete the figure by labeling the functions
- Identify the Pareto optimal quantity G^o

Voluntary provision with independent decision making

- Suppose G is sold in a free market, at price $p = c$.
- What happens if Mr. 1 and Mr. 2 purchase G *individually and independently*?
- Let x_i = amount purchased by Mr. i.
- Then the total amount provided is

$$G = x_1 + x_2$$

- Following standard practice, we look for an *equilibrium* allocation:
  - Each consumer purchases an amount that is *individually optimal* taking the amount that the other individual purchases as *given*.
  - Thus, the decisions are *independent* in the sense that the consumers do not decide 'together'.
  - However they are still *interdependent* in the sense that they are mutually best responding to one another.

Voluntary provision with independent decision making

- Suppose Mr. 1 anticipates that Mr. 2 will purchase x_2^* units.
- If Mr. 1 is *best responding*, his choice x_1^* must solve

$$\max_{x_1 \geq 0} \phi_1(x_1 + x_2^*) + \omega_1 - px_1$$

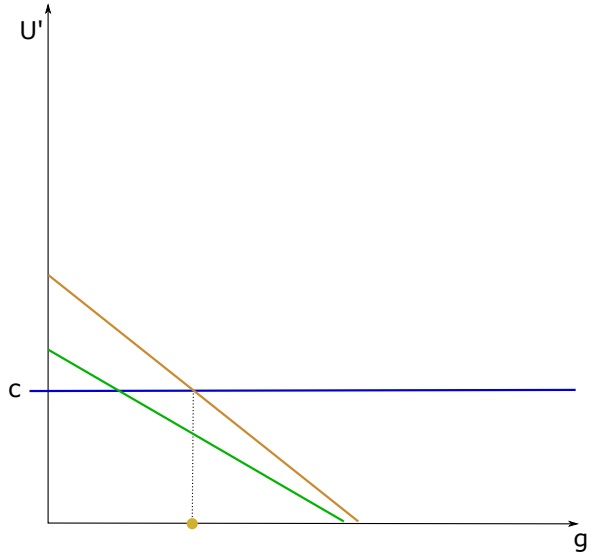
Exercise: Write the first order condition characterizing the solution to this problem.

Answer:

$$\phi'(x_1^* + x_2^*) \leq p \ (= \text{if } x_1^* > 0$$

- In words:
  - If Mr. 1 purchases a positive amount in equilibrium, his marginal utility *given the entire amount* provided by both consumers must be exactly equal to the price.
  - If he does not provide a positive amount, his marginal utility must be *at most* equal to the price.

Graphical example



- What aggregate amount $G^* = x_1^* + x_2^*$ is provided in an *equilibrium*?
- Anyone purchasing $x_i^* > 0$ must value an extra unit at exactly c dollars. This can't be true for *both* consumers in our example. So only one can purchase $x_i^* > 0$.
- For the other consumer, we must have $\phi_i'(G^*) < c$.
- It follows that only the person with the highest (marginal) valuation can provide a positive amount in equilibrium. (Mr. 2 in our case.)

Note

- Naturally, we can construct cases where no-one contributes (if $\phi_i'(0) \leq c$ for all i).
- We can also construct cases where two or more people contribute (if $\phi_i'(G^*) = \phi_j'(G^*)$ for i and j contributing).

Efficiency?

Since $\phi_2'(G^*) = c$ and $\phi_1'(G^*) > 0$,

$$\phi_1'(G^*) + \phi_2'(G^*) > c$$

Let's compare this to the *Samuelson condition*:

$$\phi_1'(G^o) + \phi_2'(G^o) = c$$

Note: The left hand side is *decreasing* in G. Therefore, these equations imply that

$$G^* < G^o.$$

Conclusion

- Individually, no single consumer is willing to provide another unit.
- As a group, they would be willing to purchase more *if costs were shared*.
- In this sense,
  'too little' of the public good will be provided *when individuals decide independently*.

Diagnosis: "Market failure"

- If decisions are coordinated only via the price mechanism, the amount provided will reflect only the marginal valuation of those who provide a positive amount.
- The result is an inefficient under-provision of public goods relative to the Pareto optimal benchmark.

Traditional conclusion: Need for government intervention

- **Centralized decision making** on behalf of the group
- **Coercion** instead of voluntary action
- **Taxation** instead of payment in exchange

'First best' policy

- Government purchases G^o (satisfying Samuelson condition)
- Uses *lump sum* taxes (confiscation of endowments) to pay

Externalities

Definition: An **externality** is present whenever the well-being of a consumer or the production possibilities of a firm are *directly* impacted by the actions of another agent.

- This definition excludes effects that operate through the price mechanism ('pecuniary externalities')
- A public good constitutes a special case of externalities, where all members of a group directly benefit when an individual provides some amount.
- We will illustrate the concept using another **quasilinear model**.

Example: Monica and Bill share an office. Bill likes to smoke cigars, which Monica hates. We denote Bill's cigar consumption by x_B.

- Bill's utility is given by
$$u_B(x_B, m_B) = m_B + \ln(x_B)$$

- Monica's utility is given by
$$u_M(x_M, x_B, m_M) = m_M - \alpha x_B$$

- Cigars are sold at a price equal to marginal cost $p^* = c$.
- Monica is endowed with ω_M of the numeraire, Bill has ω_B.
- There is no endowment of cigars.

Pareto efficient allocation:

The Pareto efficient level of cigar consumption x_B^o maximizes *aggregate surplus*:

$$\max_{x_B \geq 0} \ln(x_B) - \alpha x_B - c x_B$$

(For the same reason as we discussed in the context of a public good.)

$$\Rightarrow \quad \frac{1}{x_B^o} = c + \alpha$$

Competitive equilibrium (independent decision making)

In a competitive market, prices reflect marginal costs of production:

$$p^* = c$$

Given p^*, Bill chooses x_B to maximize his utility:

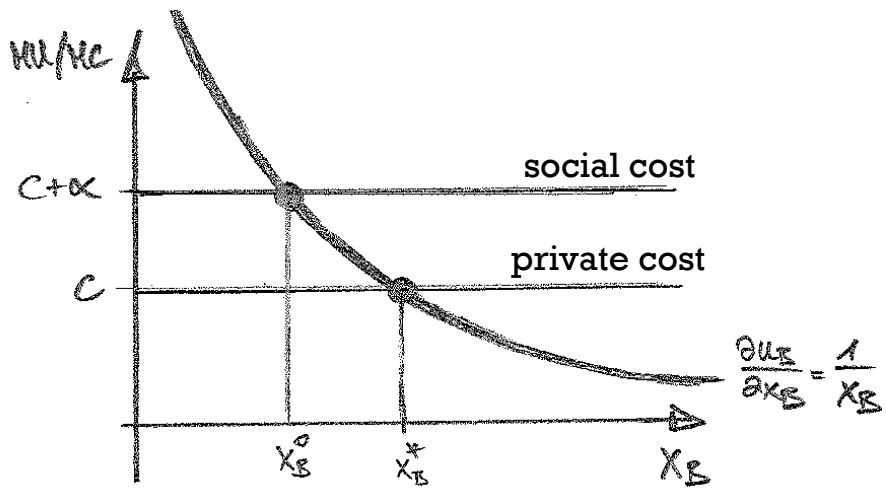
$$\max_{x_B \geq 0} \ln(x_B) + (w_B - p^* x_B)$$

$$\Rightarrow \quad \frac{1}{x_B^*} = p^* = c$$

Summary: We have seen that the Pareto efficient and Equilibrium levels of cigar consumption are characterized by *different* conditions:

$$\frac{1}{x_B^o} = c + \alpha$$
$$\frac{1}{x_B^*} = p^* = c$$

Implication: The competitive equilibrium level of cigar consumption *exceeds* the Pareto efficient level:



Traditional government solutions to the externality problem:

- Direct regulation
  - Quantity control: Restrict cigar production / purchases to equal x_B^o
  - Price control: Regulate prices to equal $c + \alpha$
- Pigouvian taxes / subsidies
  - Impose a tax equal to the marginal harm $t = \alpha$
  - Then the post-tax price becomes $q = p^* + \alpha = c + \alpha$
  - Bill's first order condition then becomes

$$\frac{1}{x_B^*(t)} = q = c + \alpha$$

    and so he chooses the efficient quantity.
  - *In addition*, the government collects revenue ('double dividend')
- Both solutions provide a possible justification for government intervention
  - Centralized decision making
  - Use of coercion (forcing compliance with regulation, payment of taxes)

Criticisms of the Pigouvian approach

(1) Benevolence

- Government is (implicitly) modeled like a benevolent dictator.
- In reality, taxes and subsidies are set by voters, politicians, and government agents, each pursuing private interests.
- What tax would you set if you were allowed to keep the revenue collected?

(2) Knowledge

- Government must know the magnitude of the social costs (α in our case)
- Benefit or harm that an activity imposes on others is necessarily subjective and private. (This point is emphasized, among others, by F.A. Hayek - see supplementary reading.)
- What would happen if we simply *asked* Monica about α, and then imposed a tax corresponding to her answer?

Criticisms of the Pigouvian approach

Pigou was aware of both of these problems.

"We cannot expect that any public authority will attain, or will even wholeheartedly seek, that ideal. Such authorities are liable alike to ignorance, to sectional pressure and to personal corruption by private interest. A loud-voice part of their constituents, if organized for votes, may easily outweigh the whole." (Pigou 1920)

Similar points apply to public goods and Samuelson condition.

"However no decentralized pricing system can serve to determine optimally these levels of collective consumption. Other kinds of 'voting' or 'signalling' would have to be tried. But (...) now it is in the selfish interest of each person to give false signals, to pretend to have less interest in a given collective consumption activity than he really has, etc." (Samuelson 1954)

Criticisms of the Pigouvian approach

(3) Solutions based on *voluntary agreements* are not fully considered

- Given that a Pareto improvement relative to the 'equilibrium' outcome is possible, why don't the parties simply agree to change the outcome?
- The 'standard model' of decentralized exchange simply *assumes* that such agreements do not occur (individuals are *assumed* to decide independently).

"Coase Theorem"

- If private contracts can be negotiated and enforced at no cost, purely voluntary agreements will always produce an efficient outcome.
- It follows that *inefficient* outcomes can arise only in contexts where it is difficult (costly) to negotiate and / or to enforce voluntary agreements.
- Ronald Coase (1960) called these impediments to efficiency 'transaction costs'.

In our example:

- Suppose Bill has the right to smoke cigars in his office.
- How might we model a *private negotiation* between the two individuals?
- One particularly simple way would be to assume that Monica can make a take-it-or-leave it offer of the form (T, x_B), where
  - T is an amount that she will transfer to Bill, and
  - x_B is a level of cigar consumption that he may engage in.
- If Bill acccepts, the agreement is binding (enforced at no cost).
- If Bill rejects, he is free to choose independently (and thus consumes x_B^*).
- What is the best take-it-or-leave-it offer that Monica can make?

Monica's best offer

- Participation constraint: In order for Bill to accept Monica's offer, he must be at least as well off as by consuming x_B^*.

$$\ln(x_B) - cx_B + T \geq \ln(x_B^*) - cx_B^*$$

- Thus, Monica chooses (T, x_B) to solve

$$\begin{aligned} \max_{(T,x_B)} \quad & w_m - T - \alpha x_B \\ s.t. \quad & \ln(x_B) - cx_B + T \geq \ln(x_B^*) - cx_B^* \end{aligned}$$

- The participation constraint must hold with equality. (Why?)
- Thus, Monica chooses x_B to solve

$$\max_{x_B} \; w_m - \Big((\ln(x_B^*) - cx_B^*) - (\ln(x_B) - cx_B) \Big) - \alpha x_B$$

- The first order condition characterizing Monica's optimal offer is given by

$$\frac{1}{x_B} = c + \alpha$$

... which is exactly the same as the Pareto efficient solution.

The same basic point applies to Public Goods as well

EXERCISE: (You may do this graphically)

- Return to our example with Mr. 1 and Mr. 2
- Start at the equilibrium outcome (only Mr. 2 buys a positive amount).
- Suppose Mr. 1 offers to pay Mr. 2 an amount T in return for providing the Pareto optimal amount (rather than x_2^*)
- Show graphically how much he is *willing* to pay for the additional units.
- Show graphically how much he must pay for Mr. 2 to *agree* to provide them.
- Argue graphically that this is the best offer that Mr. 1 can make.

Interpretation

- In the presence of externalities and public goods, *independent decisions* (coordinated only through the price mechanism) produce inefficient outcomes.
- Interested parties can still *agree* on a solution involving coordination of actions
- This solution requires
  - Negotiation of terms specifying coordinated actions
  - Enforcement of the agreements

The fundamental point:

- *Any* type of "market failure" implies that there is a potential for *mutual agreement* on alternative arrangements.
- If the individuals are rational, why would they not come to such an agreement?
- The 'standard' (Pigouvian) approach to market failure does not explain why market failure occurs in the first place!
- The *Coasian* approach suggests that market failure would not occur if all transactions were costless!

What causes transactions costs?

- The terms of a potential contract are not predetermined by market prices.
- Instead, parties must *negotiate* and agree to these terms.
  - Involves bargaining and joint decision making.
  - Private agreements require *unanimous* consent.
- Following this, contracts must be *enforced*.
  - Monitoring to verify that people are fulfilling their obligations.
  - Punishment of violations

"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 (...) undertake inspection (...) These operations are often extremely costly, sufficiently costly (...) to prevent many transactions that would be carried out in a world in which the pricing system worked without costs."

Transactions costs and group size

- As the number of interested parties grows, private agreements become more and more difficult to organize.
  - Private contracts are only binding if *all* those who will change their behavior agree.
  - Monitoring and enforcement become more difficult.
  - For these reasons, transactions costs are likely to increase with the number of people affected.
- *Even if transactions costs were zero*, individuals may have an incentive not to participate in a deal!
  (This interesting point is emphasized by Mancur Olson (2000).)
  - Everyone hopes that *others* will provide public goods.
- $\Rightarrow$ Free riding and negative externalities are likely to increase with group size.
- In large groups, efficient solutions may require
  - Collective agreement *without* unanimous consent
  - Formal enforcement and *coercion* to ensure compliance

Summary

- Given externalities and public goods, independent decision making may produce inefficient allocations ("market failure").
- The alleged inefficiency of private market outcomes is a common justification for government intervention.
- Pigouvian policies (taxes / subsidies) can be used to align private and social benefits and costs, such that independent decision making produces an efficient outcome.
- "Optimal" government intervention would require a benevolent and omniscient government.
- Private negotiations and voluntary contracting may produce efficient allocations without government intervention.
- However, this is unlikely to work in large groups because of large transaction and enforcement costs, as well as individual incentives to free ride on others' arrangements.

Implications and outlook

- Traditional Welfare economics assumed (or recommended) that 'the government' should 'fix' market failures and implement efficient outcomes
  - Maximization of 'Social Welfare' as a (descriptive?) model of government.
  - No theory of how governments are actually established and run by individuals.
  - No mention of political institutions and their effects.
  - No explanation as to how government can overcome transactions costs.
- Public Choice theorists are looking for a more coherent individualistic perspective on government.
  - Government as an alternative ('non-market') means to organize **mutually beneficial exchanges** (i.e. to deal with transactions costs).
  - But also: Government as a potential instrument for securing **individual gains at others' expense** (corruption, redistribution to special interests, etc.)
- Many Public Choice Theorists are especially interested in *democratic* government
  - (How) can the members of a community make decisions as a group?
  - What are the effects of different types of decision rules?
  - (Under what conditions) will collective decisions produce efficient outcomes?
  - (How) can the choices made using such rules be justified?

Literature

(* = required, !=highly recommended)

(*) MUELLER, Part I (Chapters 2 and 3)

(!) COASE, R. H. 1960. "The Problem of Social Cost," *Journal of Law and Economics*.

(!) OLSON, M. 2000. *Power and Prosperity: Outgrowing Communist and Capitalist Dictatorships.* Chapter 3.

SAMUELSON, P. 1954 "The pure theory of public expenditure," *Journal of Economics and Statistics*.

PIGOU, A. 1932. *The Economics of Welfare*

BUCHANAN, J. 1962. "Politics, Policy, and the Pigovian Margins," *Economica*.

HAYEK, F.A. 1945. "The use of knowledge in society," *American Economic Review*.

YANDLE, B. 2010. "Much ado about Pigou," *Regulation*.