

LECTURE 7 NOTES

These notes elaborate upon the slides for the first-half of lecture 7. Although there is no required reading from the text for first-half of lecture 7, you will notice that it draws upon some material that was within your required reading. Also, other material is drawn from non-required parts of text.

I. Role of Government: Introduction

Government is a necessary component of any society. It has certain unique powers, but broadly, its aim is to preserve and improve the well-being of the members of society. There are at least three roles we can consider. It can enhance efficiency, enhance equity or fairness and make and enforce laws.

II. Role of Government: Efficiency

By enhancing efficiency it can assist or supplement the role of private markets when such markets fail to bring about an efficient allocation of resources. Another way to say this is that it can enhance efficiency if it can bring about increases in economic surplus.

Recall that private markets use price as a means to ration and allocate resources. When we say price can be used to ration, we mean that the level of price will determine how much of a good is bought and sold. That is, if the price is too low, there will be excess demand; this is removed as a market reaches equilibrium at a higher price. Those whose reservation price or willingness to pay is below this price, are excluded, cannot buy the good. Furthermore, given nonzero marginal cost of production, again price is used to determine how to allocate resources. Recall the example of the aerobics and hair salon services industry; as price rose in one market and fell in another, resources were attracted to the market where price rose and vice versa.

However, there may be situations when market price cannot serve these functions.

One is when there are **externalities**, in which case decision makers are not internalizing true social costs and benefits and therefore the private market equilibrium P does not determine the socially optimum Q . Solutions to this problem, recall, are private bargaining, government intervention and laws. *Private bargaining* requires that the Coase Theorem hold (zero transactions costs and well-defined property rights). And, how are property rights well-defined? This requires government enforcement of laws and institutions over property rights. *Government intervention* can be in many forms; we shall consider taxes (also called charges or fees), standards (also called quotas or “command & control”) and permits.

Another case when price cannot serve its usual functions is that of **public goods**. The good in question is to a high degree both non-rival and non-excludable. In this case, price cannot be used either to ration or allocate resources. Use of the good cannot be excluded by payment (the good is non-excludable). Another way to think of non-excludability is to say that, effectively, the price is equal to zero. Also, for a public good, the marginal cost of providing extra units is zero (the good is non-rival). Another way to look at non-rivalry is to say that if price were set equal to marginal cost, price would be optimally set equal to zero. Public goods can be financed by the private sector or by government. Donations or contracting are methods that involve the private sector. Donations require goodwill voluntary contributions by members of society. Private contracting requires that to some degree those who benefit pay for the good or service. Although, collectively, society may have a WTP for a public good, individually they have an incentive not to reveal true willingness to pay (the free rider problem). Hence, a vote on taxes levied on individuals for the purpose of financing a public good or service may fail to pass, so that the public good does not get provided. Here, it is important to recognize that the type of tax system proposed can influence the outcome.

Another example when private market price does not bring about the socially optimal outcome is the case of monopoly. When the monopoly arises due to declining AC, it is efficient to have one firm (a monopoly) in

that one firm producing many units does so at lower per unit cost. Recall, we call the situation when monopoly arises due to economies of scale a ***natural monopoly***. However, as a monopoly, it will produce less than the social optimum, which is the level of output where price equals marginal cost. When costs are everywhere declining, MC is always below AC, so producing output where $P=MC$ means losses since $P < AC$. So, here, although in some sense society benefits from having one firm (since there are lower unit costs), output could be higher and price lower. Recall that a monopoly produces output where $MR=MC$ so that $P > MC$. So, policy makers may regulate the natural monopoly and require that it set $P=AC$. Here, output is closer to social optimum and price just covers unit cost. Problems are that a firm has an incentive to inflate costs. A solution to the latter problem is so called incentive regulation. Incentive regulation stipulates a price for some fixed time horizon, based on cost estimates. Then a natural monopoly that can lower costs can pocket the difference and share surpluses with its customers and, likewise, if costs go up, it must absorb the losses. In the case of incentive regulation, the problem due to the incentive to inflate costs is reduced.

III. Role of Government: Equity

While efficiency is concerned with increasing the size of society's pie, equity is concerned with issues related to the sharing of that pie. Every society struggles with the optimal mix of efficiency and equity in its decision making. On the one hand, if the goal remains increasing the pie, then there is more to share. When, the focus is solely on the increasing the size of the pie then resources are best allocated to their most efficient uses and this may require that those with greatest ability or at best a few receive high rewards for their unique or hard effort. Such a reward system inevitably leads to inequality. However, on moral and other grounds, it may be in society's interest to be concerned with the well being of those not so fortunate in their endowments of skill, intelligence or access to resources. For one thing, disregard for such members can result in other social costs which society ultimately must bear. For instance, extreme inequity in income can lead to increased crime. Making education available to all more easily can lead to a society whose members are better

equipped to make good choices and to contribute to increasing the size of the pie; the opposite may happen if educational opportunity is available to a select few. We cannot in this course go much into philosophical and moral dimensions of this important issue. We can only recognize that most reasonable individuals probably would agree that it is in society's interest to assist those who are less fortunate in their endowments.

Philosopher John Rawls argued that one way to conclude that the goal of income equality was optimal is to perform a thought experiment under the "veil of ignorance". It works roughly as follows. In order to decide what is the optimal distribution of income, each member of society is asked to suppose he did not know at time $t=1$ what would be his endowment of skill and ability and therefore income at time $t=2$. Then, under such "ignorance" what would he choose to be the optimal distribution at $t=2$ if his decision had to be made at $t=1$. Most people would say equal distribution, since they would not wish to take the chance of being the one at the low end of the income distribution in case it was chosen to be an unequal income distribution and they landed up with a low endowment.

Recently, in the context of discussion on whether to eliminate the tax on inherited wealth, Bill Gates Sr. (father of Microsoft's Bill Gates) has argued against repeal of this tax. This tax is popularly known as the "death tax", especially by opponents, since it can be considered a tax on dying since the wealth of the deceased that is passed on to benefactors (those who inherit) is taxed only upon his death. Gates Sr. argues that it is optimal to have a non-zero death tax because this is the way for the wealthy to pay back society for the benefits received. That is, he says, the wealthy were able to become wealthy due to the public services and goods used. Examples are highways for transport of goods and services of a seller, financial markets that function well due to regulatory oversight, and so on. Furthermore, he argues that since the dawn of civilization, those societies that have ignored extreme inequality in the distribution of wealth have been doomed to failure due to social unrest and revolt. Eliminating the inheritance tax would only serve to make the distribution of wealth unequal since with each successive generation wealth would be concentrated in the hands of a few. He gives other reasons against repeal

of the tax in his co-authored monograph, *Wealth and our Commonwealth* (2003).

Certainly, the US as a society, despite all the popular talk of it being a haven of free-market capitalism, has recognized the need for redistribution. However, its redistributive policies are constantly under review as legislators evaluate whether it serves society's interests at a given time, in light of incentives for work and budgetary limitations.

IV. Examples of Enhancing Efficiency & Equity

Public Good

By providing a public good for which willingness to pay exceeds cost, social surplus is increased. As the example on financing the residential security guard illustrates, from lecture 6 and restated in lecture 7 slides, the method of taxation may prevent provision of the public good if a sufficient number of individuals vote against the proposal.

Pollution Externality: Private Bargain

The example is based on a text problem involving two neighbors Barton (B) and Statler (S). B is a striving to be concert pianist and practices on his Grand piano at home. His neighbor S who lives in the apartment below is a striving poet for whom the sound of the piano is a nuisance. Hence B's piano use causes a negative externality with extra social cost. The only way to eliminate the pollution is to install soundproof walls in B's apartment. B gains by living in his apartment and has higher surplus if he does not have to incur the cost of soundproofing. S gains by living in his apartment and has higher surplus if there is no piano noise.

When B has the right to pollute, S has to consider whether to bribe B not to pollute. Given payoffs, S does not have an incentive to bribe B since the gain 40 is less than the necessary bribe of 50. The outcome is pollution and social surplus of 230. B has 150 and S has 80.

When S has right to zero pollution, B has to consider whether to bribe S. S has an incentive to bribe since gain is 50 and necessary bribe is 40. B makes the side payment of 40 to S. S then has $80+40=120$. And, B

has $150 - 40 = 110$, which is more than if had to soundproof. Again surplus is $120 + 110 = 230$.

What you need to see is that with well-defined property rights, no matter who has the rights, with zero transaction costs, social optimum can be achieved via a bargain (and side payment).

Pollution Externality: Government Intervention

We consider here a standard, tax or permit to bring about a chosen level of pollution.

There are two polluting firms Sludge Oil (SO) and Northwest Lumber (NL). Each can adopt increasingly costly technologies. The more costly the technology, the cleaner it is. However, each has differential cost structures. The marginal cost of abatement (reducing pollution units) differs for each. MC abatement for first unit is 100 for SO and 20 for NL. It is less costly for NL to reduce the first unit of pollution than SO. Etc.

Under no regulation, it is optimal to use the cheapest and pollute the most 4 units each for a total 8 units.

Now, suppose regulators have decided that 4 units pollution are tolerable (given health impacts etc).

With a standard or quota of 2 units pollution each, SO incurs marginal abatement cost 500 and NL incurs 80. Marginal abatement cost under standard is 580. It is not the least cost way to get 4 units pollution.

With a charge or tax of \$101 per unit pollution, it is optimal for the first unit of reduction to be done by the firm with lowest abatement cost. That is NL with $MC = 20$. Next unit also done by NL with $MC = 60$. Next unit has $MC = 100$ for both SO and NL. NL reduces one more unit and SO reduces one unit. In all, SO reduces 1 unit, and NL 3 units. In this way, each firm acting individually will make this very same choice. It will only be optimal for SO to reduce 1 unit, since 2nd unit has $MC = 400$. It will only be optimal for NL to reduce 3 units, since 4th unit has $MC = 220$. MC abatement is in the end 100 (from SO) plus 180 (from NL) which equals 280. This is the lowest cost method to get 4 units pollution.

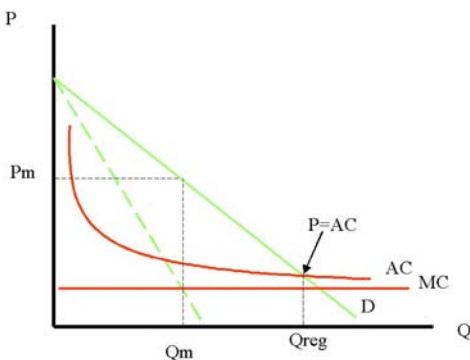
If the government auctions 4 permits, with each permit allowing 1 unit pollution, again we get the least cost outcome without the information problems associated with determining the optimal tax. With the auction of

permits, each firm weighs its own MC abatement and decides on what to bid. The right to pollute the first unit is worth 1000 to SO. If the govt offers the permit at anything up to 1000, SO will buy. Like this we see that only when the govt sets price per permit at 101, SO buys 3 and NL buys 1. At prices lower than 101, too many permits are bought; price are raised until only 4 are bought. Again, at price per permit equal to 101, SO pollutes 3 units and NL pollutes 1 unit. This results in the same lowest MC abatement as with tax.

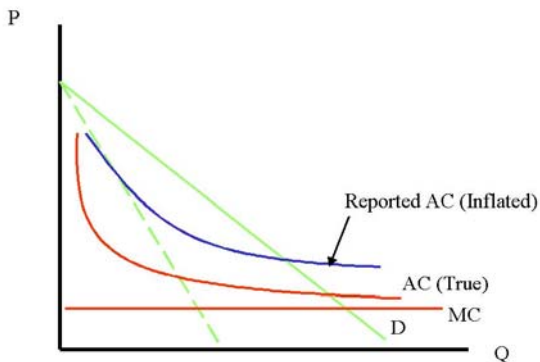
However, with permits we get the least cost outcome without the information problems associated with determining the optimal tax. In the slides, we try a tax of \$40 first. More than 4 units pollution results. A regulator faces this problem of not knowing what level of tax is exactly going to get the desired level of pollution. This problem does not occur with auction of permits. Such a trial and error process is costly and takes time.

Natural Monopoly: Cost-Plus or $P=AC$ regulation

Here a diagram serves to summarize the idea. A natural monopoly is regulated to charge $P=AC$ and supplies more output than at the monopolist's profit maximizing optimum. Alternatively, the government could require that output be at the level where $P=MC$. In that case the government would give the firm a subsidy up to the level of AC so that it breaks even.



However, under such $P=AC$ regulation, the monopolist has an incentive to lie about AC.



Government Income Redistribution Programs

We will not be able to consider these in detail.

Minimum wage, we know, is a policy whose aim is to provide a reasonable wage to the poor. But, under such a policy a surplus results and not all who want a job at that wage can get one.

The AFDC program aimed at giving assistance to families with dependent children. In many states a family with an able-bodied male at home was ineligible for aid. The program was later deemed to encourage fathers to leave their family so that the single parent family could get aid. The program was later modified to try to remove this perverse incentive, with the Personal Responsibility Act of 1996.

Food stamps and others means tested programs can distort the incentive to work. Means tested implies that the benefit falls as income increases. So, it can happen that it is a rational decision no to work when these programs are in place. In this way there is a perverse incentive not to join the labor force. To the extent that fewer people in the labor force serves to reduce output growth, this is harmful for the economy.

The Earned Income Tax Credit is a program that aims to assist the poor without creating perverse incentives. With these credits, a poor household can get a tax break when income from work is below a threshold. It does not suffer from creating the incentive not to work. And, unlike the minimum wage, does not create the incentive to lay off low wage workers; firms can pay a low wage and workers get benefits in the form of a tax break, effectively increasing money that goes into their pocket.