Lecture 10 – Land use externalities (continued)

Lars Nesheim

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1 Introduction

In the previous lecture, we discussed some of the many land use externalities that arise in urban economies. We discussed some policies that can be used to improve the efficiency of the economy including taxes or subsidies, tradeable permits, and regulation. We discussed two specific examples, fire hazards and the land assembly problem.

We then discussed an alternative way of thinking about externalities based on ideas stemming from the Coase Theorem. Under the conditions of the theorem (1. Property rights are well defined; 2. Bargaining costs are small (zero); and 3. Private agreements or contracts can be enforced), then no further policies are required to address efficiency issues. Private bargaining will lead to efficient outcomes. Further, it is possible to allocate property rights so that the costs and benefits from externality causing activities are distributed in a desirable fashion.

We discussed several reasons why the conditions of the Coase Theorem might fail to hold (It is costly to define property rights for complex goods. Bargaining costs can be large when a large number of people are involved or when there is asymmetric information. It may be difficult to enforce agreements if it is too costly to observe people's actions.). Finally, we developed an example, in which the role of bargaining costs, the payoffs to the firm, and the payoffs to the neighbours determine whether an agreement can be reached.

In this lecture, we will develop an example that highlights the role of asymmetric information and develops a policy mechanism to address one particular problem arising when there is asymmetric information. Asymmetric information can prevent efficient policies from being implemented. In such cases, policies that induce people to reveal (give people incentives to reveal) their private information can improve efficiency.

2 Asymmetric information: Choice of location for airport

Consider the followin problem. Within a large urban (or metropolitan) area, there are N possible locations for an airport. Think of each location as an independent community within the larger metropolitan area. All communities favour building an airport somewhere because it provides public benefits to the metropolitan area. However, none of the communities wants the airport to be located within its own border. The airport is extremely noisy and produces air pollution.

The government wants to put the airport in the lowest cost location (i.e. the location that causes the least harm). Assume the benefits from the airport are the same regardless of the location. No community wants the airport, but it is more harmful to some than to others. Being rational economic agents, everyone has an amount of money they would accept as compensation for taking the airport in their community.

Each community has a community official who negotiates with the government. Let v_i be the amount that community i would accept. That is, if community i were paid v_i pounds they would accept the airport. The total harm to community i from accepting the airport is less than or equal to v_i.

How can the government find the lowest cost location and minimize the amount paid?

The problem is, the government does not know the distribution of the v_i variables. Each community knows its own value of v_i. The government does not. If it did it could simply build the airport in the location with the lowest cost. This is the asymmetric information problem.

The government could ask people to reveal their values. But, why would they tell the truth? If I represent community i and my true value is v_i, wouldn't it be better to tell the government that my value is $2v_i$ or $10v_i$ or $100v_i$? How can the government induce communities to reveal their true values of v_i?

Here is one mechanism.

1. Second price auction.
   (a) Each community is required to provide a bid b_i revealing how much they desire to be paid if they accept the airport.
   (b) The government selects the location with the lowest bid and pays that location an amount equal to the second lowest bid. If the two lowest bids are equal, the government selects the winner at random.
   (c) We will say that if community i is the lowest bidder it wins the auction. If it is not the lowest bidder, it loses the auction.
   (d) Incentives facing each community.
      i. Consider community i. Let b_{-i} be the lowest bid of all other

communities. If community i bids b_i then its payoff is

$$\left\{ \begin{array}{ll} b_{-i} - v_i & \text{if } b_i < b_{-i} \\ 0 & \text{if } b_i > b_{-i} \\ \text{either } 0 \text{ or } b_{-i} - v_i, \text{ each with probability } \frac{1}{2} & \text{if } b_i = b_{-i} \end{array} \right\}.$$

ii. If community i loses the auction, its payoff is zero.

iii. If community i wins, its payoff will be positive if $b_{-i} > v_i$, negative if $b_{-i} < v_i$, or zero.

iv. Community i will never make a bid b_i such that $b_i < v_i$. Why? If it does bid $b_i < v_i$, there are three possible types of outcomes. If $b_{-i} < b_i < v_i$, the community loses and obtains a payoff of zero. If $b_i \leq b_{-i} < v_i$, the community wins the auction (with probability of one half if $b_i = b_{-i}$) and earns a payoff of $b_{-i} - v_i < 0$. If $b_i < v_i \leq b_{-i}$, the community wins the auction and obtains $b_{-i} - v_i \geq 0$. The second type of event, $b_i \leq b_{-i} < v_i$, is a bad event from community $i's$ perspective. It can reduce the probability of this event to zero by increasing b_i so that $b_i \geq v_i$. As long as $b_i \leq v_i$ increasing b_i reduces the probability of obtaining a negative payoff without affecting the probability of a positive payoff. Thus, community i has an incentive to increase b_i so that $b_i \geq v_i$. Also, changing b_i only affects the probability of winning. It does not affect the payoff if they win.

v. However, community i also has an incentive to not bid $b_i > v_i$. If $b_i > v_i$, there is a positive probability that $b_i > b_{-i} \geq v_i$. In this event, community i obtains a payoff of zero but could have obtained $b_{-i} - v_i \geq 0$ by bidding $b_i \leq b_{-i}$. By bidding $b_i - v_i$, they give up a chance of earning the non-negative profit $b_{-i} - v_i$. They can reduce the probability of this event to zero by decreasing b_i until $b_i \leq v_i$. Reducing b_i only affects the probablity of winning. It does not affect the payoff if they win.

vi. Combining the previous two ideas, it is optimal for community i to choose $b_i = v_i$.

vii. As long as, $b_i > v_i$, lowering b_i increases the probability of winning a positive payoff without lowering the amount of the payoff.

viii. Suppose $v_i = 10$ and suppose b_{-i} is uniformly distributed between 8 and 18. Suppose you bid $b_i = 12$. Then you have a 60% chance of winning at least $12 - 10$ if $b_{-i} > 12$. You have a 40% chance of losing. However, if you lower your bid to 10, you still have a 60% chance of winning at least 2, but now you have a 20% chance of winning something between 0 and 2 and a 20% chance of not winning. By reducing bid to v_i you have maximized your expected payoff.

ix. The auction gives the communities incentive to reveal their true values since lowering bid does not affect realized payoff but does

increase probability of positive payoff. Positive incentive to bid lower.

2. Summary of second price auction.

   (a) Monetary incentive to bid true value.

   (b) Compensation is crucial. Much political opposition to undesirable facilities stems from the fact that most projects offer too little compensation to "winners".

   (c) Collusion causes problems for this scheme. If communities collude, they might all agree to bid $v_i + £1,000,000$. This will still result in the project being placed in the low cost location, but not at minimum cost.

   (d) This type of mechanism can be used for any facility such as an airport, a landfill, an incinerator, a prison, or a cell phone tower. It can be used for any public facility that causes harm.

   (e) A similar auction can be used for a public facility that causes positive externalities. In this case, each community bids b_i and must pay the government the maximum of the other bidders bids.

   (f) Paying compensation has some efficiency implications for investment. Suppose community i is the low cost community. The true social cost of the project is the cost of building the facility plus the cost to community i. If the government must pay the true social cost for the investment, then it should only make the investment if the social benefit is at least as big as the social cost. Paying compensation ensures that the government uses the correct social cost to evaluate the project. In contrast, if compensation is not paid, then it is likely that the government will invest in projects where the social cost is higher than the social benefit.

3 Alternatives to 2nd price auction

The 2nd price auction might not be feasible if the number of people is large or if it is costly to manage the auction. Consider the example above again. If there are 10 communities, it might be inexpensive for the central government to design such an auction to decide in which community to build the airport. However, there may still be a problem of how to decide where within the community chosen to build the airport and how much to compensate each person within the community. In fact, within the community there is a combination of an asymmetric information problem and a land assembly problem. Suppose there are 100,000 residents in the community. Not only does the community government not know the private costs and benefits for each, but it may be that building the airport requires the local government to purchase and redevelop 20,000 homes. Moreover, these 20,000 homes need to be contiguously located.

Finally, building the airport will also have negative spillovers on those residents who don't sell their homes.

In such a case, how can the government decide which 20,000 homes to buy, induce people to sell, and manage the external effects of the airport on those who don't sell?

One answer is compulsory purchase (in Britain) or forced sales under the law of "eminent domain" (in the US) combined with regulation and or taxation of the airport and investments in public goods to in part compensate for the harm caused by the airport.

In the next section, we discuss the legal environment surrounding compulsory purchase in the UK and "eminent domain" in the US. We also discuss how this is related to the legal environment related to land use regulation. While it may seem that these are distinct, the distinction is not so clear. If I purchase a property, I pay a price to the current owner and in return gain "ownership rights." What is meant by ownership rights? These ownership rights are not absolute but generally allow me to enjoy the use of the property subject to limits on how I use the property. The limits on use are regulations imposed by the government in the form of planning law (in the UK), zoning law (in the US), environmental laws, and health and safety laws. If my property is located in a residential area, generally I am prohibited from converting it into a large scale power plant and using it to produce electricity from burning coal. If my property is in a protected green belt, I may be restricted from developing it into residential property. If the property currently consists of a 3 story house, I may be prohibited from converting it into a high-rise apartment building.

So ownership rights are restricted by government regulations that (in theory) are aimed at some public benefit. The distinction between compulsory purchase and regulation become murky when we consider changes in government regulation. If regulations change to become extremely rigid so that they impose stringent limits on my rights to use a property, they will in general reduce the value of my property. In the extreme, tightening of land use regulation is tantamount to compulsory purchase. For example, suppose a government passes a law requiring all residential homes on a certain street be demolished and converted to park land with open access to all but with no change in nominal ownership. Such a regulation is equivalent to compulsory purchase in all but name. When is a change in regulation equivalent to a compulsory purchase or in US terminology, when is a change in regulation equivalent to a "taking". When does a change in regulation require compensation? On the flip side, when should property owners pay for changes in regulation that reduce restrictions on land use? One policy proposal that has been discussed in the UK is the proposal to require owners of rural land pay to have development rights granted.

4 Issues related to the legal environment

1. Regulation vs taking.

(a) In Britain, a change in land use regulation that is judged to be in the public interest generally does not require compensation. However, “acquiring authorities" may compulsorily purchase land to carry out a function which Parliament has decided is in the public interest. Anyone who has land “acquired" is generally entitled to compensation.

   i. Local councils
   ii. Highways Agency
   iii. Government Departments
   iv. Regional Development Agencies, English Partnerships, Urban Development Corporations
   v. major utilities such as water or electric companies.

(b) Process

   i. Department makes order
      A. Report on public benefits, identify properties to be purchased, people to be affected.
      B. Detailed process for each step
      C. Publicise order and notify affected parties.
   ii. Objections
      A. Request minor amendments to project to reduce negative impact.
      B. Location chosen is not best location.
      C. Purchase does not serve legitimate public purpose
   iii. Negotiations and Inquiry
      A. Present evidence and witnesses
   iv. Confirmation of Order
   v. Appeal
   vi. Compensation either through negotiation or through a Lands Tribunal.

(c) In the US, local governments have “police power” to regulate land use without compensation. Regulations restrict the property rights of individuals. These restrictions reduce the property value of the land. The government is not required to compensate individuals for this dimunition in value.

(d) However, if the government “takes” land it must provide “just” compensation.

(e) The legal question is, what distinguishes “regulation” from “taking”. Both restrict the property rights of land owners. Both reduce the value of land. Regulation does not require compensation. Taking does.

2. When is compensation not required?

   (a) There are a body of laws and court decisions which collectively define circumstances under which compensation is required. The law states that compensation is not required when a regulation benefits "public health, safety, morals or general welfare." Compensation is also not required if a restriction (or regulation) prevents public harm or nuisance. Such a regulation must use reasonable means to achieve the public benefit or prevent the public harm and the impact of the regulation must not fall disproportionately on any individuals. Under these general circumstances a land use regulation does not require compensation. A large number of legal cases arise from disputes as to whether these conditions are met.

   (b) Examples.

      i. Police regulations can force motorists to stop at traffic lights without providing compensation for lost time.

         A. Should governments provide compensation for lost time due to this restriction?

         B. Regulations also force airline passengers to go through security checks. Such regulations "take" passengers time. Should passengers be compensated? Should these regulations only focus on a particular group of people? If the regulations focus on a particular group, should this group be compensated?

      ii. Police can require people to reduce noise at a party or a concert. The noise is deemed to be a public nuisance.

      iii. Police can force owners of historic dwellings to invest money to maintain the structures.

      iv. Police can force landowners not to build on a beautiful beachfront land if new construction obstructs the views of others.

      v. Suppose initially a cement plant exists at location A and no houses exist at location A. Then some people move into location A and build houses. Should the cement plant be forced to shut down at location A? Before the new houses were built, the cement plant was not a nuisance. After the houses are built, it is a nuisance and causes damage to the health of residents at location A.

3. The legal system defines general (not always entirely consistent) circumstances when compensation is required.

   (a) A regulation or policy that involves the "physical invasion of property" is a taking and requires compensation.

   (b) A regulation that causes "significant dimunition of value" and/or restricts "all reasonable, beneficial use" is a taking and requires compensation.

(c) A regulation whose costs outweigh its benefits, requires compensation.

(d) The interpretation of these conditions varies across legal jurisdictions, across legal cases, and across time.

5 An example: Kelo vs City of New London

1. The case of Kelo v. City of New London, was decided by the US Supreme Court in 2005.

2. In the case, the City of New London used the power of eminent domain to transfer land from one private owner to another to further economic development. In much of the US case law, it had been established that eminent domain could be used to enable a public authority to purchase property for a public benefit. However, in the New London case, New London, Connecticut condemned privately owned real property to use it for a comprehensive redevelopment plan involving a private redevelopment authority. The legal question was, can the forced transfer of land from one group of private owners to another be legitimised as being in the public interest? The economic question, is does such a forced transfer improve economic efficiency? It is potentially a mechanism to overcome the land assembly problem.

3. In the case, the Court ruled 5-4 that the general benefits a community enjoyed from economic growth qualified such redevelopment plans as a permissible "public use". The Court found that if an economic project creates new jobs, increases tax and other city revenues, and revitalizes a depressed (even if not blighted) urban area, it qualifies as a public use.

   (a) Note, this court ruling also provides job opportunities for economists as consultants. Economic experts are required to provide and/or assess evidence as to whether the project creates new jobs, increases tax or other city revenues, or revitalizes a depresses urban area.

4. In the New London case, the City argued that its tax base and population were decreasing. It was desperate for economic development. A major pharmaceutical company, Pfizer, began construction of a major new research facility on the outskirts of the Fort Trumbull neighborhood. The development plan (the project) called for construction of a resort hotel and conference center, a new state park, 80–100 new residences, and various research, office, and retail space. The City approved the plan in 2000.

5. The neighborhood in question, Fort Trumbull, consisted of 90 acres (364,000 m^2) and 115 residential and commercial lots. The development corporation offered to purchase all 115 lots. 15 refused to sell. The City ordered a forced sale (a compulsory purchase).

6. The Supreme Court ruled:
   (a) "A court confronted with a plausible accusation of impermissible favoritism to private parties should [conduct]....a careful and extensive inquiry into 'whether, in fact, the development plan:
      i. is of primary benefit to . . . the developer..., and private businesses which may eventually locate in the plan area...and in that regard, only of incidental benefit to the city..."
   (b) The court should consider evidence on:
      i. awareness of...depressed economic condition and evidence corroborating the validity of this concern...,
      ii. evidence that [government] reviewed a variety of development plans...
      iii. government chose a private developer from a group of applicants rather than picking out a particular transferee beforehand and...
7. Dissent was based on
   (a) Public benefit not proven "a costly urban-renewal project whose stated purpose is a vague promise of new jobs and increased tax revenue, but which is also suspiciously agreeable to the Pfizer Corporation, is for a 'public use.'"
   (b) Cost fall disproportionately on small group
   (c) Court made no attempt to:
      i. Consider whether there was in fact a holdout problem.
      ii. Assess the net effect of the development plan on economic welfare
8. Further negotiations between the city and the residents
   (a) Most of 15 agreed to sell.
   (b) The City agreed to move Kelo's house.
   (c) 4/6 residences remain, 2 moved within the complex
   (d) City gains ownership, charges rent.
9. Other cases
   (a) On May 23, 2006, the city council of Hercules, California voted unanimously to use the right of eminent domain to seize 17 acres owned by Walmart corporation. At a hearing preceding the decision, many dozens of residents spoke against Walmart, complaining that the box stores economically depress an area by driving small shops bankrupt, and moving profits out of the local economy. The council applied the reasoning in the Kelo decision to pre-emptively prevent Walmart from depressing the city's economy.
   (b) Later, state courts over-ruled the city.
   (c) Walmart abandoned plans to build.

6 Political issues

1. Why zoning? Why land use controls? Why planning laws?
   (a) Externality.
      i. Two people live next two each other, one is a dry cleaner, one is a residential house. Market outcome without regulation could result in too much air pollution produced by dry cleaner or too little. Public policy might like to avoid this outcome perhaps by keeping the two separated or by regulating one of the two.
      ii. Public benefit from architectural or other character of a neighbourhood. Public benefit from protecting and preserving such character.
   (b) Economic justification: Conditions of Coase theorem are not met and government intervention leads to more efficient outcome and/or "better" distribution of wealth.
   (c) Legal justification for zoning laws in the US: "Promote public health, safety, and welfare".
   (d) Generous political use of legal language can lead to the use of these laws for other purposes.
   (e) In SF, in the 1880's, zoning restrictions were instituted in part to keep Chinese population separate from white population. At that time, there were restrictions on where Chinese population could work. Many worked in laundries. The law restricted laundries to certain locations. Purported reason to keep laundries out of residential areas and prevent public health and safety problems.
   (f) In NY 1916, many low wage women were working in the garment district and numbers were increasing. High street retailers feared these low wage workers would damage business and proposed legislation to limit building sizes and heights and hence garment factories. They claimed this was to prevent a public "nuisance" caused by tall buildings (shadows, blocked light, disruption of view). The new legislation helped reduce the "nuisance" but also helped high street retailers at the expense of consumers, garment production firms, and low wage workers.
   (g) Simple model of a city with a fixed number of residents and a fixed number of vacant lots.
      i. Owners of developed land benefit from increasing stringency of land use controls on undeveloped land.
         A. See Figure 1 at the end of these notes.
         B. The variable x measures the degree of stringency of the landuse controls. The variable ranges from 0 (no restrictions on landuse) to 1 (complete restrictions on landuse).

C. Aggregate marginal benefits (MB, the falling curve in the graph) fall as regulations become more stringent. Suppose there are 10 owners of developed land and increasing the stringency increases their property value, but at a diminishing rate.

D. Aggregate marginal costs (MC, the rising curve) rise. Suppose there is one developer. Increasing the stringency of regulations reduces the value of undeveloped land at an increasing rate.

E. The marginal benefits accruing to existing residents/landowners are positive and declining.

F. The marginal costs inflicted on the developer are positive and rising.

G. Suppose the residents and one developer vote on controls: Landowners prefer $x = 1$, developer prefers $x = 0$. Why? If they vote on whether to have $x = 1$ or $x = 0$, then the political equilibrium is $x = 1$.

H. An efficient outcome would be an intermediate value of x where $MC = MB$.

I. There is room for bargain to be made. If the residents and the developer could bargain, they would reduce x from 1 toward efficiency.

J. If $x = 1$, developer would be willing to pay residents to ease restrictions.

K. If $x = 0$, company owned town, residents would be willing to pay developer to cut back on development.

L. If it is costly to bargain, because the residents and the developer can't agree on how to split the surplus or because there is asymmetric information such that each person knows his own cost and benefit but no one knows anyone elses costs and benefits, then an efficient bargain will not be struck.