Public Finance II.

Lecture VI - **Cost-Benefit Analysis**

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Readings:

- Gruber, J. (2005). Public finance and public policy. Macmillan.
- Congdon, W. J., Kling, J. R., & Mullainathan, S. (2011). Policy and choice: Public finance through the lens of behavioral economics. Brookings Institution Press.
- Sunstein, C. R. (2020). Behavioral science and public policy. Cambridge University Press.

Cost-Benefit analysis

- The discussion in previous lecture relied on the theoretical concepts of the marginal social benefit and the cost of public goods.
- For a government making decisions about how much of a public good to provide, however, these theoretical concepts must be translated into hard numbers. To accomplish this translation, the government uses cost-benefit analysis to compare the costs and benefits of public goods projects to decide if they should be undertaken.
- In principle, cost-benefit analyses are accounting exercises, a way of adding up the benefits and costs of a project and then comparing them. In practice, however, cost-benefit analyses are rich economic exercises that bring to bear the microeconomic reasoning and a host of interesting empirical evidence.
- This richness is clearly illustrated by the example of building new transportation systems. Carrying out the cost-benefit analysis in this case required answering hard questions such as: How do we value the time savings to commuters? How do we value the costs of noise and reduced visibility? How do we value the benefits of increased safety? And how do we deal with the fact that many of these costs and benefits accrue not today but far into the future?

Measuring the Costs of Public Projects

- Suppose that you are working for your state government, running the highway department. Your state turnpike is in poor shape, with large potholes and crumbling shoulders that slow down traffic and pose an accident risk. You have been charged by the governor with the task of considering whether the state should invest in repairing this road.

TABLE 8-1

Cost-Benefit Analysis of Highway Construction Project

		Quantity	Price / Value	Total
Costs	Asphalt	1 million bags		
	Labor	1 million hours		
	Maintenance	$10 million/year		
			First-year cost:	
			Total cost over time:	
Benefits	Driving time saved	500,000 hours/year		
	Lives saved	5 lives/year		
			First-year benefit:	
			Total benefit over time:	
			Benefit over time minus cost over time:	

Measuring Current Costs

- The first goal of the cost-benefit analysis is to measure the cost of this public good. It seems an easy task: add up what the government pays for all the inputs just listed to obtain the cost. This method represents the **cash-flow accounting** approach to costs that is used by accountants.

- This does not, however, correspond to the theoretical concept of social marginal cost to determine the optimal level of public goods. The social marginal cost of any resource (e.g., the asphalt, labor, and future maintenance costs) is its **opportunity cost**: the value of that input in its next best use. Thus, the cost to society of employing any input is determined not by its cash costs, but by the next best use to which society could put that input.

- Consider first the asphalt. The next best use for a bag of asphalt, besides using it on this project, is to sell the bag to someone else. The value of this alternative use is the market price of the bag, so in this case the opportunity cost is the input's price.

- This is the first lesson about opportunity costs: if a good is sold in a perfectly competitive market, then the opportunity cost is equal to the price. If the price of a bag of asphalt is $100, the asphalt costs for the project will be $100 million; if in a competitive equilibrium, price equals marginal social cost.

Measuring Current Costs

- If the labor market is perfectly competitive, then the same argument applies to the labor costs of the project. In this case, the value of an hour of labor used on this project is the market wage—that is, what that labor is worth in its next best alternative use. If the market wage for construction workers is $10 per hour, then the opportunity cost of the labor for the project is $10 million.
- Suppose, however, that for some reason there is unemployment among construction workers—perhaps state law mandates a minimum wage of $20 for construction workers.
- If $20 is above the equilibrium wage in the construction sector, there will be some workers who would happily work at the prevailing $20 per hour wage but who cannot find jobs at that wage.
- Because they value leisure, the unemployed workers do get some utility from their unemployment. Suppose that an hour of leisure is worth $10 to construction workers on average; that is, at a wage below $10, the typical construction worker would rather stay home than work.
- What is the opportunity cost of the time of any unemployed workers you bring onto the job? Their alternative activity is not working; an activity that is valued by the workers at $10 per hour.
- Thus, the opportunity cost for unemployed construction workers is only $10 per hour, not $20 per hour. If half of the million man-hours that are required for this job come from workers who are unemployed, then the opportunity cost of hiring 1 million worker hours is $20 x 500,000 + $10 x 500,000 = $15 million, even though the government is actually paying out $20 million in cash.

Measuring Current Costs

- The cash cost to the government for labor consists of two components:
    - **the opportunity cost** of the resource (labor)
    - plus the **transfer of rents**, which are payments to the resource deliverer (the worker) beyond those required to obtain the resource.
- The opportunity cost of one hour of labor is only $10 per hour for the unemployed workers, since they would be willing to work for that wage. Thus, by paying them $20 per hour, we are transferring an extra $10 per hour to them. This is not a cost to society; it is simply a transfer from one party (the government) to another (unemployed construction workers).
- So, of the $20 million paid by the government, $5 million is a transfer of rents from government to unemployed workers ($10 x 500,000), and is not counted as a true economic cost of the project (despite being a cash accounting cost). Economic costs are only those costs associated with diverting the resource from its next best use, any other costs are transfers.
- Similarly, suppose that the asphalt was sold to the government not by a perfectly competitive firm but by a monopoly, which charges a price that is above its marginal cost. In this case, the resource cost of the asphalt is the marginal cost of producing it—the cost of the asphalt in terms of what else could have been done with these resources. The difference between the price paid for the bag of asphalt and the marginal cost of its production is simply a transfer of rents from the government to the monopoly asphalt maker.

Measuring Future Costs

- The last cost is maintenance, which involves both materials and labor. The analysis for those materials and labor is the same as we have pursued thus far. But there is a new wrinkle as well, because we need to combine a future stream of costs (maintenance) with the one-time costs associated with construction.

- To do this, we compare the **present discounted value** (PDV). A dollar tomorrow is worth less than a dollar today because I could put the dollar in a bank today, earn interest, and have more money tomorrow. So a dollar today is worth (1 + r) times as much as a dollar tomorrow, where **r** is the **interest rate.** As a result, future maintenance costs must be discounted to compare them to today's construction costs.

- While applying present discounted value involves simple algebra, there are some important economic issues involved in choosing the right social discount rate to use for these calculations.

Measuring Future Costs

- If a private firm were making an investment decision, the proper discount rate should represent the opportunity cost of what else the firm could accomplish with those same funds. If there is an existing investment that yields 10% per year with certainty, and the firm pays a tax rate of 50%, then this investment would net the firm a return of 5% per year.
- The opportunity cost of spending money on any new project, then, is the 5% net return that the firm could earn on the existing investment. Thus, 5% is the rate that should be used to discount the payments associated with any new project.
- The government should also base its discount rate on the private-sector opportunity cost. The next best use for any money by the government is its use in the hands of the private sector. Thus, if a private firm could earn a 10% return on their money, then the government counts that full 10% as its opportunity cost.
- Unlike the private actor, the government does not count solely the after-tax portion of the investment return as its opportunity cost, since the government is the party collecting the taxes.
- Thus, the social cost of removing the money from the private sector is 10%: the 5% after-tax return to the firm and the 5% in tax revenues to the government.This is the opportunity cost of devoting the funds to the government's project, so 10% should be used as a discount rate.
- Using a discount rate of 7%, the $10 million future stream of maintenance costs has a present discounted value of $143 million ($10 million/0.07 $143 million). Thus, the total costs of the project in today's dollars are $100 million for asphalt, $15 million for labor, and $143 million for maintenance, for a total of $258 million.

Measuring the Costs of Public Projects

- The cost of the asphalt for this project is dictated by the market price for asphalt, $100 per bag. The cost of labor depends not on the wage but on the full opportunity cost of the labor, which incorporates the current unemployment of any workers who will be used on the project. The cost of future maintenance is the present discounted value of these projected expenditures.

TABLE 8-2

Cost-Benefit Analysis of Highway Construction Project

		Quantity	Price / Value	Total
Costs	Asphalt	1 million bags	$100/bag	$100 million
	Labor	1 million hours	½ at $20/hour and ½ at $10/hour	$15 million
	Maintenance	$10 million/year	7% discount rate	$143 million
			First-year cost:	**$115 million**
			Total cost over time (7% discount rate):	**$258 million**
Benefits	Driving time saved	500,000 hours/year		
	Lives saved	5 lives/year		
			First-year benefit:	
			Total benefit over time:	
			Benefit over time minus cost over time:	

Measuring the Benefits of Public Projects

- Measuring the benefits associated with this project is more difficult than measuring the costs because it is more difficult to use market values to place a value on the benefits.

- The first benefit associated with this project is that both producers and consumers will save travel time. For producers, we can value the time savings in a straightforward manner. The benefits to producers arise from a reduction in the cost of supplying goods, because it takes less time to transport them. The decreased costs lead to an increase in supply (a rightward shift in the supply curve), which raises the total size of social surplus. This increase in social surplus is the benefit to society from the lower cost of producing goods.

- It is much trickier to measure the benefits of time saved for consumers: How do we value the benefits of being able to get from point to point more quickly? What we need is some measure of society's valuation of individuals' time: What is it worth to me to have to spend fewer minutes in the car?

- Economists have several approaches to answering this question. None are fully satisfactory, but by putting them together we can draw some general conclusions about the value of time.

Measuring the Benefits of Public Projects

- **Using Market-Based Measures to Value Time: Wages**
  - Suppose we can show that the time that individuals save from driving faster is spent at work. Suppose, moreover, that there is a perfectly competitive labor market that allows individuals to earn their hourly wage for each additional hour spent at work.
  - Under these assumptions, we would use drivers' wages to value their time savings. Opportunity cost is the value in the next best alternative use, and the next best alternative use in this example is being at work.The value of time at work in a perfectly competitive labor market is the wage rate that could be earned during that hour.
  - What if the time savings is spent partly at work, and partly in leisure? Once again, if we are in a perfectly competitive labor market in which individuals can freely choose how many hours they want to work, then the wage is the right measure even if the time is spent on leisure.
  - This is because, in a competitive model, individuals set the value of their next hour of leisure time equal to their wage. If the marginal utility of leisure time was above the wage, individuals would work less and take more leisure (driving down the marginal utility of leisure by consuming more leisure).
  - If the marginal utility of leisure time was below the wage, individuals would work more and take less leisure (driving up the marginal utility of leisure by consuming less leisure). Thus, in a perfectly competitive labor market with freely adjusting hours, the value of time is always the wage, even if the time is spent on leisure activities

Measuring the Benefits of Public Projects

- As you might expect, this theoretical proposition runs into some problems in practice:

    - Individuals can't freely trade off leisure and hours of work; jobs may come with hours restrictions. Suppose I'd like to work more than 40 hours per week at my current wage, but my employer will not let me because that would involve paying me a higher overtime wage. In this case, my value of leisure could be below my wage, but I can't drive them to equality by working longer hours. So the wage **overstates** the value to me of saving time.

    - There may be nonmonetary aspects of the job. For example, in the summertime, my office at work is air conditioned, while my home is not. This means that I value time at work at more than the wage; I also value the fact that it is more comfortable. Thus, my total compensation at work is higher than my wage. The value of leisure is set equal to total compensation from work, not just the wage, so the wage **understates** the value to me of saving time.

- These problems limit the value of the wage as a value of time, leading economists to consider a variety of other approaches to time valuation, e.g.:

    - Using Survey-Based Measures to Value Time: Contingent Valuation

    - Using Revealed Preference to Value Time

Measuring the Benefits of Public Projects

- **Using Survey-Based Measures to Value Time: Contingent Valuation**
  - One option to figure out the value of time is to simply ask individuals what time is worth to them, e.g. "How much would you pay to save five minutes on your drive?". This approach is labeled by economists as contingent valuation: asking individuals to value an option they are not now choosing (or that is not yet available to them). The advantage of contingent valuation is that, in some circumstances, it is the only feasible method for valuing a public good
  - However, the problems with contingent valuation, are daunting:
    - **Isolation of issues matters**. When asked only one question on how much they'd be willing to pay to improve visibility at the Grand Canyon, respondents gave answers five times higher than when that question was placed third in a list with other questions.
    - **Order of issues matters.** When asked how much they'd pay to save seals and whales (in that order), seals were worth $142 and whales $195. When the order was reversed, whales (first) were now worth $172 and seals only $85.
    - **The "embedding effect" matters**. Asked to value preservation from logging of one, two, and three wilderness areas, respondents gave roughly the same values for all three scenarios, suggesting that the value reported was not for the task specified but for the general value of preserving wilderness. Similarly, respondents placed roughly equal value on saving 2,000, 20,000, and 200,000 birds.

Measuring the Benefits of Public Projects

- **Using Revealed Preference to Value Time**
  - The natural way for noneconomists to value time is to ask individuals what their time is worth, but this approach runs into the previously noted problems. The natural way for economists to value time is instead to use revealed preference: let the actions of individuals reveal their valuation. The mantra of economics is: people may lie, but their actions, which result from utility maximization, don't!
  - Suppose we compare two identical houses, one of which is five minutes closer to the central city where most commuters work. If individuals are willing to pay more for the closer home, this implies that they value the time savings. We can therefore use the difference in sales prices between the two homes to assign a value to saving five minutes of commuting. This comparison provides a market-based valuation of their time that truthfully reveals the pref- erences of individuals.
  - While appealing in theory, this approach also runs into problems in practice. This example works if the two homes are identical. But what if the house that is closer to the city is also nicer? Then we would find that it sells for a lot more, and falsely assume that this implies that individuals value their time very highly.The problem is that the price of any good values the entire set of attributes of that good, but for revealed preference analysis we are only concerned with one particular attribute (in this case, distance to the city). Because other attributes of the good differ, it is difficult to use revealed preference to distill the value of a particular attribute of the good, such as location.
  - The ideal way to value time would be a controlled experiment, where we varied just the attribute of the good that we are trying to value: in this example, we could take the same house and move it five minutes closer to the city. This is clearly not possible in many cases.

Measuring the Benefits of Public Projects

- Returning to our highway example, the other major benefit of improving the turnpike is that repairing the road will improve safety and save lives. Valuing human lives is the single most difficult issue in cost-benefit analysis. Many would say that human life is priceless, that we should pay any amount of money to save a life. By this argument, valuing life is a reprehensible activity; there is no way to put a value on such a precious commodity.

- This argument does not recognize that there are many possible uses for the limited government budget, each of which could save some lives. By stating that life should not be valued, we leave ourselves helpless when facing choices of different programs, each of which could save lives.

- By this logic, we would have to finance any government program that could save lives, at the expense of, say, education or housing expenditures. Alternatively, we could claim that virtually any government expenditure has some odds of saving a life; by improving education, for example, we may reduce crime, which will save victims' lives. To escape the impotence that would be imposed by the "life is priceless" argument, one needs to be able to place some value on a human life.

Measuring the Benefits of Public Projects

- **Using Wages to Value a Life**
  - As with valuing time, the market-based approach to valuing lives is to use wages: life's value is the present discounted value of the lifetime stream of earnings. While this seems like a logical approach, it faces a number of problems. One major problem is that using wages to value life doesn't value any time that isn't spent working. This approach also faces the same problem as using wages to value time, which is that the market wage may not accurately reflect the value of leisure time. Moreover, life may mean more than just wages earned or corresponding leisure. For example, an individual may internalize the enjoyment derived by others from her being alive.
- **Contingent Valuation**
  - The second approach to valuing a life uses contingent valuation. One way to do this is to ask individuals what their lives are worth. This is obviously a difficult question to answer. Thus, a more common approach is to ask about the valuation of things that change the probability of dying. The problems of contingent valuation will clearly haunt this analysis as well, however.
- **Revealed Preference**
  - As with valuing time savings, the method preferred by economists for valuing life is to use revealed preferences. For example, we can value life by estimating how much individuals are willing to pay for something that reduces their odds of dying. Alternatively, we can value life by estimating how much individuals must be paid to take risky jobs that raise their chance of dying. This approach, however, makes very strong information assumptions.

Measuring the Benefits of Public Projects

- **Government Revealed Preference:** Another approach to valuing lives is not to rely on how individuals value their lives but to focus instead on existing government programs and what they spend to save lives. However, the government is simply inconsistent, and does not apply the same standards in some arenas as it does in others.

TABLE 8-3

Costs Per Life Saved of Various Regulations

Regulation concerning . . .	Year	Agency	Cost Per Life Saved (millions of 2009 $)
Childproof lighters	1993	CPSC	$0.121
Food labeling	1993	FDA	0.5
Reflective devices for heavy trucks	1999	NHTSA	1.1
Children's sleepwear flammability	1973	CPSC	2.6
Rear/up/shoulder seatbelts in cars	1989	NHTSA	5.3
Asbestos	1972	OSHA	6.7
VALUE OF STATISTICAL LIFE			**8.7**
Benzene	1987	OSHA	26.3
Asbestos ban	1989	EPA	93.1
Cattle feed	1979	FDA	203.0
Solid waste disposal facilities	1991	EPA	119.4

Discounting Future Benefits

- A particularly thorny issue for cost-benefit analysis is that many projects have costs that are mostly immediate and benefits that are mostly long-term. An excellent example of this would be efforts to combat global warming through reducing the use of carbon-intensive products (via a tax on the carbon content of goods, for example). The costs of such efforts would be felt in the near term, as consumers have to pay more for goods (such as gasoline) whose consumption worsens global warming. The benefits of such efforts would be felt in the very distant future, however, as the global temperature in 100 years would be lower with such government intervention than it would be without any such intervention.

- These types of examples are problematic for two reasons. First, the choice of discount rate will matter enormously for benefits that are far in the future. Second, long-lived projects provide benefits not only to the generation that pays the costs but to future generations as well. Should we treat benefits to future generations differently than benefits to current generations? Some would argue that we should just weight the benefits to the current generation, who are paying the costs. But what if the current generation cares about its children? Then we should incorporate the children as well.

Cost-Effectiveness Analysis

- Despite the list of clever approaches to valuing the benefits of public projects, in some cases society may be unable (or unwilling) to do so.
- This does not imply that the techniques of cost-benefit analysis are useless. Rather it implies that, instead of comparing costs to benefits, we need to contrast alternative means of providing the public good, and to choose the approach that provides that good most efficiently.
- This comparison is called cost-effectiveness analysis, the search for the most cost-effective approach to providing a desired public good. For example, society may decide to combat global warming even if it is impossible to put an estimate on the benefits of doing so (or if the benefit is hugely uncertain because it is so far in the future). Even so there are many ways of combating global warming, and cost-effectiveness must be considered in choosing the best approach.

Cost-Benefit Analysis

- The time savings from this project is most appropriately valued by the revealed preference valuation of time, which is $19/hour. The life savings is most appropriately valued by the revealed preference value of life, which averages $7 million. The present discounted value of costs for this renovation project is $258 million, while the PDV of benefits for this project is $635.7 million. Because benefits exceed costs by $363.4 million, the project should clearly be undertaken.

■ TABLE 8-4

Cost-Benefit Analysis of Highway Construction Project

		Quantity	Price / Value	Total
Costs	Asphalt	1 million bags	$100/bag	$100 million
	Labor	1 million hours	½ at $20/hour and ½ at $10/hour	$15 million
	Maintenance	$10 million/year	7% discount rate	$143 million
			First-year cost:	**$115 million**
			Total cost over time (7% discount rate):	**$258 million**
Benefits	Driving time saved	500,000 hours/year	$19/hour	$9.5 million
	Lives saved	5 lives/year	$7 million/life	$35 million
			First-year benefit:	**$44.5 million**
			Total benefit over time (7% discount rate):	**$635.7 million**
			Benefit over time minus cost over time:	**$377.7 million**

Other Issues in Cost-Benefit Analysis

- There are three other major issues that make cost-benefit analysis difficult:
  - common counting mistakes
  - concerns over the distributional impacts of public projects
  - and uncertainty over costs and benefits.

Common Counting Mistakes

- When analyzing costs and benefits, a number of common mistakes arise, such as:

  - **Counting secondary benefits**: If the government improves a highway, there may be an increase in commerce activity along the highway. One might be tempted to count this as a benefit of the project, but this new road may be taking away from commercial activity elsewhere. What matters in determining the benefits is only the total rise in social surplus from the new activity (the net increase in surplus-increasing trades that results from the improved highway).

  - **Counting labor as a benefit**: In arguing for projects such as this highway improvement, politicians often talk about the jobs created by the project as a benefit. But wages are part of a project's costs, not its benefits. If the project lowers unemployment, this lowers the opportunity cost of the workers, but it does not convert these costs to benefits.

  - **Double-counting benefits**: Public projects often lead to asset-value increases. For example, the fact that consumers save time driving to work when the highway is improved could lead to higher values for houses farther away from the city. When considering the value of this highway improvement, some may count both the reduction in travel times and the increase in the value of houses as a benefit. Because the rise in house values results from the reduction in travel time, however, both should not be counted as benefits.

Distributional Concerns and Uncertainty

- Distributional concerns:
    - The costs and benefits of a public project do not necessarily accrue to the same individuals; for example, when we expand a highway, commuters benefit, but those living next to the road lose from more traffic and noise. In theory, if the benefits of this project exceed its costs, it is possible to collect money from those who benefit and redistribute it to those who lose, and make everyone better off. In practice, however, such redistribuon tion rarely happens, partly due to economic problems, and partly due to political problems of the type discussed in the next chapter.
    - In the absence of such redistribution, we may care specifically about the parties gaining and losing from a public project. For example, if a project benefits only the rich and hurts only the poor, we may want to discount benefits and raise costs to account for this.The problem, of course, is: How do we pick the weights?
- Uncertainty
    - The costs and benefits of public projects are often highly uncertain. The extent of such uncertainty, however, can vary from project to project, and should be accounted for when comparing projects. For any predicted outcome, individuals prefer that outcome be more rather than less certain. As a result, for any gap between costs and benefits, governments should prefer projects that have a more certain, rather than a less certain, estimate of the gap.

Takeways

- Providing optimal levels of public goods requires evaluating the costs and benefits of public projects.
- The costs of inputs to public projects are appropriately measured by their opportunity cost, or their value in the next best alternative use.
- If markets are in competitive equilibrium, the opportunity cost of an input is its market price; if markets are not in competitive equilibrium, however, the opportunity cost will differ from the market price, and some of the government spending may simply be transfers of rents.
- If costs are in the future, we must use a social discount rate to value those costs in present dollars.
- Measuring the benefits of public projects is difficult, and approaches range from using market values (such as wages to value time), to asking individuals about their valuation (contingent valuation), to using real-world behavior to reveal valuations (such as the compensating differentials for risky jobs to value life).
- Benefits are often in the future as well, which makes valuation very sensitive to the social discount rate chosen.
- Public project analysis requires considering the distributional implications of the project, the level of uncertainty over costs and benefits, and the budgetary cost of financing the project.

- For your senior thesis, you polled your classmates, asking them, “How much would you be willing to pay to double the amount of parking on campus?” Based on their responses, you estimated that your fellow students were collectively willing to pay $12 million to double the amount of on-campus parking. What are some problems with this type of analysis?

- The city of Metropolita added a new subway station in a neighborhood between two existing stations. After the station was built, the average house price increased by $10,000 and the average commute time fell by 15 minutes per day. Suppose that there is one commuter per household, that the average commuter works 5 days a week, 50 weeks a year, and that the benefits of reduced commuting time apply to current and future residents forever. Assume an interest rate of 5%. Produce an estimate of the average value of time for commuters based on this information.

- The city of Animaltown plans to build a new bridge across the river separating the two halves of the city for use by its residents. It is considering two plans for financing this bridge. Plan A calls for the bridge to be paid for out of tax revenues, allowing anyone to freely use the bridge. Plan B calls for imposing a toll of $6 for crossing the bridge, with the remainder of the cost to be paid out of tax revenues. City planners estimate a local demand curve for hourly use of the bridge to be Q = 1,800 – 100P. The bridge will be able to accommodate 2000 cars per hour without congestion. Which of the plans is more efficient, and why? How would your answer change if congestion was predicted on the bridge?

- Jellystone National Park is located 10 minutes away from city A and 20 minutes away from city B. Cities A and B have 200,000 inhabitants each, and residents in both cities have the same income and preferences for national parks. Assume that the cost for an individual to go to a national park is represented by the cost of the time it takes her to get into the park. Also assume that the cost of time for individuals in cities A and B is $.50 per minute. You observe that each inhabitant of city A goes to Jellystone ten times a year while each inhabitant of city B goes only five times a year. Assume the following: the only people who go to the park are the residents of cities A and B; the cost of running Jellystone is $1,500,000 a year; and the social discount rate is 10%. Also assume that the park lasts forever.

- a) Compute the cost per visit to Jellystone for an inhabitant of each city

- b) Assuming that those two observations (cost per visit and number of visits per inhabitant of city A, and cost per visit and number of visits per inhabitant of city B) correspond to two points of the same linear individual demand curve for visits to Jellystone, derive that demand curve. What is the consumer surplus for inhabitants of each city? What is the total consumer surplus?

- c) There is a timber developer who wants to buy Jellystone to run his business. He is offering $100 million for the park. Should the park be sold?