Introduction to Public Economics

Governments play a crucial role in much economic life.

- Regulatory structure (financial markets, pharmaceuticals, labor markets, civil rights).
- Taxes.
- Public goods and social welfare spending.
- Macroeconomic stabilization.

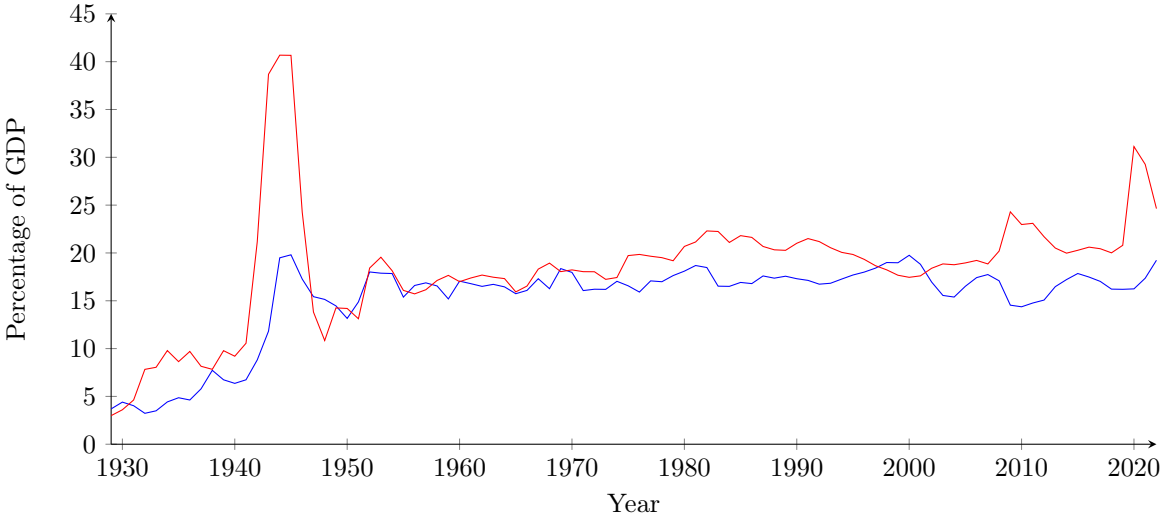
Public finance is the study of the role of government in a market economy, primarily focusing on taxes and spending.

Reasons to study public economics:

- Governments have a lot of power in the realm of economic welfare.
- Nearly every economic transition is mediated by the government.
- It can inform debates about the appropriate role of government regarding taxes, healthcare, climate change, etc.
- The government is large.
  - It employs 1/6 of the US Workforce.
  - Tax revenue is approximately 27% of the United States's Gross Domestic Product.

The government (as measured by tax revenue/GDP) greatly increased in size between 1910 and 1940 (due to the establishment of the welfare state and various wars).

Federal Spending (red) and Tax Receipts (blue) as a proportion of GDP



Two Motivations for Government Intervention

- Market Failure
- Redistribution

The First Welfare Theorem states that *in the absence of market failure*, markets will yield a result along the **utility possibilities frontier** (i.e., the set of all maximized utilities given the current market).
However, there are a lot of market failures:

- Externalities (pollution, network effects from vaccination)
- Public Goods (public safety)
- Asymmetric Information (market for lemons)
- Individual Mistakes (failure to save)
- Imperfect Competition (oligopoly, cartelization)

Policymakers also have to consider the *equity-efficiency tradeoff* in redistribution (i.e., some redistributive acts might reduce total utility)

Government as Social Cooperation

- Economists tend to have a narrow view of human behavior, but social cooperation undergirds much of the levels of societal coordination beyond individuals (i.e., families, communities, countries, global superstructures)
- Human societies of old depended on social cooperation for protection and taking care of the young, sick, and old.
- Modern states are the primary form of coordination today.
- Humans reveal their social nature (or social solidarity) via the size of the government (informal and formal).

Activity 1

Activity: Introduction to Public Economics
Econ 308

Brandon Lehr

Dani Rodrik and Stefanie Stantcheva (2021) begin their recent working paper as follows:

> One of the biggest challenges that countries face today is the very unequal distributions of opportunities, resources, income and wealth across people. Inclusive prosperity — whereby many people from different backgrounds can benefit from economic growth, new technologies, and the fruits of globalization — remains elusive. To address these issues, societies face choices among many different policies and institutional arrangements to try to ensure a proper supply of productive jobs and activities, as well as access to education, financial means, and other endowments that prepare individuals for their participation in the economy. In this paper we offer a simple, organizing framework to think about policies for inclusive prosperity.

1. This framework is illustrated with the 3x3 matrix below. Where might the following public policies fit in this matrix?

   (a) cash transfers to low income people
   (b) estate/inheritance taxation (based on estate of deceased)
   (c) healthcare; primary education
   (d) minimum wage; apprenticeships
   (e) on-the-job training; labor laws; protectionist trade policy
   (f) progressive income taxation; wealth taxes; corporate taxes
   (g) public higher education
   (h) R&D tax credits; antitrust policy
   (i) social insurance (e.g., unemployment insurance, disability insurance, Social Security)
   (j) universal basic income

		At what stage of the economy does policy intervene?		
		Pre-Production Stage: shape the endowments with which people enter the workforce	**Production Stage:** shape the employment, investment, and innovation decisions of firms	**Post-Production Stage:** redistribute income and wealth after they have been realized
Which income group is the target of the policy?	**Bottom**	c	d	a f i j
	Middle	c b	d e	f i j
	Top	c	h	b f i j

2. At which stage do you think it is most important for policy to intervene? Why?

   Pre-production: helps to equalize endowments to equalize opportunity

Microeconomic Foundations: Consumer Theory

Utility function $u(X, Y)$ translates consumption quantities into utility.

Indifference curve A graphical representation of all bundles of goods that make an individual equally well off. Mathematically, an indifference curve is the set of all bundles (X, Y) such that $u(X, Y) = U$ for some utility level U.

Marginal Rate of Substitution MRS_{XY} is the negative slope of the indifference curve — it's the rate at which the consumer will trade Y for X.

$$MRS_{XY} = \frac{\partial u/\partial X}{\partial u/\partial Y}$$

Budget Constraint the set of all bundles for which the total amount spent equals income

- Let I indicate income and P_X and P_Y represent the prices of goods X and Y respectively.
- The budget constraint is the line segment $P_X X + P_Y Y = I$.
- The slope of the budget constraint is $-\frac{P_X}{P_Y}$.

Utility Maximization A rational consumer maximizes utility subject to the budget constraint via the parallel conditions of tangency ($MRS_{XY} = \frac{P_X}{P_Y}$) and the budget constraint ($P_X X + P_Y Y = I$).

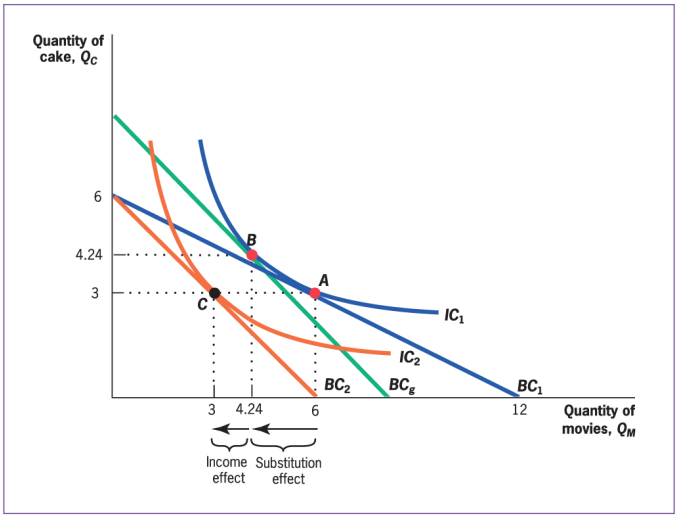
Demand Functions Utility maximization generates demand functions (quantity in terms of price) $X(P_X, P_Y, I)$ and $Y(P_X, P_Y, I)$. There are two primary canonical utility functions.

- Cobb-Douglas: $u(X, Y) = A\ln(X) + B\ln(Y)$, or $u(X, Y) = X^A \cdot Y^B$. The demand function for this utility function yields that P_X has no effect on Y and P_Y has no effect on X.
- Quasilinear: $u(X, Y) = v(X) + BY$ where $v'(X) > 0 > v''(X)$ (i.e., concave down, sloping up). The demand function for this utility function yields that I has no effect on X assuming an interior solution.

Price Effects The impact of a change in P_X on demand for X is composed into two effects:

- Substitution Effect: change in consumption due to the change in relative prices, with utility held equal. When the price of a good increases, the substitution effect is always negative, and vice versa.
- Income Effect: change in consumption due to a change in purchasing power as a result of the price change, where relative prices are held constant at the final price ratio. Income effects can be positive or negative depending on the type of good.
- The total effect is equal to the income effect and the substitution effect.

Income and Substitution Effects



Gruber, *Public Finance and Public Policy*, 6e, © 2019 Worth Publishers

Price Elasticity The price elasticity of demand is the % change in demand caused by a 1% change in price of a good.

$$E^D = \frac{dD}{dP}\frac{P}{D}$$

Elasticities are *unit-free*, typically negative, and tend not to be constant along a demand curve.

Game Theory

Some decision problems involve strategic interactions between individuals.

- For example, Antonia and Bruno might care about giving to a local charity, and give G_A and G_B respectively.
- Their utility functions depend on each other $u_A(G_A, G_B), u_B(G_A, G_B)$.
- The **Nash Equilibrium** yields each individual choosing an action that maximizes their utility *given the other person's behavior*.

Social Welfare

Economists incorporate distributional concerns by use of social welfare functions.

$$SWF = f(U_1, U_2, \ldots, U_n)$$

We have two canonical social welfare functions:

- Utilitarian SWF: $SWF = U_1 + U_2 + \cdots U_n$.
  - Marginal utility decreasing in income $\rightarrow$ redistribution from the rich to the poor.
  - Taking \$1 from a rich person decreases their utility by a small amount, but transferring to a poor person increases their utility by a large amount.
- Rawlsian SWF: $SWF = \min\{U_1, U_2, \ldots, U_N\}$
  - Social welfare is maximized by maximizing the well-being of the worst-off person.
  - Rawlsian social welfare is more redistributive than utilitarian social welfare.

There are a few other philosophies regarding the fairness of economic distribution in society.

Just deserts Individuals should be compensated in line with their contributions.

Commodity egalitarianism Society should ensure that individuals meet a set of basic needs, but beyond that point income distribution is irrelevant.

Equality of opportunity Society should ensure that all individuals have equal opportunities for success.

Present Discounted Value

The present discounted value of a future value of money F that is received and spent in n periods is:

$$PDV = \frac{F}{(1+r)^n}$$

For the **discount rate** r, typically the interest rate.

For a stream of future expenses F_i, we use the following formula:

$$PDV = \sum_{i=1}^{n} \frac{F_i}{(1+r)^i}$$

If the values of F_i are equal, then $PDV = \frac{F}{r}$, via the geometric series formula.

Activity 2

Activity: Theoretical Tools of Public Economics

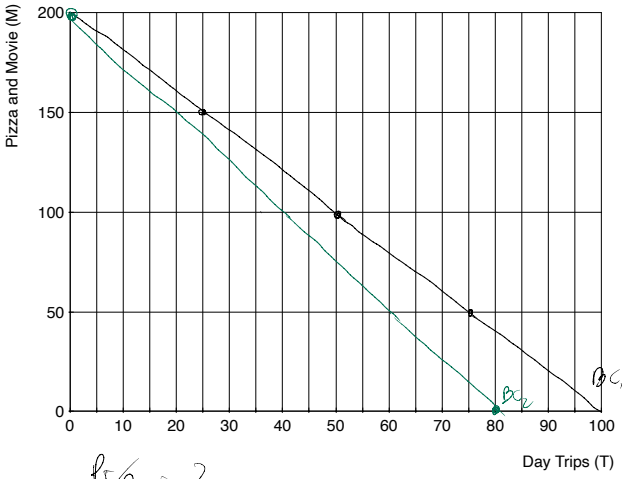
Econ 308

Brandon Lehr

1 Gruber 2.14: Consumer Choice

You have \$4,000 to spend on entertainment this year (lucky you!). The price of a day trip (T) is \$40 and the price of a pizza and a movie (M) is \$20. Suppose that your utility function is $u(T, M) = T^{3/4} \times M^{1/4}$.

a. Draw the budget constraint below. What combination of T and M will you choose?



$\frac{P_T}{P_m} = 2$

$\frac{\partial u}{\partial m} = \frac{1}{4}\left(\frac{T}{m}\right)^{3/4}$

$\frac{\partial u}{\partial T} = \frac{3}{4}\left(\frac{M}{T}\right)^{1/4}$

$\frac{\frac{\partial u}{\partial T}}{\frac{\partial u}{\partial m}} = 3\frac{M}{T}$

$2 = \frac{3M}{T}$

$40T + 20M = 4000$

$60M + 20M = 4000$

$80M = 4000$

$M = 50$

$T = 75$

$3M = 2T$

b. Suppose that the price of day trips rises to \$50. Draw the new budget constraint in the same plot in part (a). What combination of T and M will you now choose?

$P_T/P_M = 3/2$

$MRS_{TM} = 3M/T$

$3T = 6M$

$50T + 20M = 4000$

$60M + 20M = 4000$

$M = 50$

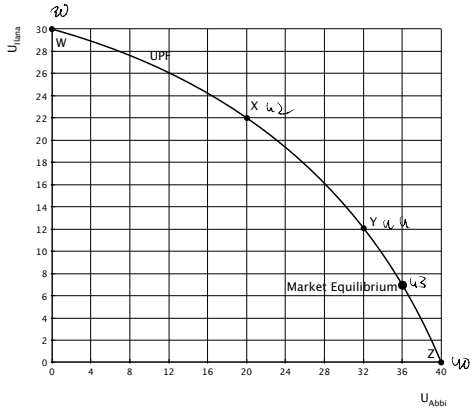
$T = 60$

2 Bonus: Social Welfare Functions

The utility possibilities frontier (UPF) drawn below corresponds to an economy with only two individuals, Abbi and Ilana. There is a high level of inequality at the market equilibrium outcome, i.e., Abbi is rich, while Ilana is poor. Which of the four labeled points (W, X, Y, Z) is most preferred by a social planner with:

a. a Utilitarian social welfare function? (Y)

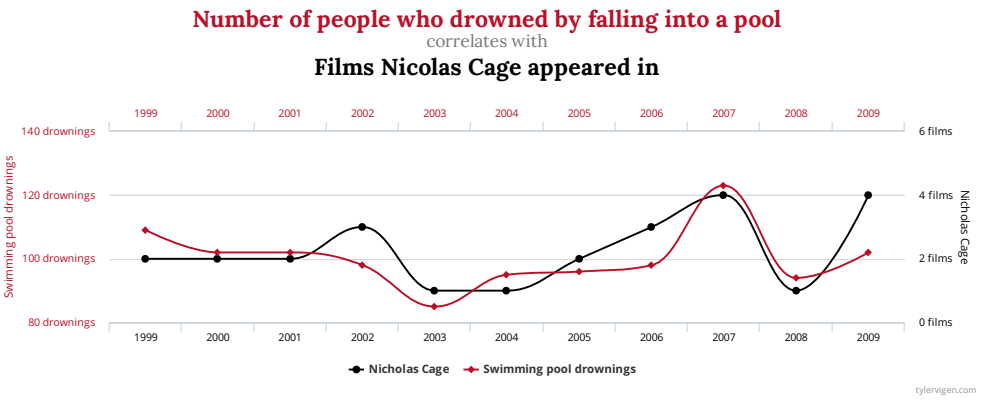
b. a Rawlsian social welfare function? (Y)



Empirical Tools of Public Economics

Identification Problem: When two variables, A and B, are correlated with each other, how do you identify which is causing which (or if both are being caused by something else)? Could the correlation be spurious?

Spurious Correlation



Randomized Controlled Trials

The gold standard of experimentation.

- One group obtains the treatment, one gets the placebo.
- The two groups must have close to identical traits aside from the treatment, which is part of the "control."

Randomized controlled trails tend to be common in science, and have grown in popularity in the social sciences, but for economics, RCTs are often difficult to carry out (after all, you cannot split up the timeline).

Limitations of RCTs

External validity: it's difficult to apply the outcomes of a randomized controlled trial to other contexts.

Attrition: unequal loss of participants (i.e., people in the control group drop out more than the treatment group, or vice versa).

Unethicality: little feedback on the part of participants, and the interests of participants aren't necessarily taken into account.

Observational Data

Data generated by individual behavior observed in the real world, not in specially-designed experiments.

- Time Series analysis: changes in two different stats over time and trying to find results from said changes.
- Cross-Sectional Regression Analysis: finding a relationship between two variables with many data samples.

  $$Y_i = \alpha + \beta X_i + \epsilon_i$$

  The OLS estimate, $\hat{\beta}$, is the slope of the data. In order for this relationship to be causal, the error term, ϵ_i, must be uncorrelated with X_i.

Quasi-Experiments

Changes in the economic environments that create nearly identical treatment and control groups for studying the effect of that environmental change, allowing economists to take advantage of quasi-randomization created by external forces.

Activity 3

Activity: Empirical Tools of Public Economics

Econ 308

Brandon Lehr

1 Air Quality and Covid-19

There have been a number of recent studies that estimate a positive association between regions with poor air quality and Covid-19 mortality rates.[1]

a. Write-ups about such studies in the popular press often suggest that poor air quality increases the severity of illness from Covid-19. Why might this inference be unwarranted?

There are other confounders like poverty, population density, etc. that affect the rate of mortality

b. Suppose you were tasked with empirically testing the hypothesis that poor air quality impacts Covid-19 mortality rates.

i. Suggest a randomized controlled trial to test this hypothesis. Assume away any legal, financial, or ethical constraints.

Take two groups, put one in a polluted area and one in a clean area, and give both groups COVID

ii. Suggest a plausible quasi-experiment to test this hypothesis.

LA County mortality rate in last 10Y vs. without wildfires.

[1] https://www.lung.org/blog/covid-19-mortality-and-air-pollution

2 Gruber 3.14: Tax Cut Effects

Your state introduced a tax cut in 2017. You are interested in seeing whether this tax cut has led to increases in personal consumption within the state. You observe the following information:

Year	Consumption in Your State
2012	330
2014	350
2016	370
2018	430

a. Your friend argues that the best estimate of the effect of the tax cut is an increase in consumption of 60 units, but you think that the true effect is smaller because consumption was trending upward prior to the tax cut. What do you think is a better estimate?

40 units (trend before vs. trend after)

b. Suppose that you find information on a neighboring state that did not change its tax policy during this time period. You observe the following information in that state:

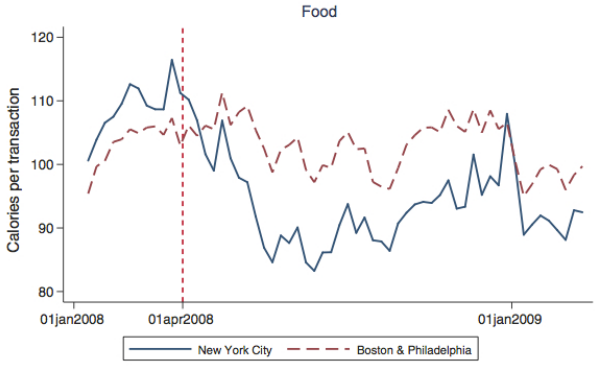
Year	Consumption in Neighboring State
2012	300
2014	320
2016	340
2018	350

Given this information, what is your best estimate of the effect of the tax cut on consumption? What assumptions are required for that to be the right estimate? Explain.

50 units (assumes similar trend would otherwise happen)

3 Bonus: Starbucks Calorie Posting

The Affordable Care Act (Obamacare) included nutritional labeling requirement for restaurants with at least 20 locations. A similar policy was enacted on April 1, 2008 in New York City (but nowhere else). Bollinger et al. (2011) study the effect of the New York City law on caloric purchases at Starbucks, summarizing their data in the figure below:



The average food calories per transaction were:

	New York City	Boston and Philadelphia
Before Law	107	102
After Law	87	96

a. What is the difference-in-differences estimate of the causal effect of the NYC labeling law?

-14

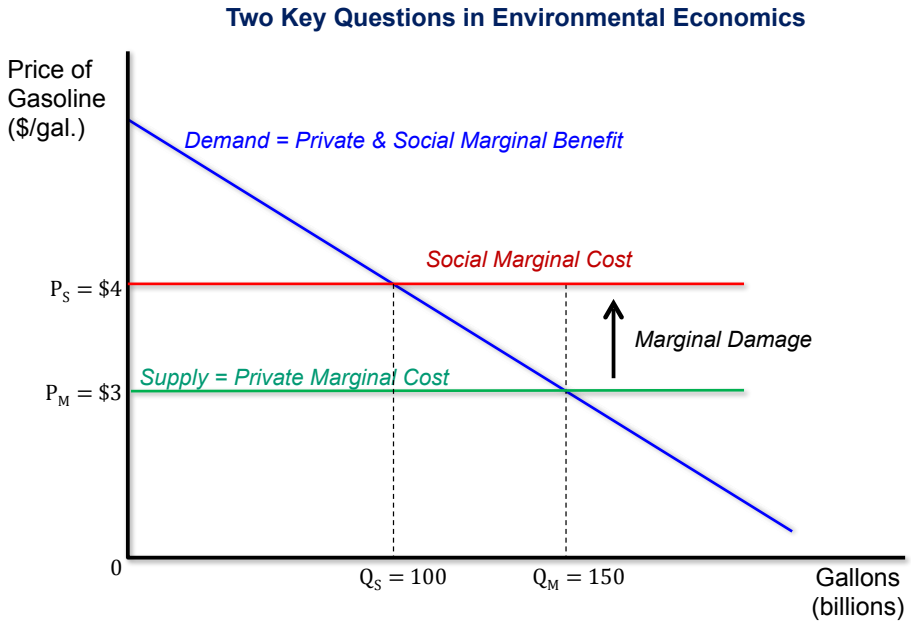
b. Do you find this to be a surprising result? Why or why not?

No, people tend to be self-conscious.

Market Failures: Externalities

The most classic market failure is *externalities*: when the fully private costs/benefits and the social costs/benefit are misaligned. For example, possibly the most important example of a *negative* externality is climate change from CO_2 emissions, a byproduct of industrial development.

Economists focus on balancing the total costs (private + social) of pollution with the total benefits (private + social) from pollution.



The top triangle represents the deadweight loss because the problem of underpriced externalities is one of *overproduction*, not of underproduction. We are facing two questions:

- How do we calculate the marginal social cost of pollution?
- What is the best way to reach the marginal social cost of pollution?

Estimating the social cost of carbon

Step 1: How does one extra ton of CO_2 impact the climate?

Step 2: How does a marginal change in climate affect various human outcomes?

Step 3: Calculate the current social cost by converting future costs into current dollars via discounting.

For Step 2, economists control for the particular location, and do comparisons over time, and check the average effect across all the locations.

After calculating or estimating future costs, economists need to discount these costs toward the present value.

$$PDV = \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \cdots$$

where r is the *social discount rate*, the rate at which society is willing to trade off between consumption today and consumption tomorrow.

Changes in r matter a lot:

- If r is large (i.e., we don't care much about future generations), then carbon costs are not large.
- If $r = 0$ (i.e., we care equally about all generations), then carbon costs can be infinite.

Various economists calculated different social discount rates:

- Giglio, Maggiori, and Stroebel calculated 2.6%, by using differences in price between perpetual ownership and 100 year leases.
- The Obama administration used a 3% discount rate, implying the social cost of carbon was \$42/ton.
- The Trump administration used a 7% discount rate, implying the social cost of carbon was \$5/ton
- The Biden administration uses an estimate of \$51/ton.

Policy Solutions

We can use *pigouvian taxes* to force market participants to internalize the cost of the externality.

Alternatively, we can use *industrial policy*, to restructure the market in order to pursue a public goal.

- Subsidizing clean energy.
- Research in clean energy technologies both public and private.
- Phase out carbon in various economic sectors and weaken fossil fuels.

We have seen great dividends so far: solar and wind have become extremely cheap to produce, and replacing coal with natural gas has yielded emissions reductions that were greater than targets. The Biden administration focused on making clean energy even cheaper via the Inflation Reduction Act.

Activity 4

Activity: Externalities: The Case of Climate Change

Econ 308

Brandon Lehr

1 Gruber 6.1: Environmental Policy and Justice

There is concern that California's cap-and-trade system for greenhouse gases, implemented in 2012, has led to "hot spots" of pollution — localized areas with very high concentrations of hazardous pollutants such as air toxics and particulate matter. A recent study by Cushing et al. (2018) showed that socioeconomically disadvantaged communities have been disproportionately exposed to these air pollutants under California's cap-and-trade program. This has happened despite the fact that overall greenhouse gas emissions and exposure to pollutants in the state have been reduced significantly under the program.

a. How might a cap-and-trade system lead to such "hot spots"?

Changes to set up a narrow use/pollution source in poorer areas + richer environmentalists can buy permits.

b. How would a utilitarian and a Rawlsian each evaluate overall social welfare from this cap-and-trade system?

Utilitarian: pro - cap and trade as net pollution decreases

Rawlsian: poorer people worse off → anti-cap and trade

c. And what are some policy solutions to mitigate the disproportionate harm?

Local set, base trade permits in poorer areas, performance standard for all factories.

2 Gruber 6.18: Getting Pigouvian Taxes Right

Suppose that the (external) damage done by pollution is known to be $MD = 300 + 5Q$, and the (private) cost and benefit are given by $MC = 100 + 2Q$ and $MB = D_0 - 2Q$, where D_0 is not precisely known.

a. If $D_0 = 1,000$, what would be the optimal quantity? What tax would be necessary in order for that to be the equilibrium quantity?

$100 + 2Q = 1000 - 2Q$

$4Q = 900$

$Q = 225$

$P = 550$

$100 + 7Q = 1000 - 2Q$

$9Q = 600$

$Q = 200/3$

$T = \frac{1000}{3}$

b. (Bonus) Suppose that, based on the result from part (a), a tax is imposed to allow the optimal quantity of pollution to be produced. If $D_0 = 900$, what would be the deadweight loss associated with having the wrong tax level?

$100 + 7Q = 900 - 2Q$

$9Q = 500$

$Q = \frac{500}{9}$

$T = 300 + 5\frac{500}{9} = \frac{5200}{9} = \frac{1300}{3}$

$H = 200$

$B = \frac{100}{9}$ → $DWL = \frac{10,000}{9}$

Public Goods

A public good is not something that's merely good for the public, but it is specifically a good that is rival and non-excludable (essentially, the same quantity of the good has to be available to every person.)

The optimal level of publi goods is when the *vertical* sum of individual demand curves equals the marginal cost of providing the public good. The reason the demand curves are added vertically is because market participants can share the public goods.

Recall that MRS_{GX} of a public good G for a private good X is how much an individual values an additional unit of G in terms of unit of X.

$$MRS_{GX} = \frac{MU_G}{MU_X}$$

The total number of units of X society is willing to give up for 1 more unit of G is the sum of all MRS_{GX}.

Assuming that $P_X = 1$, this is a measure of how many dollars society is willing to pay for 1 more unit of G. The societal value is the sum of the different MRS_{GX} values:

$$MC_G = \sum_{I=1}^{N} MRS_{GX}^I$$

This is the *Samuelson Rule*.

Private Provision of Public Goods

- The private outcome is the Nash equilibrium of a game where individuals choose how to allocate income between G and X, taking into account spending on G by others.
- The Nash equilibrium does not satisfy the Samuelson Rule.
- Public goods problems can be described as **free-rider** problems (i.e., underproduction).
- There is not necessarily zero private provision of public goods. Private provision works well in the following cases:
  - Some people have much higher marginal rate of substitution (i.e., they care more than others).
  - Altruism: people care purely about giving to others.
  - Warm Glow: people get utility from giving to others.

There is experimental evidence of free-riding; for example, Marwell and Ames (1981) had an experiment where they tested whether subjects were willing to contribute to a public good, where the Nash equilibrium was that people didn't contribute, and the social optimum was everyone contributing.

People are willing to cooperate at first, but then get upset as time goes on and retaliate.

Public Goods Example

Let there be 2 people, with the same utility functions over X, F, where X is a private good and F is a public good:

$$U_i(X_i, F) = 2\ln(X_i) + \ln(F) \qquad \text{for } i = 1, 2$$

Each participant has a budget constraint, where P_X and P_F are both 1.

$$X_i + F_i = 100 \qquad \text{for } i = 1, 2$$

Where $F = F_1 + F_2$.

Maximize Person 1's utility: (i.e., finding the best response function)

$$\begin{aligned} 0 &= \frac{\partial U_1}{\partial F_1} \\ 0 &= -\frac{2}{100 - F_1} + \frac{1}{F_1 + F_2} && \text{recall that } X_1 = 100 - F_1 \\ 2(F_1 + F_2) &= 100 - F_1 \\ F_1 &= \frac{100 - 2F_2}{3} \end{aligned}$$

Since this is a symmetric game, we know that the best response function for Person 2 is $F_2 = \frac{100-2F_1}{3}$.

The Nash equilibrium is when all players are playing their best response to each other. Since the game is symmetric, we know that $F_1^* = F_2^*$

$$\begin{aligned} F_1^* &= \frac{100 - 2F_1^*}{3} \\ F_1^* &= 20 \\ F_2^* &= 20 \end{aligned}$$

The social optimum (following the Samuelson Rule) is as follows:

$$\begin{aligned} MRS_{FX}^1 + MRS_{FX}^2 &= 1 \\ \frac{MU_F}{MU_{X_1}} + \frac{MU_F}{MU_{X_2}} &= 1 \\ \frac{1}{2}\frac{X_1}{F} + \frac{1}{2}\frac{X_2}{F} &= 1 \\ 2 &= \frac{X_1 + X_2}{F} \\ F &= \frac{X_1 + X_2}{2} \\ F &= \frac{200 - F}{2} \\ F &= \frac{200}{3} \end{aligned}$$

Public Provision of Public Goods

The primary problem of public provision of public goods is *crowding out* (i.e., reduced private contributions to public goods). There are two key assumptions of one-to-one private contributions:

- Individuals do *not* have warm glow preferences.
- Private actors are contributing to the public good.

There is empirical evidence of partial crowd-out (i.e., reduction in charitable giving as government spending is increased). However, since people tend to give to charity due to warm glow preferences and social pressures, the crowd-out is not one-to-one. Hungerman (2005) estimates that the crowd-out effect is 20–40 cents per dollar of welfare spending.

Three Questions in Public Economics

Descriptive: What are the effects of interventions and policies (empirical)?

Normative: What is the optimal policy (theoretical)?

Public Choice: Why do governments choose the policies they do (mixture of theory and empirics)?

Rules of Social Decision

There are at least 2 individuals with transitive preferences over at least 3 options. A **social decision rule** aggregates these preferences into a social preference over these options.

Suppose we want our social decision rule to satisfy the following properties:

Transitive: if a is ranked above b by our rule, and b is ranked above c by our rule, then a has to be ranked above c by our rule.

Pareto Efficiency: if everyone prefers a to b, then our rule should rank a above b.

Independence of Irrelevant Alternatives: the ranking of any two options depends only on how individuals rank the options (and not the ranking of other alternatives).

Non-dictatorship: There is no individual whose preference ranking of any two options matches the social ranking (no matter the preferences of others).

All of these seem reasonable, so they must be possible, right? Well...

Arrow's Impossibility Theorem

Arrow's Impossibility Theorem is the following:

> There is no social decision rule that satisfies the properties of Universality (i.e., transitivity), Pareto Efficiency, Independence of Irrelevant Alternatives, and Non-dictatorship.

The implication of Arrow's Impossibility Theorem means that the only voting method that satisfies the first three properties of our social rule is a dictatorship. However, since we don't want a dictatorship, we can use the following:

- Restrict preferences (i.e., transitive is insufficient)
- Relax Independence of Irrelevant Alternatives, and let intensity of preferences play a role (for example, the Samuelson rule).

Case Study: Majority Voting

Pairwise majority voting is a mechanism to aggregate individual votes into a social decision. Since Majority Voting is obviously Pareto efficient and non-dictatorial, and satisfies IIA because the ranking of a over b only depends on how many people vote a vs. how many people vote b. Therefore, we must have that majority voting fails transitivity.

Consider an election for funding public schools:

Majority Voting "Working"

Preferences	Type of Voter		
	Parents (1/3)	Elders (1/3)	Young Couples (1/3)
First	H	L	M
Second	M	M	L
Third	L	H	H

- $M >_s L$
- $L >_s H$
- $M >_s H$

Therefore, $M > L > H$, and so M is the social choice made by pairwise majority voting.

Majority Voting "Failing"

Preferences	Type of Voter		
	Public School (1/3)	Private School (1/3)	Young Couples (1/3)
First	H	L	M
Second	M	H	L
Third	L	M	H

- $M >_s L$
- $L >_s H$
- $H >_s M$

We are now stuck in a cycle $M > L > H > M > \cdots$. This election fails to successfully aggregate the preferences of the populace.

A way to get out of the trap of transitivity is to rule out preferences that are not single-peaked (i.e., one local maximum).

However, when we have single-peaked preferences, we have that the preferences of the median voter is that which is preferred by society.

Implications of the Median Voter Theorem

If we restrict our analysis to single-peaked preferences, majority voting is a social decision rule that satisfies all desirable properties.

However, this means majority voting does not imply efficiency. For example, if a public good is efficient, but because a minority has a large marginal benefit and the majority has a small marginal benefit, the public good will get rejected. What matters for efficiency is the *average* marginal benefit across individuals, not the *median* marginal benefit.

However, the median voter theorem doesn't really hold in real life (i.e., Democrats close to the median still vote similar to their caucus, and Republicans close to the median still vote similar to their caucus).