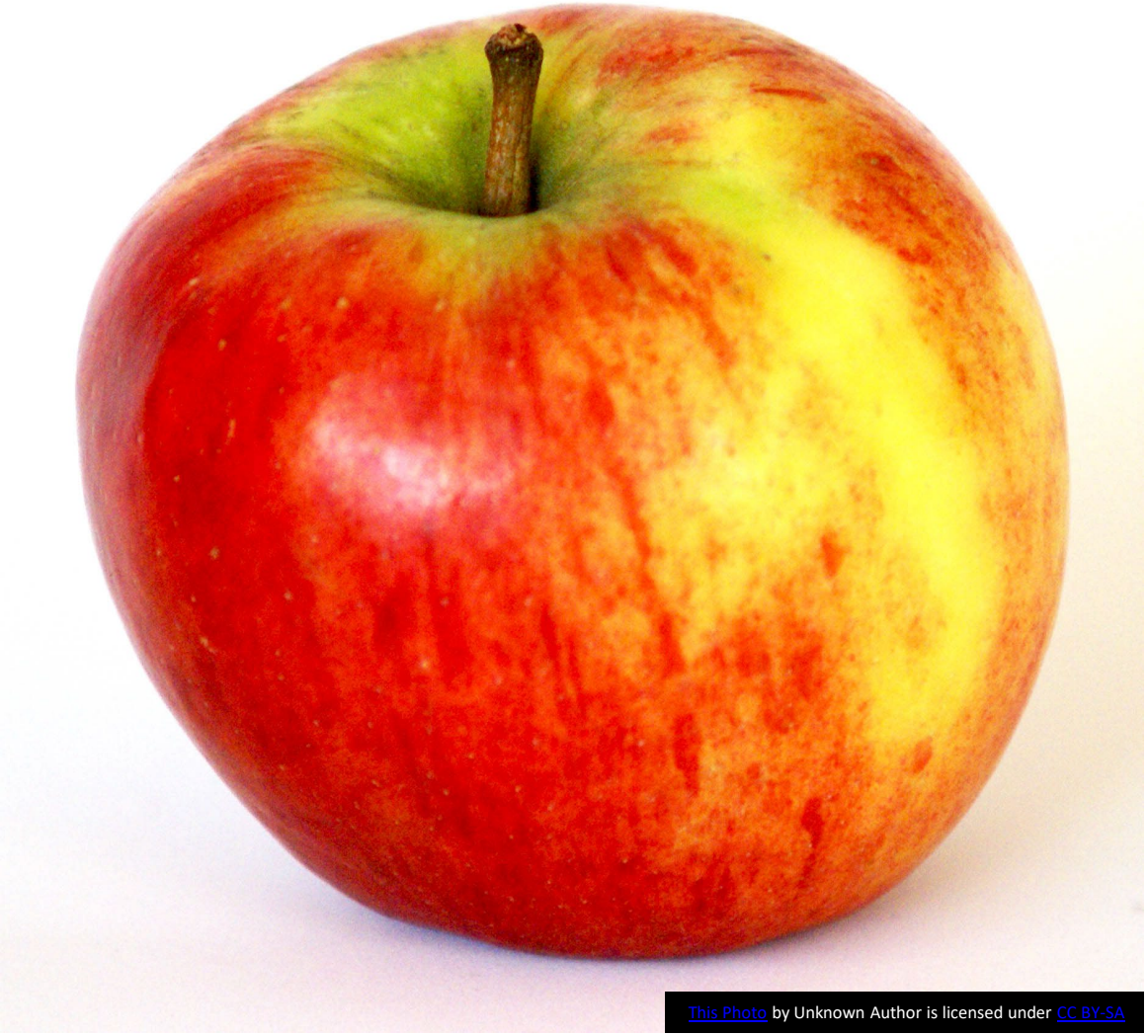
Economic Theory of Public Goods Applied to Public Health

Health Economics Lecture 15

Outline

- Part 1. Health, Rivalry and Excludability
- Part 2. Essentials of public health practice
  - Public goods problems in public health
- Part 3. Tragedies of public goods problems
- Part 4. Solutions
  - Keys from common pooling
  - How to implement?

Part 1
Health, Rivalry, Excludability



What makes public goods

Samuelson's View

- Rivalry of goods matters most

Musgrave's View

- Excludability of goods matters most

Ostrum's View

- Both rivalry and excludability matter
- Sociological solutions can and do occur
- Trust, shared identity, cooperation

Public Goods Landscape

	Rival	Non Rival
Excludable	Private Goods	Club Goods
Non Excludable	Common Pool Resources	Public Goods

Public Goods Landscape in Health

	Rival	Non Rival
Excludable	A. Private Goods Medications & Surgeries	C. Club Goods HMO membership
Non Excludable	B. Common Pool Resources Unnecessary antibiotic use Private health insurance	D. Public Goods Essential public health functions

A. Private goods markets for medications, consultations, and surgeries suffer from various market failures (See all prior and subsequent lectures)

Dual Nature of Private Health Goods

Private Nature of Health Good

- A medical event is privately consumed and is *rival*
- A medical event is excludable

Public Nature of a Health Good

- Whether the medical event had high quality
- Whether the medical event was delivered equitably to those in greatest need
- Whether the medical event wasted social resources

Quality, Equity, and Efficiency are non-rival, partially-excludable aspects of health goods

B. Common Pool Resources in Health

- Antibiotic stewardship
  - Every dose gives bugs a chance to select for a resistant superbug
  - Penicillin and Chloroquine are useless now
  - Time to resistance depends on cumulative doses in the population
- Insurance plan stewardship
  - Every act of insurance-driven waste has opportunity cost
  - Emergency room waits, diverted ambulances, drug shortages

B. Common pool resource production

- Not all common pool problems are the same
- Six Production Functions for social benefit
  - Which are easiest/hardest to get cooperation?
  - Which are like the antibiotics problem?

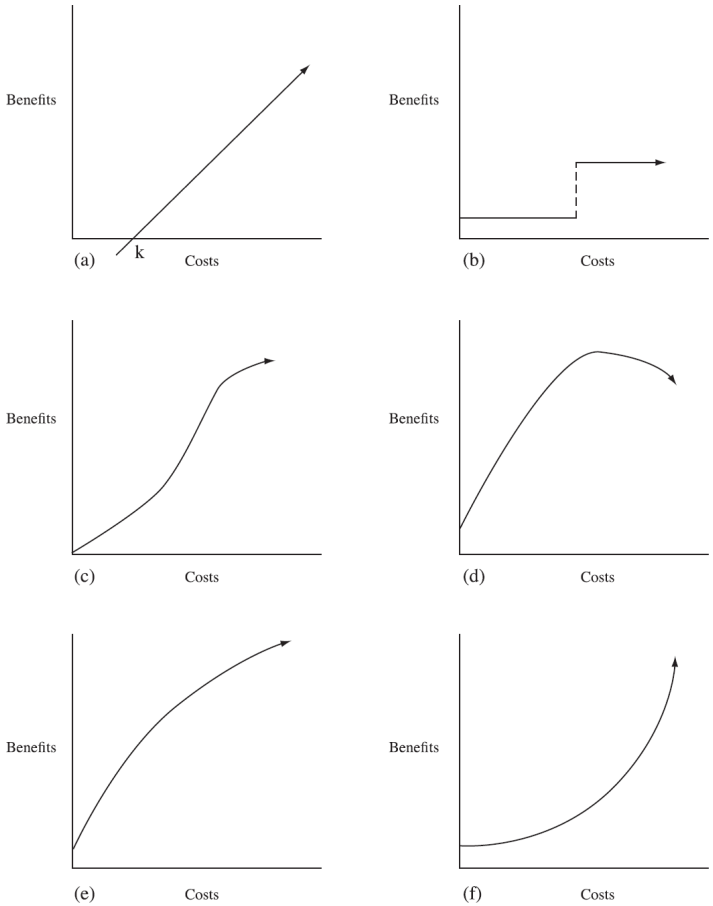


Figure 2. General Types of Production Function, (a) Linear, (b) Step Function, (c) General Third Order, (d) Quadratic, (e) Concave and (f) Convex.

B. Common Pool Problems Solvable

- Civilization exists to solve common pool problems
- Norms of cooperation not always transactional
  - Honor
  - Shame
  - Reputation
  - Loyalty
  - Decency
  - Religious belief

B. These things help communities solve common pool problems (Ostrum)

1. Information about the resource problem
2. Shared understanding
3. Norms of trust and reciprocity
4. Stable social group
5. Low cost monitoring and social sanctions

C. Club Goods in Health

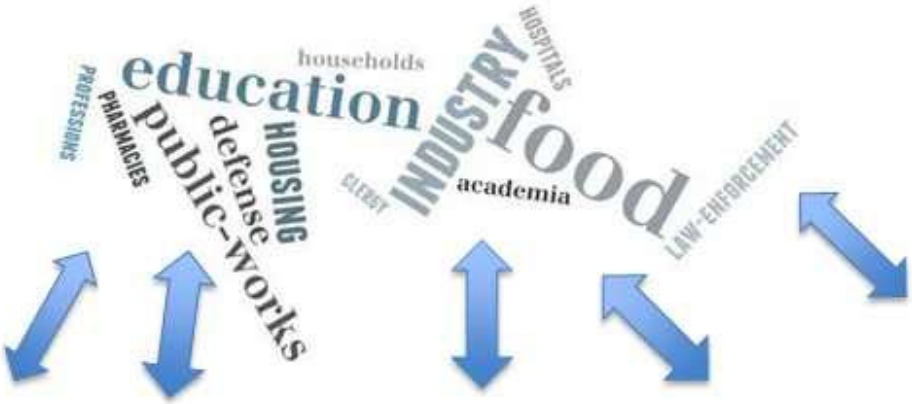
- HMO and Health Insurance Plans
  - Define a set of benefits for members
  - Exclude non members from those benefits

C. Do clubs address what the market can't?

- HMOs and insurance plans don't have to address quality, equity and efficiency to stay in business
  - Asymmetric information→ patients can't detect quality, efficiency, and information
- Keeping people healthy can lower future claims
  - Saves money <u>IF</u> people stay in plan long enough

Part 2: Public Health as a Public Good

Anatomy of a Public Health Department



Multi-sectoral Public Health Activity

Communicable Disease Control	Chronic Disease and Injury Prevention	Maternal and Child Health	Environmental Public Health	Universal Health Care Coverage

Public Health Programs

- Assessment (Surveillance, Epidemiology, Public Health Laboratories)
- Community Partnerships
- Policy Development
- Communications
- Basic Administration-IT, HR, Legal, Finance
- Performance Improvement and Accountability

Foundational Capabilities

D. Public Health Functions

10 Essential Public Health Functions

Assess

- **Monitor** health status to identify and solve community health problems.
- **Diagnose and investigate** health problems and health hazards in the community.

Develop Policy

- **Inform, educate** and empower people about health issues.
- **Mobilize** community partnerships and action to identify and solve health problems.
- **Develop policies and plans** that support individual and community health efforts.

Assure

- **Enforce** laws and regulations that protect health and ensure safety.
- **Link** people to needed personal health services and assure the provision of health care when otherwise unavailable.
- **Assure** competent public and personal health care workforce.
- **Evaluate** effectiveness, accessibility, and quality of personal and population-based health services.
- **Research** for new insights and innovative solutions to health problems

Top Down vs. Bottom Up

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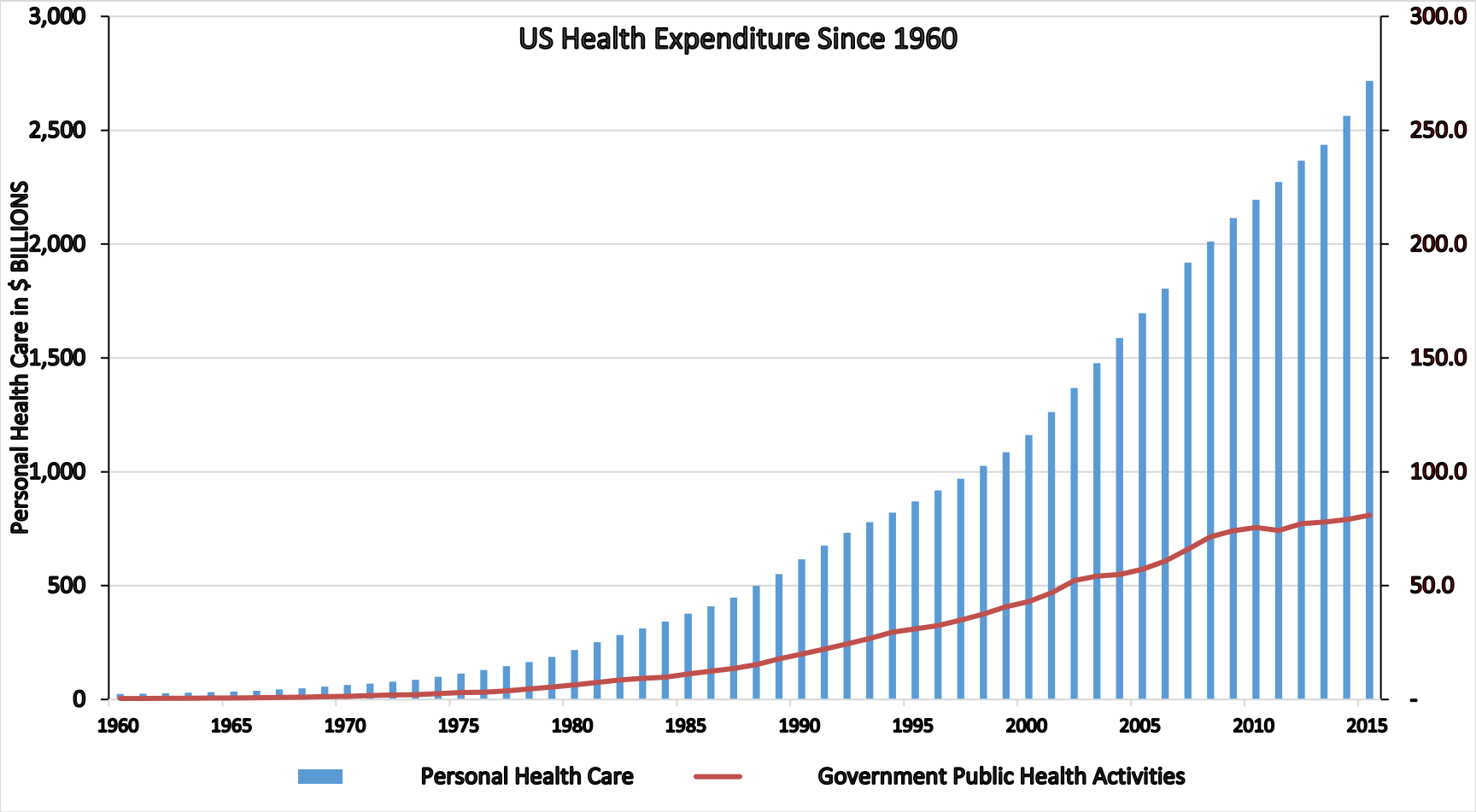
Public health is $80 billion out of $2500 billion total health spend



US Public Health Departments

- 3000 counties, 50 states, 1 federal spending $80 billion
  - Feds spend $12 billion
  - State and locals spend $68 billion
- Of the $80 billion about a third still goes for direct clinical services for historically special populations
  - STDs
  - Tuberculosis
  - AIDS
  - Drug addiction
- Little $ left for Assess, Policy develop, Assure
- Collaboration with community groups saves money and helps get things done effectively

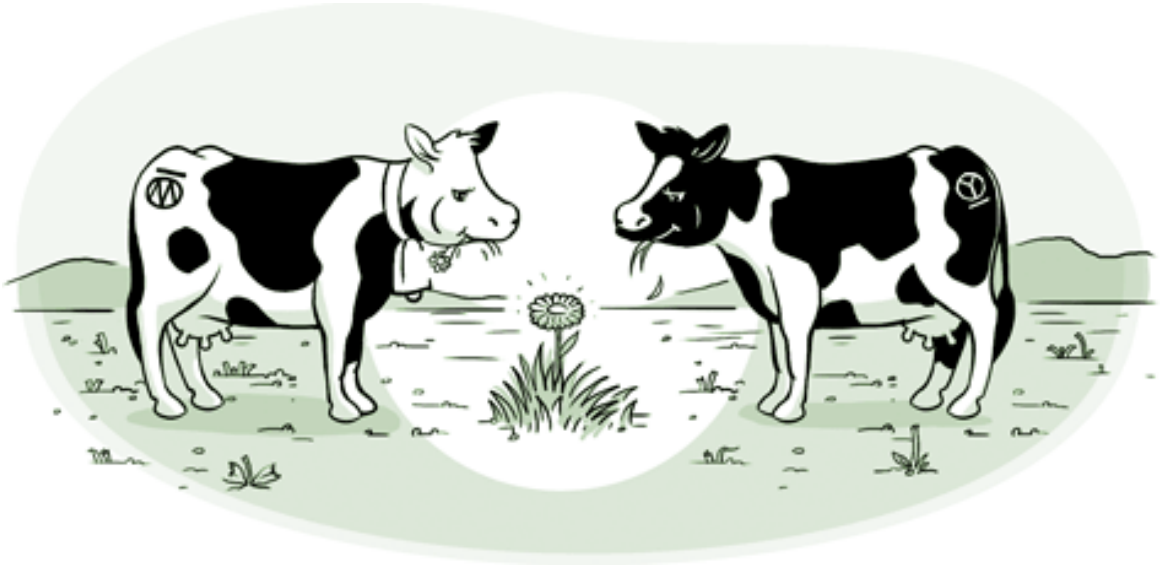
Community Networks (Bazzoli)

Service Delivered	How often as a community collaboration between public system and private system
Adult day care Acute care Hospice	Less than 30% of the time
Home health services Family planning Nutritional services	30-50% of the time
Injury prevention Community health education Child immunization Identifying community health needs	More than 50% of the time

Dilemma

- Public goods inputs that prevent disease get less than 1% of US health budget
- Can economics explain this?

Part 3 Public Goods Tragedies



Simple theory of public goods

- In absence of government or common pooling solutions

→Too few public goods

- Government as a supplier of a club good
  - Algebraic version
  - Graphical version
    - Focus on graphical version
- Can government solve the public goods problem?
  - Yes if…
  - No if…

Notation

Per Capita in Lower Case	
y	Income per capita AKA wage
x	Consumption per capita

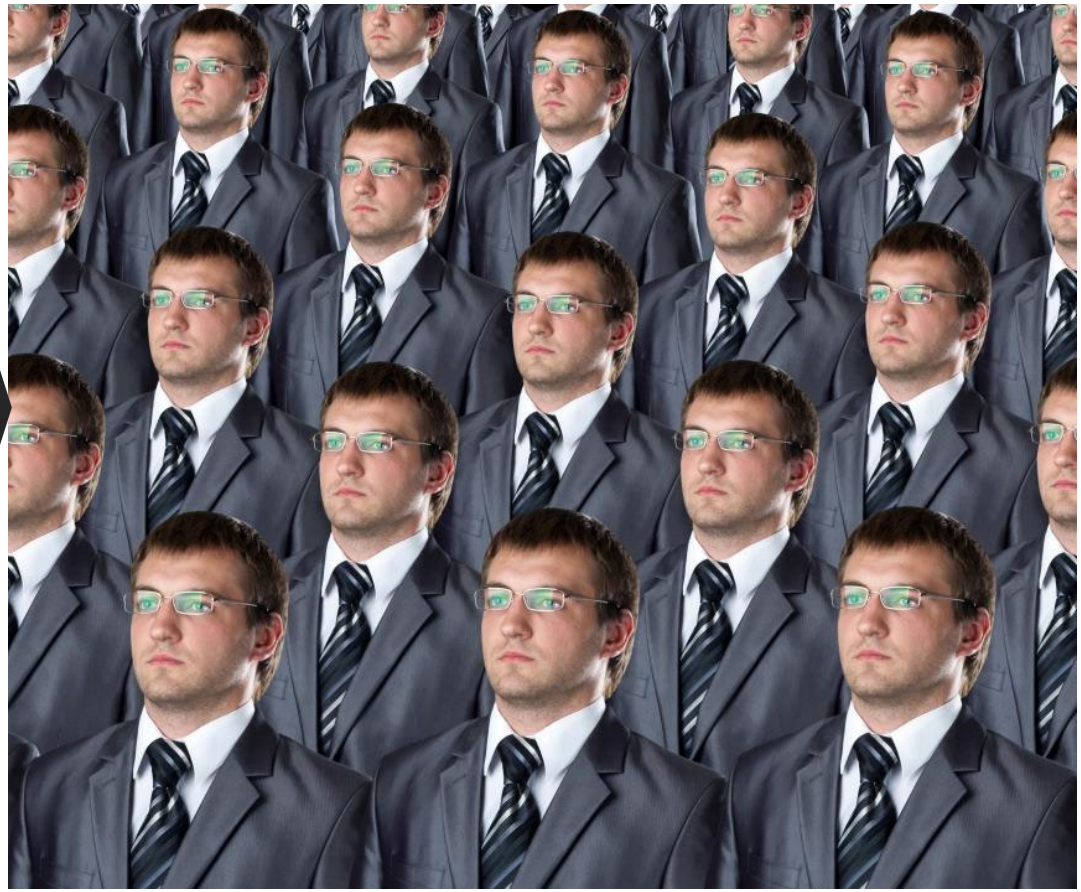
Total in Upper Case	
Y	Income
X	Consumption

$$y=Y/N$$
$$x=X/N$$

Assumptions: The Corn Economy

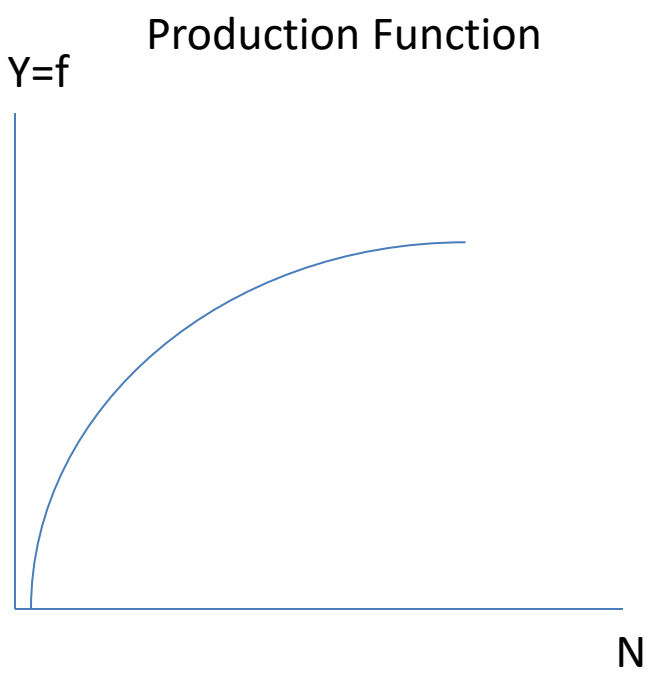
- Population =N
- Everybody is the same
- Everybody grows corn, x
- Everybody eats corn, x
  - Corn furrows breed mosquitoes
  - Malaria
  - Everybody hates malaria
- Government, G reduces malaria
  - Epidemiological surveillance
  - Outbreak detection
  - Treat cases before they spread
- Utility =U(x, G)

Everybody is the same!

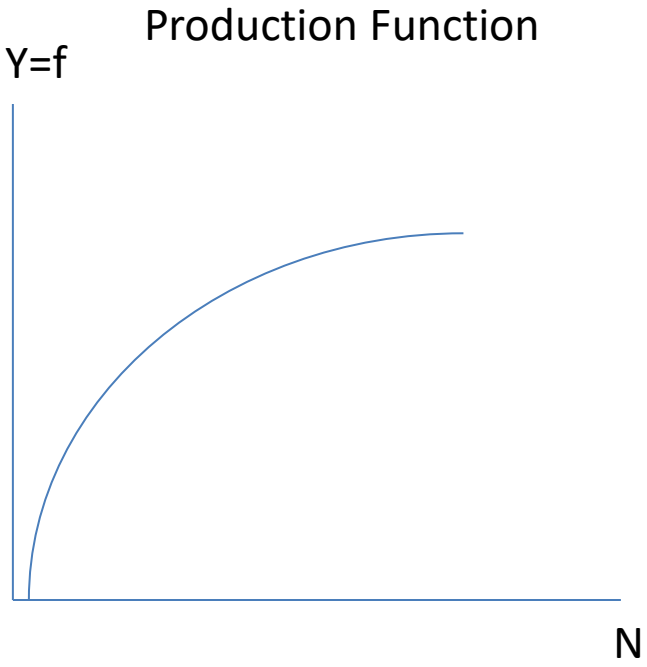


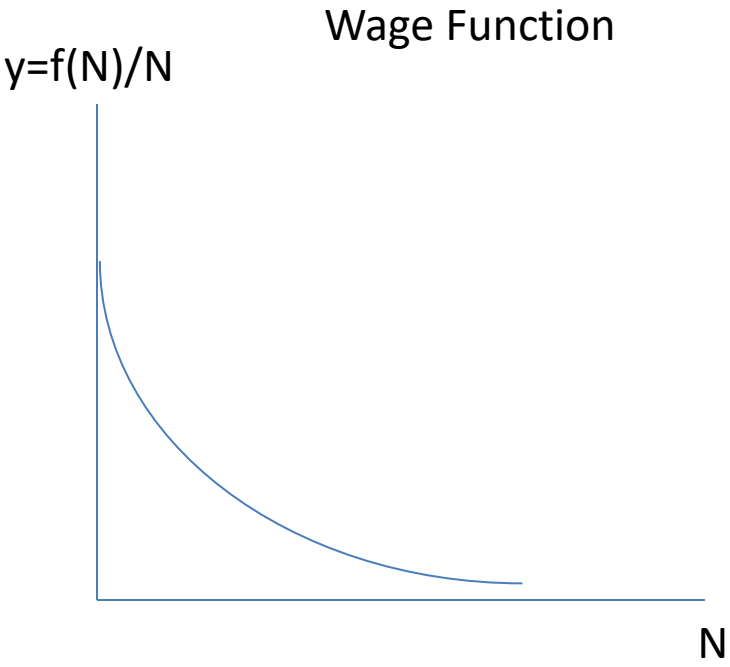
Equations for Corn Economy

- [1] Utility Function
  - $U = U(x, G)$
- [2]Production Function
  - $Y=f(N)$ where $f'>0$ and $f''<0$
- [3]Public Good Finance
  - $G=\tau Y$
  - where τ is an income tax
- [4] Consumer budget
  - $y=x+\tau y$
- [5] National budget
  - $Y=Nx+\tau Y$ or equivalently
  - $f(N)=Nx+G$



Production vs. Wage



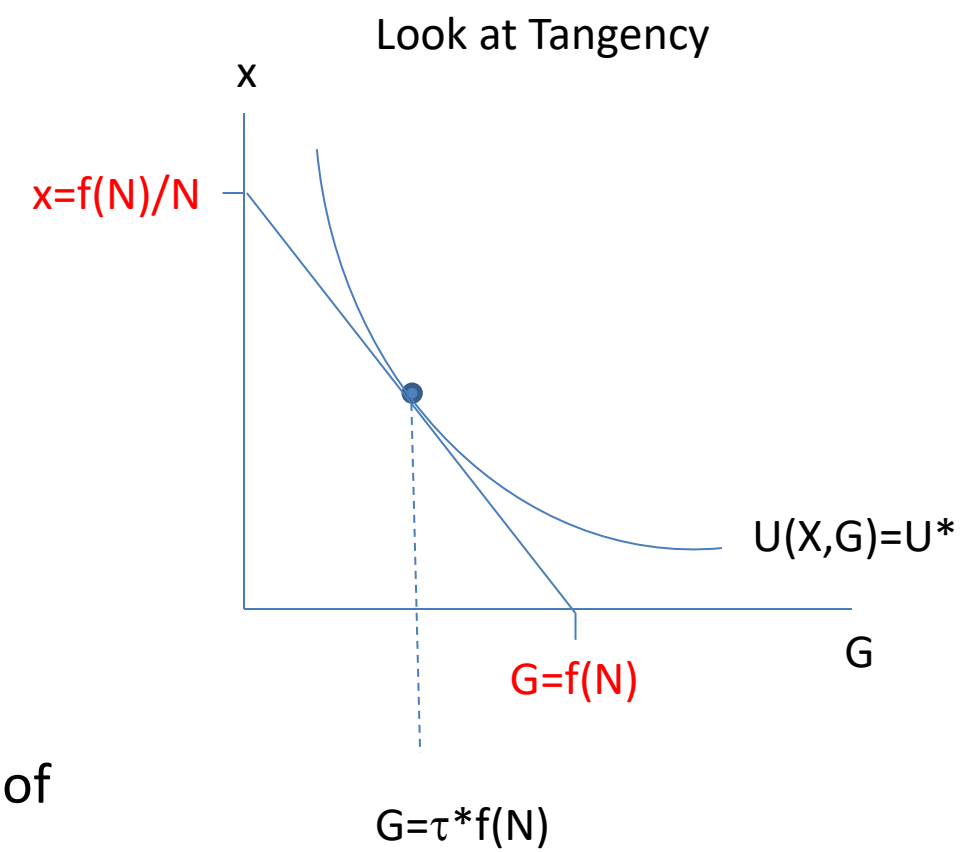


Onward to two questions

- What is optimal tax?
  - We will see a typical flat budget constraint
- Immigration policy/optimal population size?
  - We will see a convex budget constraint
  - All hell breaks loose

Policy Question 1: What is optimal tax?

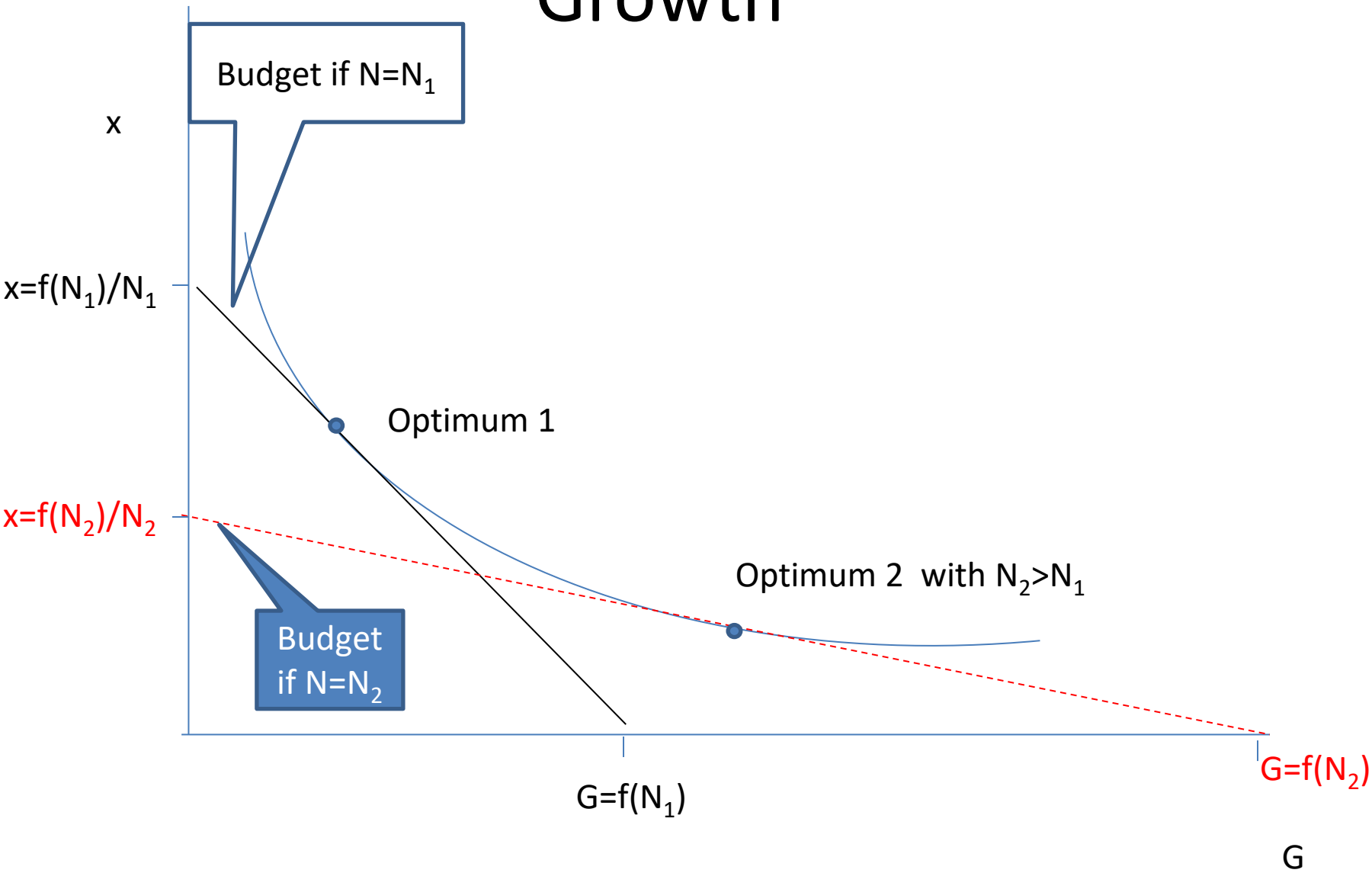
- Solve for optimal tax τ
  - Max U(x,G) such that
    - $y=x+\tau y$
    - $G=N\tau y$
  - Max $U((1-\tau)y, N\tau y)$
- Solution
  - $-\frac{dU}{dx}y+\frac{dU}{dG}Ny=0$
  - $\frac{dU}{dx}=N\frac{dU}{dG}$
  - $\frac{\frac{dU}{dG}}{\frac{dU}{dx}}=\frac{1}{N}$
- Tax until marginal rate of substitution=marginal rate of transformation



How do they feel about population?

- What does N do to wage?
- What does N do to taxes?

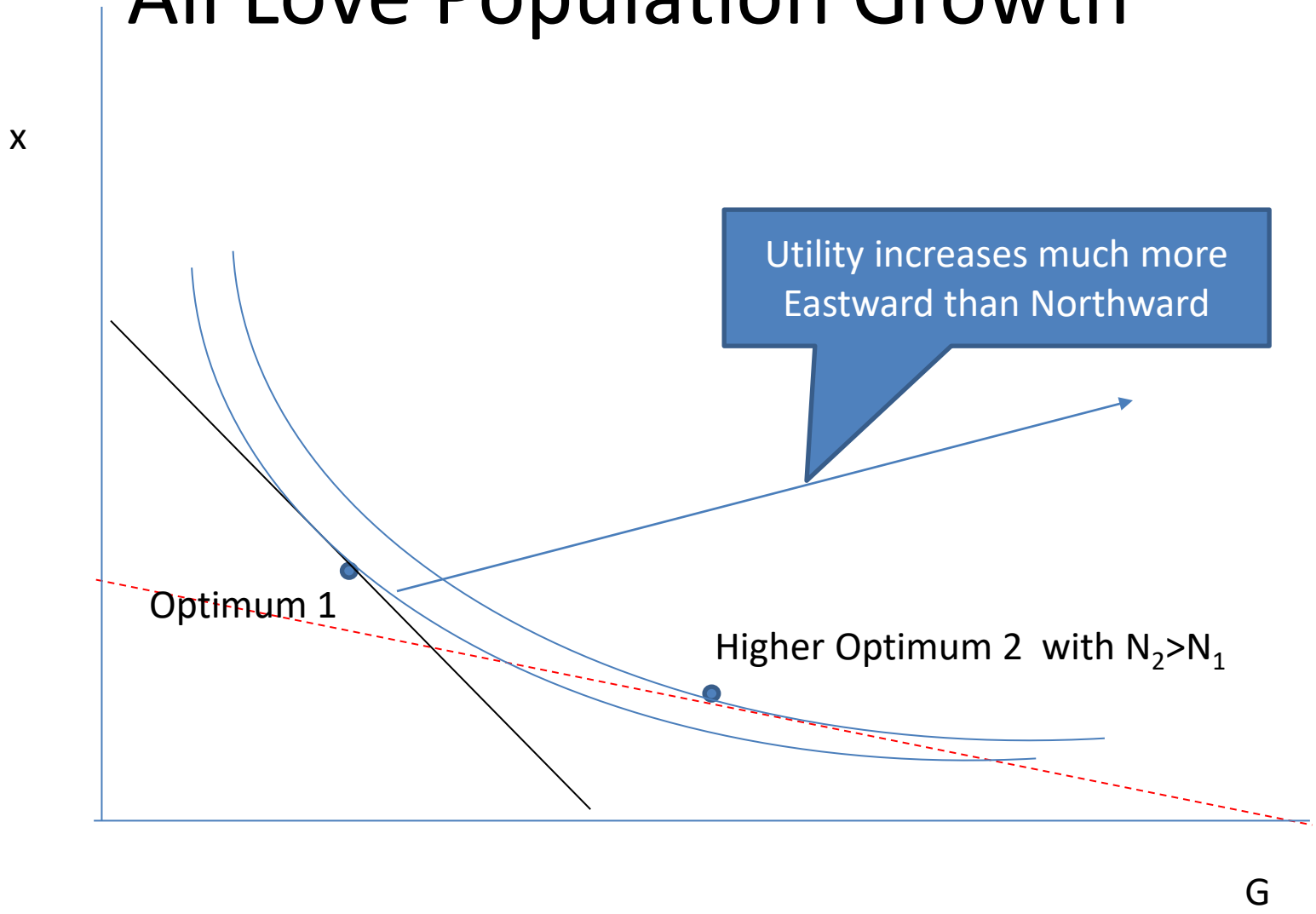
Comparative Statics of Population Growth



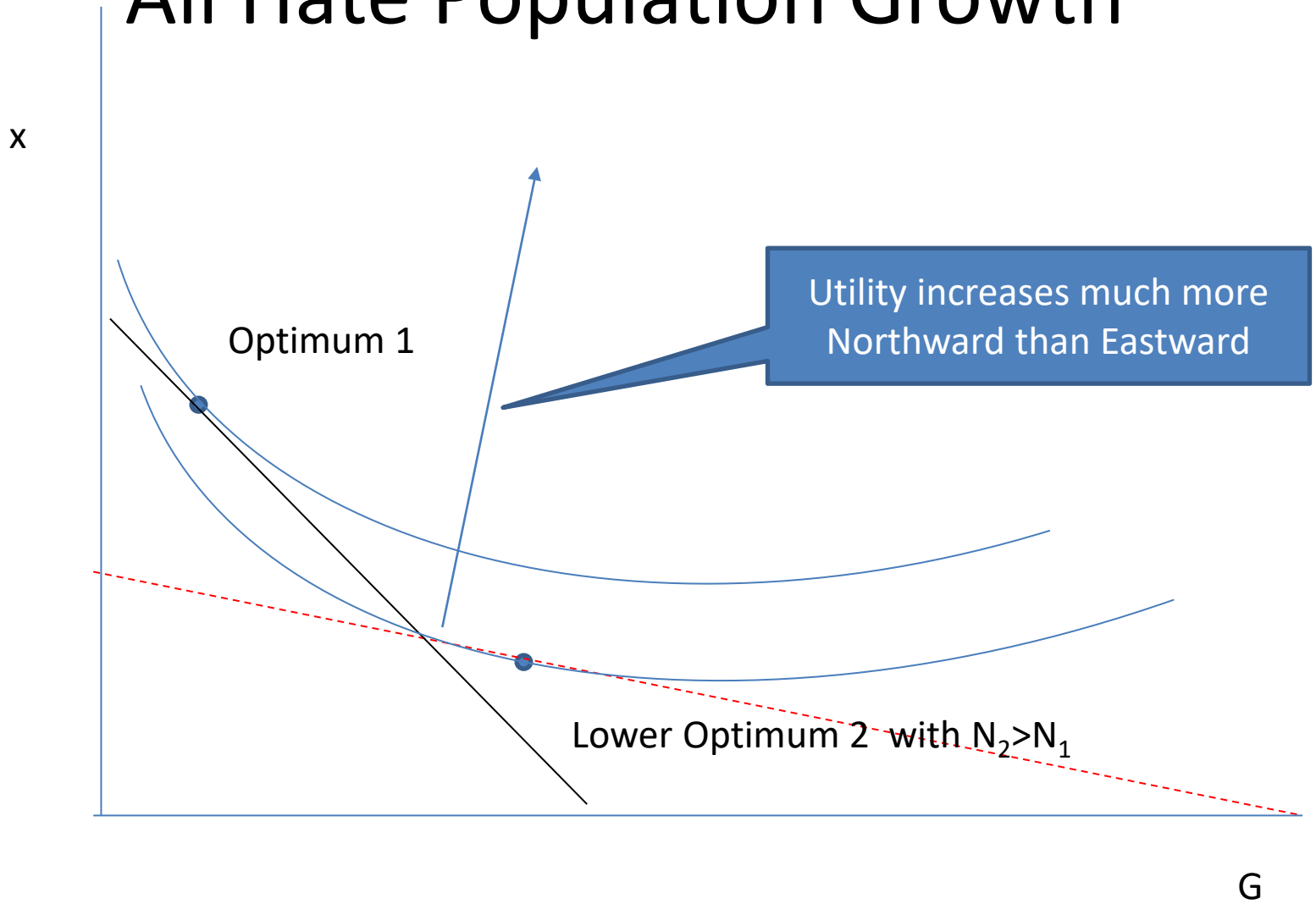
Policy Question 2: Optimal population?

- Solve for optimal N
  - Max U(x,G) such that
    - $y=x+\tau y$
    - $G=N\tau y$
  - Max $U((1-\tau)f(N)/N\ ,\ \ \tau f(N))$
- Solution
  - $\frac{dU}{dx}\left[\frac{f\prime(N)}{N}-\frac{f(N)}{N^2}\right](1-\tau)+\frac{dU}{dG}f'(N)\tau=0$
  - $\frac{\frac{dU}{dG}}{\frac{dU}{dx}}=\frac{\left[\frac{f\prime(N)}{N}-\frac{f(N)}{N^2}\right](1-\tau)}{f\prime(N)\tau}$
- Grow population until marginal rate of substitution=marginal rate of transformation

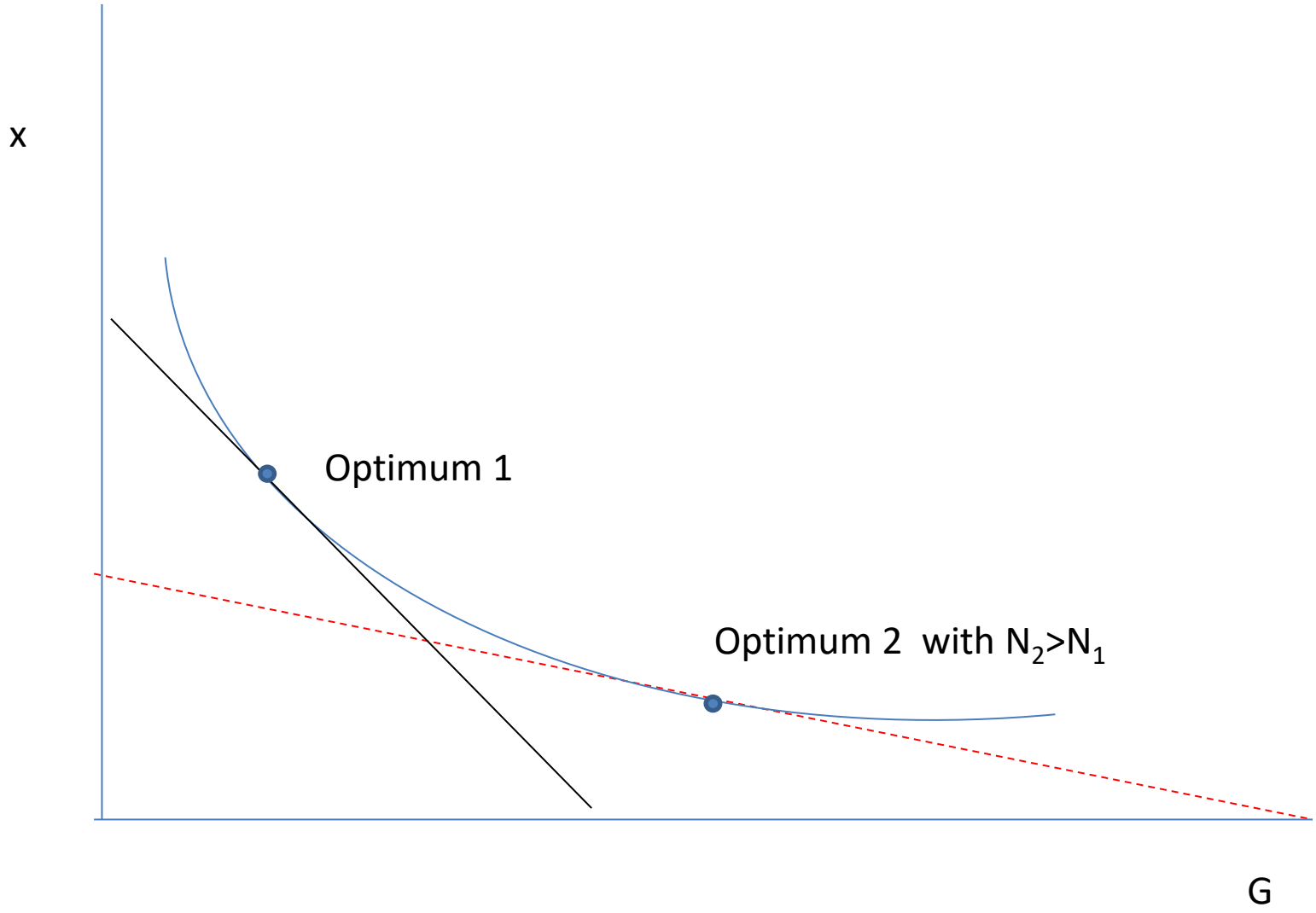
If People are Public Good Lovers They All Love Population Growth



If People are Private Good Lovers They All Hate Population Growth

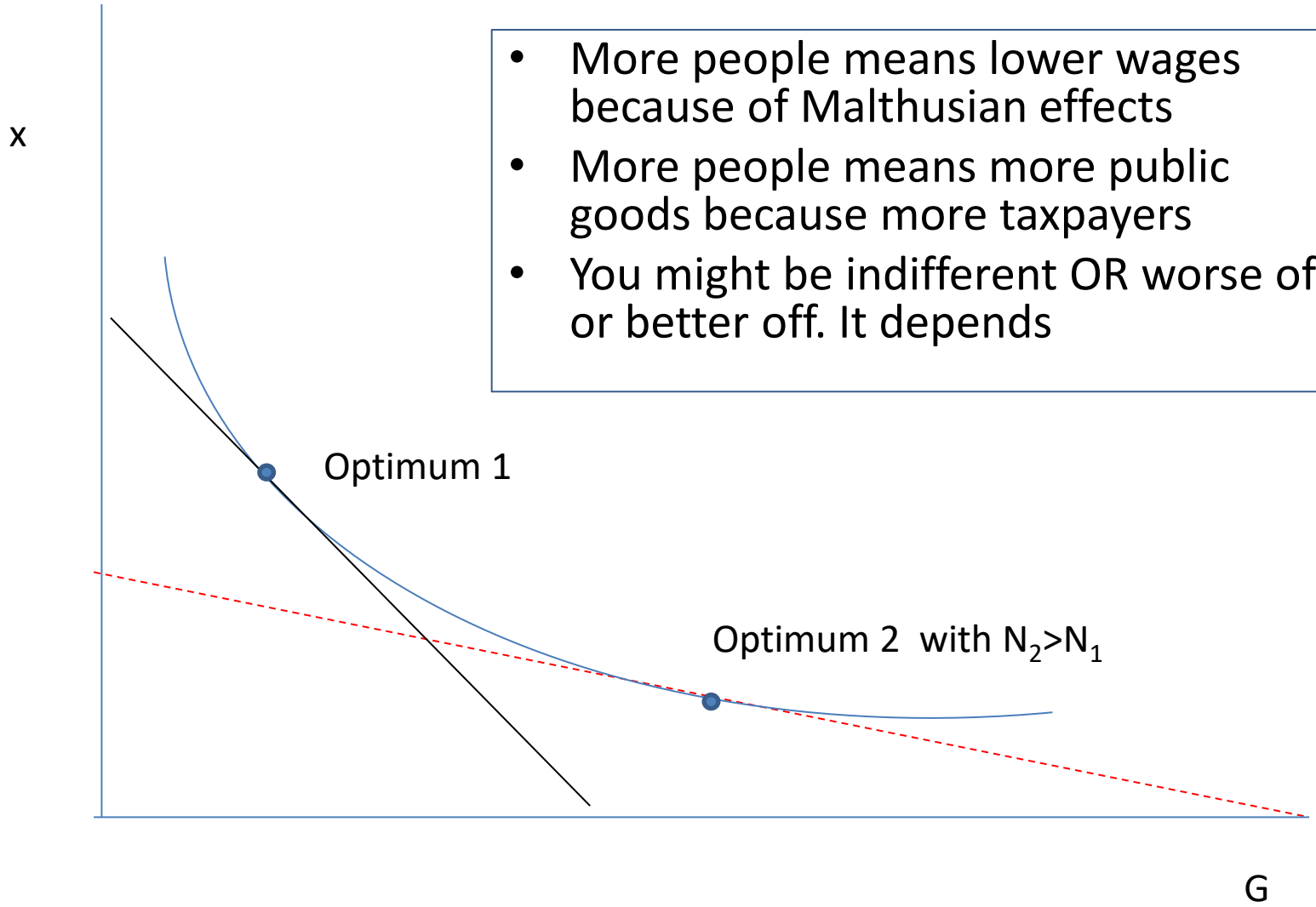


Indifferent People Don't Care

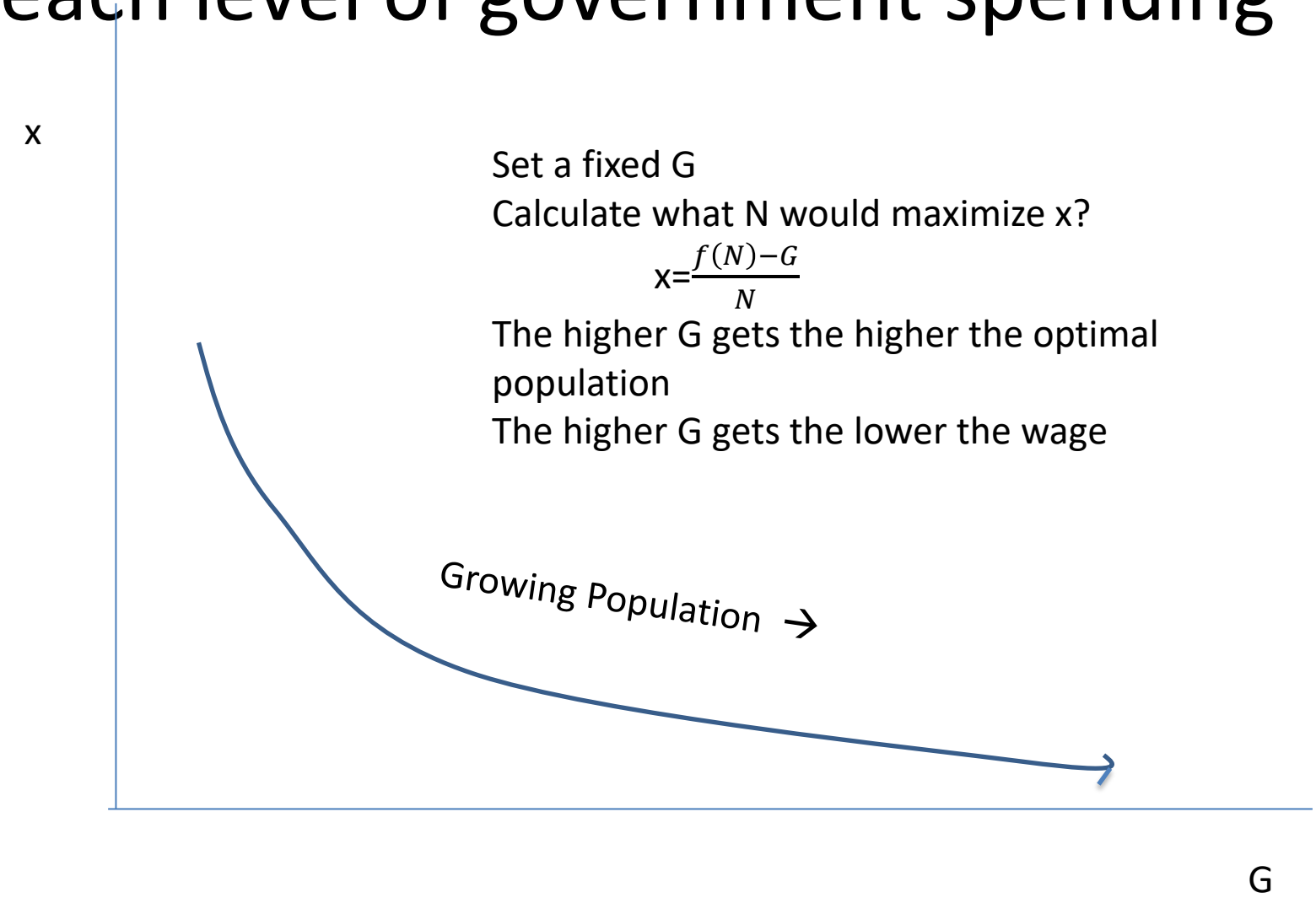


Commentary on Pop Growth

- More people means lower wages because of Malthusian effects
- More people means more public goods because more taxpayers
- You might be indifferent OR worse off or better off. It depends



Populations that gives highest wage at each level of government spending



Set a fixed G

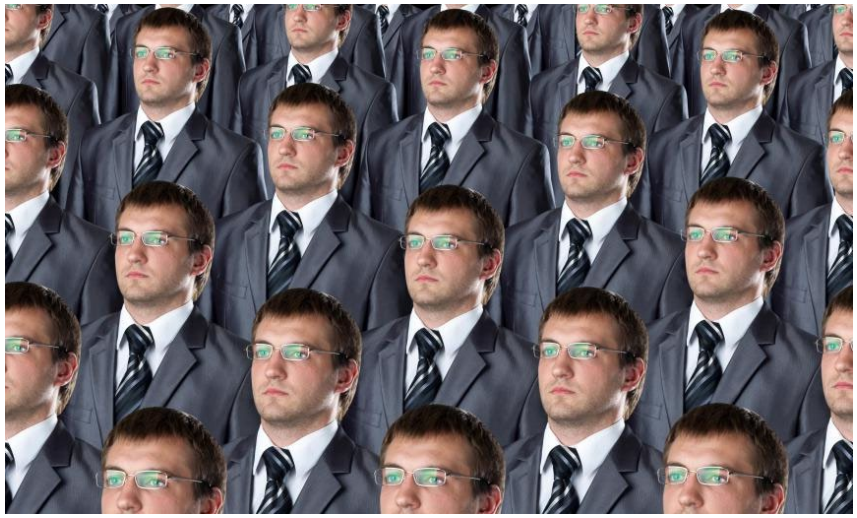
Calculate what N would maximize x?

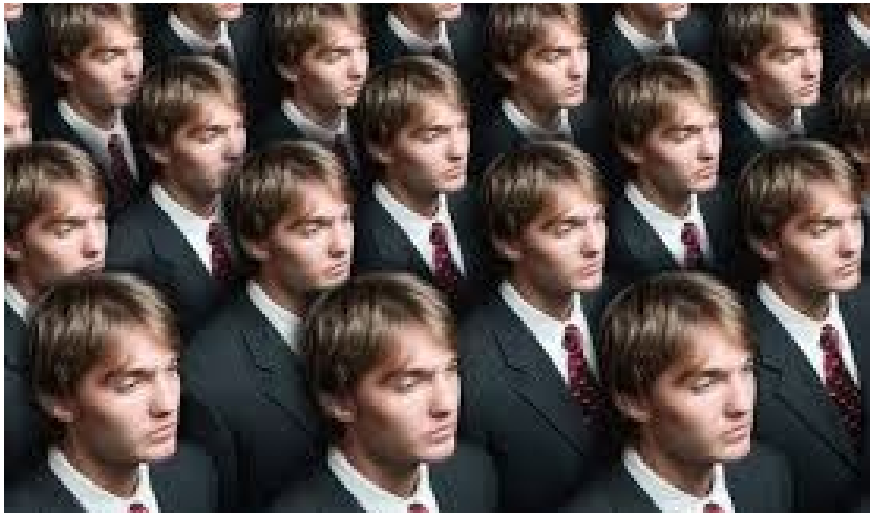
$$x=\frac{f(N)-G}{N}$$

The higher G gets the higher the optimal population

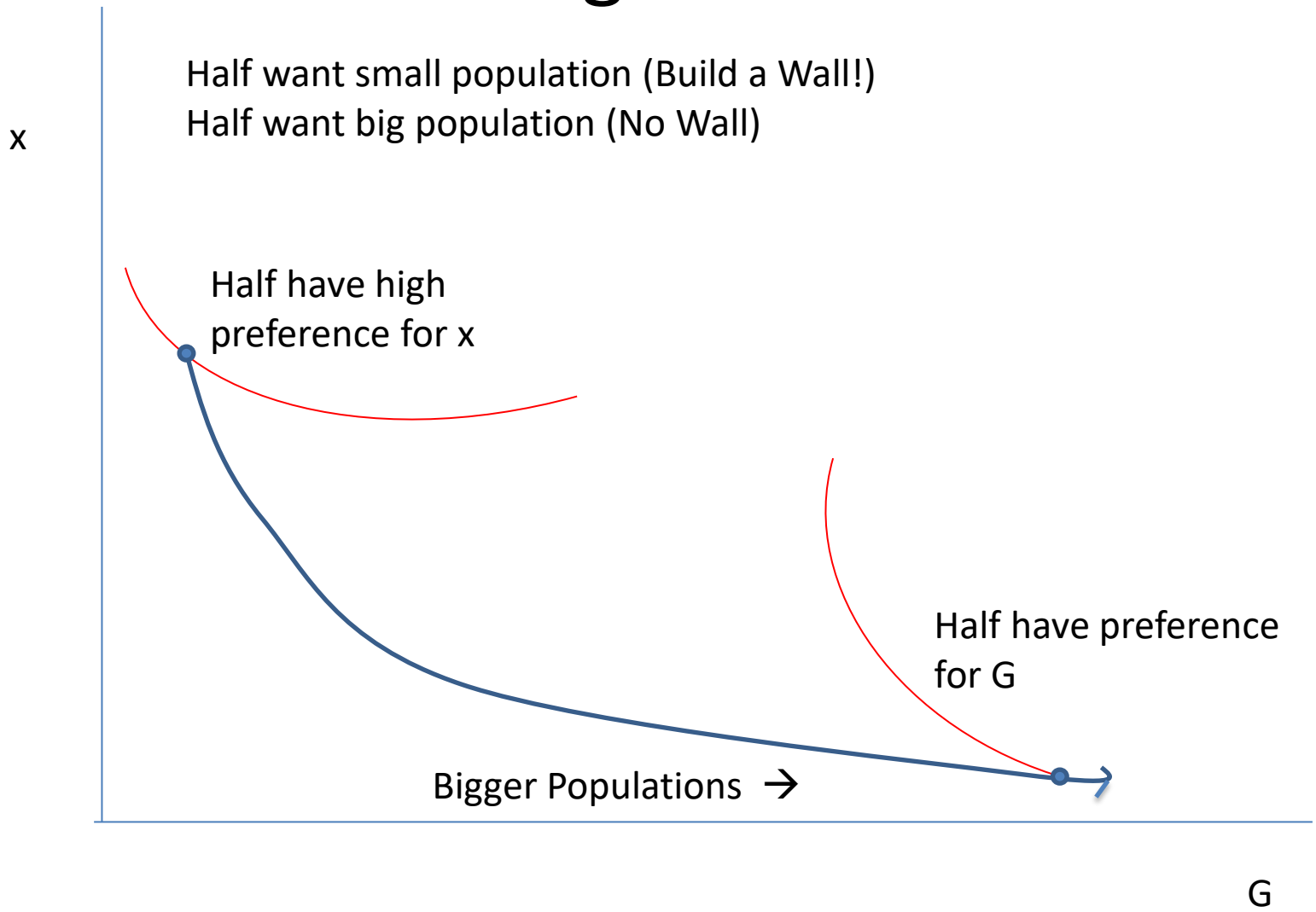
The higher G gets the lower the wage

Mixed Populations

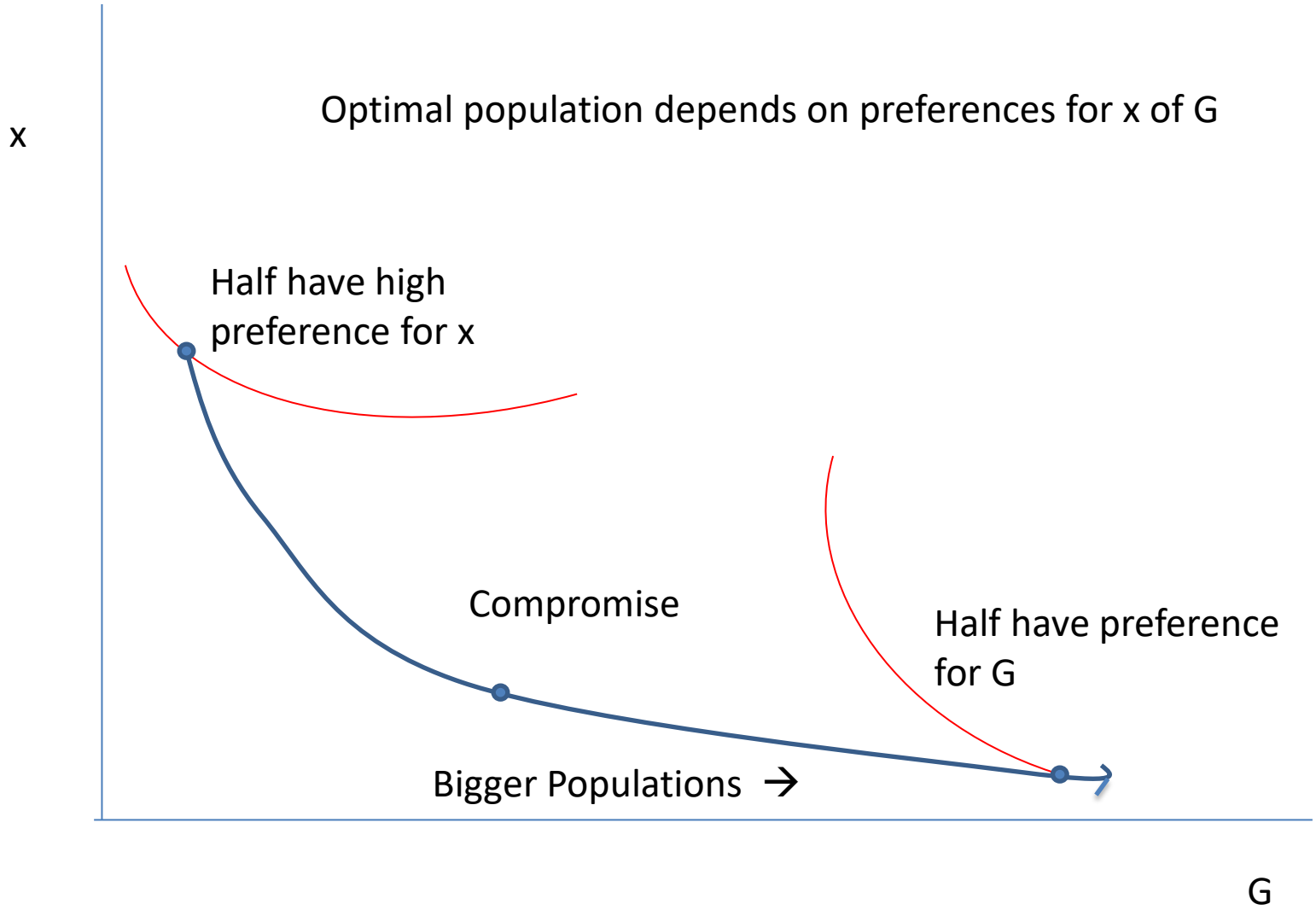




Mixed Population Tries to Vote on Immigration



Compromise worse for both



What will happen?

- A. Voting cycles where they flop back and forth
- B. Compromise where both are strictly worse off then their optimum
- C. Longer term reactions to voting cycles or compromise?

What should we do?

Part 4 Keys to solving public goods problems

Core human motivations

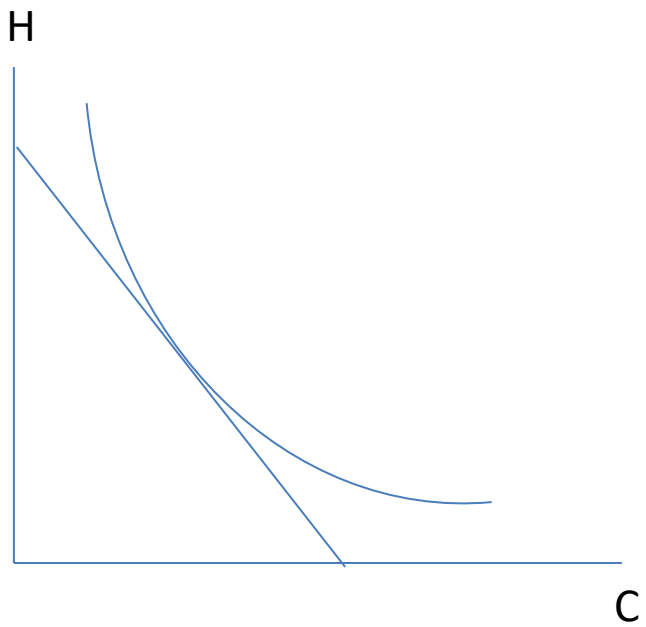
- Neoliberalism
  - A post modernist political philosophy that sees the state as the servant of consumers to assist them in their free “liberalist” individual pursuit of happiness
- Neo-orthodox economics
  - Agents are rational maximizers of their sacrosanct utility functions
    - Economists are never to question the utility function

But..

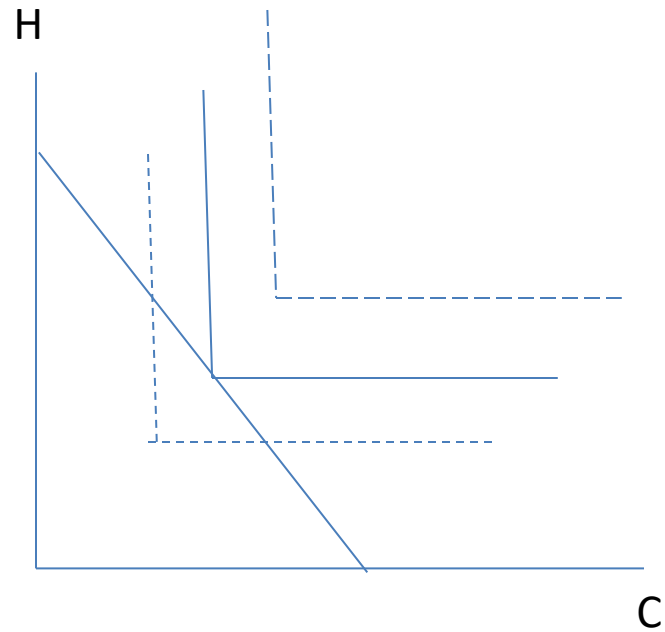
- Consider U(X, G) or for Grossman U(C, H)
  - Problems come from the assumption that C and H are independent
  - We assumed that one could have a meaningful slope on an indifference curve between these two “competing” goods

What if C and H are Complements?

- *Being healthier makes every human experience taste better, feel better, be better*



Myopic path to misery



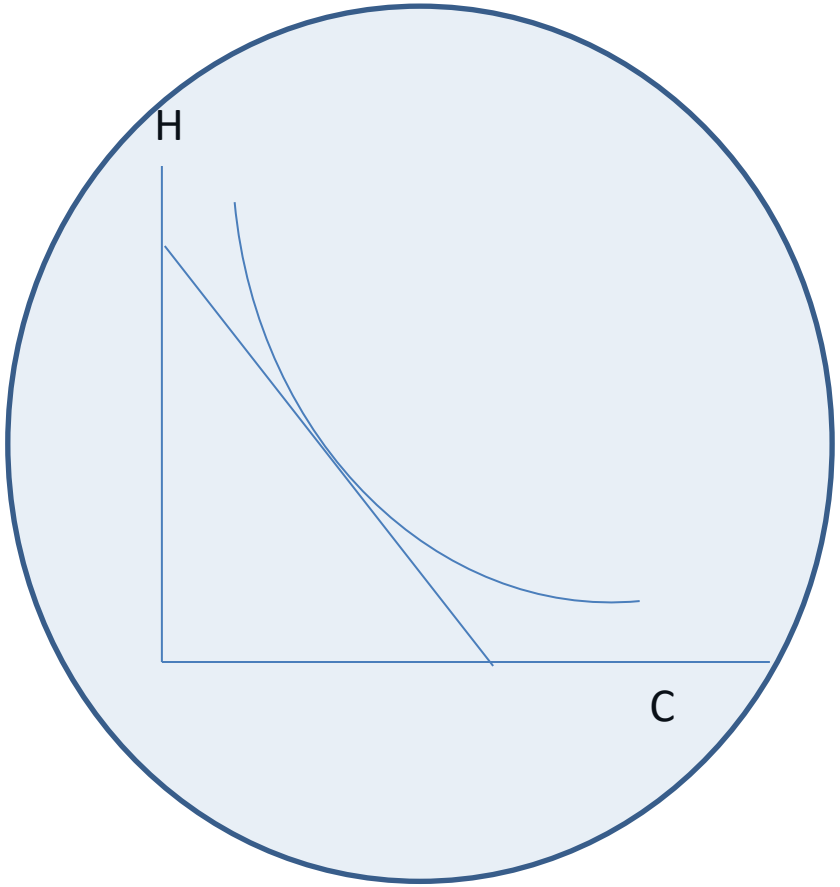
Wise path to well-being

Is it irrational to trade H vs. C?

- Neo orthodox economics says no preference structures are irrational.
- Behavioral economics opens the door for
  - Unstable preferences
  - Myopic preferences
  - Preferences that you can invest in to change

Flaw in Health Economics

- *Current models drive policy with an assumption that H and C are tradable*



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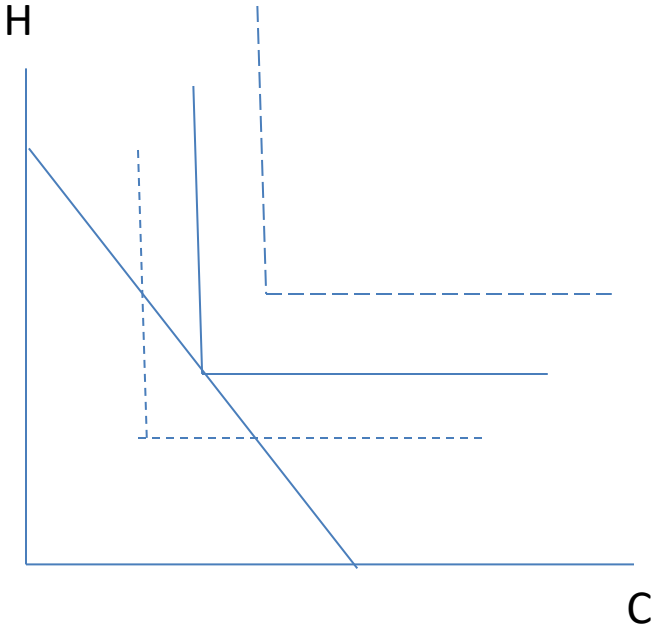

Wise path to well-being

Forms of myopia

- Time-based
  - Health consequences are in far future
- Optimistic bias due to anchoring
  - Because of “X”, bad things won’t happen to me
    - X could be “good genes, neighborhood, amulet”
- Technology can save me
  - There is always a pill
- Social myopia
  - Individual behavior is all that matters for health
  - Air, Water, Behaviors of others don’t matter

Social Myopia

- A misperception that health risks are individual risks rather than shared risks
- Fact-health risks are social
  - Air, Water, Organisms
  - Prices of narcotics, butter, sugar, tobacco
  - Social mimicry of healthy behavior

Random College Roommate Study[1]

- Random dorm assignments
- Weigh in fall and spring of freshman year
- Males gained 1.65 lb.
  - No statistically significant peer effects
- Females gained 2.42 lb.
  - Being assigned to heavier roommate made females gain more weight
  - Skinnier roommates did not lead to weight loss
  - 0.8 lbs. per roommate SD[2]
  - Stronger effects if the roommate had similar social background

[1] Yakusheva, Kapinos, Eisenberg (2014)
[2] SD=23 lb

Public Health to the Rescue

- Potential to use data to reveal the truth of shared risk
- Activate longstanding human capability to solve common pool problems
- Activate motivations from honor, respect, shame, belonging loyalty to contribute to shared solutions to
  - Road safety, Air, Water, Obesogenic environments…

Public Health and Economics

Public Health Practice

- Assess
- Community engaged policy development
- Assure solutions

Common pool solutions

- Must know the nature of the common risk
- Must have shared understanding and trust
- Must have low cost monitoring and norms of reciprocity

Agenda for Action

- Country has 3000 county health departments
- Planet has 60,000 district health departments
  - They are spending most of their time doing clinical services
- Need them to do Assess, Policy Develop, Assure and Engage Community Partnerships

Summary

- Market commodities are only a small part of health and health economics
  - Medical events are dually private public goods
- Common pool problems arise in health and can be solved via social recognition and cooperation
- Public health practice collects and shares data with communities about their health threats to motivate local shared solutions