Principles of Economics

Introduction

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This version: Fall 2021

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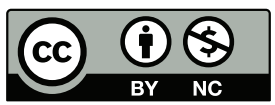


A. Issupoff, *The Bazaar in Samarkand*, 1923

What is Economics

- Economics[1], as a study in human behavior, relates to all of us. Behind the theory of Economics are stories of people and their lives as consumers, workers, and entrepreneurs in an inter-connected world.

- It is the story of
  - a Brazilian farmer who grows coffee beans brewed into espresso in Paris.
  - a New York architect working with engineers in Tokyo to build a school in Cairo.
  - a Chinese migrant worker who sends money home so that his children can go to college.

[1] The word *Economics* derives from the Greek word *Οἰκονομικά*, meaning: household management.

What is Economics

- To study Economics is to study the choices that people make as consumers, workers, and entrepreneurs, given the constraints they face in a world of limited resources, and the individual and collective consequences of their choices.
  - Every economic issue involves, at its most basic level, individual choice – decisions by an individual about what to do and what not to do.
  - The fundamental reason that people need to make choices is **scarcity**: our unlimited wants exceed our limited resources.
  - Individual choices are not independent. Each person's choices can affect other people. Hence it is important to study the interaction of individual choices and their collective consequences.

What is Economics

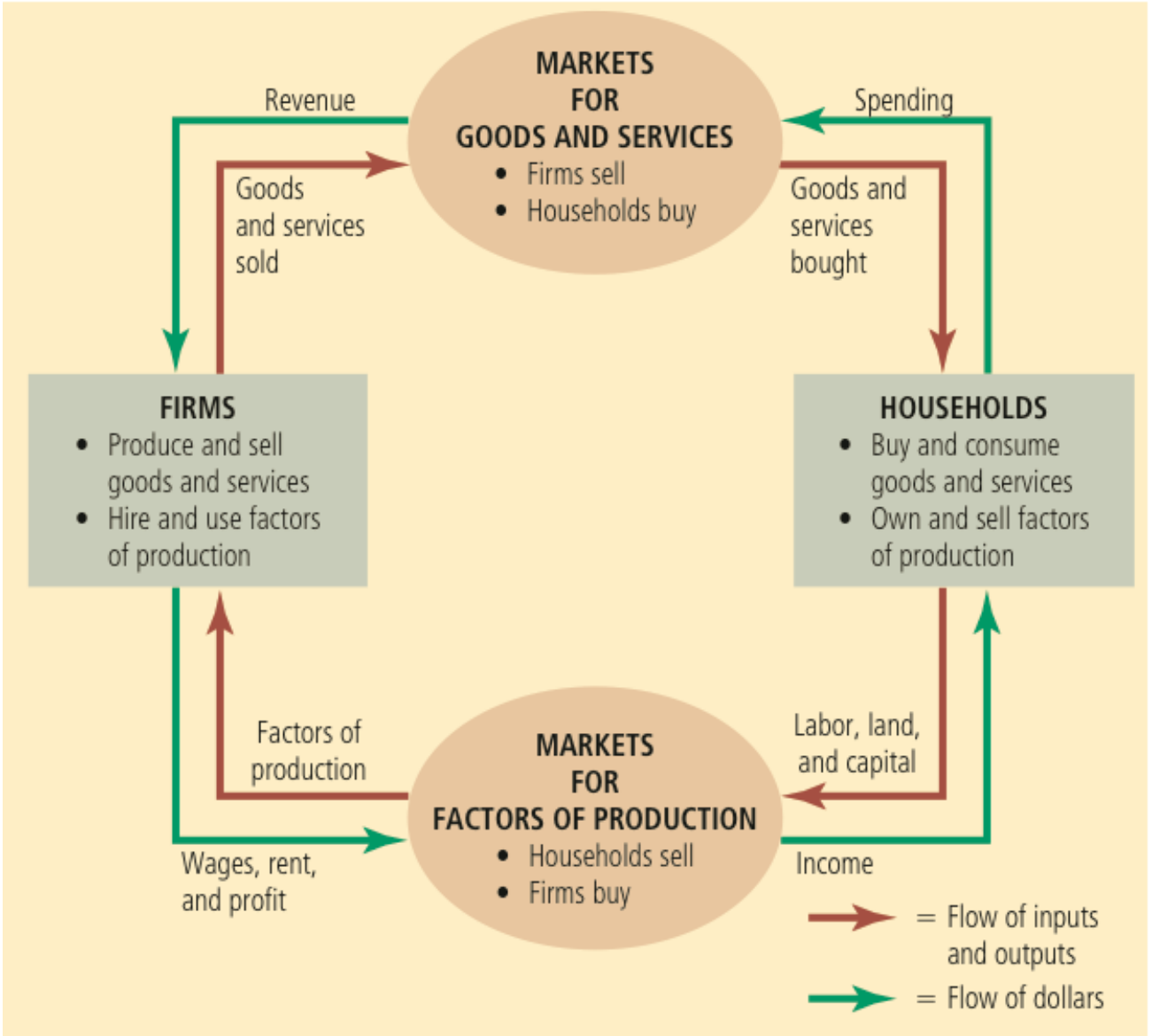
"Economics is a science which studies human behavior as a relationship between ends and scarce means which have alternatives uses." – Lionel Robbins, Essay on the Nature and Significance of Economic Science[2].

[2] See Backhouse and Medema (2009) for an account of the evolution of the definition of Economics.

What is Economics

- **Microeconomics**
  - How individuals and households decide what to buy, how much to work, how much to save, etc.
  - How firms decide what to produce, how much to produce, how many workers to hire, etc.
  - The interaction of households, firms, and governments in markets for particular goods and services.
- **Macroeconomics**
  - Aggregate outcomes of household, firm, and government choices, including inflation, unemployment, business cycles, and economic growth.

A Circular Diagram of the Economy



The Study of Economics

- **Microeconomics**
  - **Labor Economics**: labor markets
  - **Industrial Organization**, **Corporate Finance**: firms and product markets
  - **Finance**: financial markets
  - **Public Economics**, **Political Economy**: the government sector
  - **International Trade**, **International Finance**: world goods and financial markets
- **Macroeconomics**
- **Econometrics**

The Study of Economics

- Economics study the economic exchanges and their outcomes in all these markets, but it starts with the study of the *individual*: how each person makes her choices, decides what to buy, whether to work, how to invest, and interact with other people in market and non-market settings.

- The individual is the building block for the economy. Hence economics is a social science: at the most fundamental level, it is a study of human behavior.

The Micro-Foundation Revolution

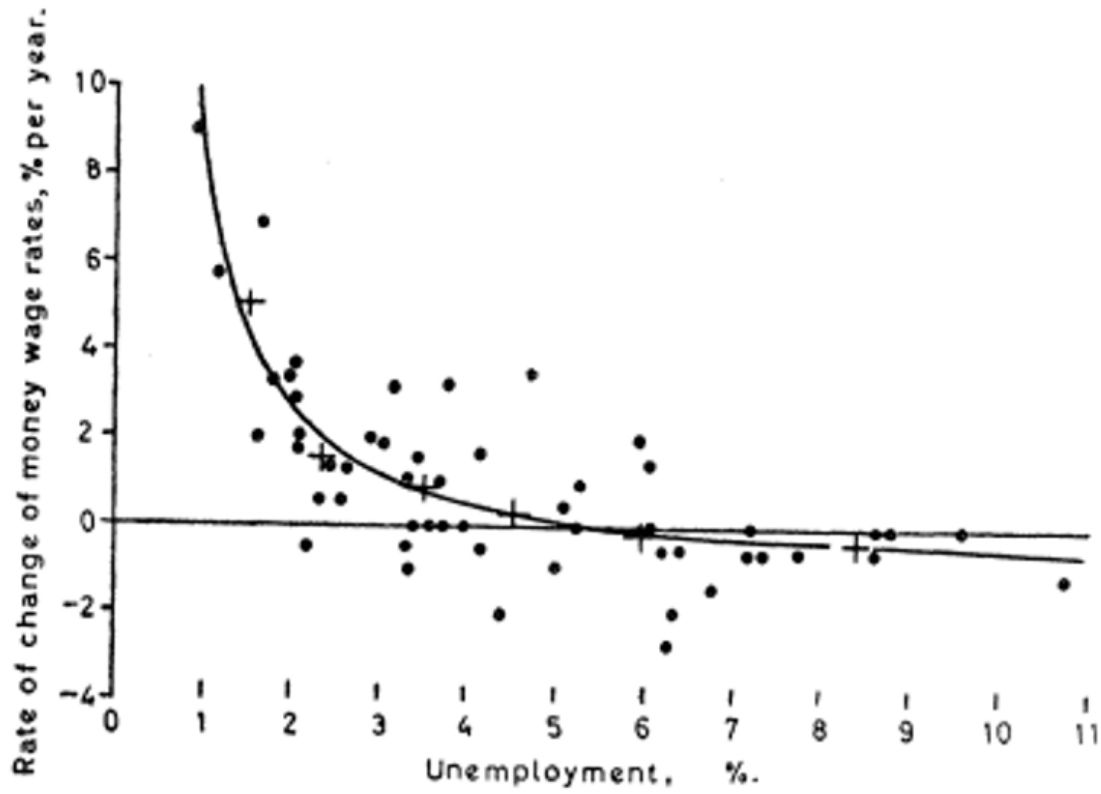
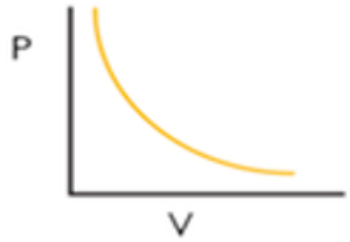


Fig.1. 1861 – 1913

P140512-2p Source: AWH Phillips, The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957, Economica 1958

The Micro-Foundation Revolution

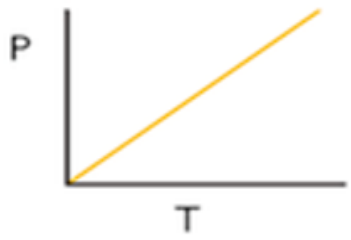
Boyle-Marriotte Law



P and V are inversely proportional at constant T and n.

$$P_1 V_1 = P_2 V_2$$

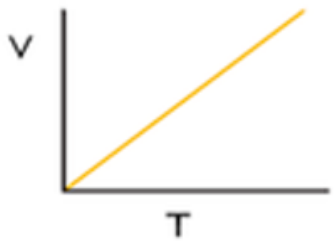
Gay Lussac´s Law



P and T are directly proportional at constant V and n.

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

Charles´s Law



T and V are directly proportional at constant P and n.

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

The Methodology of Economics

- Individual behavior: **decision theory**
- Individual interaction: **game theory**
- Competitive markets: **supply and demand**

Decision Theory

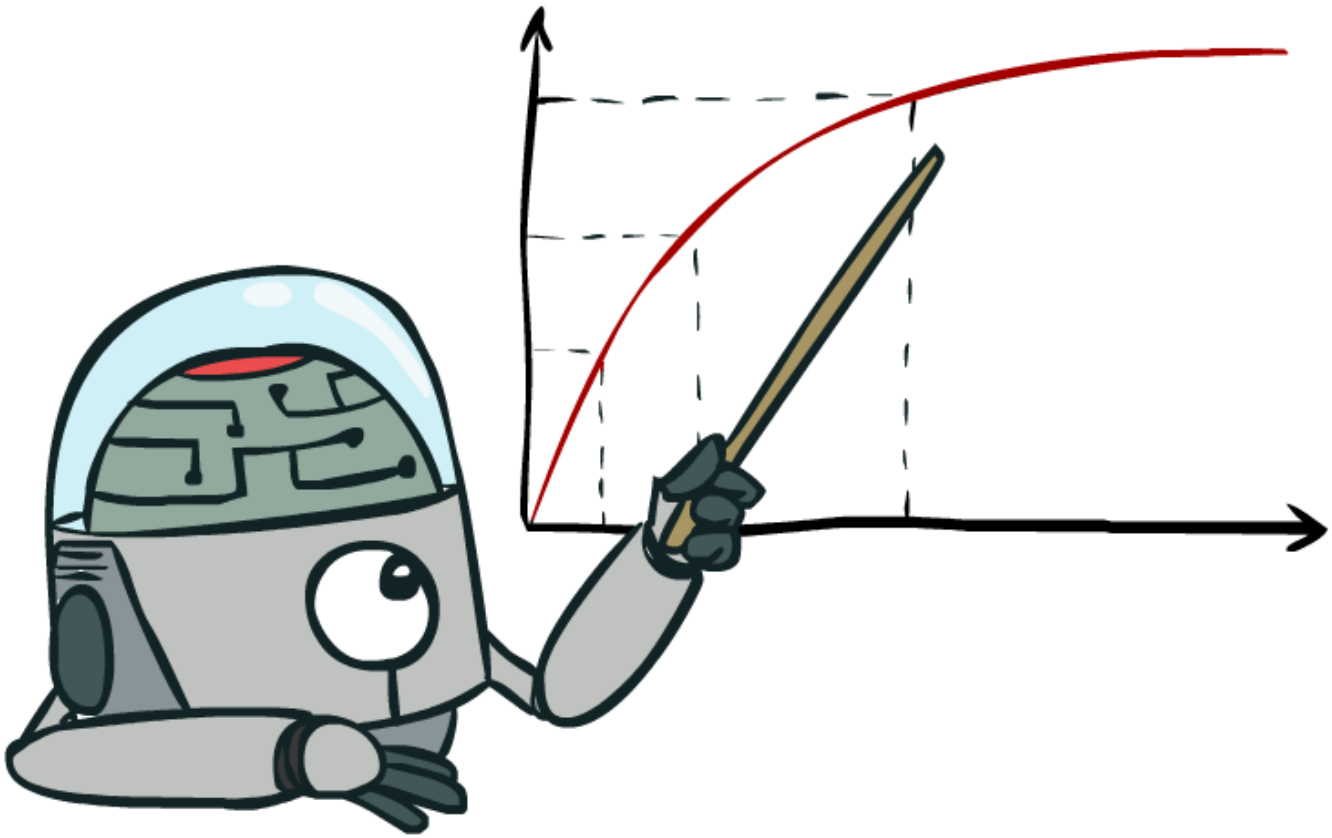
Economic models of individual behavior typically assume that agents (people, households, firms, governments) are **rational** (*Homo Economicus*).

Assumption (The Rational Agent Assumption)

*Individuals make choices by evaluating the expected costs and benefits (**expected utility**) of each available option and picking the best alternative.*

- Simply put, the rationality assumption states that "*people always do the best they can.*"

Homo Economicus



Opportunity Cost

- The rationality assumption can be equivalently stated as follows: an individual would choose an option as long as its benefit is greater than its opportunity cost.
- **Opportunity cost**: the value of the next best alternative.
  - Every choice involves a tradeoff: when you choose something, you have to give up something else.
  - The cost of something is the value of what must be given up in order to have it.

Opportunity Cost

Opportunity cost can include both **explicit (direct) cost** and **implicit (indirect) cost**.

- The cost of going to college
  - Explicit cost: tuition, etc.
  - Implicit cost: lost wages, etc.
- The cost of seeing a movie
  - Explicit cost: movie ticket
  - Implicit cost: the highest value you can get by using the time to do something else

Opportunity Cost

Example

An individual is facing three options. The benefits associated with each option are (π_1, π_2, π_3). The direct costs associated with each option are (d_1, d_2, d_3). Suppose $\pi_1 - d_1 > \pi_2 - d_2 > \pi_3 - d_3$. Let c_i denote the opportunity cost of option i. Then

- $c_1 = \pi_2 - d_2 + d_1$. The individual will choose option 1 if $\pi_1 > c_1$. Since this is true, option 1 will be chosen.
- $c_2 = \pi_1 - d_1 + d_2$. The individual will choose option 2 if $\pi_2 > c_2$. Since this is not true, option 2 will not be chosen.
- $c_3 = \pi_1 - d_1 + d_3$. The individual will choose option 3 if $\pi_3 > c_3$. Since this is not true, option 3 will not be chosen.

Opportunity Cost

Example

You are given a free ticket to see a performance at Banlam Theatre (which has no resale value). The Xiamen Philharmonic is performing on the same night and is your next-best alternative activity. Tickets to the Xiamen Philharmonic concert cost 60 yuan. On any given day, you would be willing to pay up to 100 yuan to attend a Xiamen Philharmonic concert. Assume there are no other costs of seeing either performance. What is the opportunity cost of going to see the performance at Banlam Theatre?

Opportunity Cost

Example (Sunk Cost Irrelavancy)

A 200-seat plane is about to take off with 10 empty seats. The flight costs the airline $100,000. A passenger arriving at the last minute is hoping to purchase a ticket for one of the remaining seats. How much should the airline charge her?

Opportunity Cost

Marginal Cost and Marginal Benefit

When the choice set is continuous rather than discrete, the optimal choice is where marginal benefit = marginal cost.

- **Marginal benefit** (**MB**): the benefit from a small increase in the amount of the chosen option
- **Marginal cost** (**MC**): the opportunity cost of a small increase in the amount of the chosen option

Marginal Cost and Marginal Benefit

Example

You are trying to decide how much effort to spend on doing a project. Let $\pi(e)$ be the return of spending an amount of effort e on the project. Then $\pi'(e)$ is the *marginal benefit* of spending one more unit of effort. Since the more effort you make, the better your project will be, $\pi'(e) > 0$.

On the other hand, making effort brings pain and suffering. Let $c(e)$ be the (physical or psychological) cost of exerting effort[a]. Then $c'(e)$ is the *marginal cost* of spending one more unit of effort, and $c'(e) > 0$.

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[a] Here we assume there is no other beneficial use of your time/effort, so that $c(e)$ represents both the direct cost and the opportunity cost here.

Marginal Cost and Marginal Benefit

Example (cont.)

To choose the optimal level of effort, you should choose a e^* that maximizes $\pi(e) - c(e)$. Equivalently, you should continue exerting effort on the project as long as $\pi'(e) > c'(e)$, and until $\pi'(e) = c'(e)$ (if that ever happens)[a].

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[a] If $\pi'(0) > c'(0)$, $\pi''(e) < 0$ (*decreasing marginal benefit*) and $c''(e) > 0$ (*increasing marginal cost*), then there must exist a $e^* > 0$ such that $\pi'(e^*) = c'(e^*)$.

A Study of Incentives

In many cases, the rational agent assumption is a strong but reasonable approximation to the idea that "*people generally attempt to do the best they can*."

- When gas taxes rise, people use public transportation, and travel less.
- When interest rates rise, people save more and consume less.
- Given unemployment benefits, people have less incentives to work.
- Given health insurance, people have more incentives to consume health care services.
- When governments bailout banks in trouble, banks have incentives to over-leverage.

A Study of Incentives

"Most of economics can be summarized in four words: 'People respond to incentives.' The rest is commentary." – Steven Landsburg

Game Theory

- Game theory is the study of strategic interaction among multiple rational agents.
- The outcomes affecting a person depend not only on the person's own action, but on the actions of others.
- Individuals choose their best actions while taking into account the actions that others might take.
  - need to understand what others will do
  - need to understand what others think you will do
  - ...

Prisoner's Dilemma

Two robbery suspects are arrested and questioned by police in separate rooms. The police does not have enough evidence to charge them for robbery. A deal is offered to the prisoners: each is given the opportunity either to testify that the other committed the robbery, or to remain silent.

- If A testifies against B and B remains silent, then A is set free and B gets 12 months in jail.
- If both remain silent, each will get 1 month in jail.
- If both testify, then they will each get 10 months in jail.

Prisoner's Dilemma

Payoffs

		Prisoner 2	
		silent	testify
Prisoner 1	silent	-1,-1	-12,0
	testify	0,-12	-10,-10

- Nash equilibrium: $(-10, -10)$
- Applications: price competition, the tragedy of the commons

Hawk-Dove

Two animals are contesting for a resource with value V. Each animal can act in either an aggressive (Hawk), or peaceful (Dove) manner.

- If both are hawks, they will fight. Each wins with probability $\frac{1}{2}$ and pays a cost C.
- If both are doves, they share the resource evenly.
- If one is a hawk and the other a dove, the hawk takes the entire resource.

Hawk-Dove

Payoffs

		Player 2: Hawk	Player 2: Dove
Player 1	Hawk	$\frac{1}{2}V - C, \frac{1}{2}V - C$	$V, 0$
	Dove	$0, V$	$\frac{1}{2}V, \frac{1}{2}V$

Assuming $C > \frac{1}{2}V > 0$,

- Nash equilibrium: $(V, 0), (0, V)$
- Applications: foreign policy

Choosing a Town: Version 1

- A population of N people simultaneously choose to live in one of two towns: East Town and West Town. Each town can accommodate all N people.
- All individuals prefer to live in a town with more people. The payoff of living in a town with n people is

$$u_i(n) = \frac{n}{N}$$

- Nash equilibrium: all people live in one town.
- Applications: network effects

Choosing a Town: Version 2

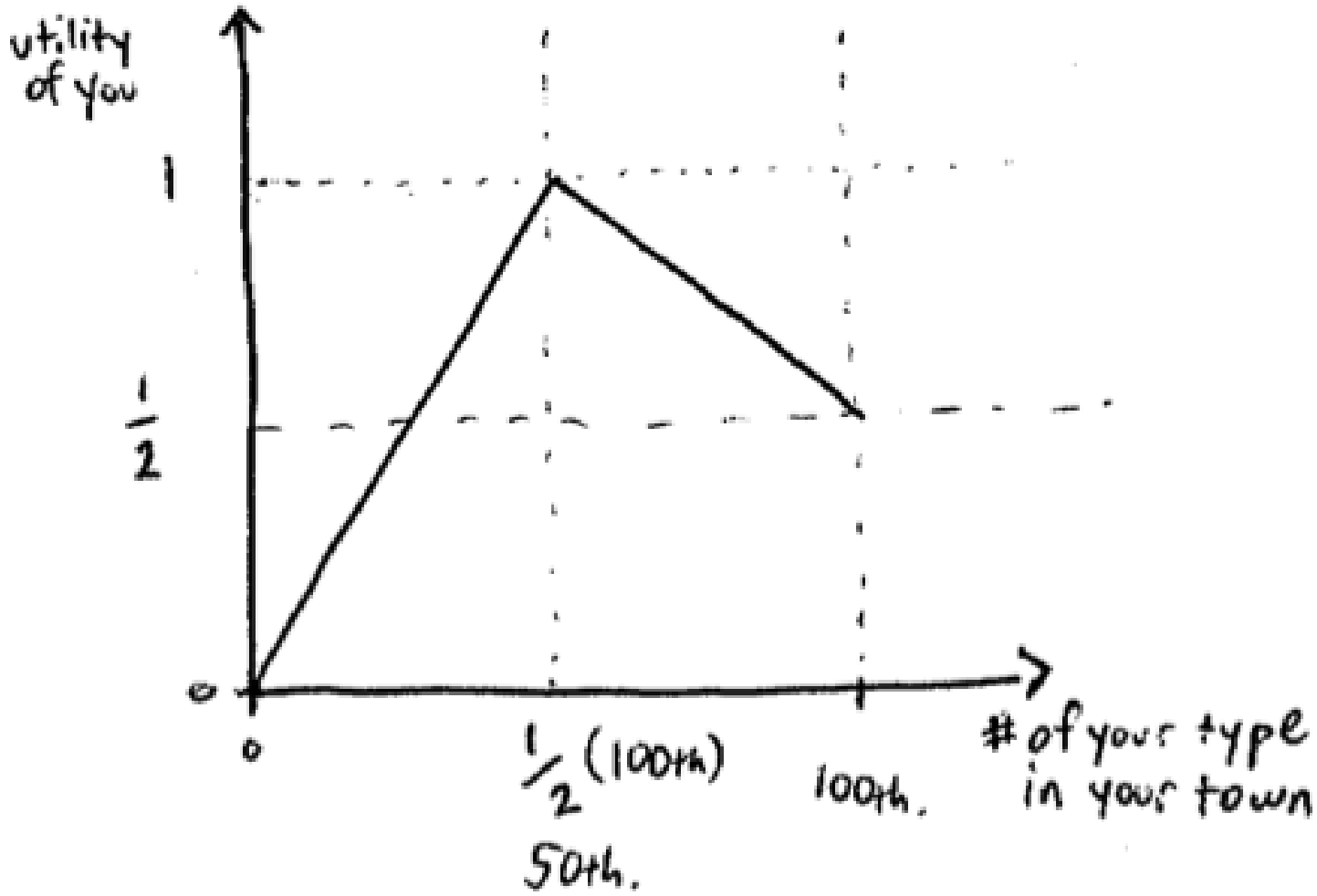
- A population of N can be divided equally into two types of people: tall and short.
- Each simultaneously chooses to live in one of two towns: East Town and West Town. Each town can hold $\frac{1}{2}N$ people[3].
- Let q_τ be the proportion of a town's residents who are of type τ. The payoff to an individual i of type τ who chooses to live in a town of q_τ is:

$$u_i^\tau(q_\tau) = 2q_\tau \mathcal{I}_{q_\tau \in [0,\frac{1}{2}]} + \left(\frac{3}{2} - q_\tau\right) \mathcal{I}_{q_\tau \in (\frac{1}{2},1]}$$

  - People prefer to live in mixed towns, but if they're going to live in a town that's not mixed, they'd rather live in a town in which they're the majority.

[3] If $n > \frac{1}{2}N$ chooses one town, then $\left(n - \frac{1}{2}N\right)$ people will be randomly chosen to be relocated to the other town.

Choosing a Town: Version 2



Choosing a Town: Version 2

- Nash equilibrium: all tall people in one town and short people in the other.
- Applications: racial and ethnic segregation
- Even though everyone prefers mixed towns, the game results in segregation as stable outcome.
- Conversely, observed segregation may not imply there is a preference for segregation.

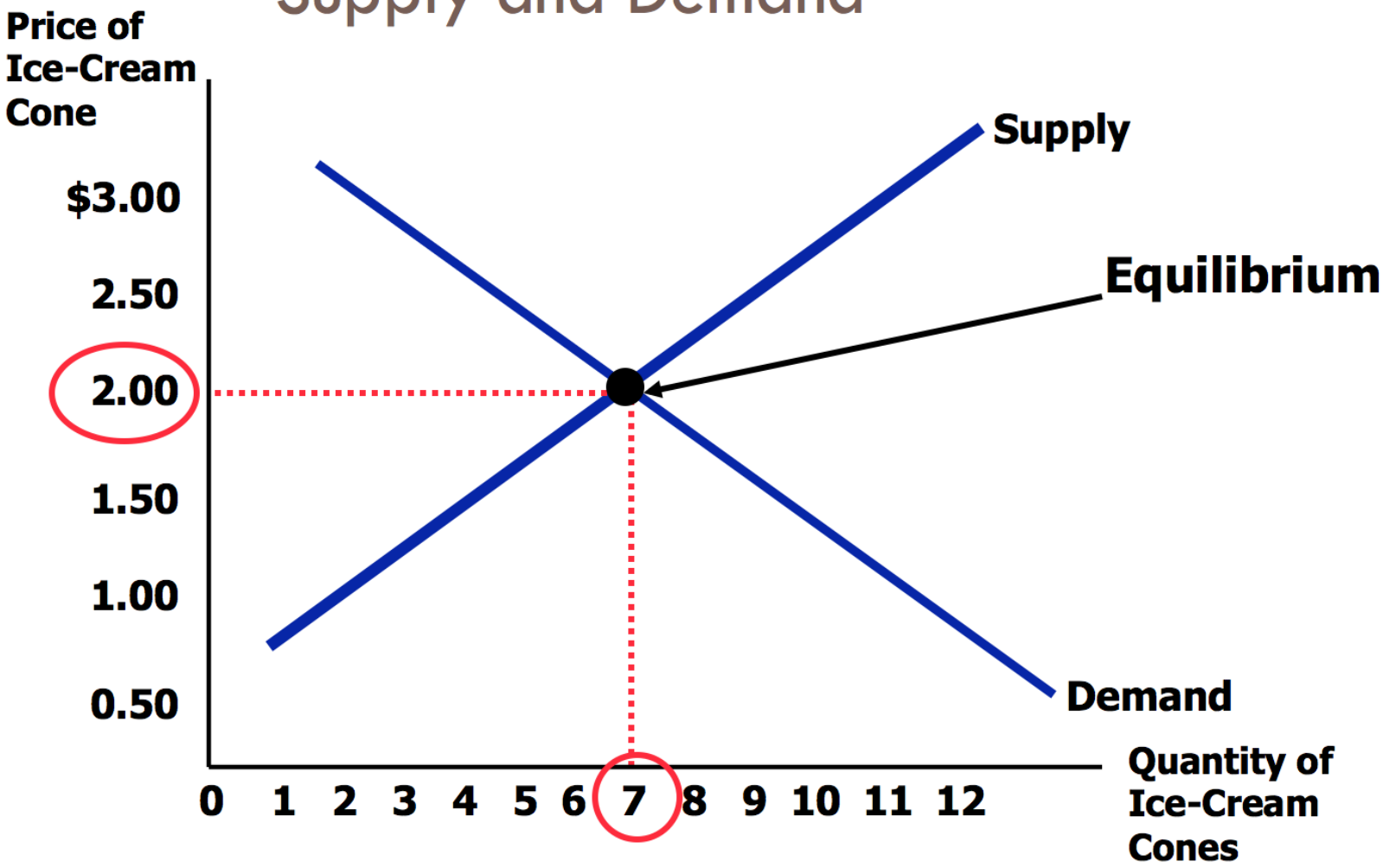
Hotelling Location Choice

- Consumers are located uniformly on a single street. Two sellers selling an identical product decide where to locate on this street. Each consumer has demand for 1 good and will buy from the seller located nearest to her. How should the two sellers choose their locations?
- Nash equilibrium: the two sellers locate next to each other in the middle of the street
- Applications: political elections

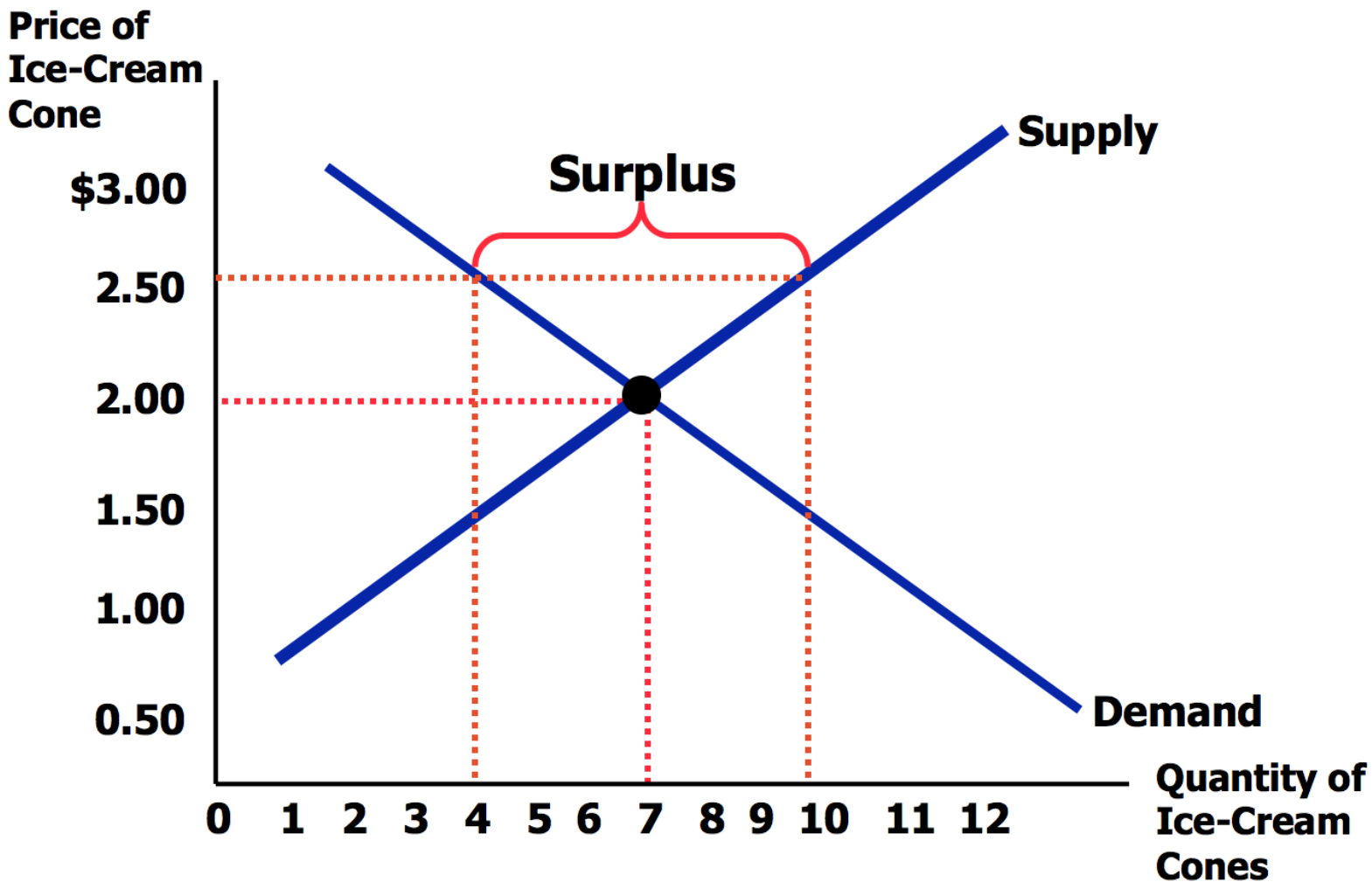
Supply and Demand

- A market is a group of buyers and sellers of a particular good or service.
- When numerous rational agents interact in a market setting, the model of supply and demand is used to analyze its outcomes.
- **Market equilibrium** occurs when quantity demanded = quantity supplied.
- Price acts like an invisible hand and adjusts to balance supply and demand, so that the market will reach equilibrium.

Equilibrium of Supply and Demand



Excess Supply



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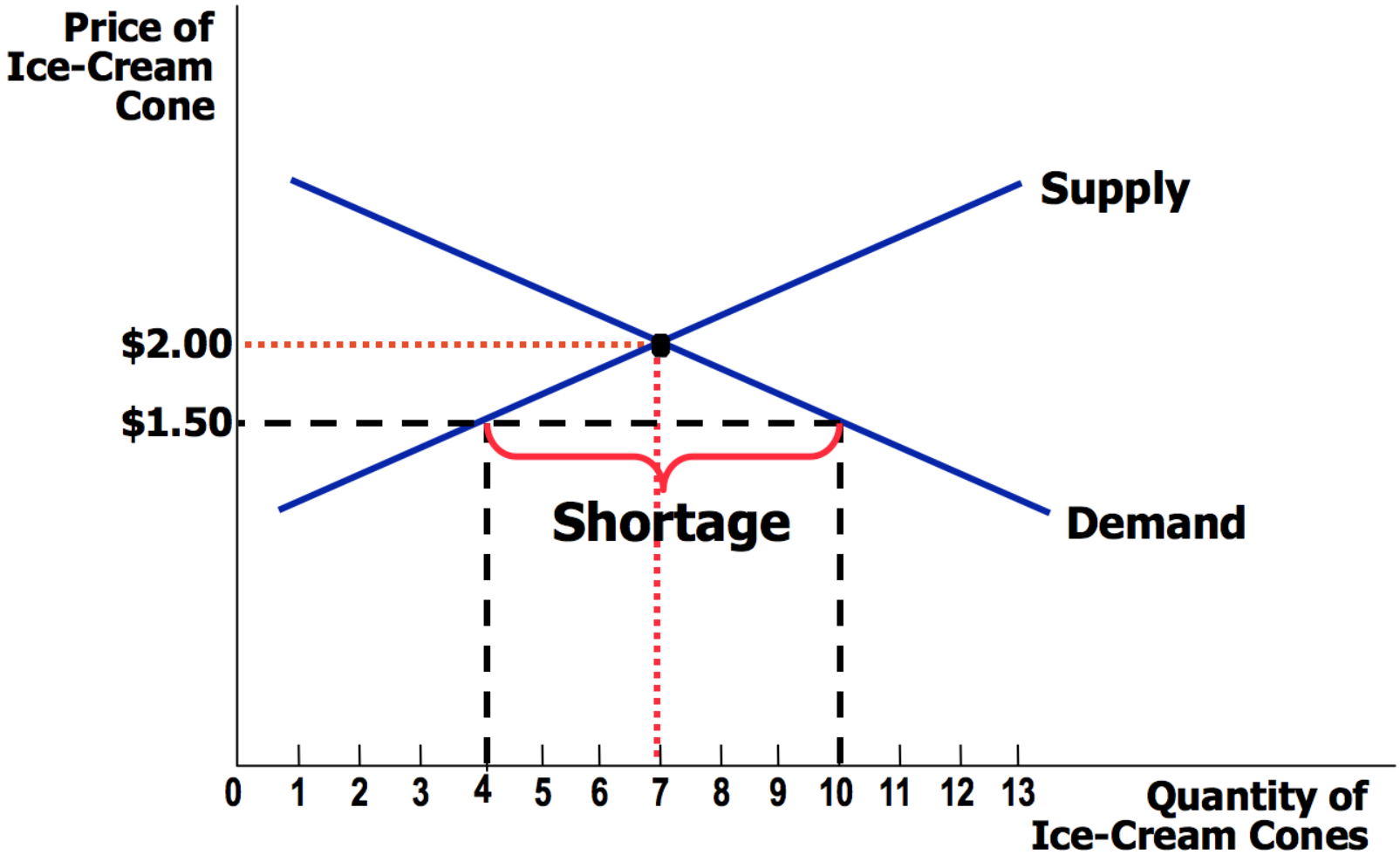
Excess Demand



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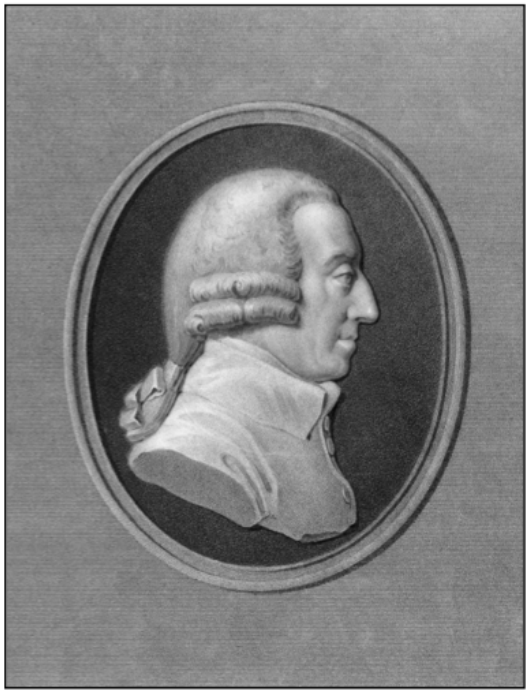
Adam Smith and the Invisible Hand

Passages from *The Wealth of Nations*, 1776



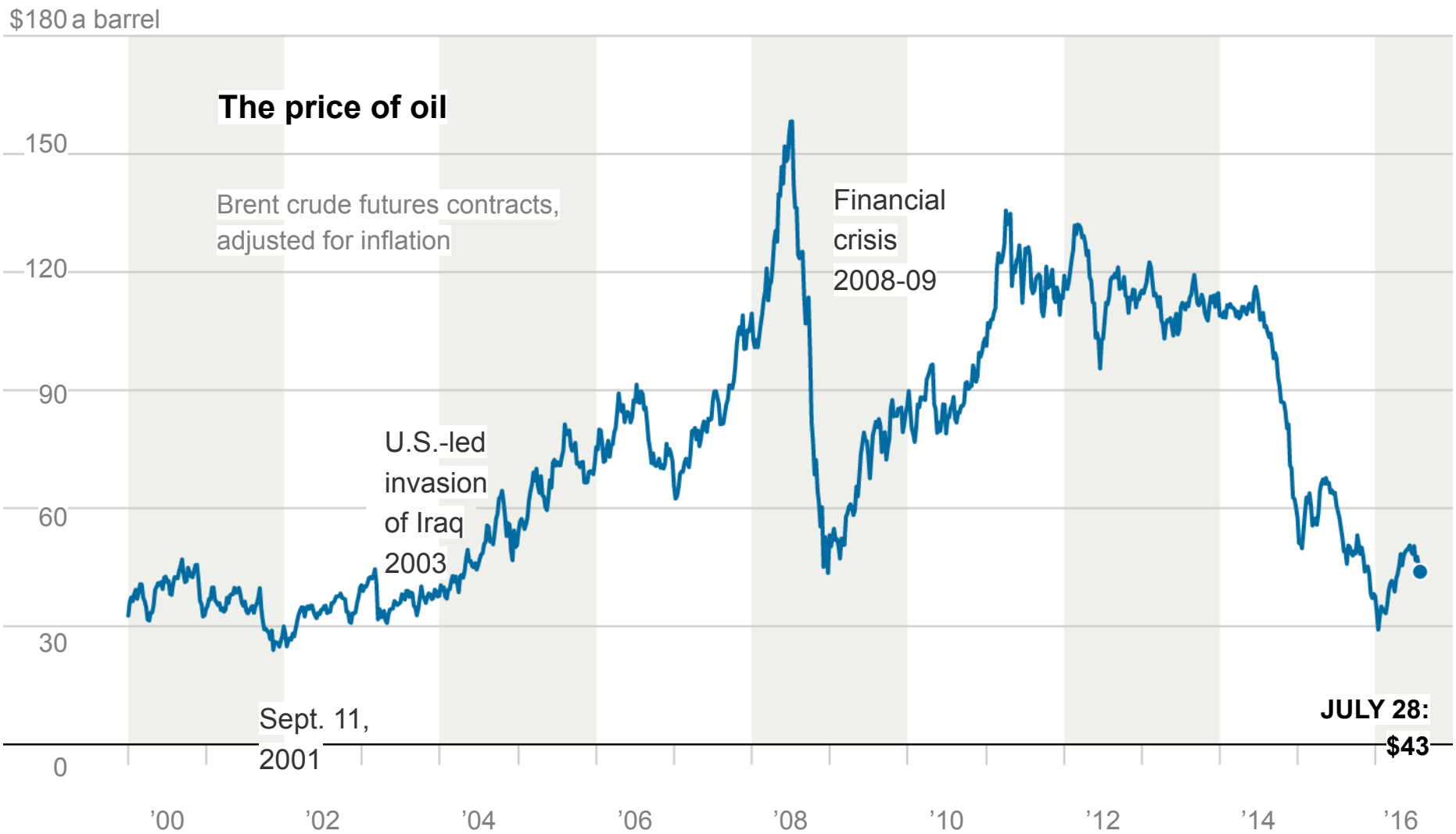
Adam Smith, 1723-1790

"Every individual…neither intends to promote the public interest, nor knows how much he is promoting it….

He intends only his own gain, and he is in this, as in many other cases, led by **an invisible hand** to promote an end which was no part of his intention.

Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it."

Oil Price



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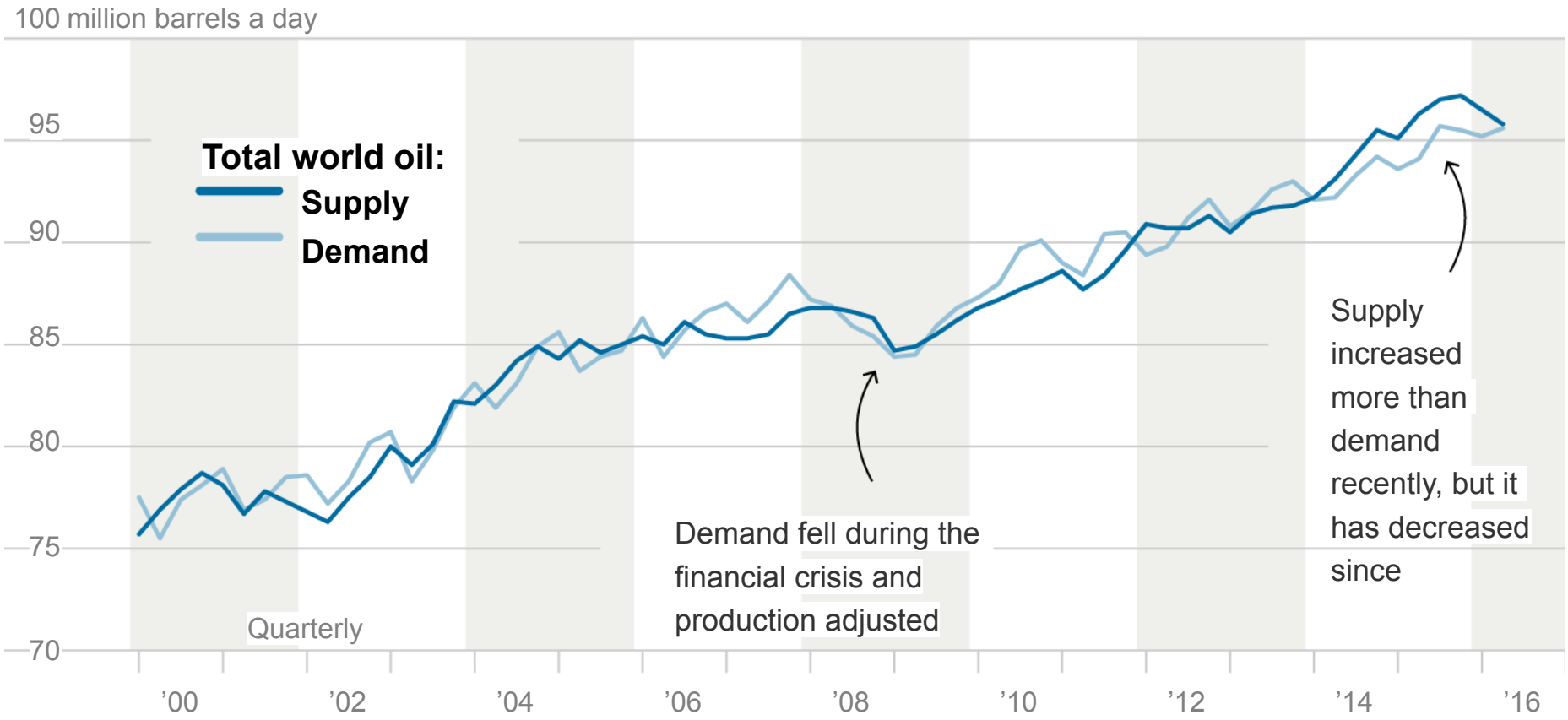
Oil Price



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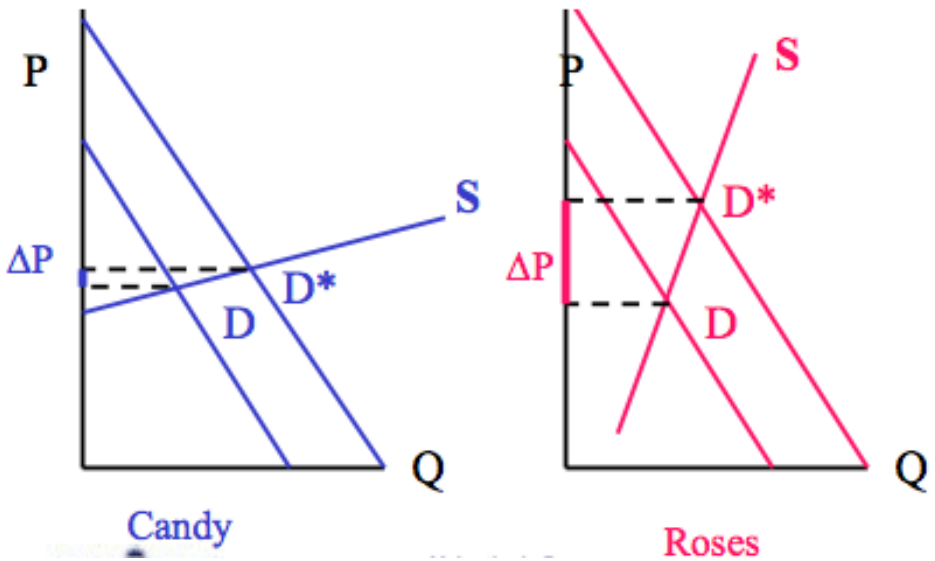
Valentine's Day

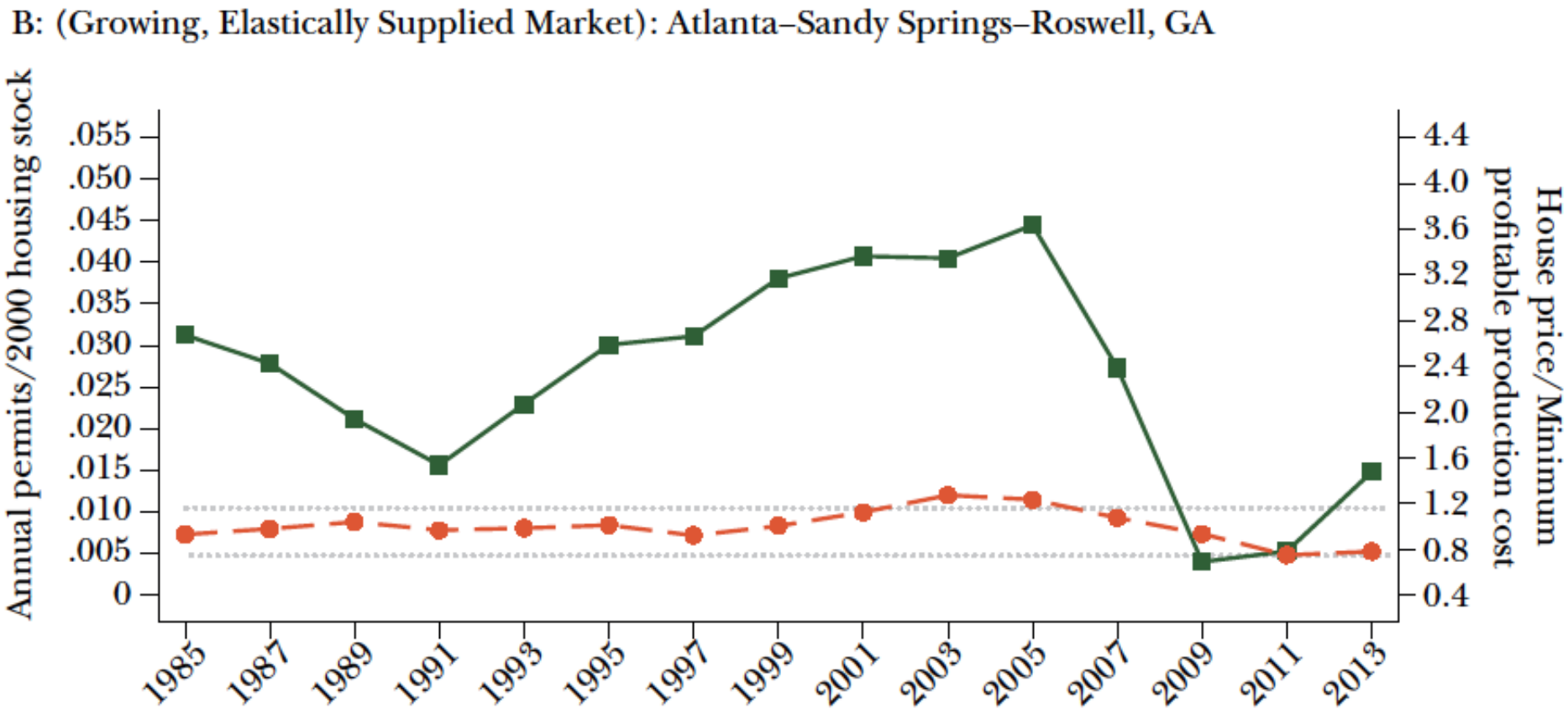
- Both chocolate and roses cost more on Valentine's Day. However, Roses cost a lot more, while chocolate costs a little more.
- Difference: chocolate candies are storable while roses are not. The supply of roses is more inelastic.



Housing Markets

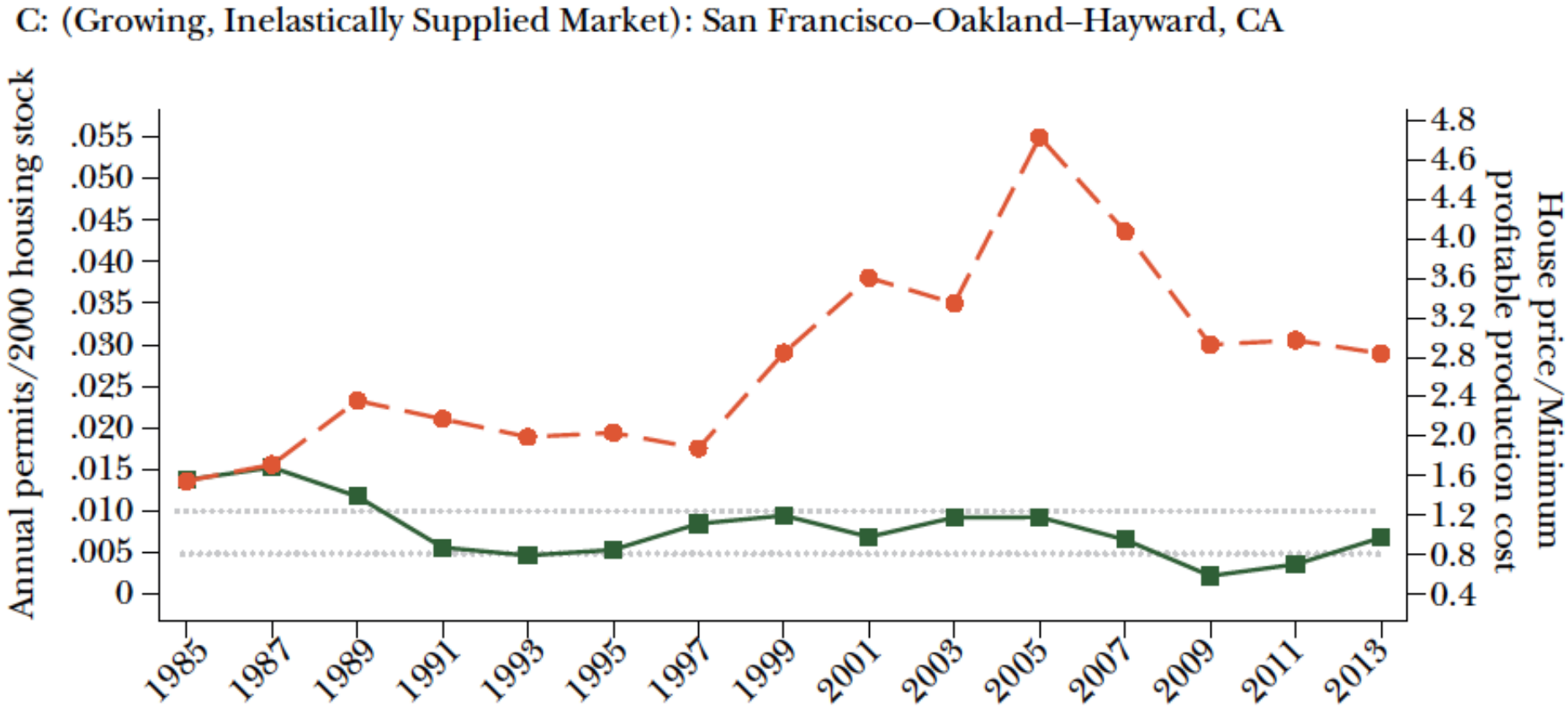
1. Rising housing demand and elastic housing supply
   - Result: *large* increase in housing supply and *small* increase in housing price. E.g., Atlanta
2. Rising housing demand and inelastic housing supply
   - Result: *small* increase in housing supply and *large* increase in housing price. E.g., San Francisco
3. Declining housing demand
   - When housing demand declines, because housing is durable, housing supply will *not* decrease (in the short run).
   - Result: decrease in housing price only.

Housing Markets



Glaeser and Gyourko (2018)

Housing Markets

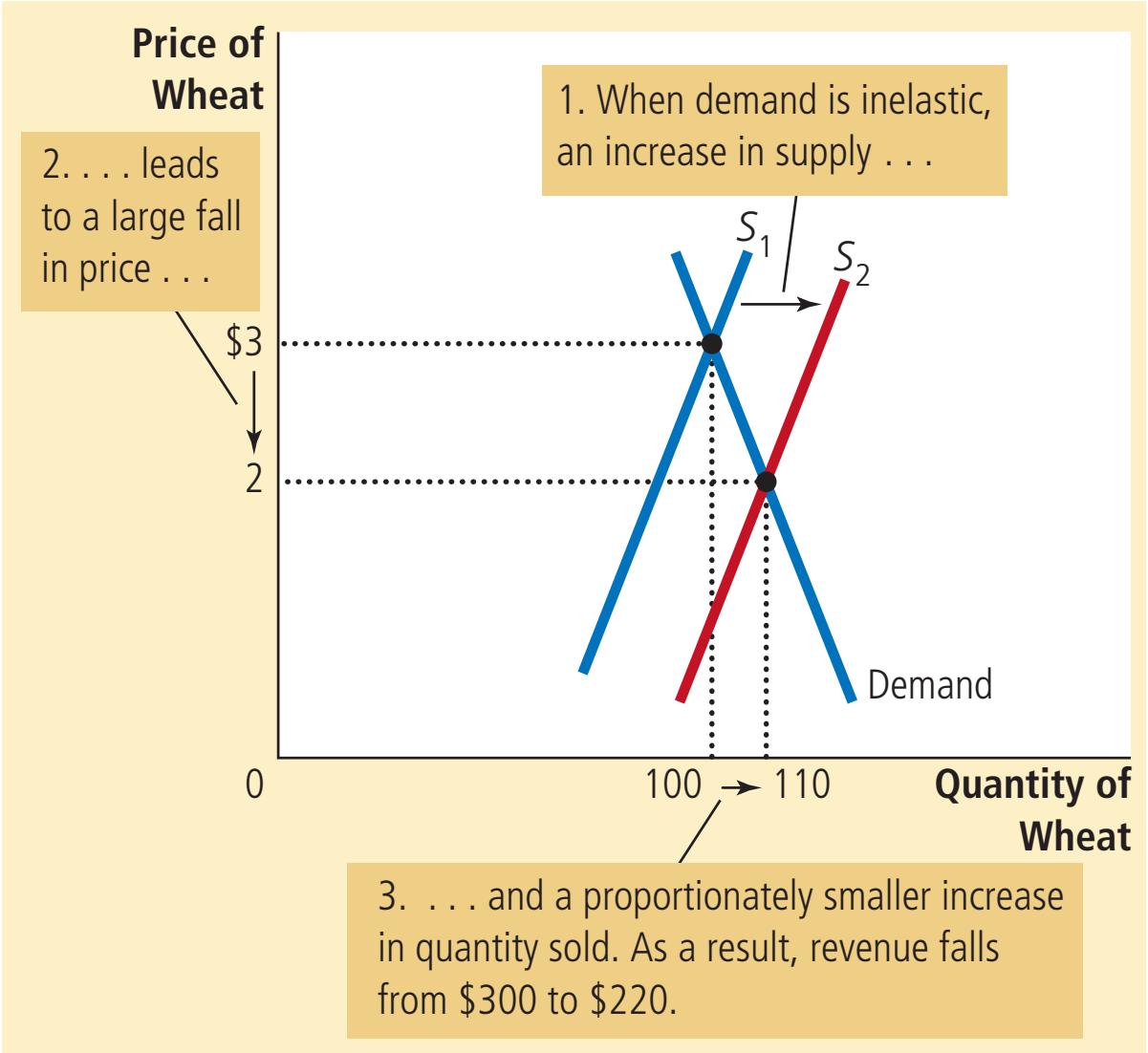


Glaeser and Gyourko (2018)

Technology and Farming

- Demand for many crops is inelastic.
- Technological progress in agriculture increases supply and leads to a *decrease* in total farming revenue.
- If new technologies are bad news for farmers, why would they adopt them?

Technology and Farming



Economics as both Science and Policy Tool

- Economics is both a science and a toolkit for advising on policy.
- Science progresses through the formulation and testing of theory. A defining characteristic of scientific theory is **falsifiability**.
  - A theory is falsifiable if it is possible, in principle, to prove it wrong using evidence.
    - ★ e.g., the statement "the sun will rise in the morning" is falsifiable, while the statement "unicorn exists" is not[4].
- Similarly, Economics works by formulating economic theories and testing their hypotheses using data.

[4] In many cases, we will never be able to prove a theory "right": even if it has been tested correct 1000 times, it can fail on the 1001-th time. Passing each test, however, means that the theory is less likely to be wrong and this is the inductive nature of our scientific knowledge.

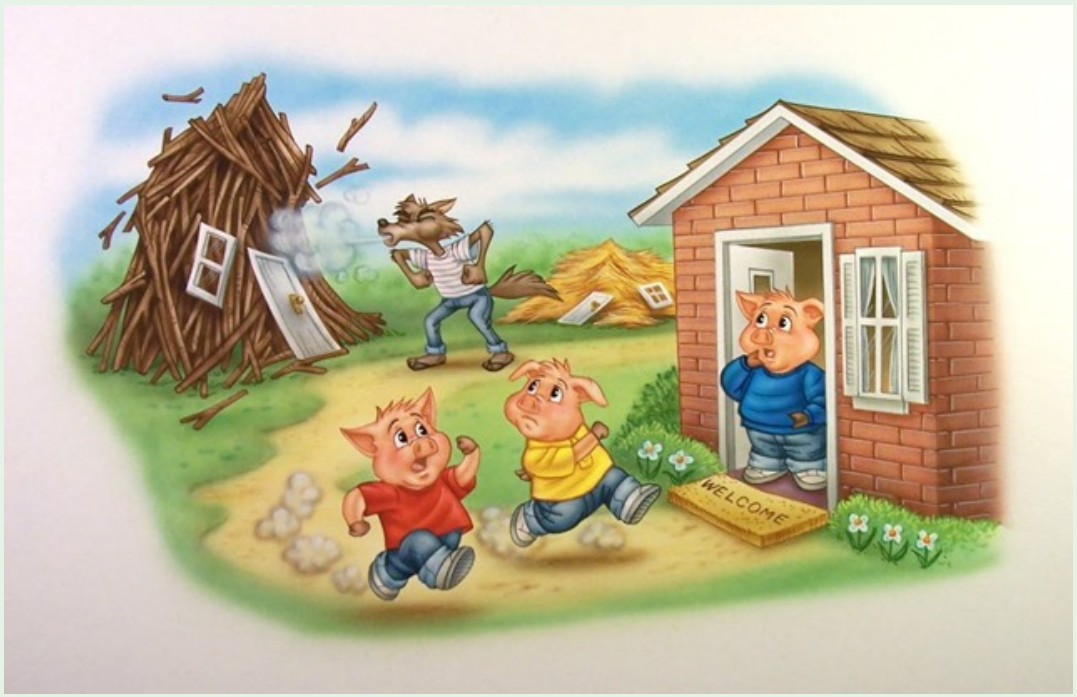
Economics as both Science and Policy Tool

- As social science, economics makes **positive statements** about how things work.
  - e.g., "minimum-wage laws cause unemployment."
- As a policy tool, economics makes **normative statements** about how things should be.
  - e.g., "the government should raise the minimum wage."
  - Normative statements contain value judgement.

Economics as both Science and Policy Tool

The Three Little Pigs

"Little pig, little pig, let me come in!"
"No, no, by the hairs on my chinny-chin-chin!"
"Then I'll huff and I'll puff and I'll blow your house in!"



Economics as both Science and Policy Tool

The Three Little Pigs: Positive Analysis

Why did the three piggies build different houses?

- They vary in their work ethic (standard interpretation)
- They have different income or face different costs
- They vary in their risk expectation
- They have the same risk expectation but have different degrees of risk aversion.

Economics as both Science and Policy Tool

The Three Little Pigs: Normative Analysis

What should the piggie government do?

- Government should invest in school programs that teach piggies to work hard and don't slack.
- Government should educate piggies on the risk of wolfies.
- Government should subsidize brick housing.
- Government should mandate brick houses in construction standards.
- Government should leave the piggies alone. The loss of two piggies doesn't suggest market failure. If piggies think it optimal not to invest *ex ante* and end up suffering losses *ex post*, so be it.

Critique from Political and Social Sciences

- In microeconomic theory, the unit of account is an individual, as opposed to a family, a tribe, a nation, or other types of social group.
- To the extent that people cooperate with one another, it is because they calculate that cooperation will serve their individual self-interest better than if they act on their own.
- Microeconomic theory is therefore inherently **individualistic**[5].

[5] See discussions in Fukuyama (2018)

Critique from Political and Social Sciences

- Economic assumptions on human behavior do not satisfactorily explain the suicide bomber, or a host of other cases where something other than material self-interest appears to be in play[6].
- To say that Mother Teresa and a Wall Street hedge fund manager are both maximizing their utility misses something important about their motivations.
- Economic theory does not explain **identity**.

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[6] Many economists would argue that economic theory says nothing about the ultimate preferences or utilities that people choose. It speaks only to the ways in which preferences are rationally pursued. The problem is that economic theory has little predictive value if preferences are not limited to something like material self-interest. If one broadens the notion of utility to include extremes of both selfish and altruistic behavior, one is not saying much more than the tautology that people will pursue whatever it is they pursue. What one really needs is a theory of why some people pursue money and security, while others choose to die for a cause or to give time and money to help other people.

The Future of the Economics Science

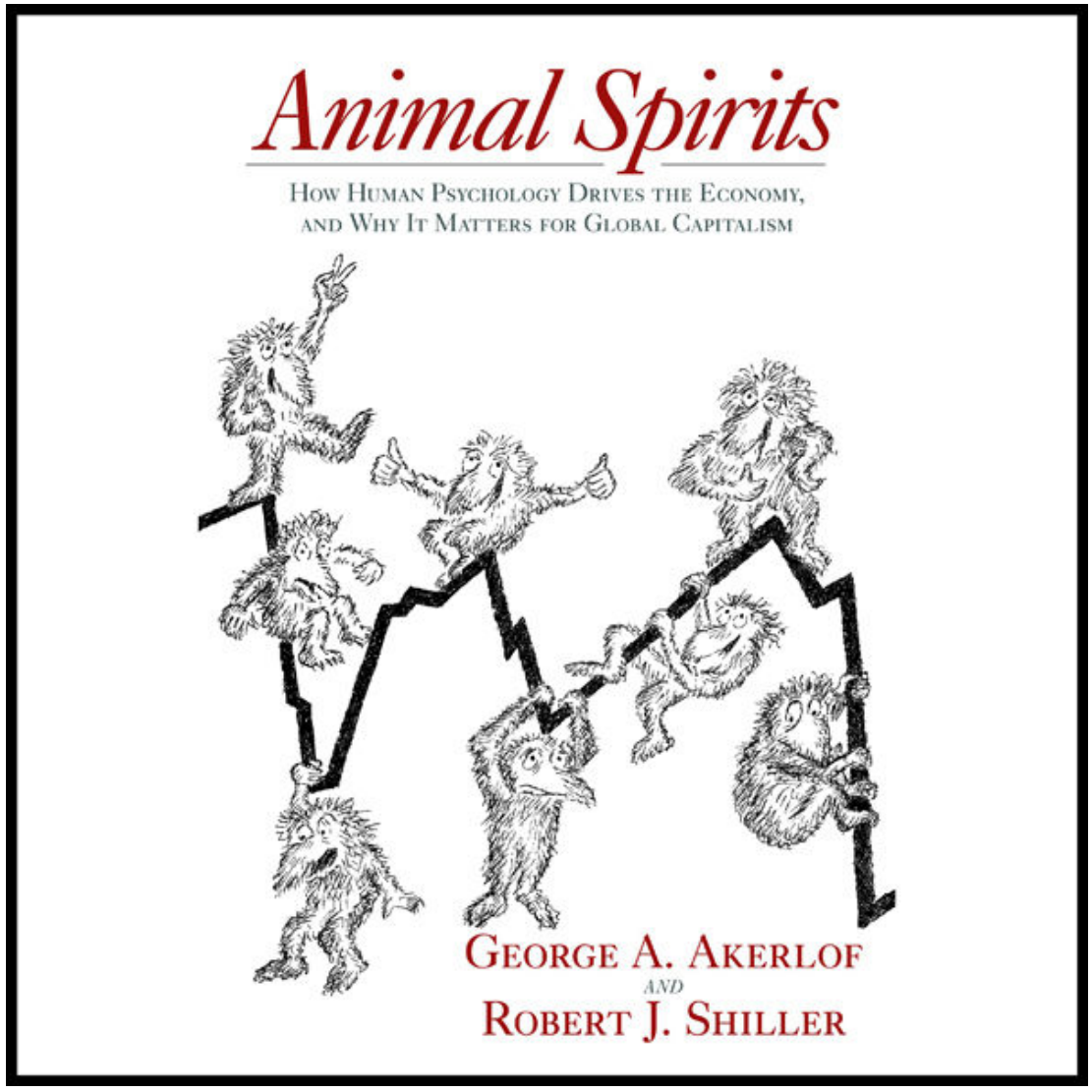
- Economics as a scientific discipline is continually evolving, with exciting new frontiers and increasing collaboration with other (social) scientific disciplines such as sociology, psychology, neuroscience, and computer science.

Beyond Rationality

In many situations, people's choices may exhibit departures from perfect rationality:

- limited attention, choice aversion, rule of thumb decision making
- time-inconsistent preferences
- reference dependence
- overconfidence
- loss aversion
- etc.

Beyond Rationality

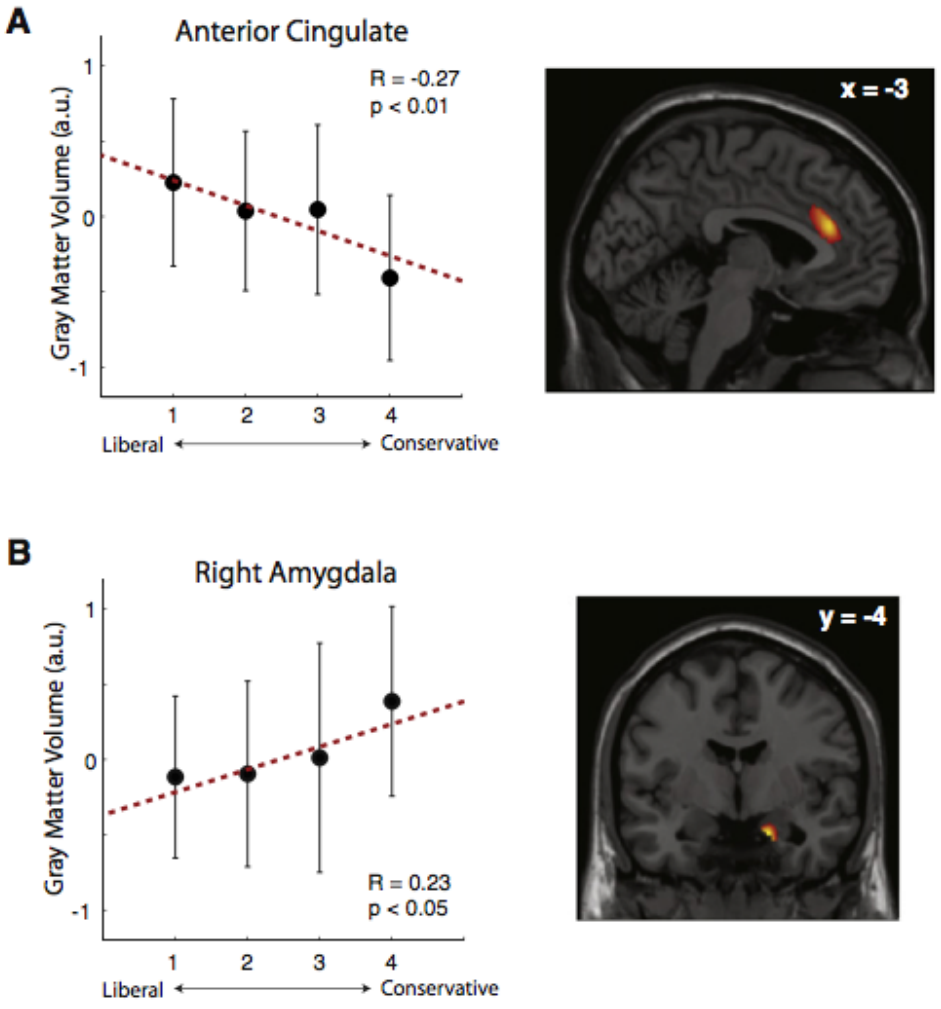


Beyond Rationality

- **Behavioral Economics** studies the effects of psychological, social, cognitive, and emotional factors on the economic decisions of individuals, using tools such as laboratory experiments.

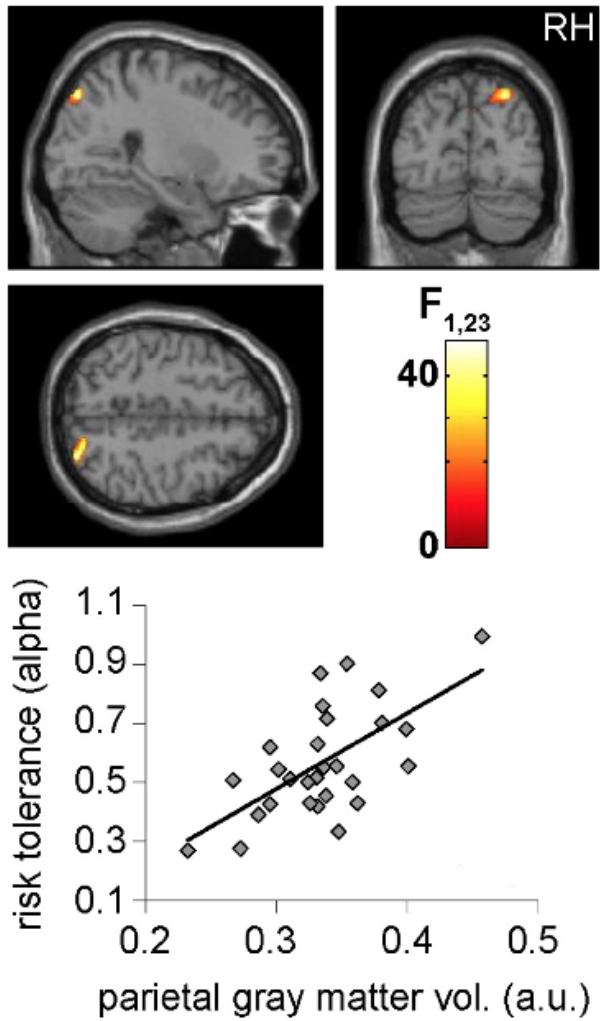
- **Neuroeconomics** aims to provide a neurobiological foundation to economic decision-making.

Neuroeconomics



Brain Structure and Political Orientation. Source: Kanai et al. (2011).

Neuroeconomics



Gray matter volume of a region in the right posterior parietal cortex predictive of individual risk attitudes. Source: Gilaie-Dotan et al. (2014).

Credit Cards and Gym Memberships

- Consider two types of goods:
  - **Investment goods**: immediate costs, delayed benefits (e.g., gym memberships)
  - **Leisure goods**: immediate benefits, delayed costs (e.g., credit cards)
- Profit-maximizing contract design when consumers are overconfident about their future self-control[7]:
  - Firms should price investment goods *below* marginal cost and leisure goods *above* marginal cost (DellaVigna and Malmendier, 2004).

[7] More precisely, consumers have quasi-hyperbolic discounting preferences and are partially naive about it.

Economics and Data Science

- Today, the increasing availability of new, heterogeneous, and very large data sets allows economics to analyze many new phenomena and develop new insights.

- The availability of **big data** also spurs rapid innovation in econometric methods.

Data are everywhere

	Cheese				
0.5/0.51 lb	**Cabot Vermont Cheddar**	0.51 lb	$7.99/lb	**$4.07**	
	Dairy				
1/1	**Friendship Lowfat Cottage Cheese** (16oz)		$2.89/ea	**$2.89**	
1/1	**Nature's Yoke Grade A Jumbo Brown Eggs** (1 dozen)		$1.49/ea	**$1.49**	
1/1	**Santa Barbara Hot Salsa, Fresh** (16oz)		$2.69/ea	**$2.69**	
1/1	**Stonyfield Farm Organic Lowfat Plain Yogurt** (32oz)		$3.59/ea	**$3.59**	
	Fruit				
3/3	**Anjou Pears** (Farm Fresh, Med)	1.76 lb	$2.49/lb	**$4.38**	
2/2	**Cantaloupe** (Farm Fresh, Med)		$2.00/ea	**$4.00**	**S**
	Grocery				
1/1	**Fantastic World Foods Organic Whole Wheat Couscous** (12oz)		$1.99/ea	**$1.99**	
1/1	**Garden of Eatin' Blue Corn Chips** (9oz)		$2.49/ea	**$2.49**	
1/1	**Goya Low Sodium Chickpeas** (15.5oz)		$0.89/ea	**$0.89**	
2/2	**Marcal 2-Ply Paper Towels, 90ct** (1ea)		$1.09/ea	**$2.18**	**T**
1/1	**Muir Glen Organic Tomato Paste** (6oz)		$0.99/ea	**$0.99**	
1/1	**Starkist Solid White Albacore Tuna in Spring Water** (6oz)		$1.89/ea	**$1.89**	

Purchase histories

j. mao

Data are everywhere

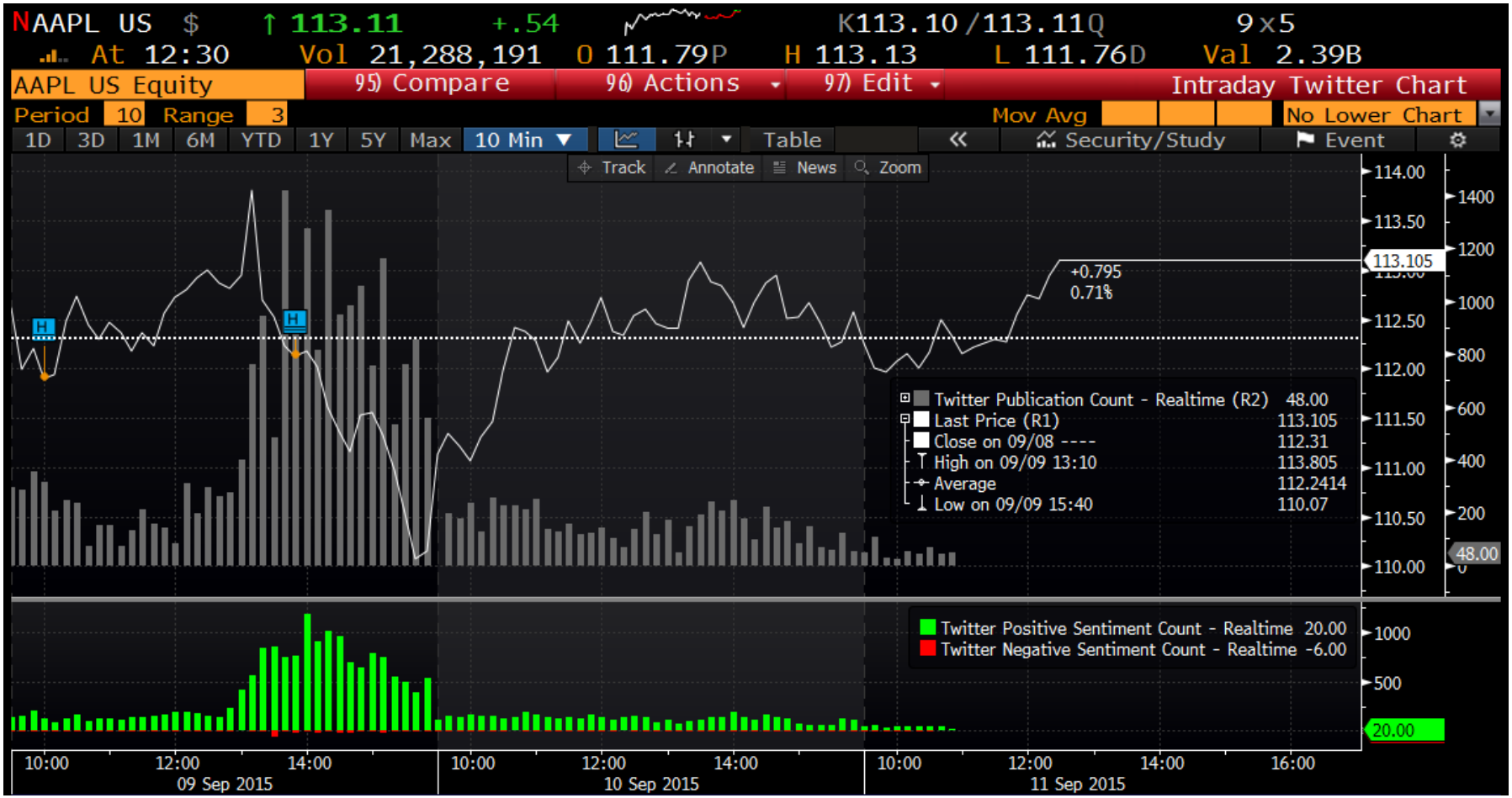
Ikiru (1952)	UR	Foreign	
Junebug (2005)	R	Independent	
La Cage aux Folles (1979)	R	Comedy	
The Life Aquatic with Steve Zissou (2004)	R	Comedy	
Lock, Stock and Two Smoking Barrels (1998)	R	Action & Adventure	
Lost in Translation (2003)	R	Drama	
Love and Death (1975)	PG	Comedy	
The Manchurian Candidate (1962)	PG-13	Classics	
Memento (2000)	R	Thrillers	
Midnight Cowboy (1969)	R	Classics	

User ratings

Data are everywhere

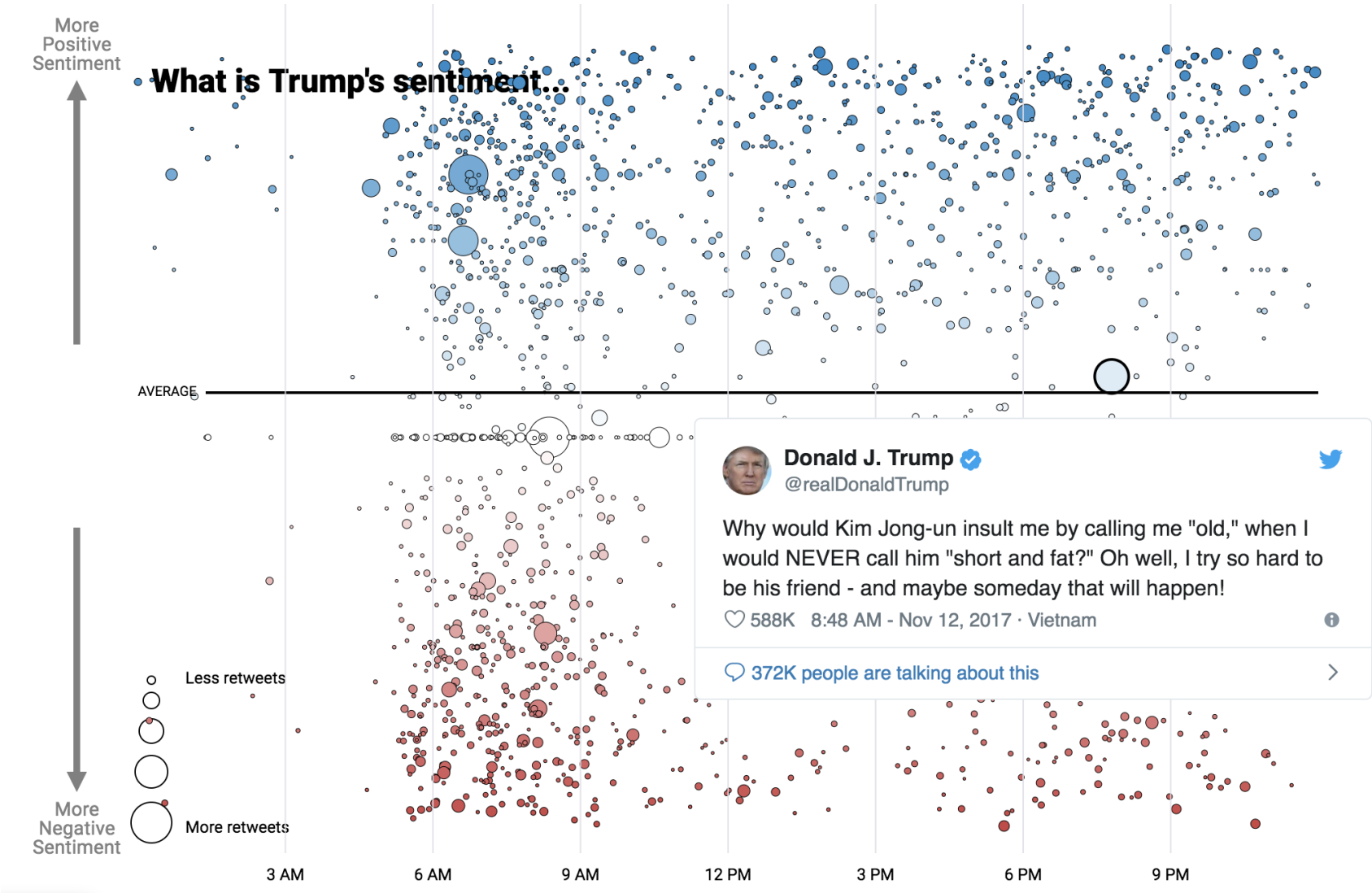
Document collections

Data are everywhere



(High-frequency) Trading

Data are everywhere



Social networks

Economics and Data Science

"What's in a name? that which we call a rose,
By any other name would smell as sweet." – *Juliet*

Machine Learning $\rightarrow$ Statistics $\rightarrow$ Econometrics

- Along this spectrum, the focus moves from prediction and pattern discovery to inference about causality and the underlying mechanisms that generate the observed data.

Classification and Discrete Choice



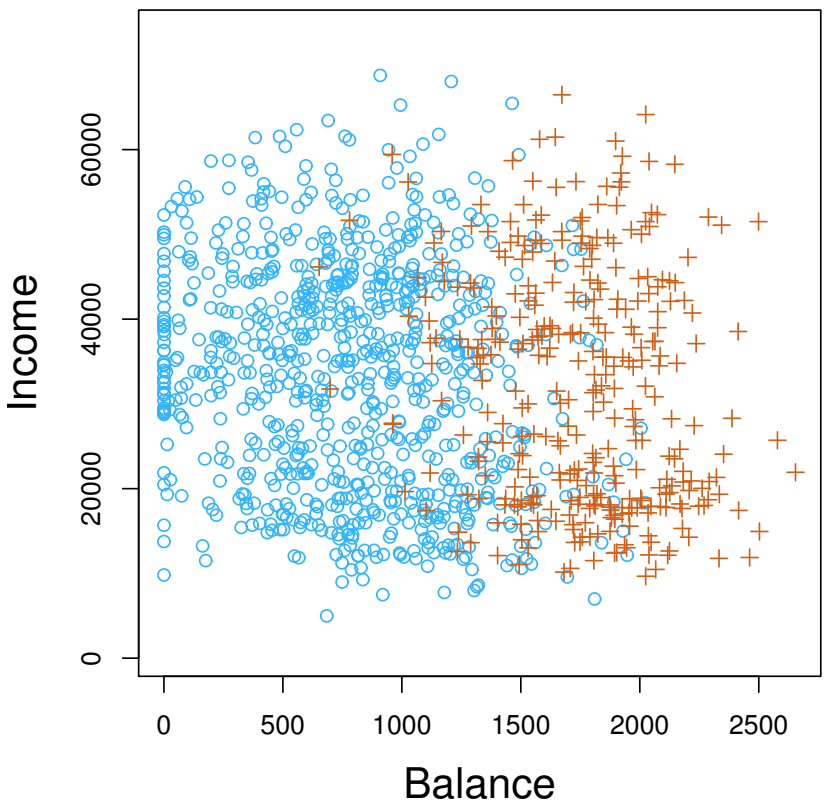


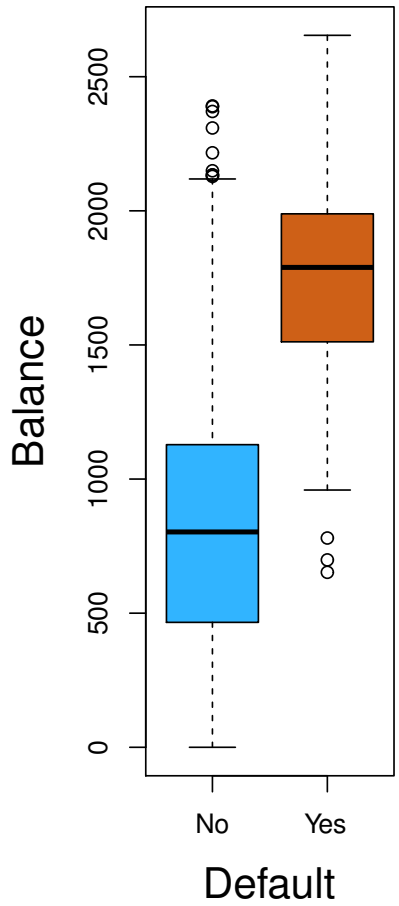


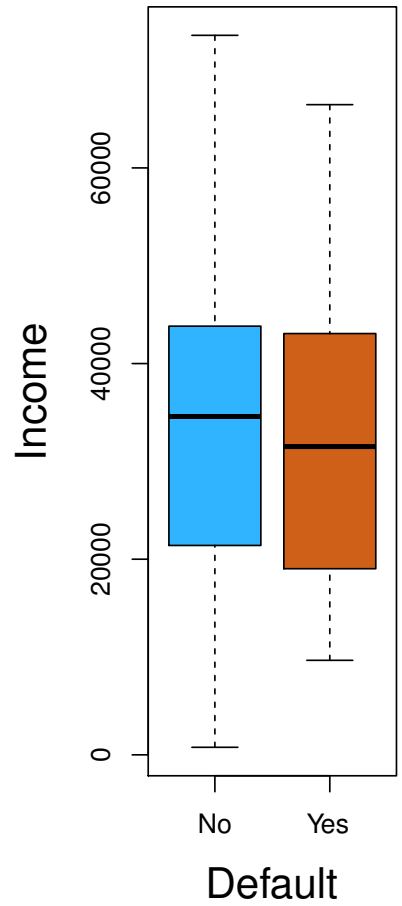


Which one is a chair?

Classification and Discrete Choice

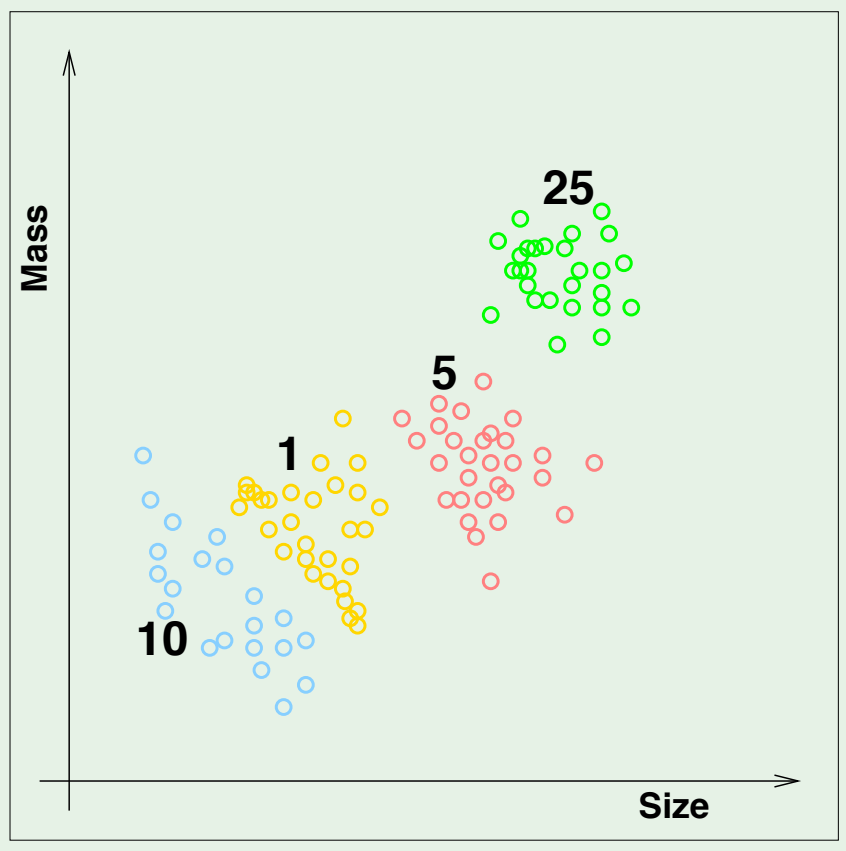


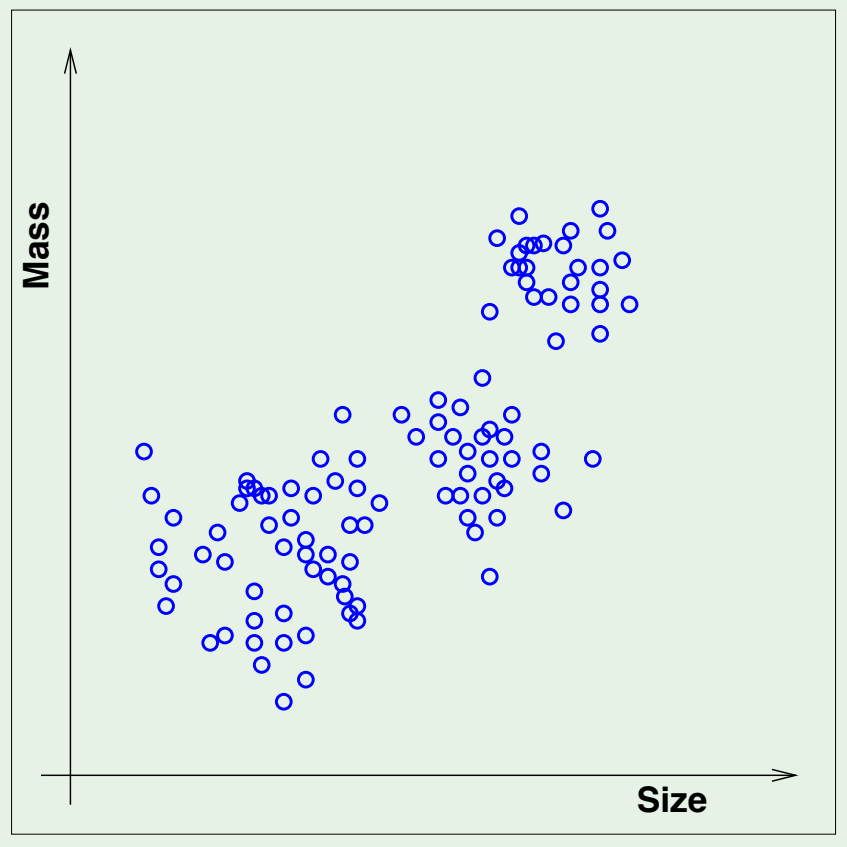




Who will default on their credit card?

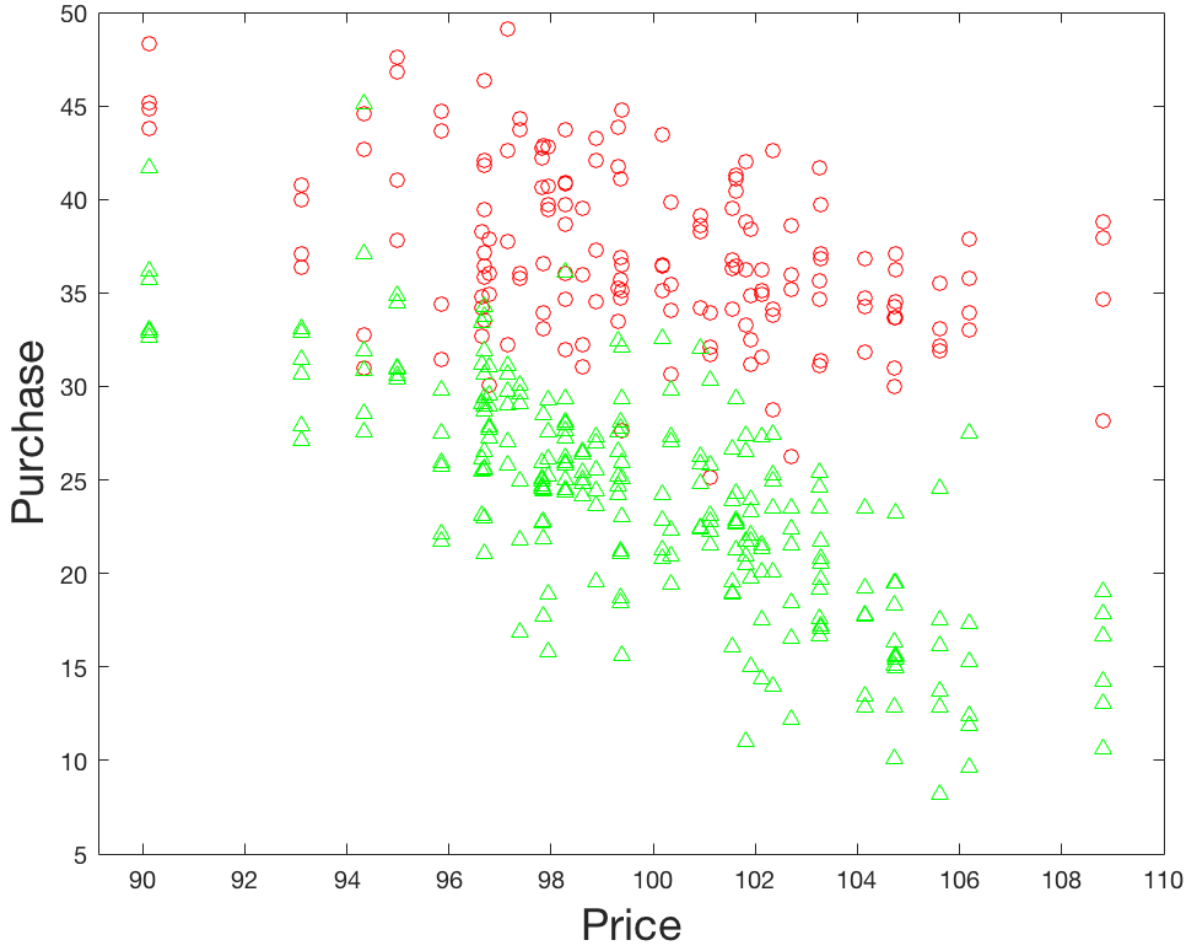
Unsupervised Learning and Individual Heterogeneity





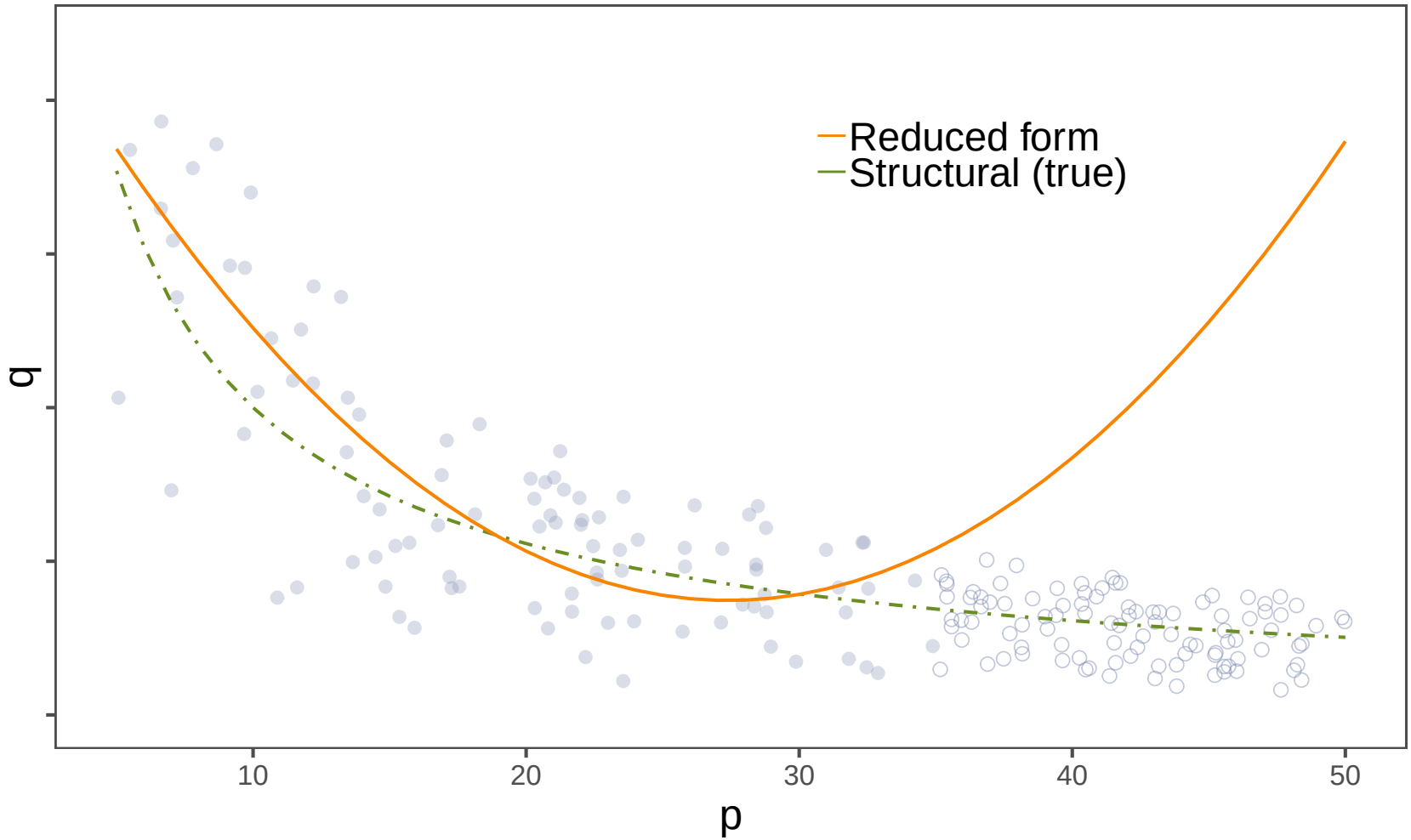
Vending machine coin recognition
Left: supervised learning; Right: unsupervised learning

Unsupervised Learning and Individual Heterogeneity



Consumer demand

Statistical vs. Economic Models

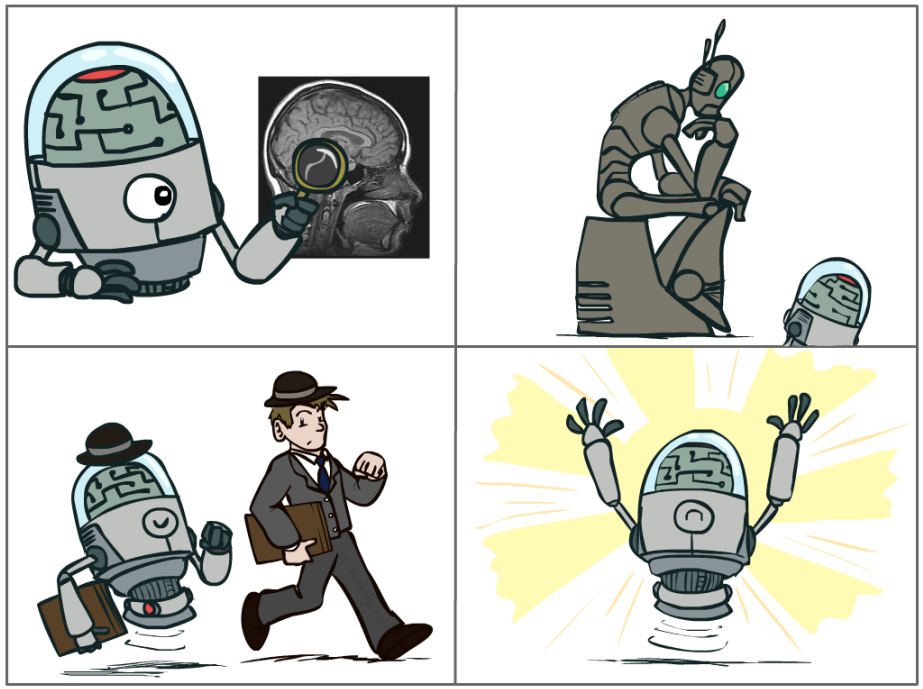


Consumption Data

Economics and Artificial Intelligence

The science of making machines that:

Think like people



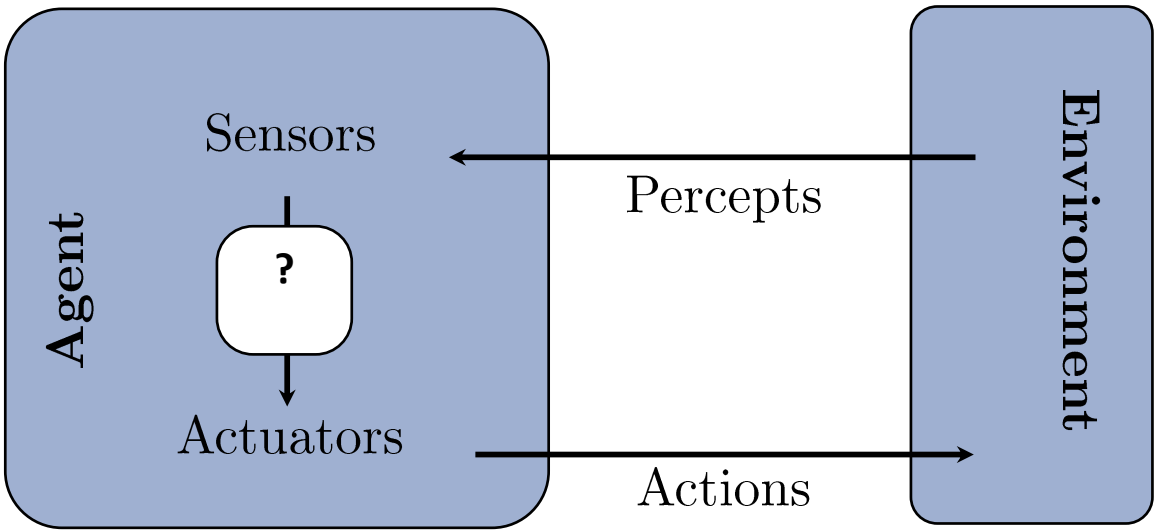
Think rationally

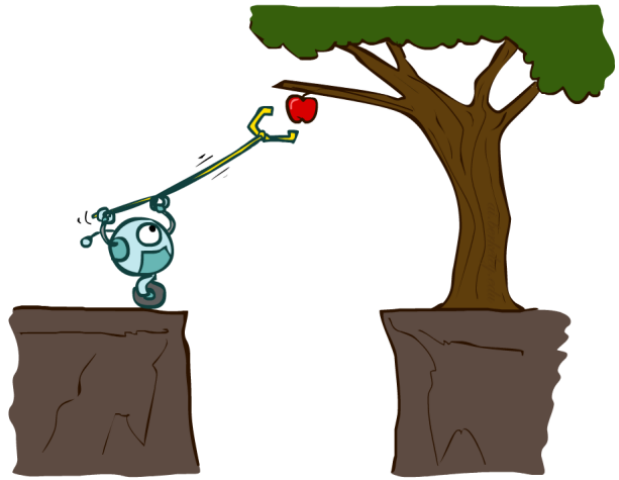
Act like people

Act rationally

Approaches to AI

Economics and Artificial Intelligence





1. Making decisions without uncertainty (search, planning)
2. Reasoning under uncertainty (decision theory)
3. Multiple agents (game theory, social choice)

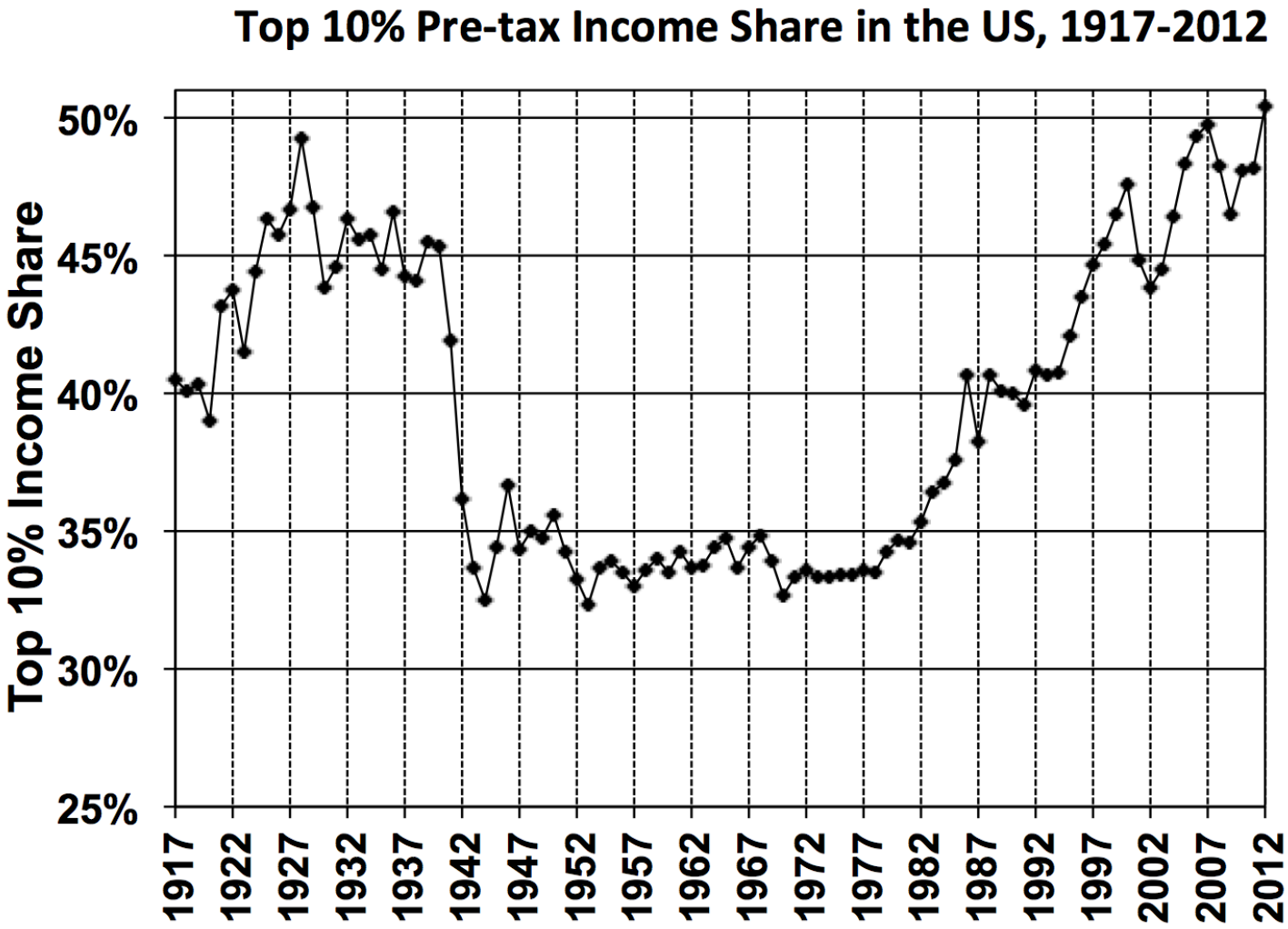
Big Problems Facing Economists Today

- Income Inequality
- Economic Impact of AI and Automation
- Globalization and Its Discontent
- Platform Economy and Antitrust
- Economic Impact of Climate Change
- Understanding Chinese Economic Growth and Its Challenges

Income Inequality

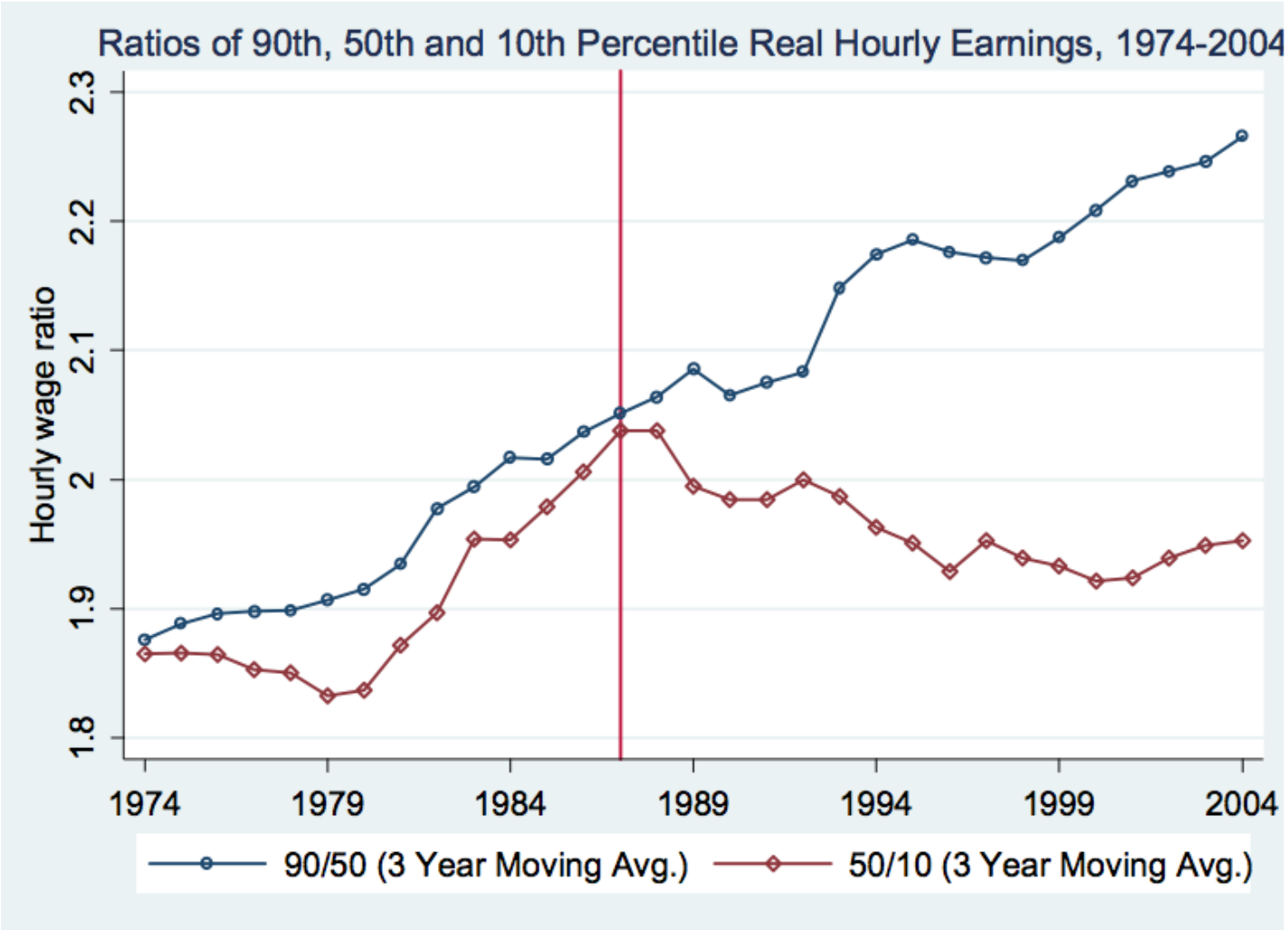
"...for 40 years, the American middle class has been disappearing. Millions of people are working longer hours for lower wages despite a huge increase in technology and productivity. And what we have seen during that period is a massive transfer of trillions of dollars from the middle class to the top one-tenth of 1 percent of America — massive wealth and income inequality, where you have 99 percent of all new income today going to the top 1 percent." – Sen. Bernie Sanders

Income Inequality



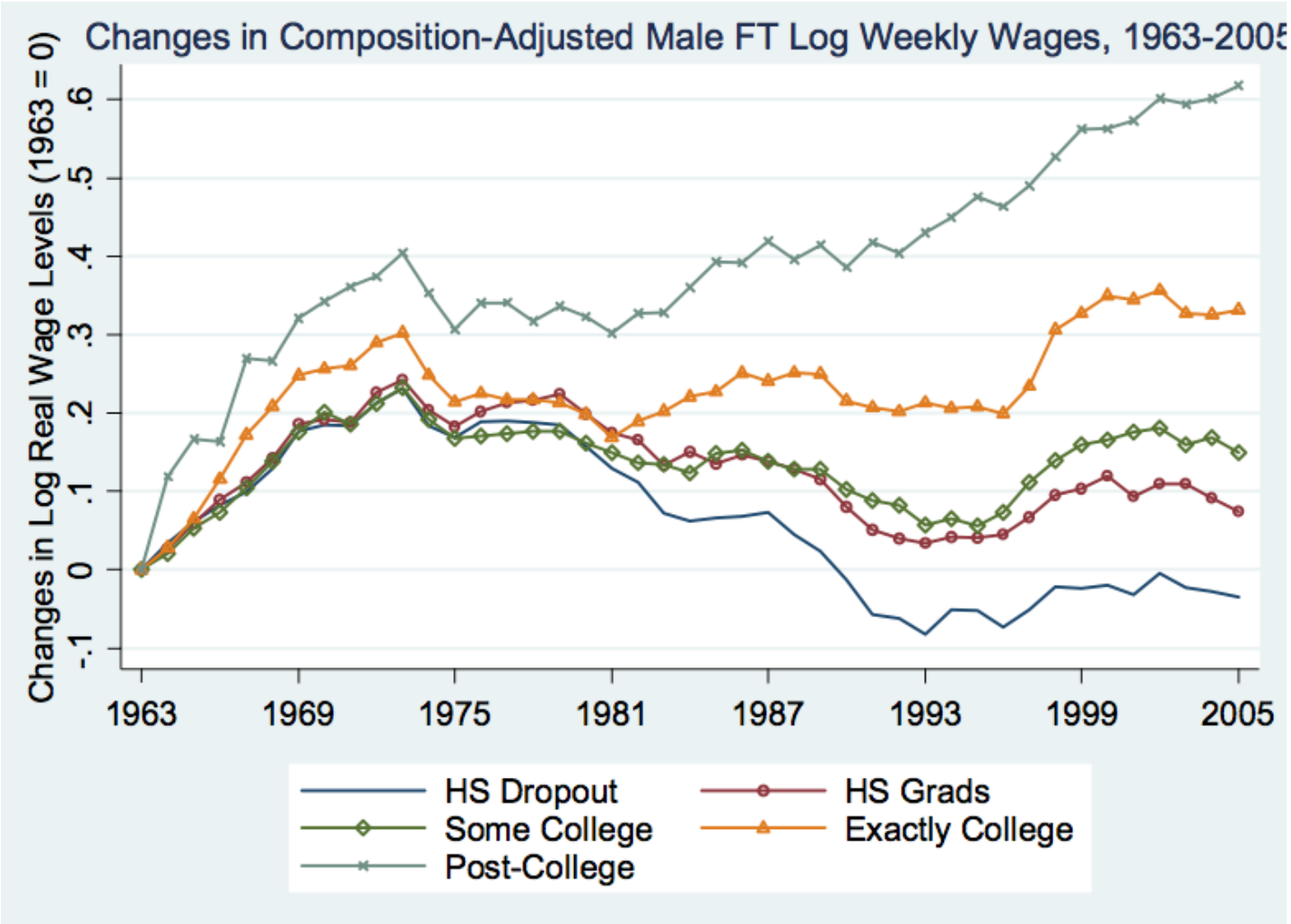
Saez (2017)

Income Inequality



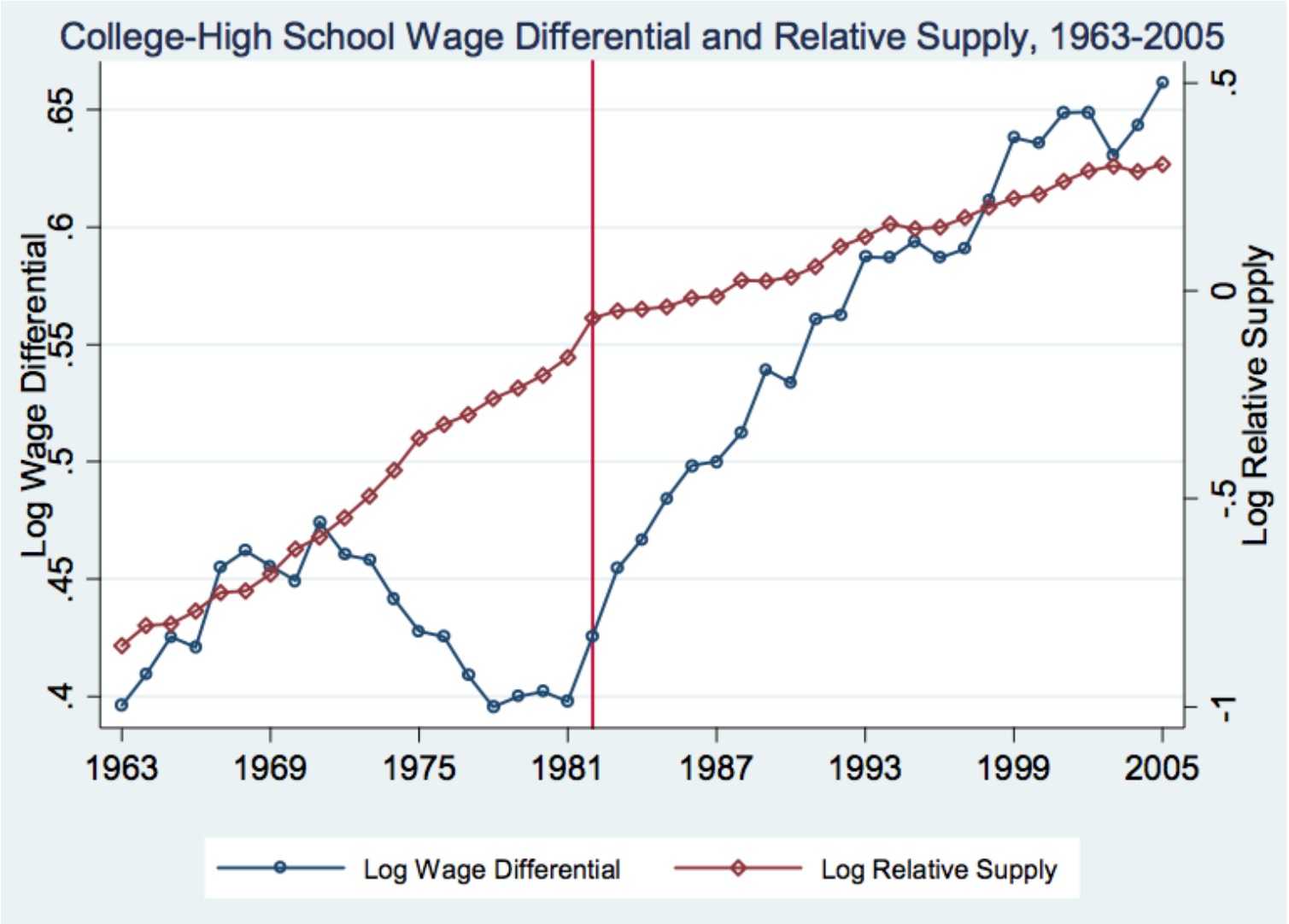
Autor (2007)

Income Inequality



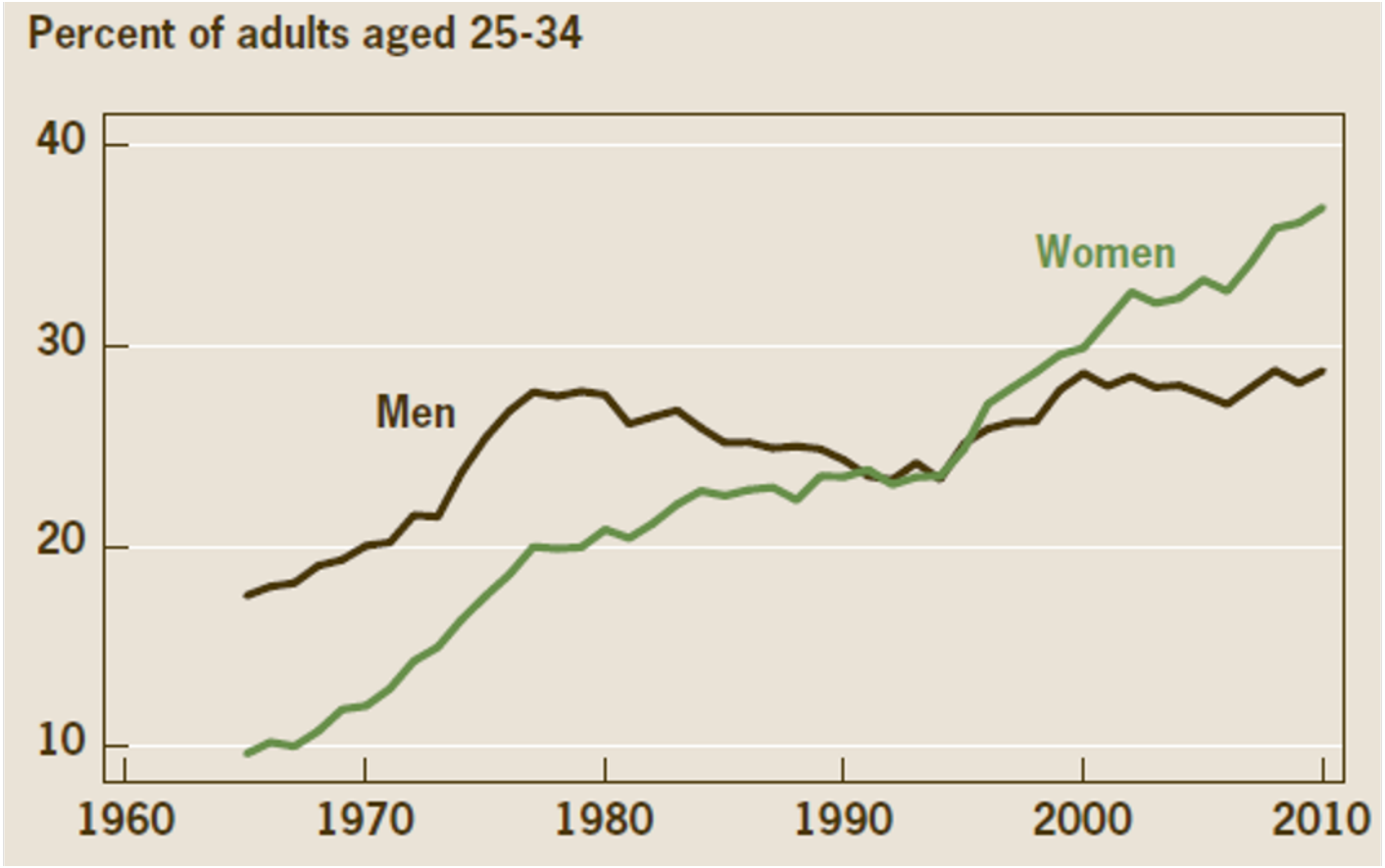
Autor (2007)

Income Inequality



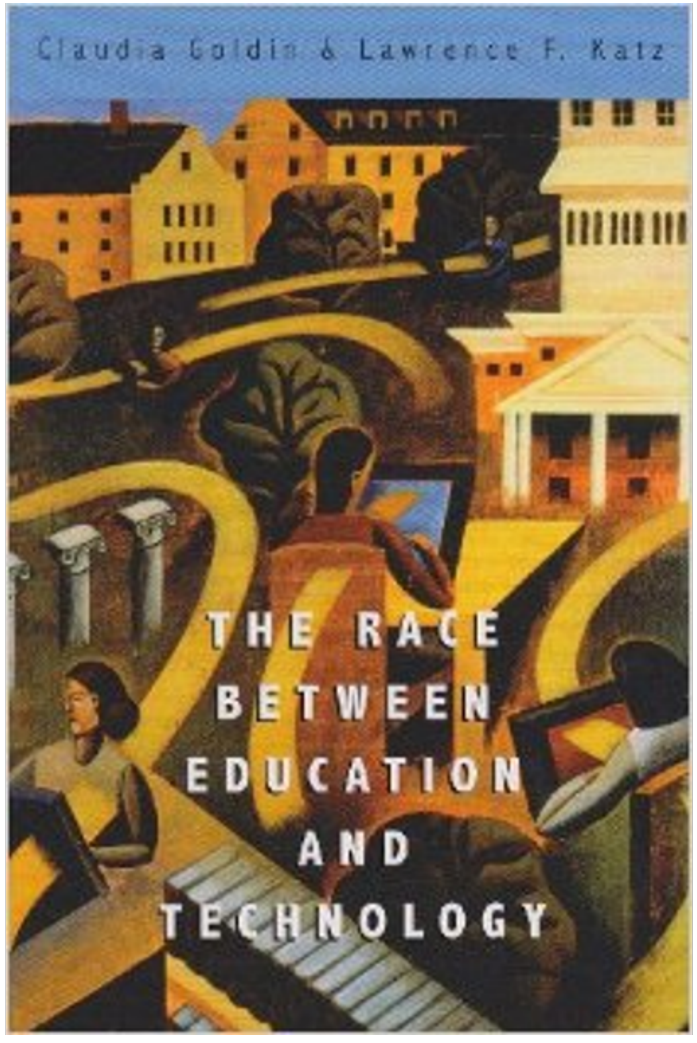
Autor (2007)

Income Inequality



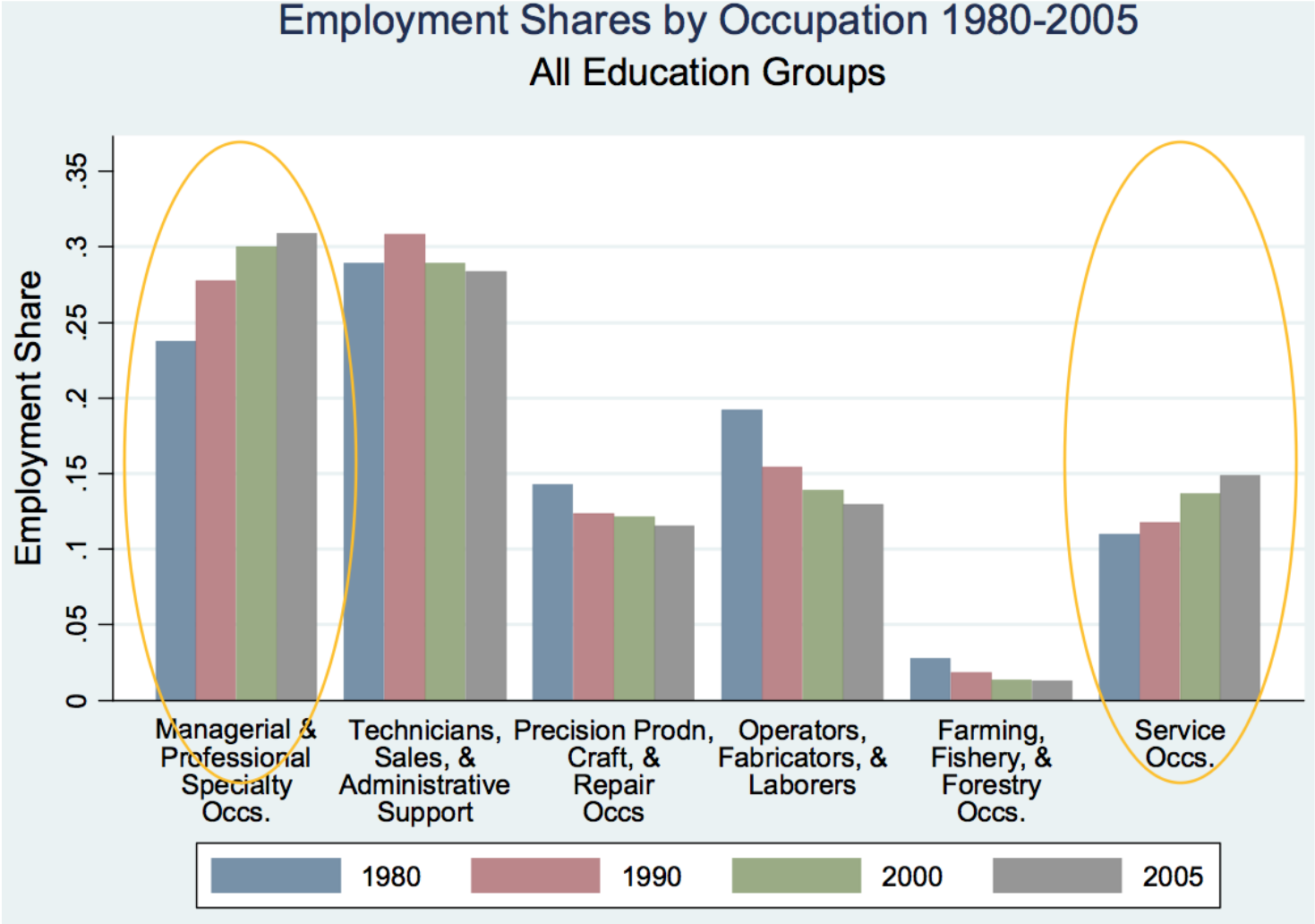
College Attainment by Gender

Income Inequality



The Labor Market Impact of AI and Automation

The Labor Market Impact of AI and Automation



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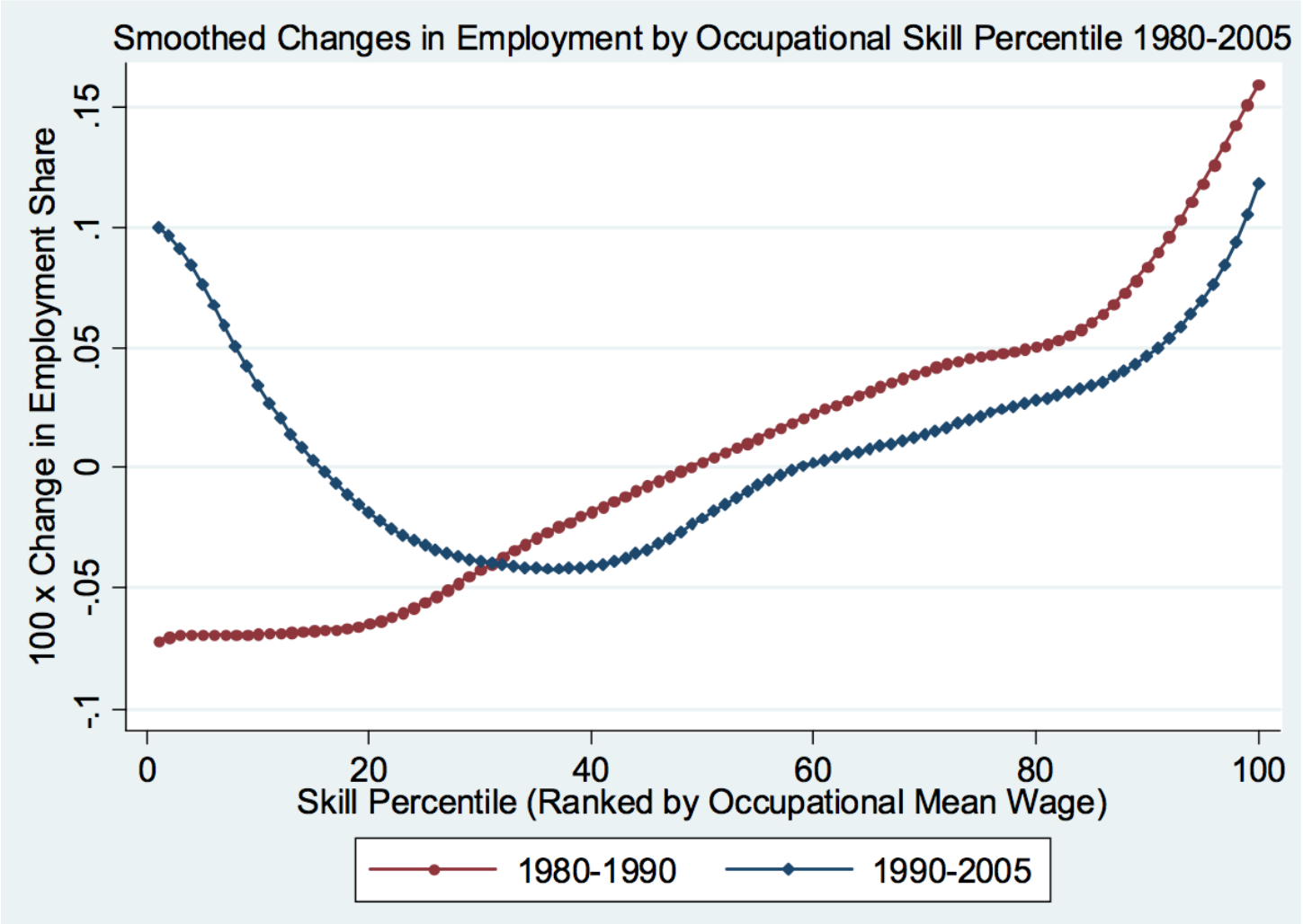
The Labor Market Impact of AI and Automation



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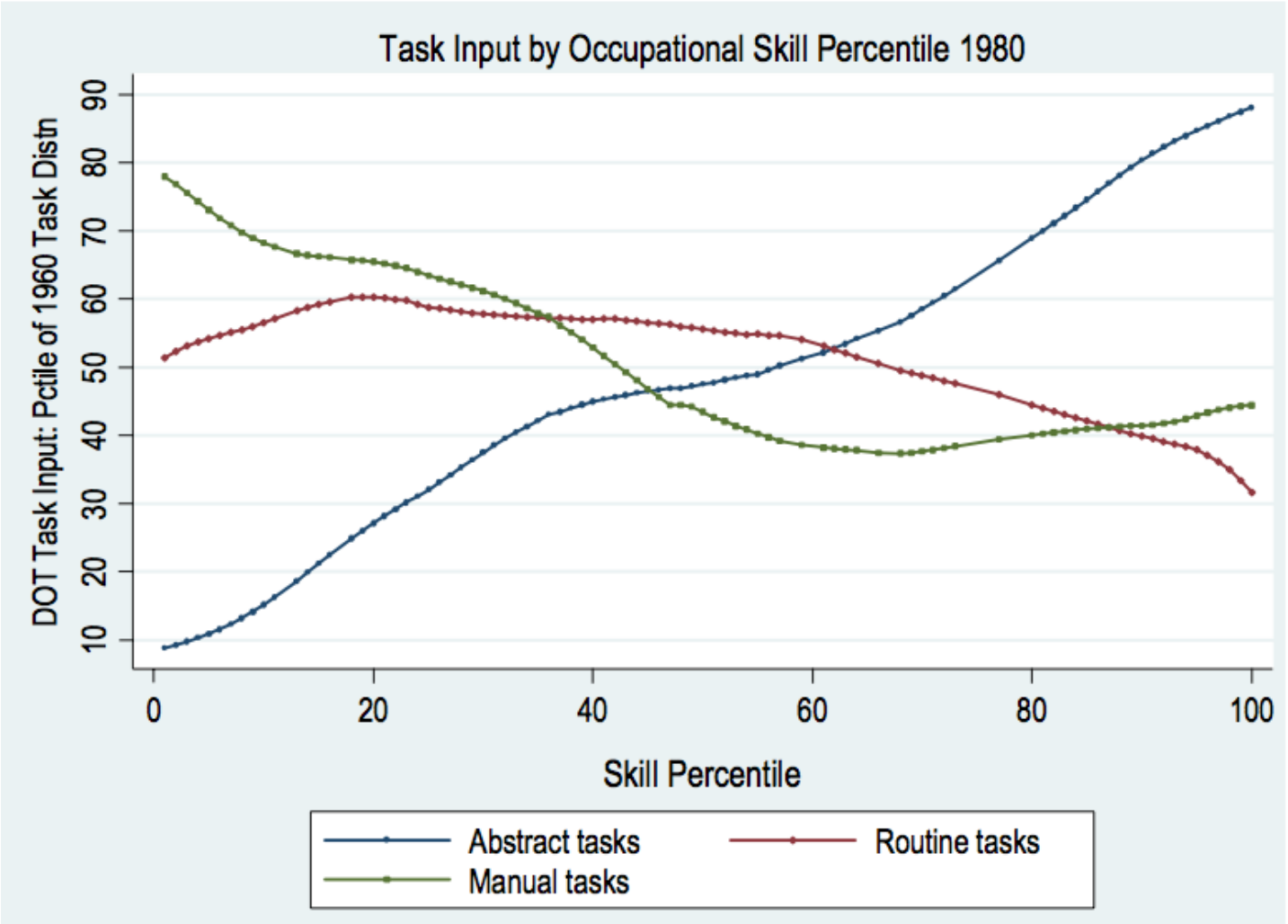
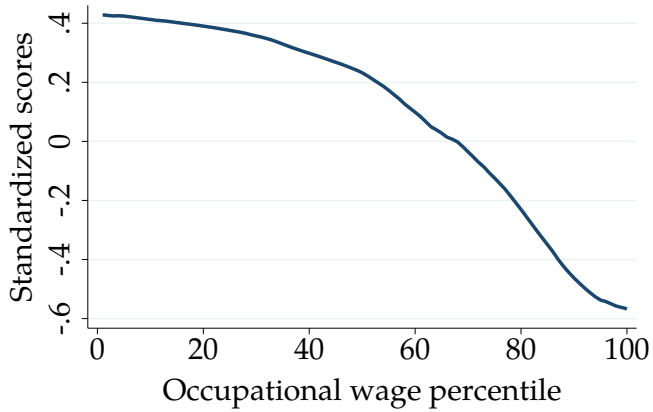
The Labor Market Impact of AI and Automation

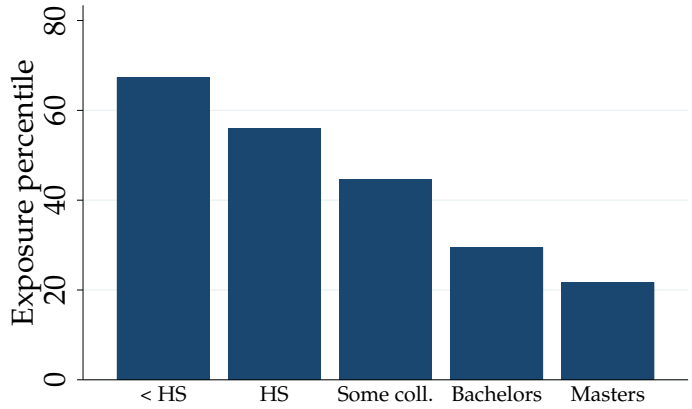


Autor (2007)

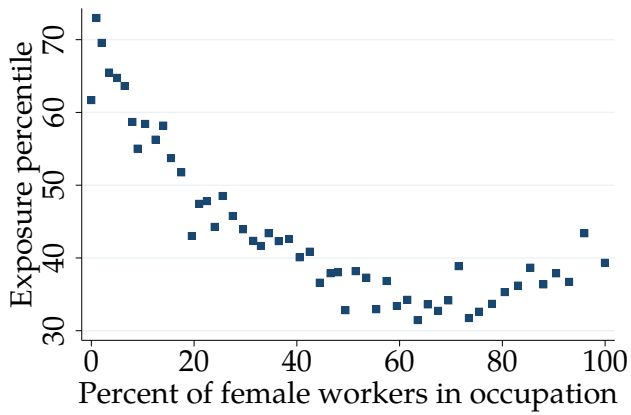
The Labor Market Impact of AI and Automation



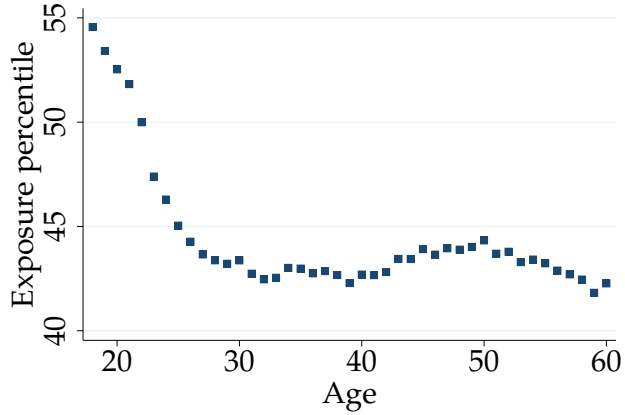
(a) Smoothed scores by occupational wage percentile



(b) Exposure by level of education



(c) Exposure by percent of female workers in occupation

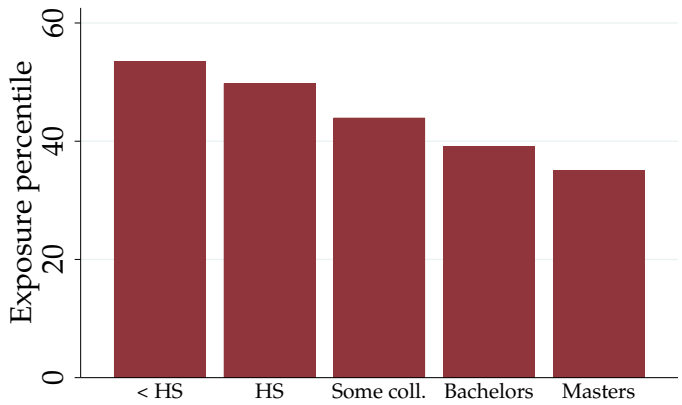


(d) Exposure by age.

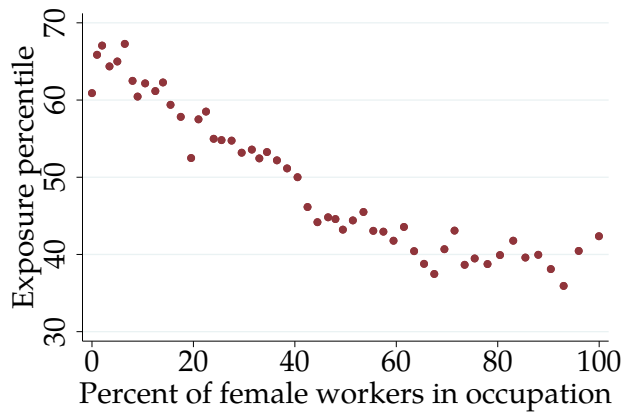
Exposure to robots. Source: Webb (2020).

The Labor Market Impact of AI and Automation

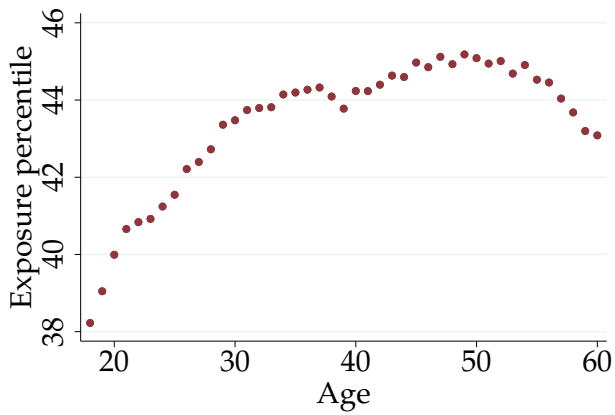
(a) Smoothed scores by occupational wage percentile



(b) Exposure by level of education



(c) Exposure by percent of female workers in occupation

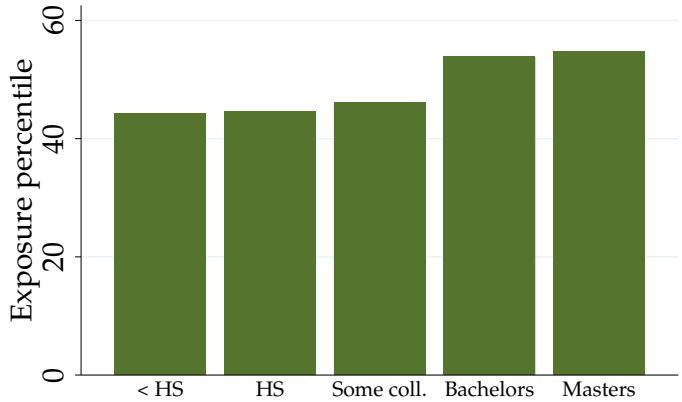


(d) Exposure by age.

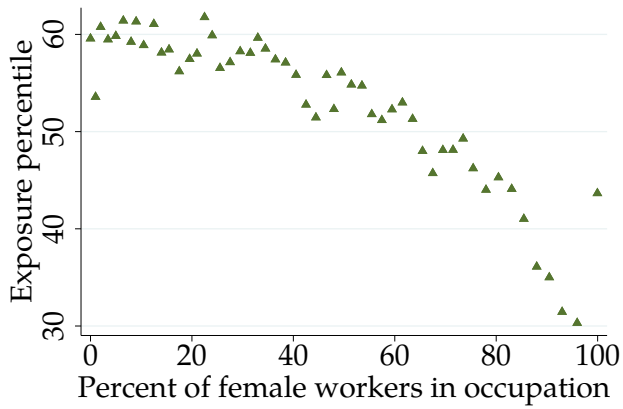
Exposure to software. Source: Webb (2020).

The Labor Market Impact of AI and Automation

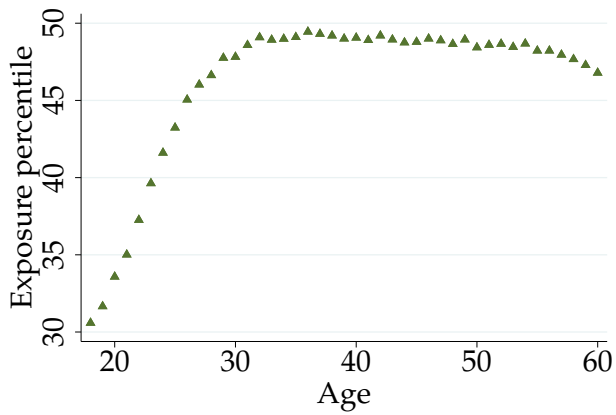
(a) Smoothed scores by occupational wage percentile



(b) Exposure by level of education



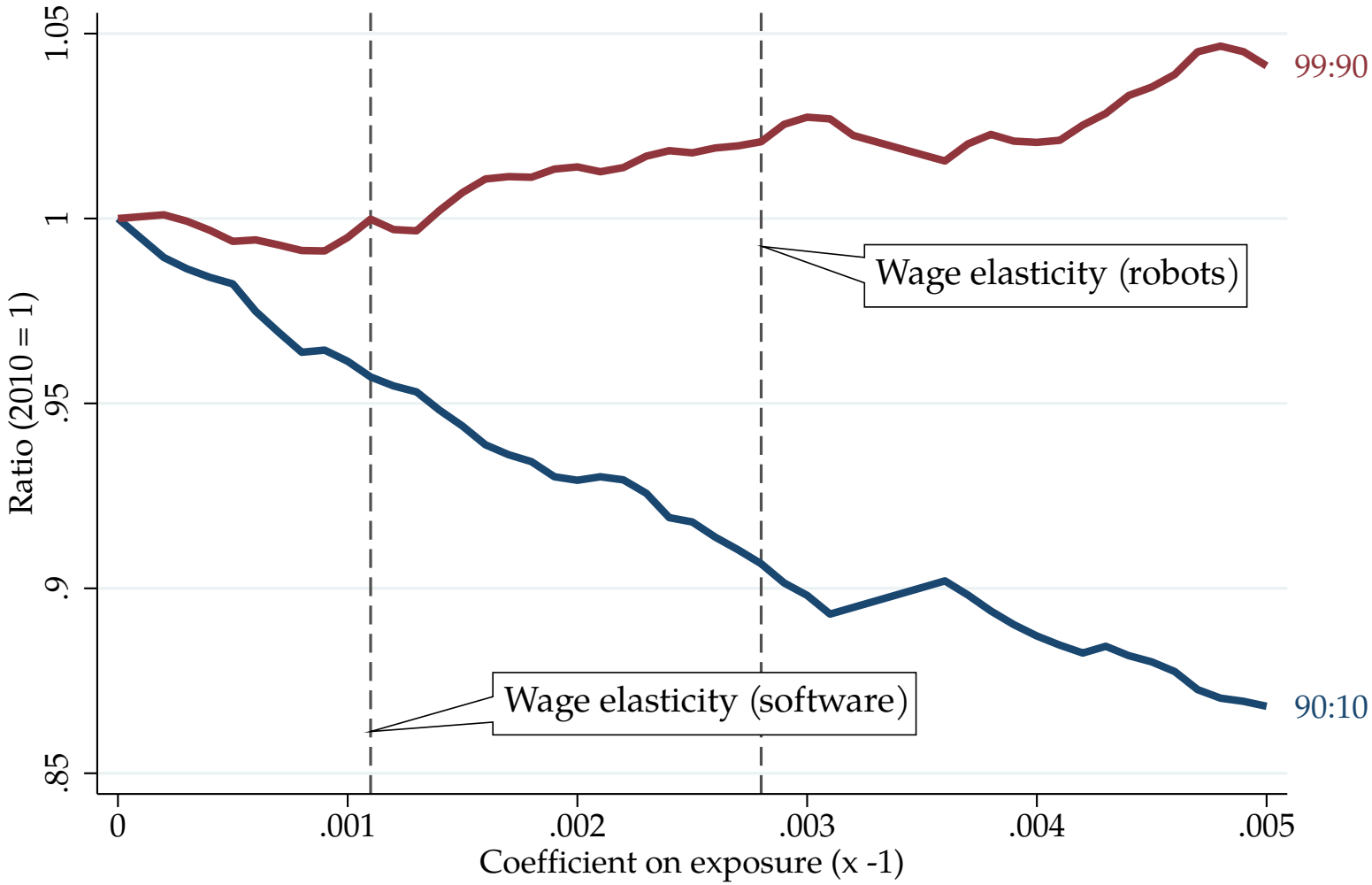
(c) Exposure by percent of female workers in occupation



(d) Exposure by age.

Exposure to AI. Source: Webb (2020).

The Labor Market Impact of AI and Automation

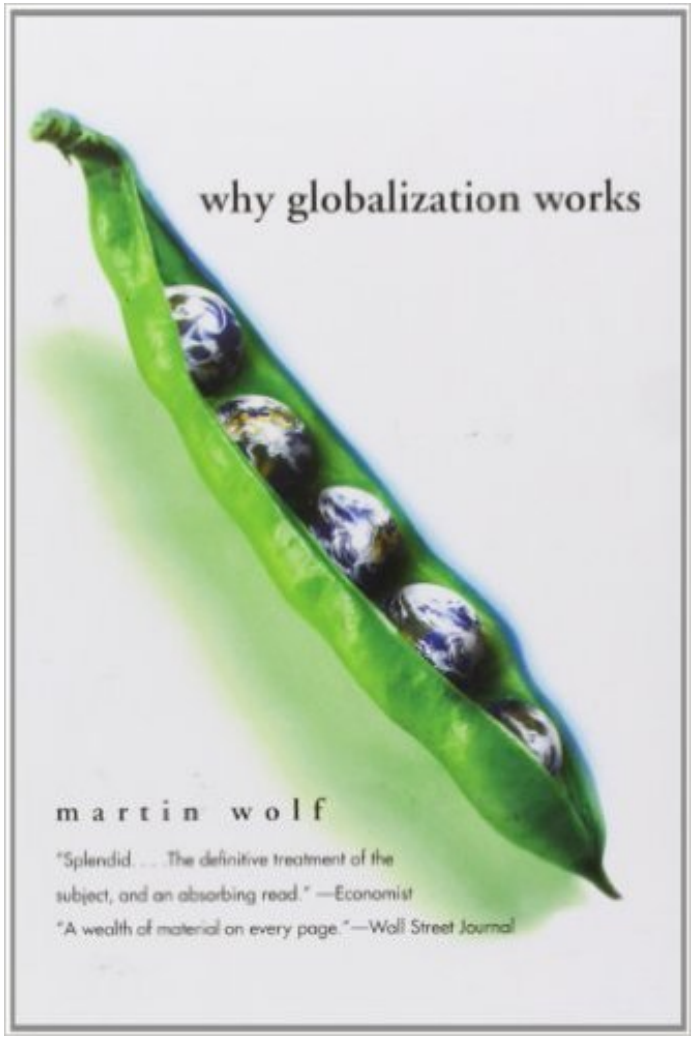


Potential impacts of AI on inequality. Source: Webb (2020).

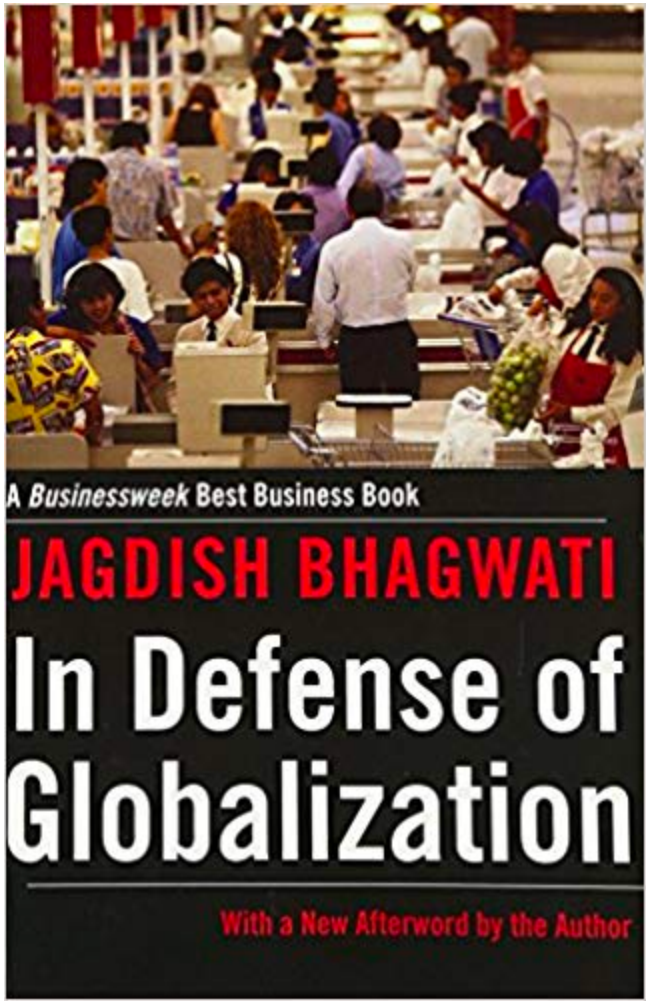
The Labor Market Impact of AI and Automation

"In the next 12 years, 1 out of 3 American workers are at risk of losing their jobs to new technologies—and unlike with previous waves of automation, this time new jobs will not appear quickly enough in large enough numbers to make up for it. To avoid an unprecedented crisis, we're going to have to find a new solution, unlike anything we've done before. It all begins with the Freedom Dividend, a universal basic income for all American adults, no strings attached – a foundation on which a stable, prosperous, and just society can be built." – Andrew Yang

Globalization and Its Discontent

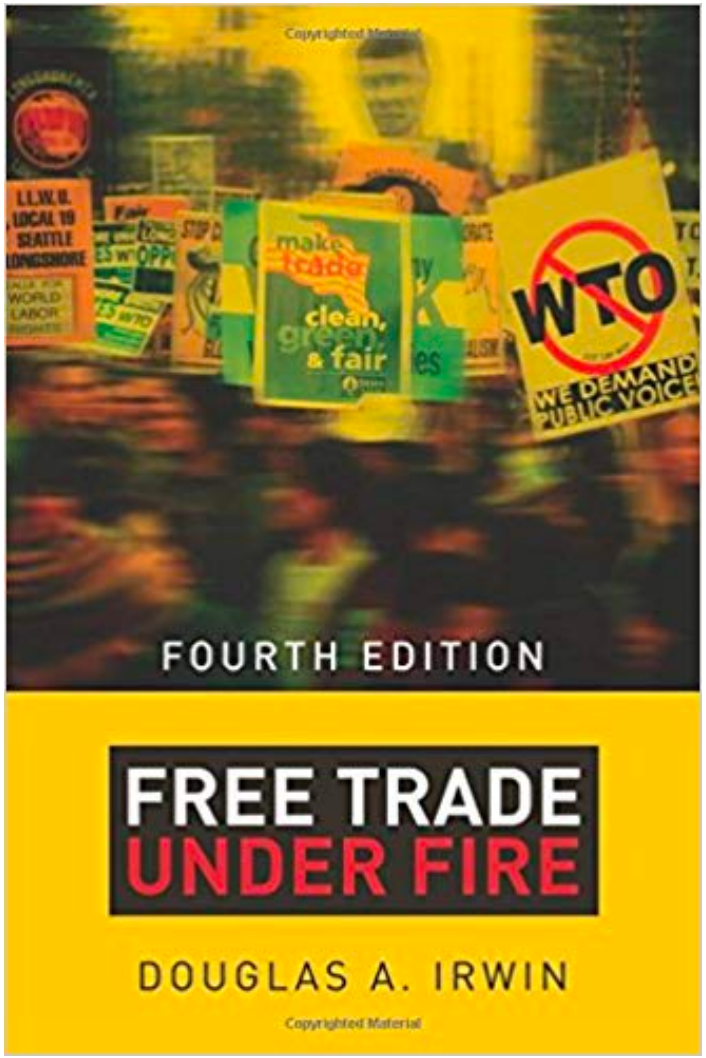


2005

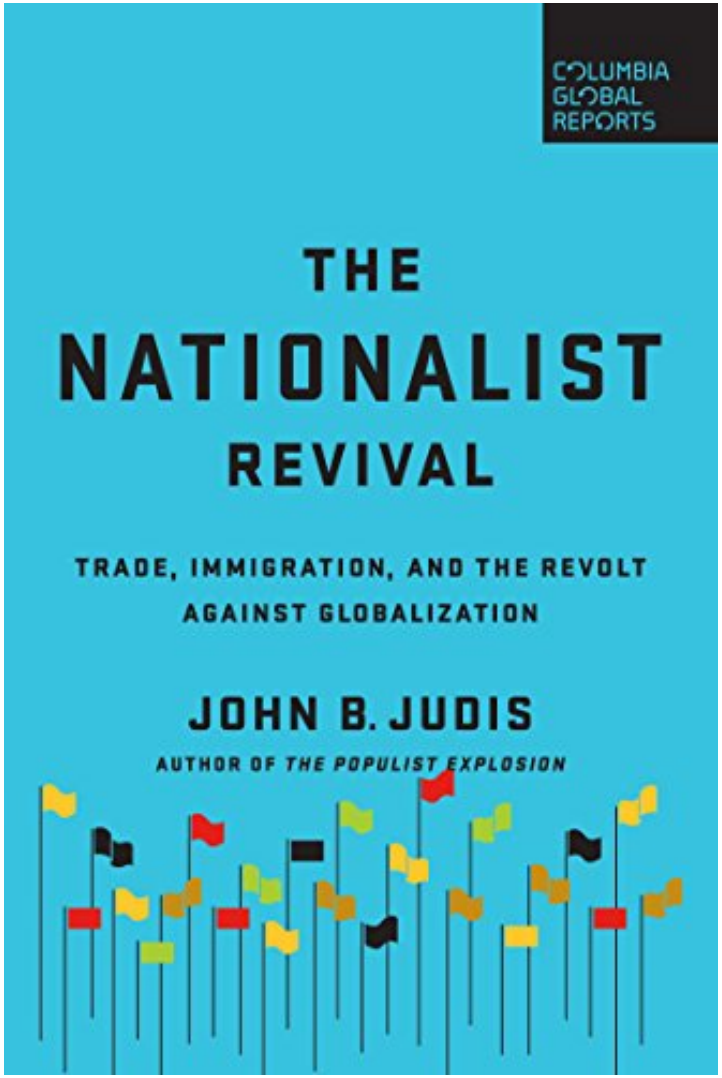


2007

Globalization and Its Discontent



2015



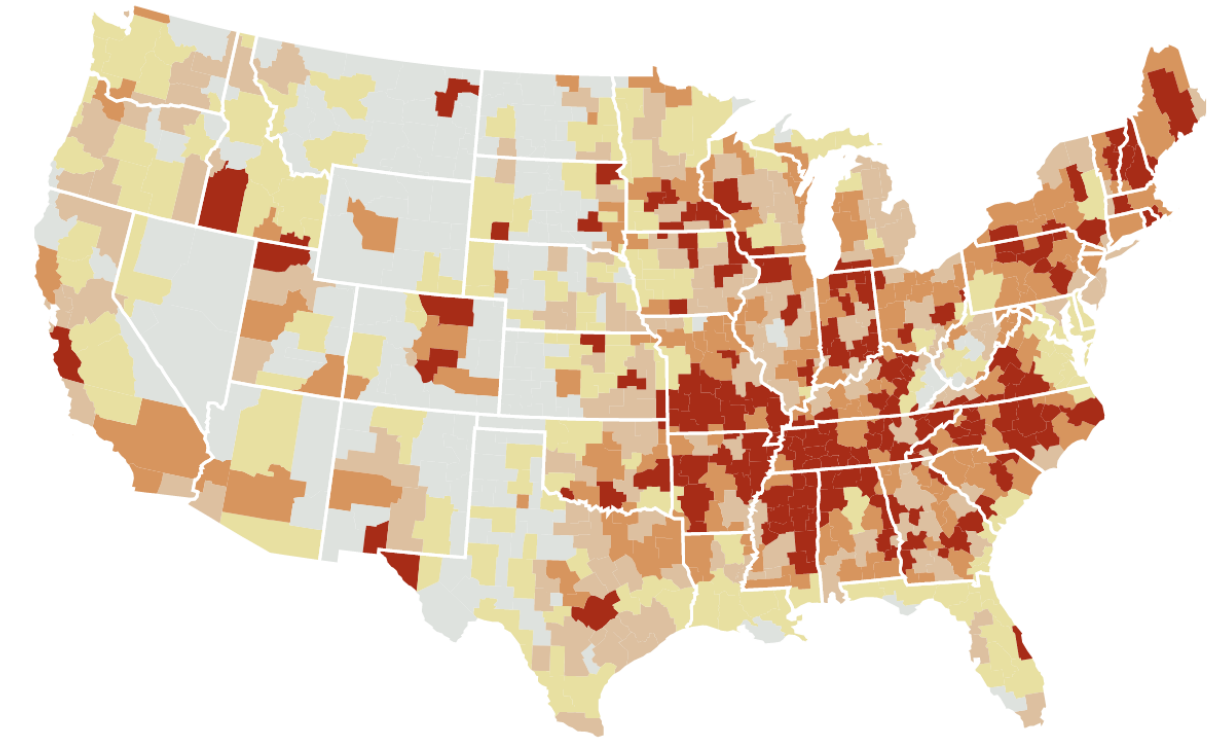
2018

Globalization and Its Discontent

Most-affected areas of the U.S.

Colors show which areas were most affected by China's rise, based on the increase in Chinese imports per worker in each area from 1990 to 2007. Hovering over each area on the map will show a demographic breakdown of that area, below, and its most-affected industries, at right.

Most-affected 20% | Second-highest 20% | Middle 20% | Second-lowest 20% | Least-affected 20%



Most-affected industries

*Most-affected industries, based on number of areas**	*Impact per worker†*
Furniture and fixtures — 196 areas	$44k
Games, toys, and children's vehicles — 114 areas	$488k
Sporting and athletic goods — 106 areas	$82k
Electronic components — 87 areas	$65k
Plastics products — 84 areas	$11k
Motor-vehicle parts and accessories — 79 areas	$12k
Electronic computers — 68 areas	$207k
Radio and tv communications equipment — 66 areas	$141k

chinashock.info

j. mao

Platform Economy and Antitrust Regulation

- Many dominant technology firms today are **platform companies** that benefit from network effects: Facebook, WeChat, Uber, Didi, etc.
  - The more users on the platform, the more useful the platform is to *each* user.
  - Platforms that serve as intermediaries, connecting buyers and sellers, are called **two-sided platforms**.
    - ★ Uber, Didi connect riders and drivers.
    - ★ Meituan, Dianping connect diners and restaurants.
    - ★ Visa, Mastercard, Alipay, WechatPay connect buyers and sellers.

Platform Economy and Antitrust Regulation

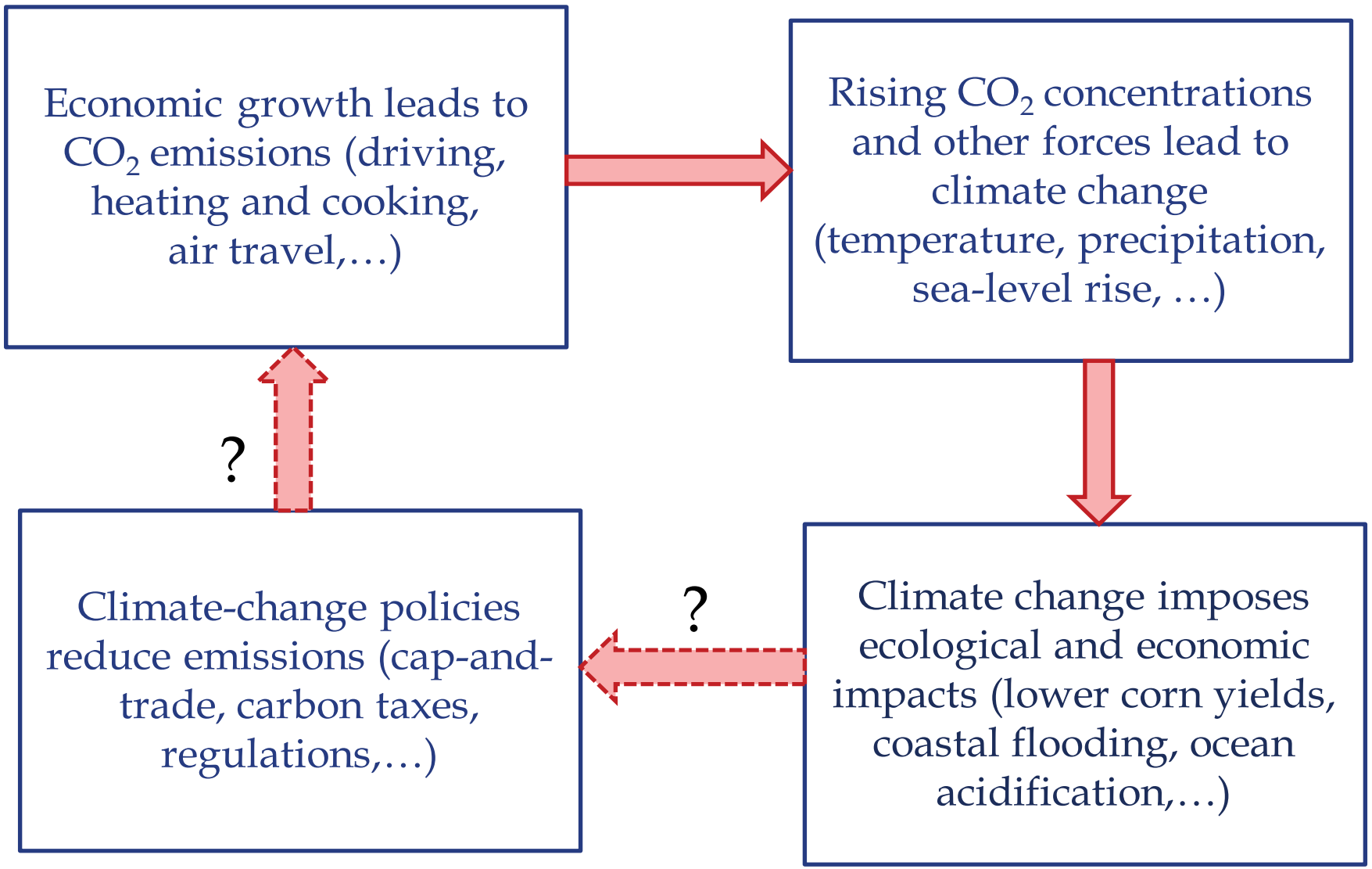
- Because of network effects, these industries tend to form natural monopolies and oligopolies. Today, these **big tech** firms are a significant part of the global economy.
- Traditional antitrust laws are ill-equipped to deal with modern platform companies.
- Existing laws require proof of monopolies using their market power to hurt consumer welfare by charging prices above marginal cost. However, internet platforms are often free to use.
- Their monopoly power can still hurt consumer welfare (in ways other than charging higher prices), deter innovation, and slow down economic growth.

Economic Impact of Climate Change

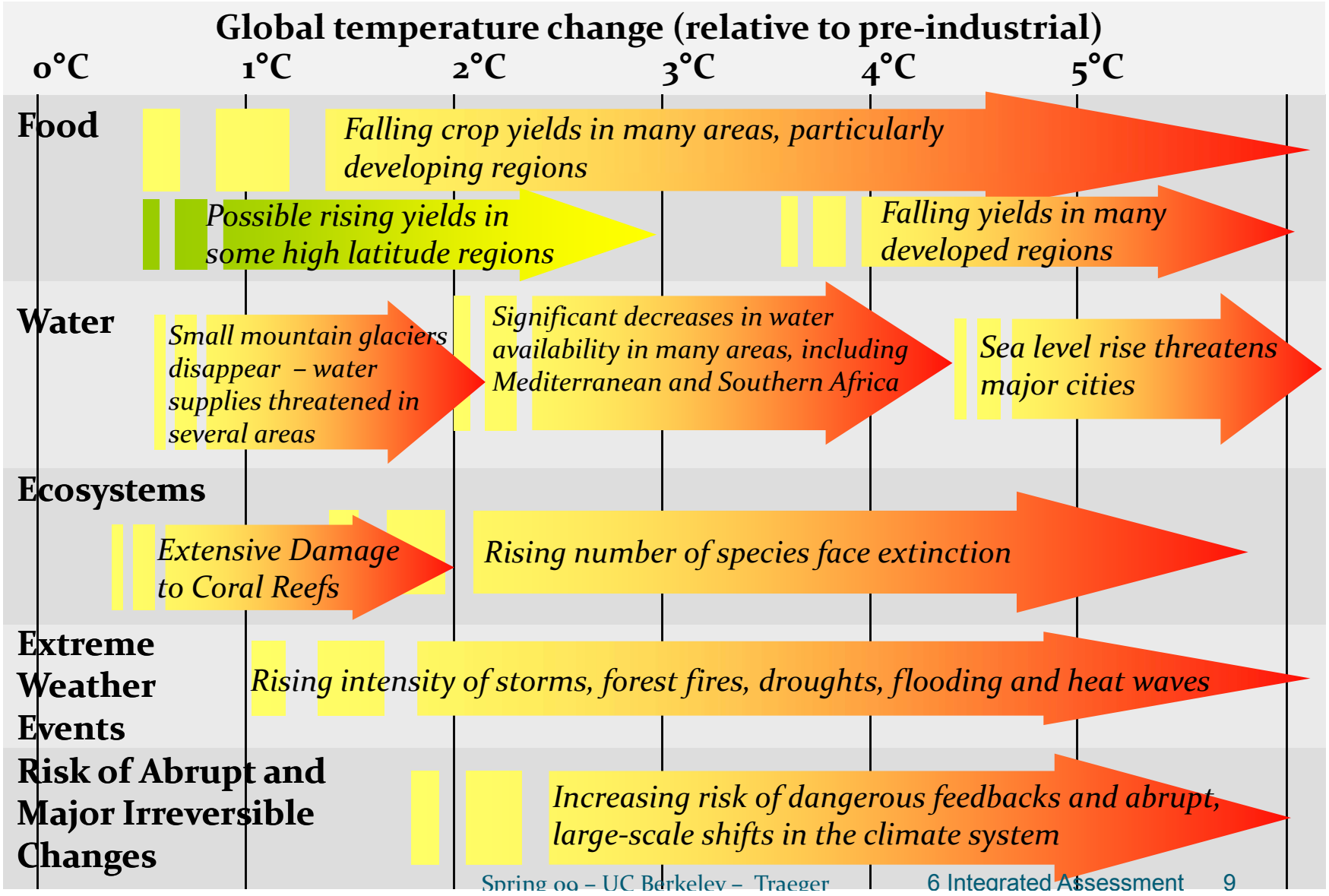
Climate change looms over our future

Francisco de Goya, El Coloso, Copyright ©Museo Nacional del Prado

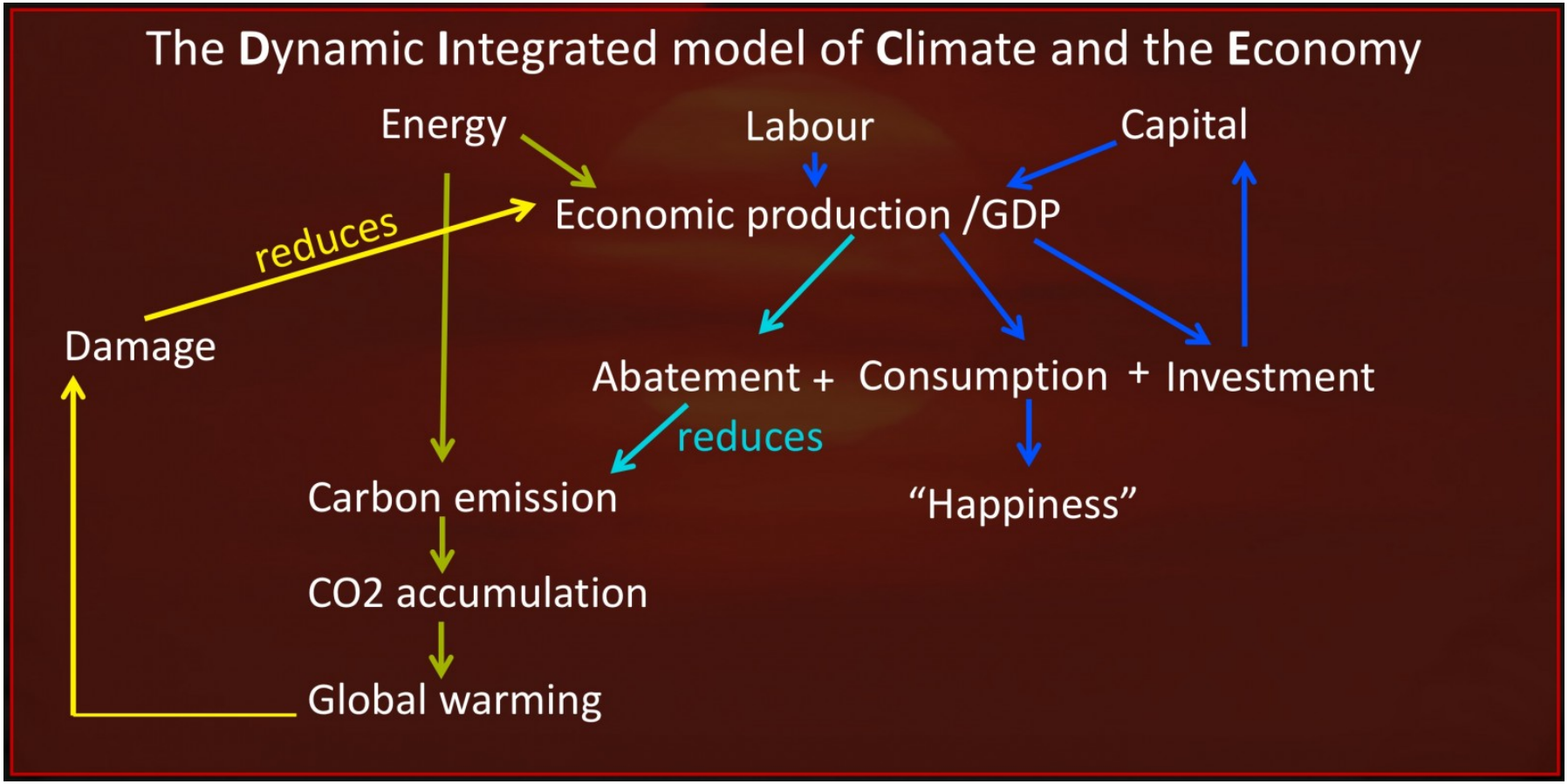
Economic Impact of Climate Change



Economic Impact of Climate Change

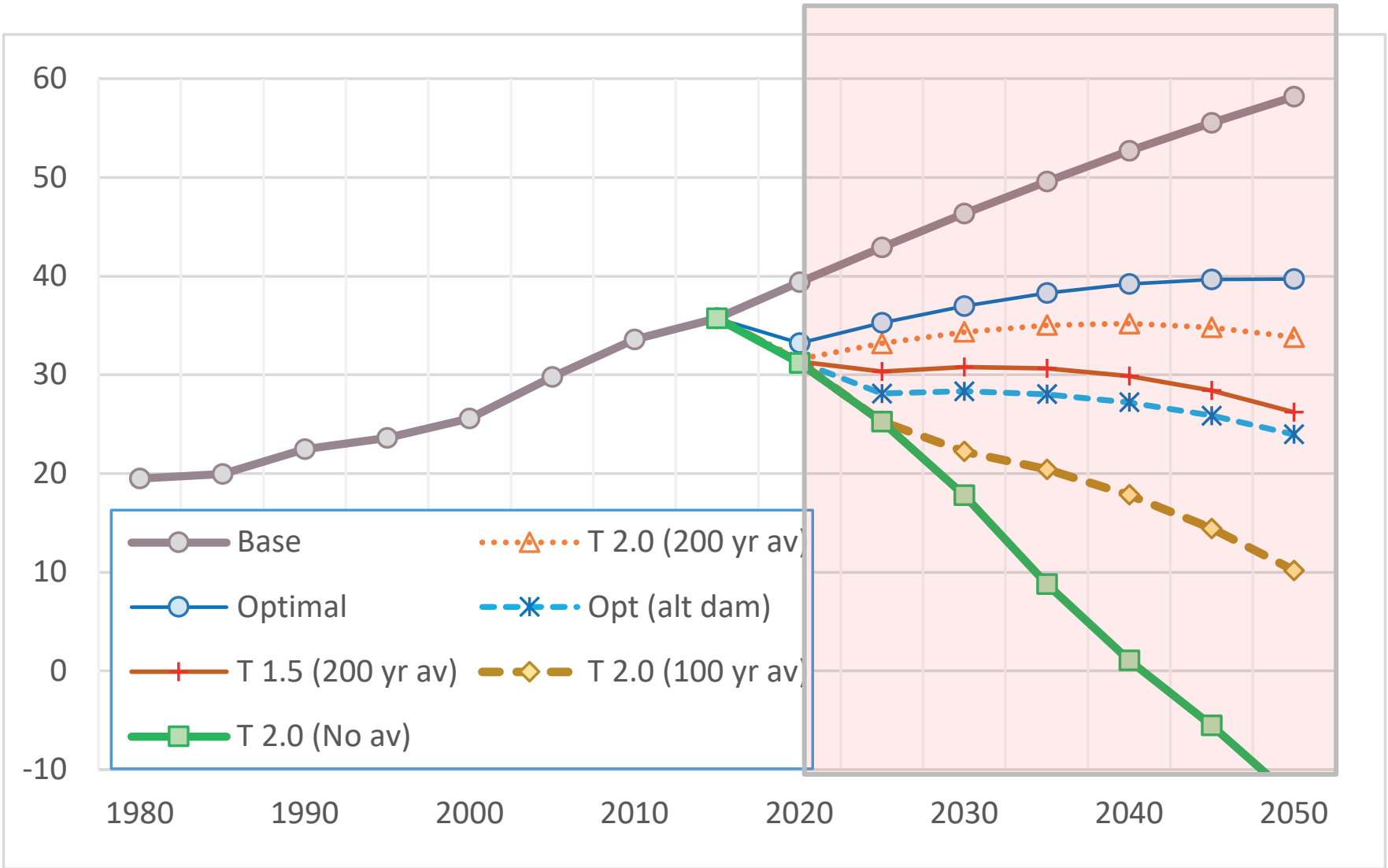


Economic Impact of Climate Change



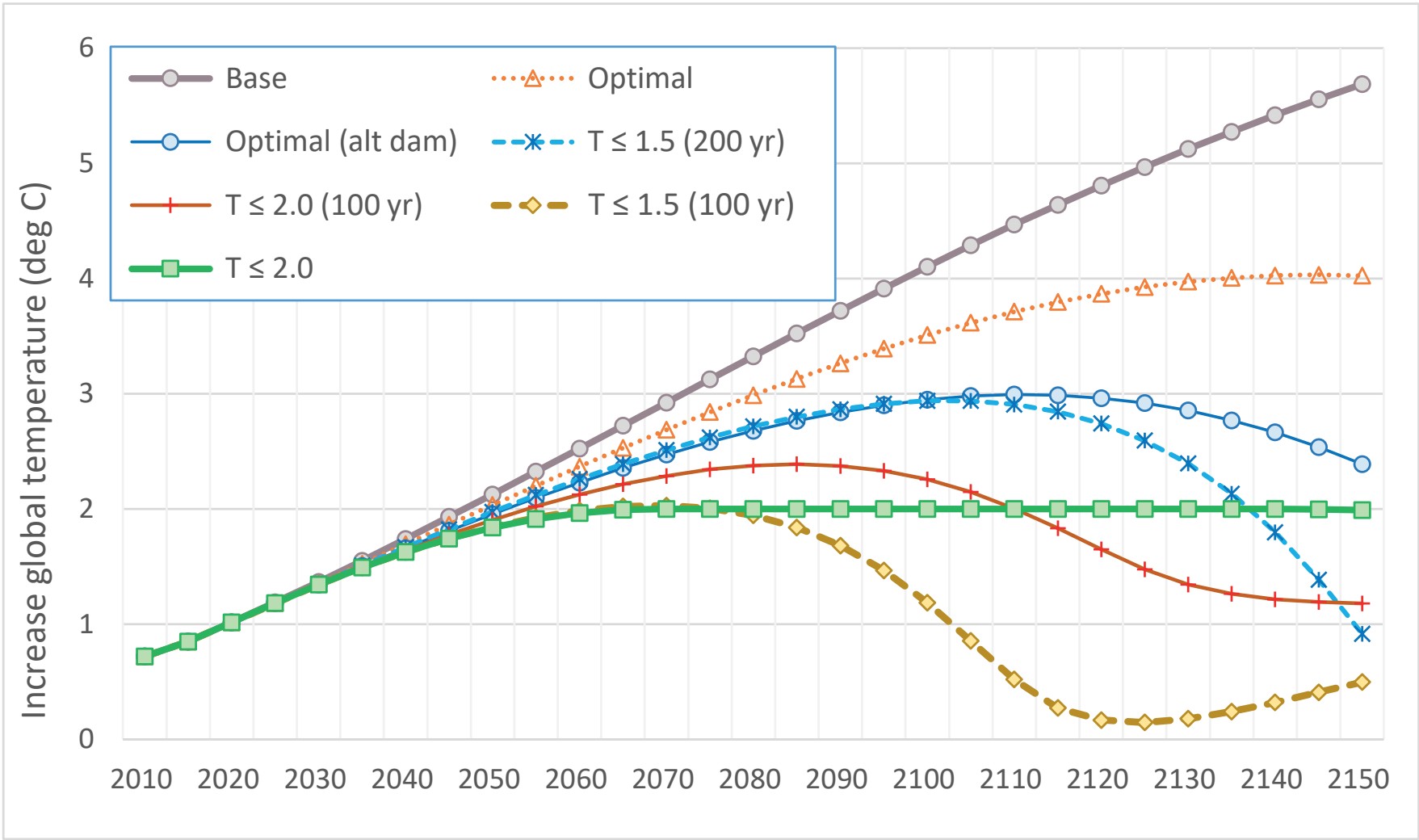
The Dynamic Integrated model of Climate and the Economy (DICE)

Economic Impact of Climate Change



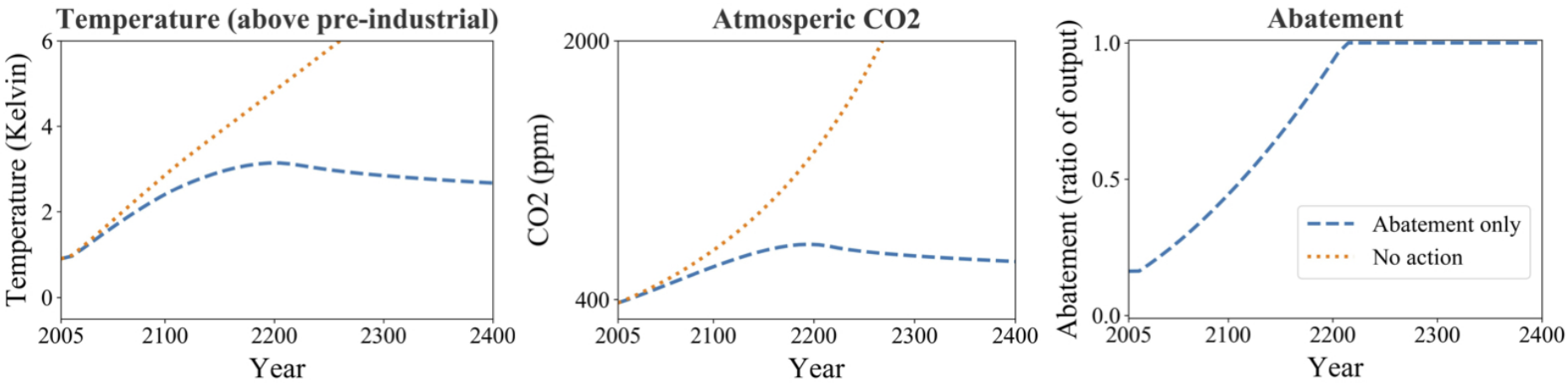
Emissions trajectories in different policies under DICE. Source: Nordhaus (2018).

Economic Impact of Climate Change



Temperature trajectories in different policies under DICE. Source: Nordhaus (2018).

Economic Impact of Climate Change



Optimal policy under DICE. The blue lines indicate the optimal policy, while yellow lines indicate no climate policy (i.e. zero emission reduction). Source: Nordhaus and Sztorc (2013).

Conclusion

"The master-economist must possess a rare combination of gifts .... He must be mathematician, historian, statesman, philosopher—in some degree. He must understand symbols and speak in words. He must contemplate the particular, in terms of the general, and touch abstract and concrete in the same flight of thought. He must study the present in the light of the past for the purposes of the future. No part of man's nature or his institutions must be entirely outside his regard. He must be purposeful and disinterested in a simultaneous mood, as aloof and incorruptible as an artist, yet sometimes as near to earth as a politician." – John Maynard Keynes