

**FE431: PUBLIC FINANCE****Fall AY 2013****Professor: Kurtis Swope****Website:** [www.usna.edu/Users/econ/swope](http://www.usna.edu/Users/econ/swope)**Office Hours: Tuesday periods 9, 10  
(other times by appointment)****Office: NI 055****Email:** [swope@usna.edu](mailto:swope@usna.edu)**Room: SA106****Phone (office): 410-293-6892****Text:** *Public Finance*, Laurence S. Seidman

**Course Description and Objective:** A decentralized, free, competitive market economy has proven to be the most effective system for producing material goods and services in the modern world. However, markets are imperfect – they may be incomplete, lack sufficient competition, or may generate an inequitable distribution of economic benefits. Government activity is necessary to provide defense and maintain order, necessary conditions for markets to function. Some government intervention in markets may also be useful for improving outcomes when markets are imperfect or inequitable. However, government activity is imperfect, may worsen inefficiencies and inequities in the economy, and requires significant resources that must be taken from the private sector of the economy through taxation.

This course examines the microeconomic functions of government focusing on the taxing and spending activities of the public sector. The primary objective of the course is to develop in students the ability to understand and explain the core objectives of government activity (improving economic efficiency and equity) in a market economy, and to think critically about and evaluate current and proposed government institutions, policies, and programs in light of those objectives.

**Grades:** Your course grade is based on total points accumulated on:

- (A) 2 Midterm Exams – 100 points each
- (B) Final Exam (Cumulative) – 100 points
- (C) Homework and Weekly Writing Assignments – 50 points
- (D) Research Project – 50 points

**Grading Scale:** There will be a total of 400 points possible in this course. Your final letter grade will be based on the following scale - expressed as a percentage of 400 points:

A (90-100%)    B (80-89%)    C (70-79%)    D (60-69%)    F (59% and below)

This grading scale is absolute (there will be no “curve”). Everyone can get an A or everyone can get an F. A grade will be rounded up if the fractional part of the final average is equal to or above .5. A grade will be rounded down if the fractional part of the final average is below .5. For example: 89.5% becomes 90%, an A for the course. An 89.49 becomes an 89%, a B for the course.

**Exams:** All exams consist of short answer, essays, and problems. Tentative exam dates are listed in the below. Using calculators in text mode or to access programmed material during exams is not permitted.

**Research Project and Presentation:** Details of the research project will be discussed later in the course.

**Extra Credit:** Under no circumstances will I give extra credit to individual students. However, during the course of the semester there may be optional class exercises in which extra credit may be earned.

**Homework and Weekly Writing Assignments** will be announced in class. Both will be collected and checked. Students not in class the day an assignment is made are still responsible for completing the assignment on time. All assignments will be posted on the web for you to download if you are not in class. You should always check to see if an assignment has been made. **Writing assignments must be typewritten.** Assignments that are complete and represent a “Good Faith Effort” will receive a check. Some homework solutions will be posted on the web.

### **Tentative Schedule and Outline of Topics**

#### **Part I: The Benefits of Free Markets**

- Assignment 1: Adam Smith (1776), portions of The Wealth of Nations
- Laurence Seidman, Public Finance, Chapter 1 (Introduction to Public Finance)
- Laurence Seidman, Public Finance, Appendix (The Indifference-Curve / Budget Line Diagram)
- Assignment 2: Problem Set

#### **Part II: Market Failure and Government Failure**

- Assignment 3: Dr. Seuss (1971), The Lorax
- Laurence Seidman, Public Finance, Chapter 2 (Externalities and the Environment)
- Laurence Seidman, Public Finance, Chapter 3 (Public Goods)
- Assignment 4: John Tierney (2000), “A Tale of Two Fisheries” and The Economist’s (2012) “Plenty more fish in the sea”
- Assignment 5: Ronald Coase (1974), “The Lighthouse in Economics”, *Journal of Law and Economics*
- Assignment 6: Problem Set

#### **Exam 1 – Wednesday, September 26**

- Laurence Seidman, Public Finance, Chapter 3 (Political Economy)
- Assignment 7: Dennis Young, “Contract Failure Theory”, and Dennis Young, “Government Failure Theory”, in The Nature of the Nonprofit Sector, ed. by J. Steven Ott, 2001

#### **Part III: Social Insurance, Redistribution, and Low-Income Assistance**

- Assignment 8: Matthew Braham (2007), “Adam Smith’s Concept of Social Welfare”
- Laurence Seidman, Public Finance, Chapter 5 (Social Security)
- Laurence Seidman, Public Finance, Chapter 6 (Health Care)
- Laurence Seidman, Public Finance, Chapter 11 (Education)
- Assignment 9: Problem Set
- Assignment 10: Jonathan Rothwell (2012), “Housing Costs, Zoning, and Access to High-Scoring Schools”
- Assignment 11: Atul Gawande (2009), “The Cost Conundrum”

#### **Exam 2 – Wednesday, October 31**

- Laurence Seidman, Public Finance, Chapter 12 (Low-Income Assistance)

#### **Part IV: Efficient and Equitable Taxation**

- Laurence Seidman, Public Finance, Chapter 7 (Tax Incidence and Inefficiency)
- Laurence Seidman, Public Finance, Chapter 8 (Income Taxes)
- Laurence Seidman, Public Finance, Chapter 9 (Consumption Taxes)
- Assignment 12: Herbert Kiesling (1992), “Taxation and Liberty”, Ch. 8 in Taxation and Public Goods
- Assignment 13: Problem Set

#### **Part V: Deficits, Debt, and the Size of Government**

- Laurence Seidman, Public Finance, Chapter 13 (Government Borrowing)

**Final Exam** - The final exam is cumulative.

FE431: Public Finance Course Notes

## Part I: The Benefits of Free Markets

### I. Introduction

Consider the following two quotes:

“The art of war, however, as it is certainly the noblest of all arts, so in the progress of improvement necessarily becomes one of the most complicated among them...In modern war the great expence of fire-arms gives an evident advantage to the nation which can best afford that expence.”

- Adam Smith, *The Wealth of Nations* (Book V), 1776



Adam Smith (1723-1790)

“I would argue that the most serious threat to the United States is not someone hiding in a cave in Afghanistan or Pakistan but our own fiscal irresponsibility.”

- Hon. David Walker, former Comptroller of the Government Accountability Office (GAO), 2007



David Walker (1951- )

What do these quotes tell you?

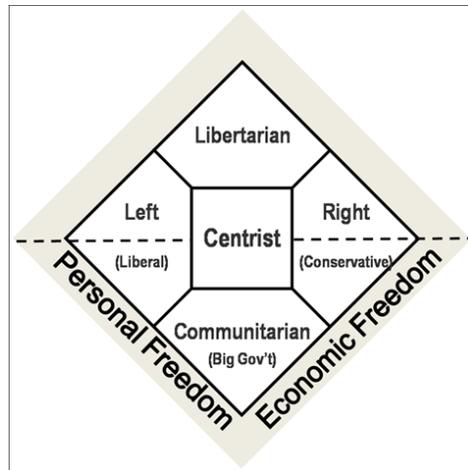
- “Public Finance” (as a course) is the study of the taxing, spending, and borrowing activities and policies of the public sector (i.e. government). It is the most important economics class you will ever take (claims Professor Swope).





David Nolan (1943-2010)

- Alternatively, the “Nolan Chart”



- Some statistics and cross-country comparisons to consider:

OECD Countries' Government Expenditures as a percent of GDP:

U.S. in 2011 = 41.9% (on the relatively "smaller" end of government for developed countries)

Annex Table 25. **General government total outlays**  
Per cent of nominal GDP

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Australia	35.9	35.7	35.1	34.3	33.6	33.5	33.9	34.3	33.6	33.1	33.6	33.1	32.6	32.6	33.5	36.3	36.4	35.0	33.8	33.2
Austria	56.1	56.3	55.9	53.5	53.7	53.4	51.9	51.3	50.7	51.3	53.8	50.0	49.2	48.6	49.4	52.9	52.6	51.7	52.0	51.8
Belgium	52.6	52.1	52.5	51.2	50.4	50.1	49.1	49.1	49.8	51.0	49.4	52.1	48.6	48.3	50.0	53.8	52.9	52.2	52.3	51.8
Canada	49.7	48.5	46.6	44.3	44.8	42.7	41.1	42.0	41.2	41.2	39.9	39.3	39.4	39.4	40.0	44.4	44.1	43.2	42.3	41.2
Czech Republic	..	53.0	41.7	42.6	43.0	42.2	41.6	43.9	45.6	50.0	43.3	43.0	41.9	41.0	41.1	44.9	44.1	43.5	43.3	42.8
Denmark	60.2	59.3	58.9	56.7	56.3	55.5	53.7	54.2	54.6	55.1	54.6	52.8	51.6	50.8	51.9	58.4	58.5	59.3	61.0	59.6
Estonia	..	41.3	39.5	37.4	39.2	40.1	36.1	34.8	35.8	34.8	34.0	33.6	33.6	34.0	39.5	45.2	40.6	38.1	39.2	36.9
Finland	63.6	61.6	60.2	56.7	53.0	51.8	48.4	48.0	49.1	50.4	50.3	50.4	49.3	47.5	49.4	55.9	55.3	53.2	52.7	52.7
France	54.1	54.4	54.5	54.2	52.7	52.6	51.6	51.6	52.8	53.4	53.3	53.6	52.9	52.6	53.3	56.7	56.7	56.2	55.9	55.0
Germany	48.0	54.8	49.0	48.2	48.0	48.3	45.1	47.5	47.9	48.4	47.2	47.0	45.3	43.5	44.1	48.1	48.0	45.5	45.3	44.7
Greece	45.1	46.2	44.5	45.3	44.7	44.8	47.1	45.7	45.5	45.1	45.9	44.6	45.2	47.6	50.6	53.8	50.2	49.9	49.2	48.7
Hungary	..	55.8	51.5	50.5	51.7	49.5	47.8	47.8	51.5	49.7	49.1	50.1	52.1	50.6	49.2	51.4	49.5	48.8	49.3	49.3
Iceland	39.9	42.7	42.2	40.7	41.3	42.0	41.9	42.6	44.3	45.6	44.0	42.2	41.6	42.3	57.6	51.0	51.5	46.0	45.1	43.6
Ireland	43.5	40.9	39.0	36.5	34.4	33.9	31.2	33.0	33.3	33.1	33.5	33.8	34.3	36.6	42.8	48.9	66.8	45.9	44.1	43.1
Israel	..	..	..	..	55.0	53.6	51.4	53.7	55.8	54.4	51.0	49.4	47.8	46.4	46.1	45.7	45.4	44.9	44.7	44.4
Italy	53.2	52.2	52.2	50.0	48.9	47.9	45.9	47.7	47.1	48.1	47.5	47.9	48.5	47.6	48.6	51.6	50.3	50.1	49.8	49.4
Japan	35.0	36.0	36.7	35.7	42.5	38.6	39.0	38.6	38.8	38.4	37.0	38.4	36.2	35.9	37.2	42.0	40.4	42.5	42.1	41.7
Korea	20.6	20.4	21.2	21.8	24.1	23.2	22.4	23.9	23.6	28.9	26.1	26.6	27.7	28.7	30.4	33.1	30.9	30.9	30.7	30.2
Luxembourg	38.9	39.7	41.1	40.7	41.1	39.2	37.6	38.1	41.5	41.8	42.6	41.5	38.6	36.3	37.1	43.0	42.5	42.5	43.0	42.4
Netherlands	53.5	56.3	49.4	47.5	46.6	46.0	44.1	45.3	46.1	47.0	46.1	44.8	45.5	45.2	46.2	51.5	51.2	50.5	50.4	50.0
New Zealand	42.8	41.9	40.8	41.6	40.6	40.2	38.3	37.8	36.9	37.5	37.1	38.2	39.6	39.6	41.8	42.8	43.1	49.3	43.5	43.0
Norway	54.1	50.9	48.5	46.8	49.1	47.7	42.3	44.1	47.1	48.2	45.4	42.1	40.5	41.1	40.7	47.3	46.1	43.8	44.5	45.2
Poland	..	47.7	51.1	46.6	44.5	42.9	41.1	43.7	44.3	44.7	42.6	43.5	43.9	42.2	43.2	44.6	45.4	44.7	44.3	43.5
Portugal	42.4	41.5	42.1	41.1	40.8	41.0	41.1	42.5	42.3	43.8	44.7	45.8	44.5	44.4	44.8	49.9	51.3	49.4	46.9	45.8
Slovak Republic	..	48.6	53.7	48.9	45.8	48.1	52.1	44.5	45.1	40.1	37.7	38.0	36.5	34.2	34.9	41.5	40.0	39.4	37.9	36.8
Slovenia	..	52.3	44.2	44.5	45.4	46.2	46.5	47.3	46.2	46.2	45.7	45.3	44.6	42.5	44.2	49.3	50.1	50.1	49.9	48.9
Spain	46.7	44.4	43.2	41.6	41.1	39.9	39.2	38.7	38.9	38.4	38.9	38.4	38.4	39.2	41.5	46.3	45.6	42.7	41.0	39.7
Sweden	68.3	64.9	62.9	60.7	58.8	58.1	55.1	54.5	55.6	55.7	54.2	53.9	52.7	51.0	51.7	55.0	52.9	51.8	52.7	52.1
Switzerland	35.2	35.0	35.3	35.5	35.8	34.3	35.1	34.8	36.2	36.4	35.9	35.3	33.5	32.3	32.4	34.1	34.2	34.0	34.2	33.9
Turkey	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	33.2	34.5	34.2	39.4	37.1
United Kingdom	44.6	44.1	42.2	40.6	39.5	38.8	36.5	39.8	40.9	42.3	43.1	44.0	44.2	43.9	47.9	51.1	50.6	49.8	48.9	47.5
United States <sup>1</sup>	37.1	37.1	36.6	35.4	34.6	34.2	33.9	35.0	35.9	36.3	36.0	36.3	36.1	36.9	39.1	42.7	42.5	41.9	41.1	40.7
Euro area	50.9	53.1	50.5	49.2	48.5	48.1	46.2	47.2	47.5	48.0	47.5	47.4	46.7	46.0	47.2	51.2	51.0	49.3	48.8	48.1
Total OECD	41.9	42.7	41.6	40.4	40.8	39.7	38.8	39.8	40.4	40.8	40.2	40.4	39.7	39.8	41.5	45.2	44.6	44.0	43.3	42.7

*Note:* Data refer to the general government sector, which is a consolidation of accounts for the central, state and local governments plus social security.

<sup>1</sup> These data include outlays net of operating surpluses of public enterprises.

*Source:* OECD Economic Outlook 90 database.

*This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.*

Discuss:

- How does the U.S. compare to other developed countries?
- Are there any trends in the size of government over time?

OECD Countries' Government Debt as a percent of GDP:

U.S. in 2011 = 74% (and rising quickly, and on the "high" end for developed countries)

Annex Table 33. **General government net financial liabilities**  
Per cent of nominal GDP

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Australia	25.7	26.3	20.9	21.1	16.0	14.9	8.8	6.4	4.5	2.4	0.3	-1.3	-4.6	-7.2	-7.5	-3.7	1.8	4.9	6.1	6.1
Austria	35.2	38.6	40.2	36.4	36.5	35.7	34.7	35.6	37.1	36.1	38.1	37.9	34.0	31.4	34.7	40.6	44.0	45.2	47.4	48.9
Belgium <sup>1</sup>	114.4	114.5	115.3	110.8	107.7	103.0	97.5	94.9	93.1	90.2	83.7	82.0	77.2	73.2	73.6	79.7	80.3	80.4	81.5	81.1
Canada	67.9	70.7	70.0	64.7	60.8	55.8	46.2	44.3	42.6	38.7	35.2	31.0	26.3	22.9	22.6	28.3	30.4	33.6	36.6	38.3
Czech Republic	..	..	..	..	..	..	..	..	-15.6	-7.2	-9.3	-10.9	-11.2	-15.7	-6.7	-2.7	2.3	6.0	9.2	12.2
Denmark	32.9	33.4	33.3	32.3	35.1	28.4	22.5	20.1	19.1	18.0	14.8	10.5	1.9	-3.8	-5.3	-3.7	-1.3	2.4	7.4	10.2
Estonia	..	-39.2	-28.6	-23.5	-40.4	-39.8	-30.4	-28.5	-28.6	-29.1	-32.1	-31.9	-31.4	-28.9	-26.3	-29.6	-36.5	-32.7	-28.9	-26.9
Finland <sup>2</sup>	-16.3	-7.3	-6.7	-7.5	-14.5	-50.3	-31.1	-31.7	-31.3	-38.5	-46.7	-58.6	-69.5	-72.6	-52.2	-62.5	-64.5	-60.9	-56.6	-53.6
France	29.6	37.4	41.9	42.4	40.6	33.6	35.2	36.7	41.9	44.4	45.4	43.4	37.4	35.7	45.9	52.3	58.9	62.7	66.2	67.7
Germany <sup>3</sup>	19.1	29.7	32.7	32.5	36.3	34.4	33.7	36.1	40.3	43.3	47.3	49.6	47.7	42.5	44.6	49.1	52.2	51.5	51.6	50.5
Greece	..	81.7	82.2	77.5	73.3	71.2	89.8	94.1	95.9	88.4	88.5	83.7	87.1	82.0	90.4	102.0	115.5	133.1	144.6	147.8
Hungary	3.4	24.5	25.5	25.2	32.1	34.4	33.0	32.5	36.9	37.8	41.8	46.2	51.7	53.5	51.9	59.9	61.0	55.0	56.6	58.0
Iceland	..	..	..	..	42.6	35.9	37.5	29.2	28.5	30.7	27.6	13.6	7.9	-1.0	26.0	39.9	48.2	50.5	50.6	49.4
Ireland	..	..	..	..	42.2	27.4	15.9	12.5	14.0	11.9	8.7	6.4	2.0	-0.1	12.6	26.3	54.9	65.0	72.5	77.6
Italy	104.0	98.6	103.9	104.1	106.3	100.3	95.0	95.7	95.2	92.3	92.0	93.4	90.3	86.6	89.5	99.7	98.6	100.2	100.6	99.1
Japan <sup>4</sup>	19.6	23.8	29.2	34.8	46.2	53.8	60.4	66.3	72.6	76.5	82.7	84.6	84.3	81.5	96.5	110.0	116.0	127.6	134.8	142.5
Korea <sup>5</sup>	..	..	..	..	..	..	..	..	-32.3	-31.1	-31.6	-35.9	-36.8	-40.3	-37.7	-39.0	-37.4	-38.3	-39.4	-40.7
Luxembourg	..	..	..	..	-53.2	-52.4	-54.5	-60.6	-59.2	-56.9	-54.1	-51.4	-51.0	-54.8	-50.8	-55.6	-49.9	-46.2	-43.5	-39.8
Netherlands	44.6	54.0	52.7	49.7	48.2	36.7	34.9	33.0	34.8	36.2	37.6	35.0	31.6	27.8	27.0	29.7	34.4	37.7	40.2	41.8
New Zealand	43.9	37.6	32.4	29.8	27.8	25.4	23.4	21.1	17.6	13.1	8.3	3.7	-1.2	-5.5	-5.0	-1.0	2.9	10.8	14.3	16.8
Norway	-30.6	-36.1	-41.0	-48.5	-51.9	-57.3	-67.2	-84.4	-80.7	-95.1	-104.2	-121.4	-135.1	-141.3	-126.3	-158.8	-165.9	-162.5	-167.7	-170.4
Poland	..	-15.0	-5.7	0.3	6.4	13.5	15.5	18.5	22.1	22.7	20.8	23.5	22.4	17.0	17.2	22.5	28.7	32.2	33.7	34.0
Portugal	..	24.3	26.5	31.2	32.5	30.4	28.0	29.8	34.0	36.2	41.1	44.1	50.1	49.6	54.1	64.5	69.6	75.8	82.2	83.9
Slovak Republic	..	-30.7	-18.2	-12.1	-3.7	1.2	12.5	10.9	1.7	1.8	7.6	4.9	6.5	7.3	8.9	17.2	21.6	26.4	29.8	31.6
Slovenia	..	..	..	..	..	..	..	-15.6	-14.2	-9.5	-9.7	-8.5	-9.9	-16.9	-5.0	0.1	0.8	6.1	10.5	13.5
Spain	46.4	51.6	55.5	54.2	53.7	47.7	44.2	41.6	40.3	36.8	34.6	29.1	22.4	17.8	22.6	34.4	40.3	45.6	49.6	51.7
Sweden	20.7	25.6	26.6	24.6	22.0	12.4	5.5	-2.5	3.9	0.0	-2.7	-7.9	-18.9	-22.5	-16.6	-24.4	-26.1	-24.9	-24.2	-24.0
Switzerland	..	..	..	..	..	6.0	3.3	2.8	7.3	7.4	9.3	8.4	5.5	1.0	2.8	1.9	1.3	0.4	0.0	-0.6
United Kingdom	19.7	26.3	27.9	30.6	32.6	29.0	26.8	23.2	23.7	23.9	25.9	27.1	27.5	28.4	33.3	44.1	53.9	61.7	68.9	74.0
United States	54.4	53.8	51.9	48.8	44.9	40.2	35.3	34.6	37.2	40.5	42.1	42.5	41.8	42.7	48.5	60.5	68.4	73.8	80.3	85.6
Euro area	44.2	49.2	53.6	53.6	53.9	48.3	47.5	48.0	50.4	50.6	51.4	50.5	46.6	42.6	47.4	54.5	58.5	60.8	62.8	63.1
Total OECD	41.8	43.4	44.3	43.6	44.0	40.5	38.2	37.8	40.0	41.4	42.5	42.1	40.0	38.3	43.9	52.5	58.1	62.5	66.7	69.7

Note: Net debt measures are not always comparable across countries due to different definitions or treatment of debt (and asset) components, see also *OECD Economic Outlook* Sources and Methods (<http://www.oecd.org/eco/sources-and-methods>).

1. Includes the debt of the Belgium National Railways Company (SNCB) from 2005 onwards.

2. From 1995 onwards housing corporation shares are no longer classified as financial assets.

3. Includes the debt of the Inherited Debt Fund from 1995 onwards.

4. Includes the debt of the Japan Railway Settlement Corporation and the National Forest Special Account from 1998 onwards.

5. Data are on a non-consolidated basis (SNA93).

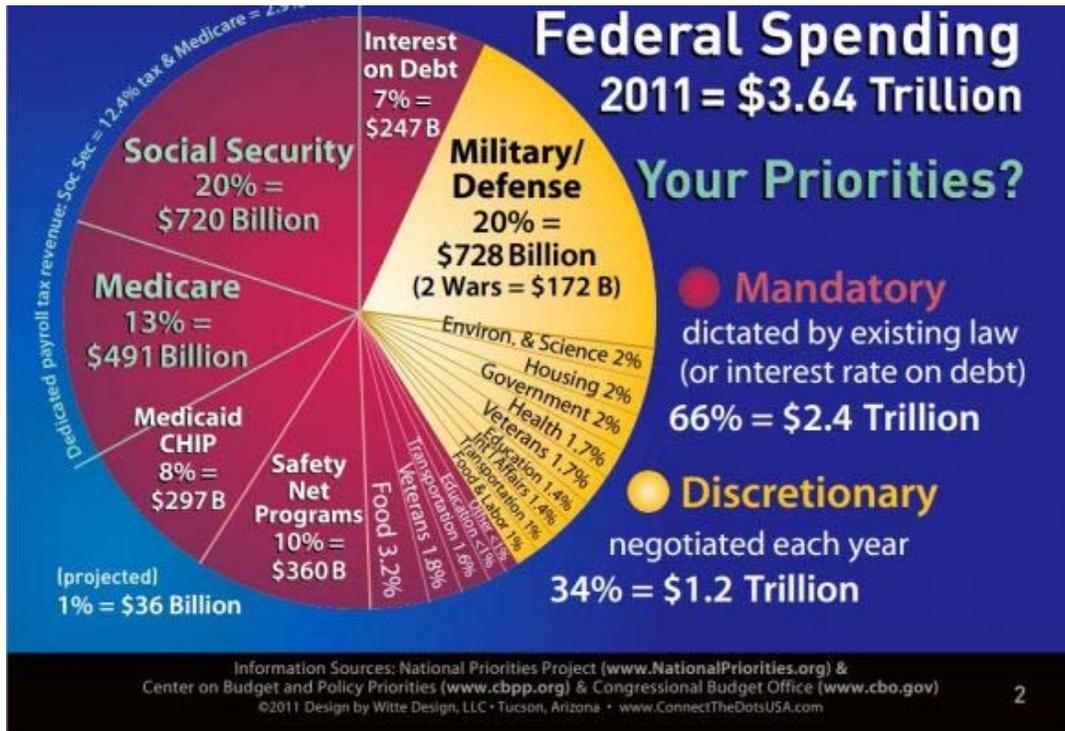
Source: OECD Economic Outlook 90 database.

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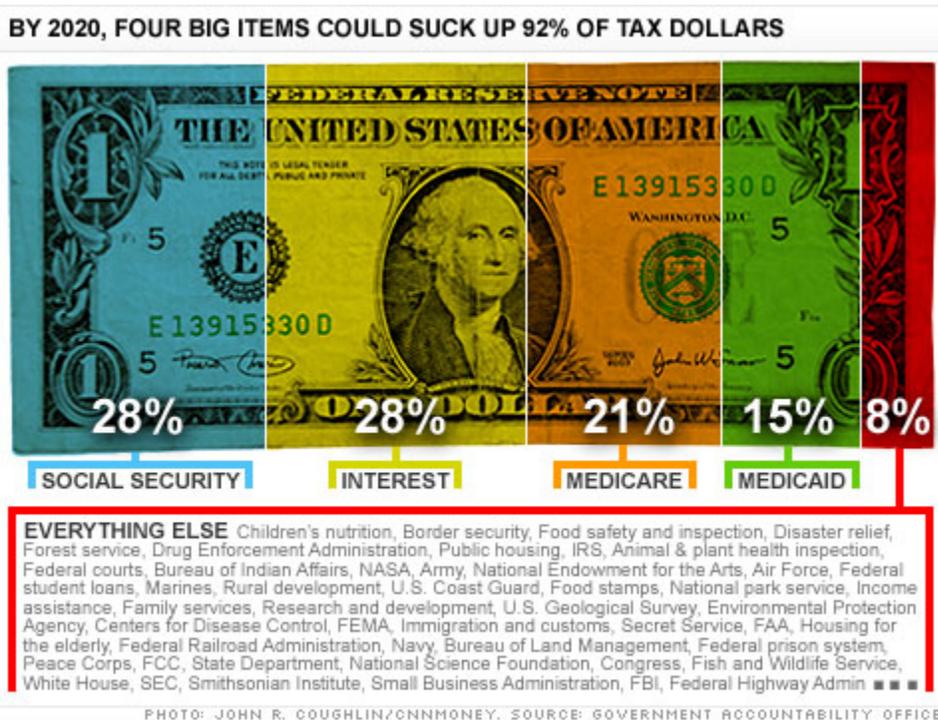
Discuss:

- How does the U.S. debt level compare to other developed countries?
- Are there any trends in government debt over time?

Currently...



Projected under current law...



Vilfredo Pareto (1848-1923)<sup>1</sup>

## II. Efficiency Concepts

- An “ideal” economic system would be
  - Pareto’s efficiency criterion
    - ⇒ A Pareto improvement refers to any change that leaves at least one person better off without making anyone worse off.
    - ⇒ A Pareto efficient outcome is any outcome for which no Pareto Improvement exists.
  - Other related efficiency concepts
    - ⇒ A Hicks-Kaldor improvement (or potential Pareto Improvement) is a change that leads to “gainers” and “losers”, but overall the gains exceed the losses. The idea is that a Pareto Improvement could be reached, if only those who benefit could somehow appropriately compensate those who are harmed.
    - ⇒ Hicks-Kaldor efficiency refers to an outcome where all potential Pareto Improvements have been realized (even if the losers are not fully compensated for their losses).

(H-K improvement / efficiency may be a more practical criterion for public decision makers because rarely will public policy changes lead to actual Pareto Improvements – there will always be somebody who is worse off, and it is typically impractical to try to compensate every person harmed by the change)

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<sup>1</sup> Italian economist who also famously observed the regularity that 20% of the population typically owns 80% of the land in most countries (also called the Pareto principle or 80-20 rule). The same relationship generally holds for wealth (20% of the world’s population owns just over 80% of its wealth) and many business relationships (e.g. 80% of your sales typically come from about 20% of your customers).

III. Efficient provision of “private” and “public” goods

- Bottom line → we expect free, competitive markets to produce and distribute private goods efficiently, but not necessarily public goods

(Note that free, competitive markets may not lead to an equitable distribution of private goods, though → more on this later)

- Consider two attributes of all goods and services:

1) Excludability

2) Rivalry

		Excludable	
		Yes	No
Rival	Yes		
	No		

\*\*\* Note that who provides / produces a good does not determine whether it is a “public good” or a “private good” for our purposes (e.g. the public sector may produce and provide some private goods, such as food, housing, medical care, etc. Similarly, the private sector may produce and provide some public goods, such as wildlife / habitat conservation. Some goods, such as education, are produced by ALL FOUR sectors → government, households, non-profit, and for-profit. What type of good is education?)

#### IV. The Origin of Markets and a Role for Government

≈ 50,000 years ago

≈ 10,000 – 6,000 years ago

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<sup>2</sup> Euclid (as in *Euclidean Geometry*) was a Greek mathematician living in Alexandria, Egypt 300 B.C. Euclid's Elements was, other than early printings of the Bible, one of the most reprinted books.

From <http://christianhubert.com/writings/index.htm>

"We owe geometry to the tax collector." (J.L. Heilbron, *Geometry Civilized*, p.1) According to the Greek historian Herodotus, the Egyptian king Sesostris divided all the land in Egypt equally among its inhabitants in return for an annual rent. But every year the flood of the Nile washed away parts of the plots. Those whose lands had disappeared naturally objected to paying the rent on what they had lost. 'Upon which, the king sent persons to examine and determine by measurement the exact extent of the loss; and thenceforth only such a rent was demanded of him as was proportionate to the reduced size of his land. From this practice, I think, geometry first came to be known in Egypt, whence it passed into Greece.' "Geometry expresses in Greek what the Greeks received from the Egyptians, retaining its root meaning of land measurement." (Heilbron)

“Every workman has a great quantity of his own work to dispose of beyond what he himself has occasion for; and every other workman being in exactly the same situation, he is enabled to exchange a great quantity of his own goods for a great quantity, or, what comes to the same thing, for the price of a great quantity of theirs.” (Book I)

“It is not from the benevolence of the butcher, the brewer, or that baker that we expect our dinner, but from their regard to their own interest.” (Book I)

“As every individual, therefore, endeavours as much as he can both to employ his capital in support of the domestic industry, and so direct that industry that its produce may be of greatest value...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 worse for society that it was no part. By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good.” (Book IV)

- Adam Smith, *The Wealth of Nations*, 1776

- What is the appropriate role of government in an economy? Some views:

1) Adam Smith's<sup>3</sup> (1776) “Duties of the Sovereign”:

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<sup>3</sup> This is the classic libertarian perspective. See also Friedrich Hayek (1973) who viewed free markets as a “spontaneous growth of civilization” that evolved because they work. Hayek thought organized power (namely government) tends to corrupt and destroy free markets. Ronald Reagan said he was heavily influenced by Hayek.

Adam Smith's own summary of *The Wealth of Nations* (Book IV, Chapter IX, last paragraph):

“All systems either of preference or of restraint, therefore, being thus completely taken away, the obvious and simple system of natural liberty establishes itself of its own accord. Every man, as long as he does not violate the laws of justice, is left perfectly free to pursue his own interest his own way, and to bring both his industry and capital into competition with those of any other man, or order of men.

The sovereign is completely discharged from a duty, in the attempting to perform which he must always be exposed to innumerable delusions, and for the proper performance of which no human wisdom or knowledge could ever be sufficient; the duty of superintending the industry of private people, and of directing it towards the employments most suitable to the interest of the society.

According to the system of natural liberty, the sovereign has only three duties to attend to; three duties of great importance, indeed, but plain and intelligible to common understandings: first, the duty of protecting the society from the violence and invasion of other independent societies; secondly, the duty of protecting, as far as possible, every member of the society from the injustice or oppression of every other member of it, or the duty of establishing an exact administration of justice; and, thirdly, the duty of erecting and maintaining certain public works and certain public institutions, which it can never be for the interest of any individual, or small number of individuals, to erect and maintain; because the profit could never repay the expence to any individual or small number of individuals, though it may frequently do much more than repay it to a great society.”

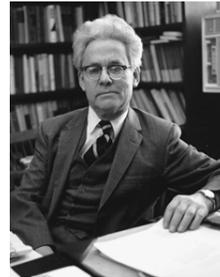
[He later summarizes this last duty as “the other works and institutions of this kind are chiefly those for facilitating the “*commerce*” of the society, and those for promoting the “*instruction*” of the people.]

2) Richard Musgrave's (1958) "Functions of Government":

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Richard Musgrave (1910-2007)

3) U.S. Constitution → Article 1 Section 8<sup>4</sup>

⇒ Empowers Congress "to pay the Debts and provide for the common Defense and general Welfare of the United States."

⇒ "The Congress shall have the Power to lay and collect Taxes, Duties, Imposts, and Excises."

⇒ Congress may also "borrow Money on the credit of the United States."

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<sup>4</sup> No explicit constraints on the size of government are set in the Constitution.

## V. Some important applications of the Pareto Criterion

## A. Efficiency in a pure “exchange economy”

- Suppose there are just two people (Tom and Jerry) and two goods (Apples and Bananas)
- Tom currently has 4 apples and 16 bananas; Jerry has 6 apples and 4 bananas.

Question: Is this allocation of the two goods Pareto efficient?

Answer:



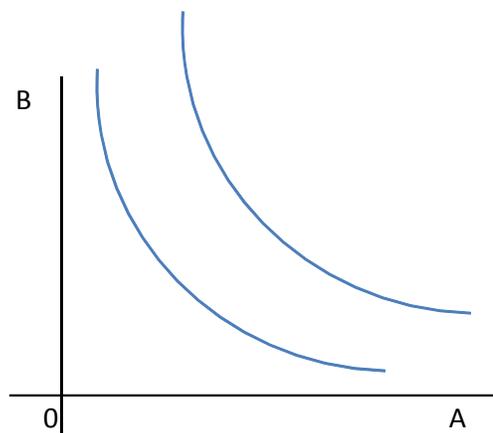
Francis Edgeworth (1845-1926)<sup>5</sup>

- Suppose Tom’s utility function is
  
  
  
  
  
  
  
  
  
  
- For simplicity, let Jerry’s utility function also be
  
  
  
  
  
  
  
  
  
  
- Based on this information, it is easy to see that trades exist that would be a Pareto improvement.  
Give an example:

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<sup>5</sup> His 1881 Mathematical Psychics was the first to use “utility functions” and “indifference curves”.

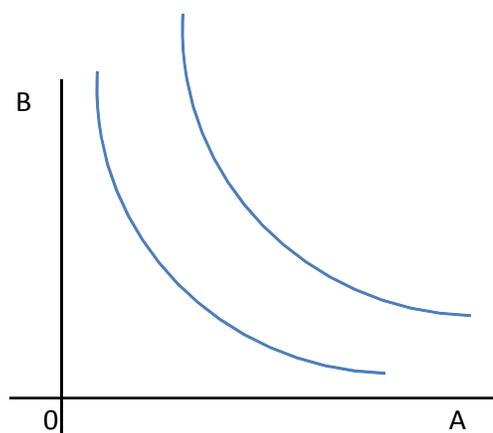
- Tom's marginal rate of substitution<sup>6</sup> ( $MRS_{AB}^T$ ) here is



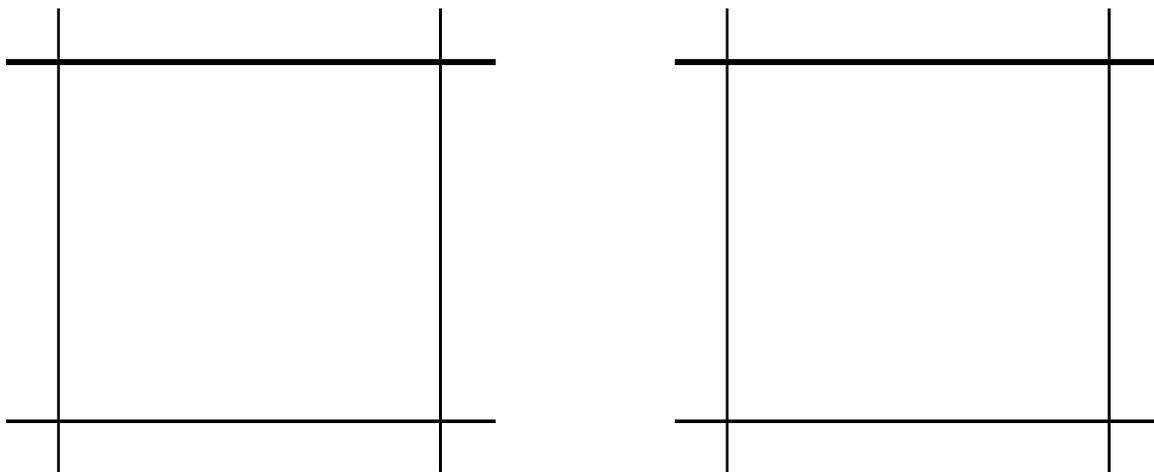
- Jerry's marginal rate of substitution ( $MRS_{AB}^J$ ) calculation here is similar

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<sup>6</sup> Notice that Tom's "marginal rate of substitution" is just a way of expressing his marginal value or "marginal benefit" from more apples, *expressed in terms of bananas* (which we have to do because there is no "money" or "all other goods" here to represent value in this simple exchange economy).



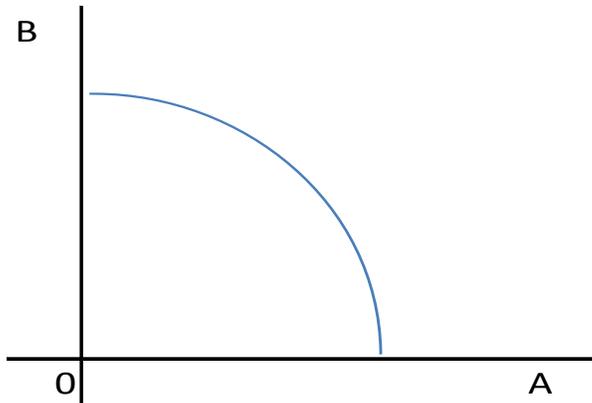
- Francis Edgeworth developed a clever way of illustrating voluntary exchange of goods between two individuals → The Edgeworth Box



- The contract curve shows the set of all Pareto efficient allocations of goods.
- The core is the subset of Pareto efficient allocations that are possible through *voluntary exchange* given an initial endowment of goods.<sup>7</sup>

<sup>7</sup> Notice that the contract curve does not depend on the initial allocation of goods or the initial indifference curves associated with that allocation. The core does depend on the initial allocation and will lie between the initial

- The Edgeworth Box illustrates *efficiency in the exchange* or distribution of goods ( $MRS_{XY}^{Person A} = MRS_{XY}^{Person B}$ ). What about the *production* of goods? Can we easily define *efficiency in production*?
- Consider the production possibility frontier (PPF) over two goods?



- The marginal rate of transformation<sup>8</sup> ( $MRT_{AB}$ ) here is

where  $MC$  is the marginal cost of the good, measured in terms of units of resources needed to produce one more unit of the good.

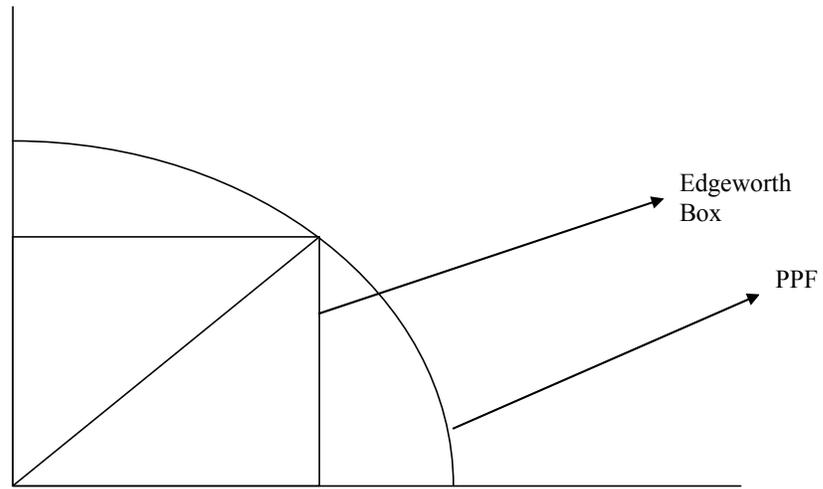
- We typically think of PPFs as “bowed out” because resources are specialized. Therefore, the opportunity cost of a good increases as we produce more and more of it.

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indifference curves (i.e. individuals will not voluntarily trade to a point that makes them worse off than when they started).

<sup>8</sup> Notice that the “marginal rate of transformation” is just another name for the “opportunity cost” apples, again *expressed in terms of bananas*. It gives you the slope of the PPF, and it tells you how many bananas (good Y) you have to give up to produce one more apple (good X). For example, if it would take 2 units of labor to produce one more apple, but just one unit of labor to produce one more banana, the  $MRT_{AB} = 2/1 = 2$ , which means producing one more apple would require giving up two bananas.

- What do we learn from the Edgeworth Box analysis?



\*\*\*Looking ahead, we can also now say that if good X is a public good the condition for efficiency becomes<sup>9</sup>

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<sup>9</sup> The difference here is simply because for a public good, the two people don't need their own units. They can share any units of the public good, so we are only concerned with their *joint* benefit from a little more of the good ( $MB_X^{Person A} + MB_X^{Person B}$ ).

- The easiest way to remember the efficiency condition is that for *any good* (that's right, I said *any good*) the efficient provision requires simply that

*marginal social benefit = marginal social cost*

$$MSB = MSC$$

You just have to be clear whether you are talking about a rival / private good (where everyone needs their own little units), so  $MSB_X = MB_X^{Person A} = MB_X^{Person B}$

or a non-rival / public good (where everyone can happily share whatever is provided), so

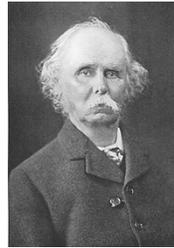
$$MSB_X = MB_X^{Person A} + MB_X^{Person B}$$

More on this later...

## VI. Efficiency in free, competitive markets

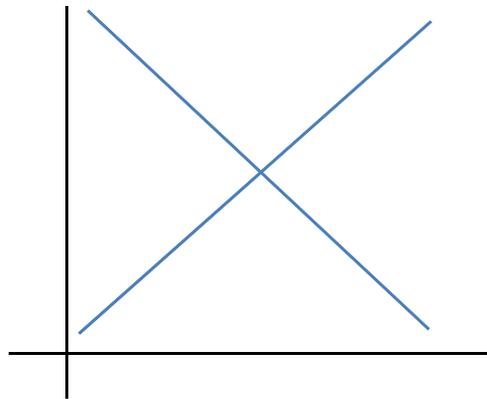
“Every workman has a great quantity of his own work to dispose of beyond what he himself has occasion for, and every other workman being in exactly the same situation, he is enabled to exchange a great quantity of his own goods for a great quantity, or what comes to the same thing, for the price of a great quantity of theirs.”

- Adam Smith, *Wealth of Nations* (Book I)



Alfred Marshall (1842-1924)

- The “Marshallian Cross” (from Marshall’s *Principles of Economics*, 1881)



- In a free, competitive market, the “market demand curve” represents the *marginal benefit* of more of the good to consumers.<sup>10</sup>
- In a free, competitive market, the “market supply curve” represents the *marginal cost* to producers of producing more of the good.<sup>11</sup>
- The important thing to notice is that voluntarily exchanging goods in a free, competitive market is, in general, a Pareto improvement (because  $MSB > MSC$ ), and the *competitive market equilibrium price and quantity exchange* is Pareto efficient!

### First Fundamental Theorem of Welfare Economics<sup>12</sup>

A Pareto efficient allocation of resources will emerge if:

- 1.
- 2.

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<sup>10</sup> We can easily show that (on the next page) how an individual’s demand curve can be derived from our budget constraint / indifference curve analysis, and how the market demand curve is just the horizontal summation of individuals’ demand curves.

<sup>11</sup> We can easily show (on the next page) how an individual competitive firm’s supply curve is the upward-sloping portion of its marginal cost curve, and how the market supply curve is the horizontal summation of individual firms’ supply curves.

<sup>12</sup> The First FTWE basically states that under ideal conditions, free markets are efficient. The Second Fundamental Theorem Welfare Economics states that any Pareto efficient outcome can be supported as a competitive equilibrium of markets. Without going into detail here, the Second FTWE basically says that we could achieve any particular efficient outcome (e.g. one that may be more “fair”) if make a suitable redistribution of goods / resources / wealth at the beginning, but then let free markets again take over. Thus, the First FTWE deals mainly with efficiency issues, while the Second FTWE deals mainly with equity issues.

Deriving market demand and supply, and proving the First FTWE:



