

CM1. THE ECONOMIC PROBLEM (3/19/21)

*The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back. John Maynard Keynes *The General Theory of Employment, Interest, and Money* (1936, p. 383)*

MOST, BUT NOT ALL, OF WHAT YOU SHOULD KNOW

1. What is the difference between microeconomics and macroeconomics?
2. What is the standard definition of microeconomics?
3. Are incentives important in determining the decisions made by economic agents?
4. What is meant by economic activity?
5. What does scarcity mean to you and me?
6. When is a good or service scarce?
7. What does scarcity mean to an economist?
8. Are stocks, bonds, and gold capital?
9. How does an economy's endowments of labor and capital effect how it produces goods?
10. What are the major factors that determine economic change?
11. What are the three questions that all economies must answer?
12. How is opportunity cost related to scarcity?
13. What is the standard definition of opportunity cost?
14. Distinguish between explicit and implicit costs and benefits.

15. Define MC and MB.

16. At what point should you stop expanding an economic activity?

17. If something has no alternative uses because the expenditure has already been made and the amount spent is not recoverable is it a cost?

18. Should sunk costs be taken into account when making an economic decision?

19. Is a terrorist bomb a good?

Note that *these questions are the sort of questions that you should have on your flash cards*. You should be able to answer them by finding where I cover this issue in the Commentary. If you can't find an answer email me.

Generate your own flash card questions by carefully reading the Commentaries and using these questions as a guide.

1. INTRODUCTION

1. Economists study economics both because of its intrinsic interest (really!), and also in the hope that if we understand how the economy works, then we will be able to derive effective policies to deal with the myriad economic problems that plague us.

2. An economy is a complex adaptive system. The US economy is very large (it will probably produce a little more than \$21t of goods and services in 2021), it has a population of more than 330 million divided into about 126 million households, there are about 160 million people in the labor force, and there are about 32 million firms¹, and it produces millions of different goods and services each year. There is an extensive system of government agencies at the Federal, State and local levels, and many not for profit organizations. The number of inter-relationships in such a system runs to many hundreds of billions per year and so the system is clearly complex. It is adaptive because it evolves over time, influenced by technological change, changes in tastes, its own past behavior and responses to policy initiatives, and various random shocks, everything from

¹ There are about 32m firms that report to the US Census, but only about 9.5m have annual revenues of \$50,000 or more. Only 800,000 have revenues over \$5m and only about 5,000 are listed on US stock exchanges. The Fortune 500 largest firms dominate US business.

hurricanes to changes in the world price of crude oil and now the coronavirus. The economy continually adapts to new circumstances and there is no reason to believe that its response to, say, an oil shock in 2021 will be the same as its response to the oil shock of 1973/4. In particular economic agents, households and firms, learn and form expectations about the future by extrapolating from what they have experienced in the past. The economy is in constant motion, a dynamic system that changes and cannot move back in time.²

A major problem with economic theory is that it is static, it is designed to explain what the system will look like after it has fully adjusted to any changes in circumstances. Economic theory is mute about how the economy adjusts to changes. Building an adequate dynamic theory has defeated the best minds that have tackled the problems in the last 60 plus years, and is definitely beyond my intellectual capabilities. I do not expect someone to come up with an adequate theory in my lifetime, although such a theory might emerge in your lifetime. However, most economists are happy to play with equilibrium models and that is what we will do in this course.³

The economy is not like most physical systems that appear to be invariant with respect to time and place; it is more like a biological system continually evolving in response to changes in its environment. The correct way to analyze such a system is to use non-linear dynamics (complexity theory), although this is still not usually taught to economics students, even at the graduate level. However, the required mathematics would be well beyond what most of you (me too) can handle. But there is no need to worry; we will not do any math beyond simple arithmetic in my section of ECON 206.

However, although I do not use any math you will encounter a large number of diagrams in the course, you must learn to think rather abstractly about the economic issues, and be willing to follow simple chains of logical reasoning.

3. You have spent the last eighteen years or more living in an advanced industrial economy (that is where your faulty intuitions come from), the second largest economy in the world, with a GDP of about \$21t⁴ in 2019. You are

² The Dark Ages in Western Europe are an obvious counter example to this assertion.

³ Current economic theory makes no attempt to explore how our economy came into existence although humans have been living in economic systems at least since the transition from hunter gatherer societies into agricultural and more settled communities some 10,000 years ago.

⁴ If you have no idea how big a trillion is look at the Appendix; if you have, take a look anyway. You probably have a rough idea what GDP measures, we will discuss GDP in CM19.

therefore already familiar with many features of the economy. In particular you are familiar with words like price, goods, services, households, firms, and markets. This is both a plus and a minus. It is a plus, because you don't need to have many of these terms explained to you in the way that you need concepts explained to you in physics and chemistry. It is a minus, because economists sometimes use familiar words in unfamiliar ways and because what you think you know about the economy, much of it gleaned from the media, is wrong! In this course you must beware of using your "commonsense" on the exams, where *what I want you to do is to be able to reproduce what I tried to teach you*, not what seems obvious to you.

4. Economists are, understandably, obsessed with economics. But firms must convert inputs into outputs according to the laws of physics in twenty-four-hour days; the economy is embedded in the biosphere and uses the biosphere as both a source of raw materials and energy, and as a sink for waste products. (These actions impose strains upon the environment, and deplete the resource base. We will look at some of these problems in CM14.)

The economy is also a part of society, the social system in which we live. Economic activity is crucially dependent on institutions, in particular a system of property rights guaranteed by law (see CM13). Voters may be more concerned with a candidate's views on abortion than they are about her views on taxation.

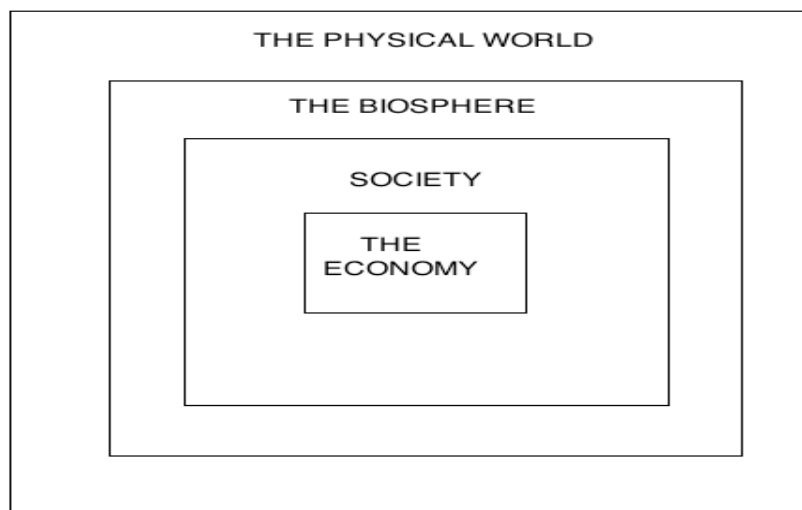


Figure 1

2. MICROECONOMICS versus MACROECONOMICS

1. Economics is divided into two main branches: *Microeconomics* (what you study in ECON 206) and *macroeconomics* (what you will study if you take ECON 207). **Microeconomics** is that part of economics that deals with the individual components of the economy, economic agents (by which I mean individuals and households, firms, unions, not for profit enterprises, government agencies, non-government organizations (NGOs), etc.). Economists want to know what causes economic actors to act in the ways that they do, and want to use that knowledge to understand how the economy behaves. Microeconomics is the part of economics that is concerned with the determination of the prices and outputs of *specific* goods and services – the prices of cars, the number of hamburgers produced in 2021, the fees that you pay a lawyer, the number of men’s haircuts last month, among many other things.

2. **Macroeconomics** is concerned with the behavior of the whole economy: the level of output and employment, the rate of economic growth, the rate of inflation, and the balance of payments. Macroeconomics is the part of economics that attempts to explain the long run growth of the economy and why the economy fluctuates around that long run trend, causing unemployment and inflation. Macroeconomists attempt to guide policy makers on how to conduct monetary and fiscal policy, the tools that are used to attempt to control the economy. Macroeconomics is also concerned with government deficits and the workings of the financial sector. In a sense macroeconomics is more important than microeconomics – think how much hardship the Great Recession caused. However, professional macroeconomics, the sort done by economists who publish in the area and is taught to graduate students (not what is taught in undergraduate courses), is largely indistinguishable from the sort of microeconomic theory that I will criticize from time to time as the course progresses.

3. Microeconomics is about the trees and macroeconomics is about the forest; microeconomics is concerned with the individual cogs and wheels whereas macroeconomics is about the behavior of the machine; microeconomics is about individual cells while macroeconomics is about the whole organism. You will see

the sort of issues that microeconomists are interested in when you look at the Topics listed towards the end of the Syllabus.⁵

4. There are many more economists doing microeconomics than economists doing macroeconomics. Microeconomics is split into a number of subfields. A far from exhaustive list of microeconomic specialties is: labor economics, international trade, environmental economics, resource economics, energy economics, health economics, urban and regional economics, industrial organization, game theory, experimental economics, behavioral economics, neuroeconomics, agricultural economics, the economics of education, law and economics, public choice theory, transportation economics, the economics of gender and marriage, the economics of the arts, the economics of sports. Business schools treat finance, which most economists regard as a sub-field of microeconomics, as a separate discipline.

5. Our department offers a number of joint majors and is particularly strong in the environmental and resource economics area. Our joint major in Politics, Philosophy, and Economics, modeled after the Oxford University PPE degree, is an excellent pre-Law major.

3. DEFINING ECONOMICS

"Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses." Lionel Robbins *The Nature and significance of Economic Science*, (1932. Quotation from page 16 of the second edition, 1935.)

1. One of the things that you learn in the introductory chapter of a microeconomics principles text is how to define economics. I think that this may not be very helpful at this point in the course but I will follow the convention. *The standard **definition** of economics is that economics is the study of how to allocate scarce (limited) resources amongst alternative (almost unlimited) wants/uses.* This definition emphasizes scarcity as the major concern of economics and, as we will see below, this will lead us to the concept of opportunity cost and the need to make trade-offs between alternative purchases

⁵ One of my criticisms of contemporary economics is that much of the research involves data analysis of topics that have only a tenuous relation to the sort of economics discussed in undergraduate course; much of that research could equally well be published in sociology and political science journals. Steve Levitt – a brilliant man, the economic part of *Freakonomics*, a book with no economic content – is a very skilled data analysis and on his own admission has never contributed an interesting idea to economics

or activities; economists think not in terms of either X or Y but how much of X must be sacrificed in order to get an additional unit of Y. The scarcity definition is the basis for the economist's preoccupation with maximization subject to constraints: choosing the best alternative given the limited alternatives available to us. If you have only a rock or a hard place then you have to decide which you "prefer" – which is least unpleasant. However, the standard definition is very general.⁶ The broad scope of this definition has allowed economists to invade sister social sciences – economics to become the imperial social science – such as sociology, criminology, political science, and law.

2. Some economists like to emphasize that economics *studies of how economic agents respond to incentives*, both positive (benefits) and negative (costs). You would pay much more attention to parking regulations if the parking piranhas were allowed to boil parking violators in oil on Thursday afternoons. Incentives are certainly a major focus of microeconomics. Later in the course we will see that positive incentives (rewards) are usually much more effective than negative ones (penalties) and why this is important in determining which sorts of economic organizations are most efficient.

3. Neither definition captures the idea that economics is concerned with economic activity; **economic activity** involves the *production, exchange, and consumption of goods and services*. Firms buy inputs such as labor, energy and raw materials (owned by households), and transform them into goods and services (production); what is produced is sold to consumers (exchange);⁷ "consumers" (obviously individuals and households but also firms and the government sector) then consume what is produced (consumption). For example, Microsoft uses labor (programmers) to create goods (software) that it sells to, and is used by, consumers.

4. My preferred definition of economics is that economics is what (academic) economists do. This is deliberately vague! Economists are not licensed and anyone can call herself an economist. When I use the term economist, I mean someone with a Ph.D. in economics usually employed by a university, but including economists who work in think tanks, for the various branches of the

⁶ A football coach allocates scarce resources to win the game but we would not usually think of this as economic decision making.

⁷ The word exchange is used in a very general sense in economics. To an economist an exchange is any form of transaction in which there is a buyer and seller. I am engaged in an exchange with the university in which I supply labor (my time) and the university buys it by paying me a pitiful salary.

government, and international agencies (the World Bank, the IMF, and various UN Agencies).

Academic economists do three types of economics: 1) *Analytical Economics* (essentially *economic theory*, which is formulated mathematically); 2) *Empirical Economics* (doing *statistical analysis of data* – what economists call econometrics – perhaps 85% of the work done by economists involves data analysis); and 3) *Prescriptive Economics* (a term that I invented to describe *economists applying their analysis to working out the consequences of other people's value judgments and other people's policy preferences, not the economist's own value judgments or policy preferences*). Prescriptive Economics attempts to diagnose the true nature of the economic policy problem confronting economic policy makers (which may not be the problem that they think they face), and prescribes alternative policies that are consistent with the policy makers' preferences, given the constraints that the policy makers face. Prescriptive Economics attempts to determine, and where possible measure, the trade-offs that confront policy makers. Prescriptive Economics draws on Analytical and Empirical Economics.

4. SCARCITY

1. Lionel Robbins (who taught me when I was at the LSE) formulated the widely adopted scarcity definition of economics: his definition is quoted at the head of the Commentary. Economists say **economics** is the study of the allocation of **scarce** resources amongst **alternative** uses. (This definition of economics is difficult to reconcile with what macroeconomists do.) Economists often use the phrase "resource allocation" when talking about microeconomics; what we mean is the allocation of limited resources between alternative uses. *Economists assume that people's wants are essentially unlimited*, taking into account the quality as well as the quantity of goods and services we wish to consume. My wife and I enjoy art and we would be happy to build our own art gallery and stock it with the greatest paintings still on the market. If we had huge amounts of money to spend we could not only buy pictures but we could use our own private jet to travel between our houses, apartments and villas all over the world, waited upon by our resident staffs, eating the meals prepared by our chefs, and with all of the comforts of home - including different wardrobes of clothes – visiting the great art collections (for suitable donations, the curators of these collections would be willing to allow us private showings of their treasures.)

2. Note that although my toenail clippings are scarce, they have no alternative uses that I can think of and so they have no economic value. Your bronzed baby shoes are also scarce, but they possess only intrinsic value to your parents. A “splinter from the true cross” should have been very scarce in the fourteenth century (although there were surprisingly large numbers of them available to the devout and naive) and some pieces of wood purporting to be pieces of the cross used in the crucifixion Jesus of Nazareth could be sold for large amounts of money.

3. Notice that I have introduced the word value into the discussion. Economics was originally called Political Economy; a hundred years ago microeconomics would have been referred to as the theory of value.⁸ Later it was called the theory of price (and still is at the University of Chicago). However, economists are like Oscar Wilde’s cynic capable of attaching a price to (almost) everything but are unable to know the value of anything.

4. You and I perceive scarcity in terms of our limited access to goods and services – we have finite incomes and goods and services have positive prices. To us scarcity means that we cannot consume all of the goods and services that we may wish to. Remember that we are interested in the quality of those goods and services as well as their quantity. But time is the ultimate scarce resource – even Bill Gates, Jeff Bezos, Warren Buffet, and John Paulsen have only twenty-four hours in a day.

5. *Economists say that goods and services are scarce if, at a zero price, the quantity demanded is larger than the quantity supplied – if supply exceeded demand at a zero price the good or service would be free: the air we breathe is free, but air on the Moon might not be. Economic goods and services have positive prices. As goods and services become relatively scarcer so their prices rise; indeed, economists often use changes in prices to gauge what is happening to the relative scarcity of resources such as oil.*

In 2021 Americans will probably have “only” \$21t of goods and services available to us, including goods and services used by firms and the government. (I have no idea what the US economy will produce after the virus finally abates - we hope.)

⁸ When I taught economics at the University of Glasgow I did so in the department of political economy.

6. But to an economist scarcity is really about inputs rather than outputs. Why only \$21t and not \$221t or \$2t? The answer is that we have a *given technology* and a *given quantity of resources* (factors of production or inputs) in the short term – the 365 days of 2021. Scarcity is really about limited resources and technology, which place a limit on our ability to produce goods and services at any instant of time.

5. RESOURCES

Economists traditionally classify resources into four categories – the names are hangovers from the late eighteenth century and early nineteenth century when economics began to be thought of as a separate subject:

LAND – although this includes spatial extent, what economists really mean by land are the natural resources within that space: arable land, oil, natural gas, minerals, forests, fisheries.

LABOR – the physical and mental abilities of those in the labor force (about 165m persons). Labor force participation – the number of people who actually work as opposed to those who could potentially work – has declined in the US in recent years. Our labor becomes more productive if we add “*human capital*” (CMs 2 and 23), that is, we invest, as you are doing, in *education and training*.

CAPITAL – *physical goods* that can be used in the production of other goods and services, **not** financial capital. Here is one of those cases where economists define a word in a specific way that is different from standard usage. (Similarly, I will use the term *investment* to mean investment in *physical* capital unless I specify that I am talking about financial investment). **Physical capital** means: *machines, buildings, and inventories*; **not** cash, bank deposits, stocks, bonds, gold, whatever. Inventories are stores of raw materials (wings of a Boeing aircraft that have not been attached to a fuselage), semi-finished goods (half a Boeing 737), and finished goods (Boeing 737s that are complete but have not been delivered to customers). *Pay careful attention to how economists define capital because I might ask you about this on an exam.*

ENTREPRENEURSHIP – *the ability to bear risk and to innovate*: classic examples of entrepreneurs are Henry Ford, Bill Gates, Steve Jobs, Jeff Bezos, Mark Zuckerberg, Sergey Brin. (A great deal of the risk of innovation is often born by

taxpayers who finance various government subsidies. For example, Tesla⁹ receives large government subsidies.)

Because we have, at any point of time, only a limited quantity of these resources, economists say that we live in a world of scarcity: goods and services are scarce because productive resources are scarce. (Economists use the terms resources, factors of production, and inputs interchangeably.) And, at a point in time, we have only a limited amount of technical knowledge to draw upon to enable us to transform those resources into goods and services. If the US in 1921 had had available to it 2021 technology then it would have been able to transform the 1921 scarce resources into more goods and services than were historically produced in 1921. If the US in 2021 had only the resources that were available in 1921, but still had today's technology, the US would not be able to produce \$21t in 2021.

6. CHOICES

1. *Scarcity forces us to make choices.* Those choices mean that we forgo some things in order to have others; we sacrifice the alternative uses of the scarce resources that we use to produce what we decide to produce. The economists' concept of cost derives from the idea that *the cost of doing one thing is the value to us of whatever we had to forgo in order to do that thing.* Choices involve trade-offs, giving up part of something in order to get more of something else.

SCARCITY ⇒ CHOICE ⇒ OPORTUNITY COST



TRADEOFFS

2. My grandson used to be a tank nerd. I once asked him to design the best possible tank, taking into account the following features of a tank: the caliber and muzzle velocity of its gun, the speed with which the turret could be traversed, the elevation and declination of the gun, the amount and type of ammunition, the speed and maneuverability of the tank, its ease of maintenance, its weight, the amount of fuel that it could carry, the number of

⁹ <http://www.latimes.com/business/la-fi-hy-musk-subsidies-20150531-story.html>

crew, the amount of armor on the front, sides, back and top of the tank, the slope of the armor, the sophistication of the gun laying computer and its communications system, the amount of smoke it could generate, the composition of its secondary armament including its anti-aircraft capabilities, and the width of the tracks. Designing a tank, or choosing features for your new car, involves very complicated trade-offs, having to give up some feature in order to get more of some other feature. Economists assume that firms always get these tradeoffs right, or they will be forced out of existence by competition, which is not necessarily true.

7. TECHNOLOGY

1. Although different countries have different endowments of factors of production, they effectively have almost equal access to technology. The US has abundant capital and relatively small amounts of labor and so capital is relatively cheap while labor is relatively expensive in the US. In India labor is abundant and capital is scarce, and so labor is cheap in India but capital is expensive. Both countries have the same access to technology, but the US will use capital intensive methods of production (dams and roads built with many huge machines and relatively few workers) while India will use large quantities of labor with relatively small amounts of capital (masses of workers moving earth with spades and pickaxes and people carrying away the earth and rubble in wicker baskets and only a few large machines) to construct dams and roads.

Consider the way in which the North Korean army and US army might deal with sniper fire. Americans go to ground and start suppressing fire with the automatic rifles and light machine guns they carry. If this is not successful then heavy machine guns and mortars may be brought up. If the sniper keeps sniping then armor may be used, or fire from 155m artillery, helicopter gunships or air strikes may be resorted to. (If the sniper is not dead then we can always call in a flight of B52s.) The US army is capital intensive and economizes on scarce labor. The North Koreans would probably send out groups of grunts to winkle out the sniper, taking casualties but labor is cheap.

12. We assume that in 2021 *technology will be essentially constant*. But historically economic change is dominated by technical change especially in Western Europe since the mid 18th century.

13. Economic change is also driven by **changes in tastes** (men seldom wear hats



anymore, only a few old fogies like me wear ties, and ladies do not wear little gloves and may be seen wearing pants, or with bare legs). Until the 1920s middle- and upper-class women avoided tans because they were associated with having to work outside.

Tastes change and fashions and fads die out. Three years ago, students were cool if they wore their baseball hats reversed – a singularly repellent style. Many Americans sport tattoos in 2021 who would not have dreamt of having one ten years ago. As we grow older our skin becomes slack – unless you really exercise – and tattoos smudge and fade. Tattoo removal may be a major occupation in 30 years' time. I think it was RBG who said that you should never do anything to your body that was irreversible.

Technological change has dominated the growth of the US economy over the last two hundred years destroying millions of jobs but creating many millions more (buggy whips versus computers). Technological change profoundly alters the economy and the fabric of society, changing not merely our ability to produce more goods and services but also the range of goods and services that are available to us and the way that they are used – cars and suburbs, computers and social media.

8. THREE QUESTIONS

1. If we can only produce \$21t of goods and services then we have to make choices about:

WHAT will be produced? We must choose which goods and services will be produced, and in which quantities and *qualities*; more cars versus better roads, more pet food versus more food stamps, more aircraft carriers versus more health care, more elder-care versus more financial services.

HOW will those goods and services be produced? This is an economic not an engineering problem – it refers to whether an economy uses capital-intensive or labor-intensive production processes. The US uses capital intensive production techniques because capital is relatively abundant compared to labor in the US. India uses labor intensive techniques of production because labor is abundant (India will have a larger population than China in three years) relative to capital.

In India building a dam involves using huge amounts of labor and relatively small amounts of capital – picks and shovels, baskets for transporting soil. In the US we use huge earth moving machines, giant trucks, cranes and rollers but little labor (look at a building site the next time you are allowed out). The differences in the proportions of labor and capital do not depend on the US having a more advanced technology, in 2020 Indian engineers have essentially the same knowledge base as American engineers do.

WHO will get the goods and services produced? The so-called classical economists were interested in what determined factor shares as the economy grew, the share of output that went to labor, the share that went to capital, etc. We are more interested in the shares of output going to households and individuals – income (and wealth) distribution. Note that the answer to this question has a profound impact on the answer to the first question (as we will see in CM21).

COVID ECONOMICS. Solving the three problems raises issues of efficiency and equity. Efficiency is concerned with how big is the pie and equity is concerned with who gets (how much of) the pie. Economists have traditionally concentrated on efficiency on the grounds that equity involves inter-personal comparisons of well being and economists' opinions on these issues are no more valid than anyone else's.

The pandemic illustrates these issues well. Efficiency is concerned with how to use our scarce resources to deal with the pandemic. Resources have to be transferred to producers of Personal Protection Equipment, masks, ICU beds, vaccines, swabs, needles, latex gloves etc. Hospital resources have to be diverted to dealing with patients infected with the virus who have severe cases. Resources have to be diverted to developing vaccines. Equity is concerned with who gets the PPE etc. and who gets the vaccines when they are produced.

2. All societies, whether they are hunter-gatherers or centrally planned or make extensive use of markets have to come up with solutions to these three problems (CM13). Almost all modern societies extensive use of prices as means of solving the three problems. The Trump Administration decided to use the price mechanism to allocate some of these resources; states and municipalities competed with the federal government to buy almost all crucial supplies. The supply curves for these items are close to vertical and the price is then determined in a bidding war with the items going to the entity with the most bucks. An alternative would have been a price freeze on all existing items, say the price at 12/31/2019 plus a 10% to provide an incentive to increase supplies. New items could be priced higher to encourage their production. I will return to this when we get to CM6 on maximum prices.

Although prices and so called "markets" are efficient they are not necessarily equitable. In this case, as in a major war, Americans are unwilling to allow the price mechanism to do the allocation (there are distributional problems with the price mechanism). Do you think that vaccines should go to those who can pay the most? Consider the plight of poor countries who cannot bid away vaccines from richer countries.

3. Because at a specific point in time we have limited inputs and a given technology we must constantly trade-off some goods and services for other goods and services. If we allocate more of our inputs to medical care then we have less available to produce cars and trucks. While non-economists think in terms of either/or economists think in terms of how much more of one good or service relative to how much less of other goods and services.

There are serious trade-offs to be made between infections and deaths and loss of income, especially to low income groups who seldom can work at home.¹⁰ To

¹⁰ In 2019, a usual - pre-pandemic - year, more than 2,854,000 people died in the US from all causes; that is about 7,820 deaths per day. Approximately 1,200,000 died from heart disease

come to grips with this issue we need to know the value of a statistical life (VSL). Economists really talk about life extension since we all die (me soon, you much later) – doctors do not really save lives only extend them – and while extending my life by ten minutes should be infinitely valuable to you, extending the life of some random person in the US who you will never have any contact with in any way is probably “worth” about \$11 million, if you think like an economist, or perhaps \$0 if you are honest! The elderly, people like me in their 80s and 90s, do not contribute to GDP, but this group, about 5% of the population account for almost 50% of US health expenditures – Americans do not triage in the way that the Brits do and families are very reluctant to “pull the plug”.

9. OPPORTUNITY COST

1. When you think of the cost of a textbook you think in terms of how many dollars you have to pay in order to purchase it, its price. But, this identification of cost with monetary expenditures has two disadvantages. Firstly, *it ignores things that are true costs although they are not monetary expenditures*. Secondly, it encourages you to think in terms of *numbers of dollars rather than lost alternatives*. Do you think that we should spend \$1b to save the southern Orcas? What could you do with \$1b if you did not spend it on Orca preservation, for example, panda preservation or relief of child poverty?¹¹ If you were out of “the (stock) market” from March to July 2020 it cost you thousands of dollars that you would have earned if you had been invested in a well-balanced stock portfolio.

To an economist *cost is the consequence of scarcity and the consequent need to make choices*. Because we have limited resources and many possible uses for those resources the cost of what you do (buying a textbook, attending a lecture, acquiring a degree) is what you would have done if you had not made the choice that you did; it is the value to you of the highest valued alternative that you gave up (what you would have done if you had decided against your

and cancer the two leading causes of death. Persons over the age of 65 were most likely to die. Many of the persons who succumbed to Covid-19 in 2020, especially those over 65 years of age and suffering from severe illness, would probably have died from non-virus causes. Half of the huge US medical bill is spent on persons in the last five years of their lives. I am 82 years old and have a life expectancy of 4 years. I will try not to croak during the quarter. I have set up contingency plans should I do so.

¹¹ It is estimated that as many as one in five children live below the poverty line. Many of these children suffer from what is euphemistically referred to as “food insecurity”.

present choice).¹² You should spend the next week thinking about the cost to you of everything that you do – the latté you buy, the extra hour of sleep you took, the cost of studying ECON 206 for an hour, etc.

2. Scarcity means that when we decide to produce or consume more of X we must produce or consume less of Y – we trade off or sacrifice some Y, to get more X. (As we will see economists usually do not think in terms of *either X or Y* but how much of X must be sacrificed in order to get *more* of Y.) *The economists' concept of cost is a corollary of our preoccupation with scarcity: the standard economic concept of cost is called opportunity cost: the value of the Y that we give up or forgo when we decide to consume X.*

(Notice that because I am doing a piece of theory I have switched into “abstract mode” – I could easily re-phrase everything in terms of food versus entertainment, or, even more specifically, pizzas versus cinema tickets, but I want you, occasionally, to see how economists actually phrase these sorts of problem. Of course, you can always substitute apples when you see X and bananas when you see Y.)

OPPORTUNITY COST: *The opportunity cost of X is the value, which to an economist means the price you are willing to pay in order to obtain the good or service, of the most valuable alternative given up, the value of what would have been chosen if you had not chosen what you did, the value of the second ranked alternative.*

1. Rank 26 alternatives A, B, C, ..., Y, Z in order of preference, that is, the first item is the most preferred, the second item is the next most preferred, and the last item is the one that we like the least. The ranking might be: M, F, J, U, A, ..., P. (We are making the dubious assumptions that we know our preferences, that we know the complete set of goods and services available, and the exact qualities of each one.)

2. Choose the highest ranked alternative: M. (This is a maximization decision. The Nobel laureate, Herbert Simon, argued that we don't maximize, we “satisfice” – we choose what is acceptable not necessarily that which is best because we have only a limited amount of time to gather information and only limited mental computational power to make our choice.)

¹² I will argue in CM 2 that many American university students would be better off if they trained to be electricians rather than completing a four-year degree.

3. The value of the second highest ranked alternative, F , is the opportunity cost of choosing M rather than F . We have also given up the other 24 alternatives but they don't count – if M were not available F would have been chosen, not C , or any of the other 24.

4. The opportunity cost is **not** the sum of the values of all the 25 options that were rejected: $F + J + U + A + \dots + P$.¹³

5. Here are some more examples: The opportunity cost of attending a lecture; the opportunity cost of not being invested in “the market” when market suddenly rises by 12% during a day; the opportunity cost of watching an hour of TV; the opportunity cost of subsidizing agriculture; the opportunity cost of a space defense program; the opportunity cost of putting a woman on Mars; the opportunity cost of the Large Hadron Collider; the opportunity cost of Mick Jagger completing his accounting degree at the LSE, Bill Gates completing his Harvard degree, Tiger Woods etc. (Jagger was an accounting student at the LSE and was given the excellent advice by my late friend Bernard Corry that he should complete his degree before trying to be a full-time rock musician. Jagger ignored the advice and look what happened to him! Bill Gates emphasizes that almost everyone is better off completing their degree.)

Have you ever been to a film and realized after ten minutes that it seems to be one of the worst films ever made? What did you do? Did you get up and leave or sit there in the hope that the film would get better? If you sat there then what does that imply about what you believed about the opportunity cost of your time? The same argument applies to watching a not very good TV show.

6. Note that opportunity cost is subjective; my opportunity cost of doing something will almost certainly be different than yours. The dollar cost approach seems very objective, a dollar is a dollar, but what we do with the dollar depends on who we are. Say the City decides to build a new bike path on the south side. The benefit will depend on whether you bike or walk for exercise, and if you live on the north of Bellingham then your benefit will be different from mine because I live in Fairhaven. An aircraft carrier group will have a different benefit for a Republican than a Democrat – they may both want the carrier

¹³ I believe that opportunity cost should be thought of in terms of Net Benefits, the difference between the forgone benefit and any costs involved but that is not how opportunity cost is defined by economists.

group but what they would otherwise have spent the \$40b on would be different.

10. SUNK COSTS

1. An expenditure that cannot be recovered is called a **sunk** cost. Anything that you have *already spent* can't be relevant to your choices because those expenditures no longer have any alternative uses. The sunk cost terminology is unfortunate because *sunk costs are not costs* – they money that has already been spent and thus have no alternative uses, they are ex-costs, they have gone to meet their Maker! For example, say a firm spends \$10m on new machinery. If the machinery is specific to that firm and has no scrap value then the firm has a sunk cost of \$10m. Since that \$10m cannot be recovered by anything that the firm does, that \$10m is irrelevant to any decision the firm makes. If the machine can be re-sold for \$5m it has a partial recovery value – this \$5m is a cost of using the machine – and the remaining \$5m is a sunk cost. If the machine can only be sold as scrap for, say \$20k, then the cost of using the machine is \$20k and the rest of the expenditure, \$9.98m, is a sunk cost. If the firm spends \$10m on an advertising campaign then that \$10m is a sunk cost because it cannot recover the money spent on the advertisements once they have been produced.

2. Say you buy a ticket for \$50 for a rock concert but when you arrive at the concert you find that you have lost your ticket. You must buy a second ticket if you want to attend the concert. What is the cost if you decide to attend the concert? The cost is *not* \$100; the cost is \$50. The \$50 spent on the ticket *when you bought* it last week was an opportunity cost; the \$50 could have been spent on other things that you gave up to buy the ticket. Today the \$50 you spent is no longer a cost, you are not giving up anything today, you just lost the \$50 ticket and there is no way in which you can recover that \$50; that \$50 is a sunk cost, it too has gone to meet its Maker!

When deciding whether to buy a second ticket you should compare the cost of the second ticket, \$50, with the benefit that you expect to gain from attending the concert. If the highest yielding benefit comes from attending the concert then you should buy the ticket. When making the decision to buy another ticket you should not take into account the lost ticket that cost you \$50 because it has no bearing on what you can or cannot do now.

3. *Because sunk costs are not costs, they should not be taken into account when making economic decisions* – a rule that is frequently violated by governments.

The British and French governments wasted almost \$10 billion in current dollars (really pounds and Euros) developing the supersonic jet airliner, the Concorde, repeatedly using the argument that if they spent another £50m here and another €100m there then they would finally get a viable commercial aircraft and would therefore have something to justify the millions of dollars they had already spent.¹⁴ The US sensibly cancelled its supersonic airliner program despite protests from some in Congress who argued that we should keep spending just a little bit more and then we would have something to show for the millions of dollars already spent on the project. But, those millions of dollars that had already been spent were a sunk cost; they were not recoverable.¹⁵ Remember the old sayings: don't throw good money after bad, and bygones are bygones.

If you think that having spent \$8b on the F-35 stealth fighter we should spend another \$6 billion more fixing its problems and bringing it into service then the politicians are correct to ignore economists' advice.¹⁶

11. MARGINAL ANALYSIS

1. We have been talking about totals – Total Benefit and Total Cost – but economists know that the most efficient way to make decisions is “at the margin”, concentrating on the costs and benefits of an *additional* unit of an economic activity. We can find where Net Benefit is maximized by looking at the difference between total benefits and total costs, TB and TC. But it is easier to find maximum Net Benefit by determining where marginal benefit (MB) is equal to marginal cost (MC). **Marginal benefit** is defined to be *the change in Total*

¹⁴ Only 14 commercial Concorde's were built, although it was generally regarded as an engineering masterpiece. Each plane cost \$190m. A Concorde could cruise at 56,000 feet and achieve a maximum speed of 1,300 m.p.h. However, it was not commercially viable because the amount that could be charged for a ticket, given the small capacity of the plane, was not sufficient to cover the plane's operating costs. Because the Concorde was supersonic it also created a sonic boom, which severely limited its ability to fly over built-up areas.

¹⁵ Of course, politicians were not interested in the economics of canceling the Concorde, they were concerned with the political consequences, which includes the lost employment in the aerospace industry. They do not think that keeping those people employed on the Concorde project may be a bad use of their scarce, valuable, labor from society's point of view.

¹⁶ <https://www.defensenews.com/congress/2021/03/05/ripping-f-35-costs-house-armed-services-chairman-looking-to-cut-our-losses/> I seem to remember that the operating costs of an F-35 is \$56,000 per hour.

Benefit (ΔTB)¹⁷ brought about by a small or unit change in whatever it is that we are doing. **Marginal cost** is defined to be the change in Total Cost (ΔTC) brought about by a small or unit change in whatever it is that we are doing. In general, marginal means “additional”. Usually we are changing the quantity of something and so we think in terms of a small or a unit **change** in quantity (ΔQ).

In general: A *marginal something* is the incremental, unit change in that thing brought about by an incremental, unit change in something else. Assume that total benefit (TB) increases as we increase the quantity (Q) that we consume. Then if we change Q by a unit, we expect TB to change – increase if Q increases and decrease if Q decreases. We call the change in TB when we change Q by a unit the Marginal Benefit (MB) of the change in Q and often write this as $\Delta TB/\Delta Q$. Similarly, Marginal Cost (MC) is usually thought of as $\Delta TC/\Delta Q$. There are many other marginal things in economics, such as marginal utility and marginal product, but we do not need to discuss them yet. (In ECON 206 we talk about one-unit changes but when doing economic theory economists think in terms of infinitesimally small changes: those of you who have done calculus should think of marginals as derivatives.)

2. We will think in terms of Marginal Net Benefit (MNB) where MNB is MB-MC. The rule is to increase the activity (Q) if MNB increases and decrease the activity (Q) if MNB decreases. *NB is maximized* when $MNB = MB - MC = 0$, that is when **MB = MC** – this is one of the most important ideas in economics. Be certain that you really understand the argument.

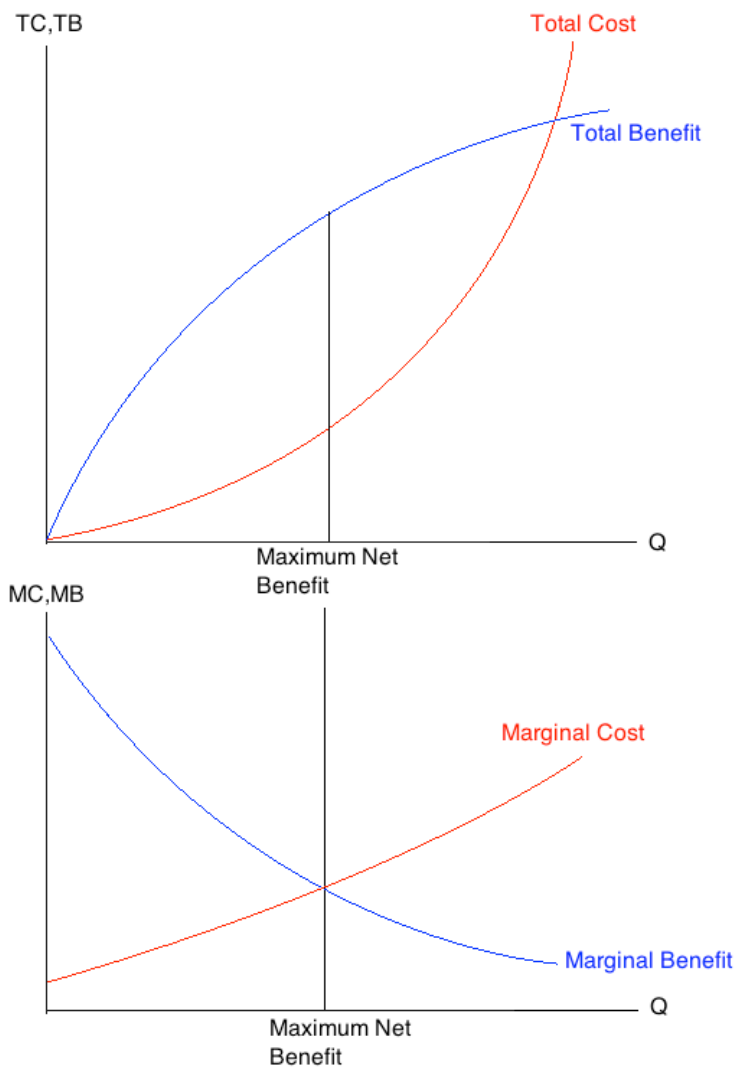
3. Referring to Figure 1 to maximize NB we want to choose the point on the horizontal (Q) axis where the **vertical** difference between the TB and TC is largest (and positive). Notice that this maximum difference is difficult to find by eye. But, if you do find that Q then you will discover that at that Q the TB and TC curves are parallel, that is, their slopes are equal. (To the right and left of that point the curves are converging.) But from the definition of slope we see that the slope of the TB curve is MB and the slope¹⁸ of the TC curve is MC and so the

¹⁷ The triangle, Δ , is the Greek capital d, delta. It is the symbol mathematicians and economists use to represent a small finite change.

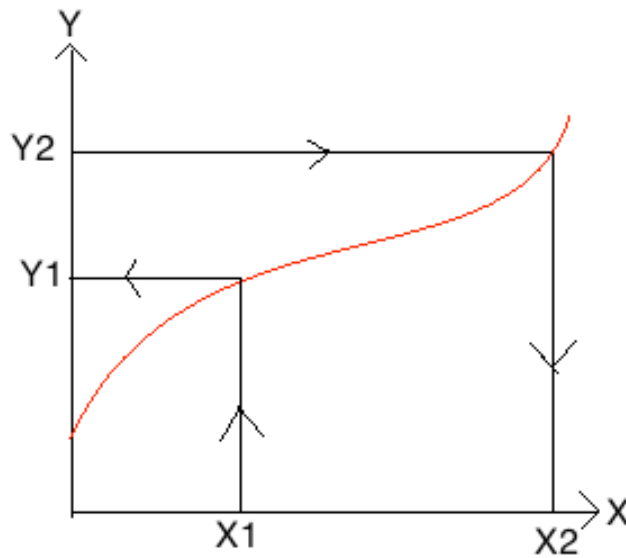
¹⁸ Slope is RISE/RUN the change in the Y over the change in X. Marginals correspond to the slopes of total curves. MB is the change in TB divided by the change in Q and MC is the change in TC divided by the change in Q.

point (Q) at which NB is maximized is also the point at which the MB and the MC curves intersect: NB is maximized at the point (Q) at which $MB = MC$. [Those of you who have done calculus will recognize that $MB = MC$ is just the first order condition for a maximum of the NB function.]

4. **Note very carefully** that the *maximum net benefit does not occur where $TC = TB$* (because $NB = 0$ at that point!). We are looking for the point on the horizontal axis where (in the upper diagram) the difference between the heights of the TB and TC curves is largest. At that point the slopes of the TB and TC curves will be equal.



[HOW TO READ A DIAGRAM. A diagram is *not* a picture. A *diagram* is a visual calculating device; it tells you where you are on one axis when you know where you are on the other axis. By the time you take the exams you should be able to draw every diagram that I use in the lectures and Commentaries. You must learn how to construct the diagrams on your own. Watch very carefully what I do in class. In the diagram below we have two related variables X and Y. The relationship between X and Y is shown by the red curve. If we know that we are at X1 on the horizontal axis then the curve allows us to find the corresponding point on the Y-axis, namely Y1. If we are at Y2 on the vertical axis then we can use the curve to find where we are on the X-axis, namely X2.]



12. "GOODS"

1. Most microeconomics courses discuss choice with examples that are familiar to students, for example, pizza and beer, shoes and jeans, visits to the cinema and song downloads: what economists call private goods, things that can be consumed by only one person at a time and which become that person's property when purchased. This analysis appears quite innocuous. But it has a hidden subtext that is easily missed. If in economics courses you are usually presented with situations in which the consumer is required to make choices between two private goods, and you are told that the consumer always prefers

more goods to fewer goods, and if it is emphasized that a “rational” consumer will never want to “leave goods on the table” (not spend all of her income), then you may end up thinking that rationally you should be a good consumer and keep on buying more goodies and if necessary work harder to obtain the means to acquire them. Economists will immediately point out that the theory allows for choices between goods and leisure and there is no presumption that one is better than the other; that the analysis can be used to study decisions in which you save part of your income rather than spending it all; and that economists routinely analyze choices involving environmental goods and services (CM14); and finally she will argue that there is no presumption that choices have to be made only between private goods, and that there is a vast literature on public goods (some of which we will encounter in CM15). But, Sleeman says, if you read standard textbooks and listen to standard lectures, then these caveats are seldom actually made, the examples are primarily about choices between private goods and services, which may lead you to believe that you should buy as much as you can,¹⁹ that you should maximize in a self-interested way, and you may even end up believing that we should maximize GDP.

2. Economists are often accused of advocating greed.²⁰ But maximization does not exclude empathy although the topic is not given much emphasis in undergraduate microeconomics. Our empathy and altruism are undoubtedly influenced by our preferences and beliefs. When St. Theresa received the Nobel Peace Prize, she probably did not spend a cent of her almost \$1 million prize on herself; she spent the money in ways that she believed would alleviate the suffering of the pitifully poor dying in Calcutta. Her charitable work was not a random distribution of \$10 bills on street corners but a very hard headed evaluation of every cent spent in order to maximize the benefits to the people she wanted to help. In a sense she was selfish, she was maximizing her welfare by maximizing other people’s welfare; that hardly fits in with our usual conception of greed.

I would expect that Jews would give more to Jewish charities than to Muslim ones, Muslims to give more to Muslim charities than Jewish ones, Catholics to give to Catholic charities, and Protestants to give to Protestant charities, etc.

¹⁹ Note that the very term “good” suggests that we will always want more goods. But some “goods” are bad for us and others are not necessarily going to make us happier.

²⁰ Ayn Rand, the patron saint of Libertarianism, did advocate greed.

However, when we discuss alternative economic systems, I will suggest that the 2021 American version of capitalism does seem to be based upon beliefs that are very different than those of European and other countries (American "exceptionalism"). For example, US firms emphasize shareholder wealth maximization that can lead firms to emphasize profits at the expense of pay and working conditions, employment. (Fraudulent behavior and negligence by firms are not discussed in any economic textbook I have encountered in 60 plus years. If anyone can find the words fraud and/or negligence in an economics textbook I would be happy to give you a very small monetary reward.)

(About 9,650 words, approximately 21.4 pages of text in a standard textbook.)

APPENDIX 1: HOW BIG IS A TRILLION DOLLARS?

1. The US GDP in 2019 was about \$20t.

2. How big is that? There are about 1 million seconds in 12 days. There are about 1 billion seconds in 31 years (allowing for leap years), and about 1 trillion seconds in about 31,000 years and so it would take a computer about 620,000 years to count \$20 trillion counting a \$1 bill per second. (Humans have been around for about 300,000 years).

3. Dottiness:

Define a "square" to be 10x10 dots (ten rows of ten dots). A "square" has 100 dots.

Define a "big square" to be a square made up of one hundred – 10x10 – "squares". A "big square" has 10,000 dots.

Define a "super square" to be one hundred (10x10) "big squares". A "super square" has 1,000,000 dots = 1 million dots.

If you formed a row of 1,000 "super squares" (each containing 1 million dots) you would then have 1 billion dots.

If you formed a "gigantic square" consisting of 1,000 rows each containing 1,000 "super (million dot) squares" then you would end up with 1 trillion dots: 1,000x1,000 "super squares" each containing 1 million "super squares" or 1million x 1million = 1trillion dots.

If you made a "stupendous square" of consisting of $5 \times 5 = 25$ "gigantic squares" you would have 25 trillion dots, 3% more dots more than the number of dots needed to represent the approximate dollar value of the output the US economy in 2018.

Note that dots are static/timeless like a stock variable (something that has a precise value at an instant in time) and do not capture the dynamic, temporal flow of something like GDP (a flow variable). The dots would be better at representing the US money stock at noon on 12/31/2018.

The thing to note, and to improve your numeracy, is how big an "order of magnitude" is – an increase by a factor of ten. Notice how much time it would take to just make a row of ten "squares" (each square has $10 \times 10 = 100$ dots in it), that is, just 1,000 dots.

If this line represents 1 thousand dots then where is the first dot on this line?

0 _____ 1,000

If this line represents 1 million dots then where is the one thousand dot on this line?

0 _____ 1m

If this line represents 1 billion dots then where is the one million dot on this line?

0 _____ 1b

If this line represents 1 trillion dots then where is the one billion dot on this line?

0 _____ 1t

Here is a site has a really clever way of conceptualizing large numbers:
<http://www.kokogiak.com/megapenny/>

Here is a graphic, originally from the New York Times, illustrating what \$1 trillion looks like in terms of \$100 bills. <http://www.pagetutor.com/trillion/index.html>