

04 Marginality Theory 1: Personal Action

Neoclassical economics accepted the basic Classical self-maintaining system that leads toward the greater good through free action. It used marginality theory to give a much better account of strategic action and of how the system actually works. Marginality theory is a formal version of the idea of diminishing returns. This chapter and the next explain the logical guts of neoclassical marginality theory. This chapter explains personal action. The next explains the strategies of business firms, and describes the system that arises out of the strategies of people and firms. These chapters can get detailed, but we need them, so please be patient.

To build the best foundation, the argument in these chapters does not depend on money. It relies on trade only. These chapters bring in money sparingly when money is not misleading.

To make the examples easier, mostly I use goods for which many units can be easily found, each unit is fairly small, and each unit is pretty much like any other unit, such as corn and tomatoes. I know most people do not live on farms now but it is hard to find simple suitable goods from the daily experience of city people. It is not hard to extend the ideas to other kinds of goods: small goods that are not exactly alike such as movies discs of various genres; large indivisible goods such as cars; unusual goods such as tickets to the Super Bowl; and expensive goods such as Rolex watches. But this kind of extension is too much for here. Just keep in mind that apparent exceptions really are not, and that they do not invalidate the argument.

04 Marginality Theory 1: Personal Action; Synopsis.

For the economy to work well, most of the time people have to rationally pursue self-interest, on the basis of available information. On what information do people base action? People act according to prices. People choose more or less of various things according to the comparative prices of the things: apples versus peaches versus smart phones versus cars. In choosing by price, people reinforce the price system; and that is how the economy becomes a dependable system that delivers a lot of benefit.

Classical economics could not explain the price system. For example, water is important but cheap while movies are a luxury but rather expensive. Explaining prices, the basis for strategic action, the price system, and the interlinked replicating economy, was the main task of marginality theory. The details are tedious but the central idea is not hard if you take it by steps. Instead of thinking about how much we benefit from the total amount of anything, think about how much we benefit from the last one of whatever we buy. Instead of thinking about how much we benefit from all the apples we ate this year, think about how much we benefit from the last pound of apples we eat regardless of all the pounds that went before. That last pound sets the price for all the pounds of apples that went before and for apples in general. Instead of thinking about how much we benefit from all the movies we saw this year, think about how much we benefit from the last movie we see this year. That last movie sets the price for all the movies we see this year and for movies in general. With this information, we can compare the price of movies with the price of apples to see if we would rather to see another movie or rather buy a large bag of apples to make a pie. When the movie makers and farmers know what the consumers are likely to do, they adjust

their production accordingly. Production comes to match what consumers want, and so production prices-costs come to match what consumers want. Consumers see about the price they expected. The price system duplicates itself, everybody knows just about what to do, and the economy continues on.

Once we understand the price system, we can think about the results of the economy and why they turn out that way. We can understand why we make HD-DVD instead of regular DVD; make so many cars and so many pickup trucks; why professional quarterbacks get paid more than doctors, and doctors more than mechanics; we have so many doctors and so many mechanics; so much of the total wealth goes to the electronics industry, the car industry, or to labor; more land goes to cattle ranching than nut growing; more energy goes to cars than to education; the economy grows or does not grow; and the economy grows this large and no larger. We can see why intervening is likely to do more harm than good, especially intervening to force growth.

Basic Questions. Textbooks often start by posing four standard question clusters, to which I add five more question clusters. These questions tell us what to look for. The next chapter provides the answers given by marginality theory to the first four questions.

(1) What gets made and in what quantities? Why do we make SUVs at all? Why do we grow organic food? Why do we grow so many tons of organic carrots and so many tons of non-organic carrots? Why do we make so many SUVs and so many mid-sized sedans? Why does the United States now provide a lot of services such as family counseling rather than make more material goods such as cars?

(2) How do we make anything? Do we use resources efficiently? Why do we have business firms make things for us? Why does it take all those technicians in a dentist's office or a hospital? Why do we use so much diesel fuel, and so little labor, to grow a basket of corn?

(3) Who gets what we make? Why do CEOs and medical doctors make so much while retail clerks make so little? How is the wealth in the economy distributed? How do rich people get rich and stay rich? How do poor people get poor and stay poor?

(4) Why does the economy grow? How does it grow? How much can it grow? Does growth solve problems? How can we make it grow? Should we make it grow?

The answer in simple terms: The actions of individuals and business firms automatically lead to making particular goods in particular amounts, efficient use of resources, appropriate distribution of wealth according to productivity, and to all the natural growth that people want at the pace they want. This chapter and the next fill in the details. The chapters after that show how this simple answer is not fully correct.

The following question clusters are the ones that I add.

(5) Where does profit come from? How do the sources of profit influence what gets made and who gets the wealth?

(6) Why do socio-economic classes arise and persist? How does employment affect class, and vice

versa? What are the relations between classes? Do all the poor really deserve to be poor? Why do we blame the poor for being poor? Why are so many poor people in jail? Why do the poor get longer jail sentences for the same crime? Why does the upper middle class seem overly sympathetic to the poor while the working class seems overly hostile? Why are people so intense about some issues such as abortion and drugs?

(7) Does the economy actually lead to the greatest welfare and to the greatest fairness?

(8) Is the economy stable and reliable? Does it self-regulate? Is it circular and closed? Does it reproduce itself? Where is it going in the future?

(9) What about things that cannot be fit into the system such as pollution and preserving the environment? How do we deal with these problems?

The first four question clusters imply that, under good conditions (near perfect competition), we could not change anything without making things worse. We could not move resources around without using resources less efficiently, and thus reducing total benefit. We could not force more production of any particular good, such as cars, without reducing other goods, such as refrigerators, and without also reducing the total wealth and total satisfaction available. We could not build fighter planes, build cheap housing for the poor, support farmers, or bail out the housing market, without necessarily moving resources away from other goods and thus changing total welfare. Even if we take away only a little bit from many other activities to support one activity, we still reduce the total welfare.

The first four question clusters also imply that we cannot make the economy bigger by moving resources, such as through tax breaks for the wealthy and business firms. Such measures might work for a while but they cannot work very long without causing worse problems than they solve.

We can only change the pattern of production, or increase total production, if we act in response to an obvious flaw and if we act without making the situation worse. This is true regardless of whether we see the problems among the poor or among business.

Growth does not solve all problems. It does not solve the problem of unemployment and under-employment. Growth makes a bigger pie but it does not change shares within the pie, including a zero share of unemployment. To solve employment problems, we have to move resources in a way that hurts the economy least and causes the least other problems.

Utility and Money. Although having more money usually allows a person to get more utility, money and utility are not the same. Alabama does not have a lottery while Georgia does. Sometimes when I drive to Georgia, I buy a lottery ticket. I can calculate the odds, and so I do not expect to get a decent return on my ticket in terms of money. But I do get a lot of fun. My action is silly financially but makes sense in terms of utility. "Money can't buy me love", but there is love in the world and we can seek it. The difference between utility versus money is why we have to be clear about what happens without money first before allowing money in. We have to think about how prices form a public system and about how prices get to be expressed in money. When we understand this, we can use money as a proxy for utility.

Mutual Benefit in Free Trade. Classical economics could not explain subjective consumer taste, consumer choice, or consumer demand, and could not explain the role of consumer choice in the economy, so it emphasized production and objective conditions. Neoclassical economics advanced by taking seriously subjective consumer taste, choice, and demand. We can see the need to understand consumer action through a long-standing problem: why do people trade items of equal market value?

Carl comes to the farmers' market with large baskets of corn while Teresa comes with small baskets of tomatoes. 1 large basket of corn (2 pounds) and 1 small basket of tomatoes (1 pound) both fetch a loaf of bread in exchange, so that the two goods have equal value (price). Carl and Teresa decide to exchange 3 baskets. They both leave with exactly the same value in goods as they had before but they both feel as if they benefited. If the corn and the tomatoes have the same value, why do Carl and Teresa benefit? Why do they stop with 3 baskets instead of 4 or 5? Why does Carl not give 4 baskets of corn for 3 baskets of tomatoes or 5 baskets of tomatoes? People can sense the general answers to these questions but the challenge is to give precise answers.

Even though the public market values of corn and tomatoes are equal, for Carl and Teresa the personal values of corn and tomatoes are not equal because Carl has one without the other while Teresa has the other without the one. We have to see how personal situations govern trade, and then how trade becomes a system with public prices (values) the same for everyone.

Before going on to that, we have to make a point about mutual benefit in trade. Choice depends on having a free market. One way of expressing freedom of the market and the role of choice is to say people engage in trade only to the extent that they wish, and people only continue to trade to the extent that they benefit, that is, to the extent that they gain utility. Carl only trades to the extent that he gains utility. Teresa only trades to the extent that she gains utility. When either stops gaining utility, he-she is free to stop trading. If he-she continues to trade beyond the point where he-she benefits, then he-she is harmed. In a free market, people never harm themselves. People are free to trade up to the point of maximum utility, and then stop; and that is just what they do. Free trade always results in gain, and always results in the most gain. In later chapters, we use this idea of free trade to understand investing, education, and wages. We can also see how free trade leads to conditions that undermine free trade, to flaws and problems.

The logic of mutual benefit in free trade is a powerful argument for free trade both within nations and between nations, and is a powerful argument for capitalism. We need to understand the argument well enough to see both its power and its limitations.

Marginality and Subjectivism. The term "margin" refers to the latest in a series, such as the latest five minutes of the 35 minutes that have gone by so far since I woke up, the sixth cookie out of the six that I have eaten so far, the latest half hour sitcom so far out of an evening wasted in front of the tube, the latest book read, or the latest chore done at work. The "latest" is not necessarily "the final" because I might read another book, eat another cookie, or watch more TV. It can help to think of the latest as "the last" in the usual sense of that term as "the most recent and thus the latest of a series", as in "the last camp ground we were at". The "latest" means "this one right now".

Marginality theory pays attention to how people use the latest in a series so as to get the most out of the

whole series. People use the latest in a series so they can compare different series and can get the most out of several different series, such as reading books, watching TV, and playing cards. Marginality theory uses the common idea behind “diminishing returns”, “don’t throw good money after bad” and “pay attention to what is going on now”.

We have to see how marginality guides the choices of one person before we see how it guides interaction.

We start with the idea of “diminishing returns”. Over the Fourth of July weekend, there was a marathon of the classic original Star Trek series. As I watched more episodes, each additional (marginal) episode gave me less satisfaction. As I ate more bowls of ice cream while watching, each additional (marginal) bowl gave less satisfaction. As a car buff puts more work into his-her car, the performance and appearance of the car improves less with each additional (marginal) hour of work. As a gardener puts more labor into his-her garden, the yield of tomatoes, berries, and zucchinis diminishes with each additional (marginal) hour of work. As a dentist puts more money into his-her practice, the profit from the practice diminishes per each additional (marginal) dollar invested. Diminishing returns on additional marginal units is true of almost everything.

Ralph is listening to the radio on a rainy Sunday afternoon. He has a choice of half-a-dozen stations. He starts with alternative rock, his favorite. As Ralph listens to one station long enough, he gets tired of that kind of music. That kind of music suffers from diminishing returns. The utility that he gets from one kind of music declines as he listens to that music longer. The utility from that kind of music “diminishes” as he “consumes” more of the music. Eventually Ralph switches from rock to jazz, and then the same thing happens with jazz. Ralph goes from station to station, sometimes returning to a station a couple of times before making it through the whole dial. This behavior is typical of what people do for all goods, and typical of what consumers in general do in the economy in general.

Ralph’s behavior listening to the radio is a small system. By the time Ralph has listened through the whole afternoon we see patterns. Ralph does not listen to all the stations for equal amounts of time. The total amount of time that Ralph spends on one station represents about the value of that station for Ralph. If Ralph listens to rock for three hours while he listens to jazz for two hours, then we can say rock is about one-and-a-half times as valuable to Ralph as jazz.

The last few minutes of listening to rock gives about the same utility as the last few minutes of listening to jazz, classical, country, or any other kind of music. Ralph listens to each kind of music so that the utility of the last few minutes of listening is the same for each kind of music. When Ralph quits listening to any particular kind of music, he has gotten about as much pleasure from it as he can and he is about as tired of that kind as he is with any other kind of music.

The last few minutes of listening are the “marginal” minutes. The utility from the marginal minutes is the “marginal” utility. Ralph listens to each kind of music so that the marginal utility from any kind of music about equals the marginal utility from any other kind. The last ten minutes of listening to rock about equals the last eight minutes of listening to jazz which about equals the last seven minutes of listening to country, and so on. When we have a system, it is typical that the marginal utility from any one good is about the same as the marginal utility from any other good in the system.

What is true of one person with several goods to choose from also is true of a system made up of many

traders each with labor, corn, beans, or other goods to trade. The marginal utilities tell us that we have a system, how the system looks, and that we are in equilibrium or out of equilibrium.

Something I saw among peasants helps to get across the idea of marginal quantities. Peasants brought to morning market a few handfuls of peppers, a few fish, a few bamboo tubes of sticky-rice candy, or a few eggs, to trade (sell). They did not bring the whole of what their gardens, fields, or boats could make in a season, but only what they had available right now, the marginal quantities that arose each day. These little bits of what they could bring each day set the trading rates of fish for eggs, or eggs for peppers, or of stick rice candy for fish, for that day. It was not how big a woman's fields were in total, how big a woman's garden was, or how big a man's boat was, but how much could be taken from them to the market that day. The value of fish was how many small fish would exchange for so many eggs, or how many small fish it took to get one tube of sticky rice candy. The value, or price, of any one good was the exchange rate of that good for any other good. The exchange rate of that good for any other good was set by the marginal amounts that were offered for exchange among a group of traders.

Quantity and Utility in Trade. Now we can return to Carl and Teresa trading corn and tomatoes so we can get a more precise understanding of how marginal utility sets exchange rate and thus sets price-value. Assume that Carl and Teresa already have made adjustments to take cost into account. We can leave cost in the background for a while.

We need some facts about quantities and utility. Suppose that Carl has 10 baskets of corn. Because all the baskets are pretty much alike, it does not exactly make sense to say that there is a "latest" (marginal) basket. So we can think of any basket as the "latest" (marginal) basket, whichever one Carl happens to grab at the time. We can see what happens as Carl adds baskets to his stock or takes baskets from his stock.

Because of declining marginal utility (diminishing returns), the more of a good that a person has, the less utility he-she gets from the marginal basket. The more corn that Carl has, the less utility he gets from the last basket of corn. He can more easily spare the last basket when he has 30 baskets than when he has 5. On the other hand, the less of a good a person has, the more utility the last marginal (last) basket has. If Carl had only 5 baskets of corn, the last basket would have more utility to him than if he had 30 baskets.

As a person gets more units of a good, the total utility of all the good increases but the marginal utility of the latest (marginal) unit goes down. Carl starts with 10 baskets. Carl gets another basket of corn, so that he now has 11 baskets of corn. The total utility from all the corn has gone up, but the extra (marginal) utility from the 11th basket is not as much as from the 10th basket. If Carl gets a 12th basket, the total utility goes up again, but not as much from the 12th basket as from the 11th basket; and so on. When Carl has 99 baskets of corn, he will have much more total utility than when he had only 10, but the utility of the 100th (marginal) basket of corn will be very small.

The same thing happens in reverse. As a person loses units of a good, he-she has less of that good, so the total utility from the good goes down. Yet each particular unit (the marginal unit) gets more important so that the utility of the latest (marginal) unit increases. Carl has 10 baskets of corn again. If he loses a

basket so that now he has only 9 baskets, the total utility of the corn decreases but the utility of the 9th basket increases from the marginal utility that the 10th basket used to have. If Carl loses another basket so that now he has only 8 baskets, the total utility declines again, but each basket becomes more precious, so that the marginal utility of the 8th basket becomes even greater than was the marginal utility of the 9th basket; and so on. If ever Carl were down to his last basket of corn, he would have less total utility than when he had 10 baskets, but the marginal utility of the only basket would be great.

Even though the first basket of corn is physically exactly like the 100th basket of corn, they are not alike in their value to Carl. Keep this fact in mind during trading.

During trading, people trade out some of the goods that they have, so that their stock of goods-traded-out continually diminishes, and the marginal utility of their goods-traded-out continually increases. At the same time, people trade in some of the goods that they did not have before, so that their stock of goods-traded-in continually increases, and the marginal utility of their goods-traded-in continually decreases.

Classical economists intuitively understood the inverse odd relation between total utility and marginal utility, but they did not know how to fit it precisely into their analyses. They tended to think that exchange rates (prices and values) should depend on total utilities. Nearly all people think this way until an economist forces them to think otherwise. Non-economist social scientists, such as anthropologists, still make this mistake. Learning to separate total from marginal utility, and forcing yourself to think in terms of this odd inverse relation, was part of the advance of neoclassical economics.

Mutual Benefit in Trade Again. Assume that corn and tomatoes have no price yet, not even in terms of loaves of bread; Carl and Teresa will set the price through trade.

We do not know how much corn Carl brings to the market or how many tomatoes Teresa brings. They line their baskets up in a row behind them. As they trade, each person takes the last basket from the row to give to his-her trading partner, and receives the last basket from the row of his-her trading partner. The last basket in the row is the marginal basket of corn or of tomatoes. Carl brings large baskets of corn while Teresa brings small baskets of tomatoes.

Now Carl trades with Teresa. Carl gives 1 large basket of corn to Teresa, who gives 1 small basket of tomatoes to Carl in return. For Carl, corn is the good-traded-out while tomatoes are the good-traded-in. We can focus on Carl. The same is true of Teresa in mirror image.

At first, the small basket of tomatoes that Carl trades in has more utility than the large basket of corn that Carl trades out. The marginal basket (last basket in the row) of tomatoes traded in has more utility than the marginal basket (last basket in the row) of corn traded out. Carl gains in utility.

Because Carl gained from the exchange of the first basket, Carl and Teresa trade another basket. The marginal small basket of tomatoes-traded-in still has less more for Carl than the marginal large basket of corn-traded-out. Carl still gains in utility. They trade another basket because Carl and Teresa still benefit. They are now up to 3-for-3.

Both Carl and Teresa gained in total utility. The tomatoes that replaced corn for Carl have more total

utility for Carl than the corn-traded-out, while the corn that replaced tomatoes for Teresa has more utility than the tomatoes-traded-out.

Stopping. Teresa wishes to trade at least 1 more basket because, for her, 1 more large basket-of-corn-in would have more utility than 1 more small basket-of-tomatoes-out. For Carl, this is not the case. The marginal (additional) large basket-of-corn-out would have more utility than another marginal small basket-of-tomatoes-in. Teresa suggests that she give 2 more small baskets of tomatoes for 1 more large basket of corn. Carl agrees. The 2 more small (marginal) baskets-of-tomatoes-in have more utility for Carl than the 1 more large (marginal) basket-of-corn-out. The 1 more (marginal) large basket-of-corn-in for Teresa has more utility than the 2 more (marginal) small baskets-of- tomatoes-out. At this point, they have traded 4 large baskets of corn for 5 small baskets of tomatoes.

Here they stop trading. Carl wants no more tomatoes because the marginal utility of “corn out” exceeds the marginal utility of “tomatoes in”. The marginal utility of tomatoes has diminished so that more tomatoes are no longer worth the lost corn to him. Teresa wants no more corn because the marginal utility of “tomatoes out” exceeds the marginal utility of “corn in”. The marginal utility of corn has diminished so that more corn is no longer worth it to her.

Both traders have benefited through trading, and they have benefited as much as they possibly could under the circumstances.

How do we know that Carl and Teresa have benefited and that they have benefited as much as they can? Because Carl and Teresa choose to trade in this way, and they are free not to trade if trade does not benefit them. Their behavior only makes sense if we assume that they benefit, and that they benefit as much as they can. This is reasoning in a circle, but it still makes sense enough given the explanations of the previous chapter.

By not paying attention to money, and by thinking in terms only of goods, we see how two people can exchange goods of equal value and yet benefit. The goods that a person does not have carry more utility than the goods a person does have, even though the market value is the same. In later sections we need to see how this process sets the market value.

Return to the recently modern world temporarily: George is in a music store, George wants to buy some compact discs, and George has some cash in his pocket. George buys 5 discs for \$75 in total. The value of the compact discs just equals the value of the \$75. Again we have a case where equal value exchanges for equal value. So we have to understand why George did that. We break down George’s action disc-by-disc and \$15-by-\$15 so that we can see marginal utility in the background guiding the choice. The marginal utility of the \$15 that George spends on the first compact disc is less than the marginal utility of the compact disc. By buying the disc, George gains more utility than he loses. With each additional disc and each additional \$15, the marginal utility of the disc decreases and the marginal utility of the \$15 increases. For the fifth disc, the utility gained from the disc still is just barely more than the utility lost from the \$15. For the sixth disc, the utility to be gained from the disc is less than the utility to be lost from the \$15, so George does not buy the sixth disc. People actually behave this way in stores. You can see them pick up discs and put discs down until they have just as many discs as justifies spending the money on the last one.

Because ordinarily George buys five discs for \$75 all at once, it is hard to see what is going on, why the five discs were more important to George than the \$75 even though both had the same market value. It is easy to get misled by totals and to overlook decisions based on marginality. A subjective decision based on declining marginal utility lies behind the seeming all-at-once total decision. When we break it down disc-by-disc, and \$15-by-\$15, we more easily see what is going on. We see how marginal utility guides George's subjective choice.

This is the breakthrough of marginal utility theory, the breakthrough that lets us see subjective choice behind actions. It might not seem like much but it was a revolution that allowed modern economists to logically close the Classical model.

Free Trade Again. The idea that people gain through free trade even when they trade goods of equal value is perhaps the most powerful argument for free trade. Classical economists used the argument even when they could not quite explain how it worked. When neoclassical economists could explain why it worked, the idea contributed powerfully to the ideology of free trade, as it does to this day. The argument might seem simple, and of course we can see problems with it in the real world, but the core remains true. It remains more powerful than any counter-arguments advanced against it. Free trade works. It works well. We should encourage it when possible.

Nearly all the actions in this book that go to building up an economy can be seen as a variation of trade, including seeking a job, hiring people, paying wages, and forming a large business firm.

So the argument for free trade in this case applies to nearly all aspects of an economy. The more actions are free, then the more that everybody benefits – as long as we all respect some basic rules of fairness and decency, take account of flaws and problems, and intervene only minimally and properly.

Avoiding a Mistake: Simplistic Free Market. Now we know how people gain by exchange, and know that people always gain from exchange as long as they are free to start and stop when they wish. Strong proponents of the free market use these outcomes to argue that people always and only do what is best for themselves. A free market always works perfectly. There can be no flaws and problems. Thus we should make the market as free as possible and never interfere. They make one of the mistakes of subjective circularity. They act as shills for business. They excuse whatever is now as the best that can be, and in particular they excuse whatever business firms do as good for everybody in general.

We saw in Chapter Three that people do make mistakes, even when they are free, such as when they are duped by advertising. Common sense tells us the economy has flaws and problems. Denying these facts by using the argument from free trade only undermines the strength of the argument for free trade. The real question is: When we see flaws and problems, can we make things better by interfering? In most cases, even where the market has flaws and problems, we cannot make things better by interfering.

We can use the idea that free trade is often beneficial to understand when it is not beneficial, why we usually should leave well enough alone, and where we should interfere. We should not use the benefits of free exchange as an excuse.

General Exchange Rate, Value, Price, and Cost. This section makes the most important point from marginality theory because it shows how marginal utility determines value and price. From now on, we can accept that Carl and Teresa trade regularly at the rate of 4 large baskets of corn for 5 small baskets of tomatoes. At this rate, neither can gain any more without losing more than he-she gains. Neither Carl nor Teresa can force the other further or entice the other further.

Now we have an exchange rate. The exchange rate sets values. Now we know the values of corn and tomatoes: the value of 4 large baskets of corn is 5 small baskets of tomatoes while the value of 5 small baskets of tomatoes is 4 large baskets of corn. You should practice thinking of value as an exchange rate.

This exchange rate is based on the marginal utilities of corn and tomatoes to Carl and Teresa, not on the total utilities of corn and tomatoes to Carl and Teresa. We did not even know how many total baskets Carl had, or how many total baskets Teresa had, so we cannot even guess about the total utility of corn and tomatoes to either. We can only see the results from marginal utilities, but that is enough for exchange rates and for all properties of a free trade economy. It will guide us to understand the flaws and problems as well.

This section describes the key point. It is a bit counter-intuitive. It probably prevented Classical economists from seeing how utility set an exchange rate. It is the basic statement of value-price in neoclassical economics. I cannot offer strong logical argument in favor of it here. I describe it, and hope that is enough. Assume that most people have about the same tastes as Carl and Teresa. Carl has more than 4 baskets of corn and Teresa has more than 5 baskets of tomatoes. The remaining baskets of corn do not have exactly the same marginal utility for Carl as the ones he already traded, and the same is true for Teresa for tomatoes. Carl trades with people other than Teresa, and Teresa trades with people other than Carl. Even so, once the rate of exchange for corn and tomatoes has been set by the marginal utilities, then Carl trades all corn at that rate and Teresa trades all tomatoes at that rate. Even though the remaining baskets of corn might have a higher marginal utility for Carl, still he trades with other people at the rate of 4 baskets of corn for 5 baskets of tomatoes. The same is true of Teresa. The value of all sets of 4 baskets of corn is set by the marginal utility of that last (marginal) lump of 4 baskets, and the value of all sets of 5 baskets of tomatoes is set by that last (marginal) lump of 5 baskets. Now all sets of 4 baskets of corn have a value of 5 baskets of tomatoes, and all sets of 5 baskets of tomatoes have a value of 4 baskets of corn. I restate this result in several ways through the rest of the chapter.

So we can see how a trading rate can set and stay among a group of people, again assume that most people have about the same tastes as Carl and Teresa. We can use Carl and Teresa to represent general demand for corn and tomatoes. We can assume that people in general trade in the ratio of 5 baskets of tomatoes to 4 baskets of corn.

If people in general trade at the rate of 4 baskets of corn to 5 baskets of tomatoes, that rate will remain the same for the group even though a few people do not enjoy corn and tomatoes in those ratios, even though those ratios do not represent equal marginal utilities for some people in the group. Suppose some non-average people like corn much more than tomatoes, and are willing to trade more than 5 small baskets of tomatoes for 4 large baskets of corn. They might temporarily affect conditions, but soon their particular small reserves are gone, and then the general taste prevails again. On the other side, suppose

some non-average people like tomatoes more than corn, and are willing to trade more than 4 large baskets of corn for 5 small baskets of tomatoes. Soon their small reserves are gone too, and the general taste prevails again. In fact, the people who like corn more than tomatoes cancel out the people who like tomatoes more than corn, and vice versa, so that the general rate prevails precisely because some people deviate from the general rate on both ends. That is what it means to have a general rate. The fact that people have various tastes actually makes the general rate more stable, but it is too much to show this result strongly here.

Eventually, a kind of “average marginal utility” emerges for corn and tomatoes among the traders at the market in general. The average marginal utility, among all traders, of 4 large baskets of corn, is about the same as the average marginal utility, among all traders, of 5 small baskets of tomatoes. The average marginal utilities of goods determine the exchange rates for goods. The term “average marginal utility” is not used in neoclassical economics textbooks but it is useful here as a shorthand. It will not lead you astray.

After people have sorted it all out and have come to trade on the basis of average marginal utility, all traders know they have to give 4 large baskets of corn to get 5 small baskets of tomatoes or have to give 5 small baskets of tomatoes to get 4 large baskets of corn. When they know, they adjust their own personal trading strategies to that rate, so they still manage to gain the most utility for themselves given that is the prevailing rate. Some people trade more than the average while others trade less. The people that trade more cancel out the people that trade less, and vice versa.

In adjusting their own personal strategies to the going rate, traders again reinforce that rate as the standard prevailing public price of corn and tomatoes in the market for everybody. They establish a public price. The public price becomes something to which people adjust. In adjusting to the public price, people reinforce the public price. Now we have a real price system, at least for corn and tomatoes.

Avoiding a Mistake: Total, Average, and Marginal. Total quantities and average quantities do not set exchange rates, value, prices or costs. Marginal quantities set them. We do not know how much corn or tomatoes that Carl and Teresa had. We could not know the average utility of corn or tomatoes for Carl or Teresa. We do not know the average utility of 4 baskets of corn, or of 5 baskets of tomatoes, for Carl or Teresa. All we know is that the marginal utility of 5 small baskets of tomatoes equals the marginal utility of 4 baskets of corn. That is all we need to know.

People naturally tend to think more in terms of totals and averages than of marginal quantities. It is hard to think in terms of marginal quantities even when we use them all the time. Classical economists thought skillfully in terms of total quantities and average quantities but could not make the formal jump to marginal quantities. I do not know why this is true of people in general or of Classical economists in particular. Mathematicians can relate total, average, and marginal. It is possible to rephrase marginal arguments in terms of total or average quantities. But that is not what is really happening at the basic level, and so it is a good idea to avoid it here.

People also get confused about total and average in a way that is actually likely when thinking in terms of margins. We see that 5 baskets of corn exchange for 4 baskets of tomatoes, and we think: 4 in total exchange for 5 in total; or 4 on average exchange for 5 on average; or there is an average in 4 (say “2”)

and an average in 5 (say "2.5") that exchange directly. All this is natural too but still wrong.

Total quantities do affect strategies at the margin. If Carl routinely came to the market with only two baskets of corn, his strategy would differ than if he routinely came with 10. If Carl routinely came with 100 baskets, his strategy would differ than if he routinely came with 10. The difference in the first case could be important but we can assume it does not come up much. The difference in the second case is not too important, and it takes a lot of groundwork to cover it thoroughly, especially ground work about cost, so we can ignore it for now. It will come up again when we think about the effects of interfering in a market.

Marginal analysis plays a big role only in Chapters Four and Five. Marginal quantities lead quickly to exchange rates, and from there to the normal prices, values, and costs with which we are comfortable. As long as we get the basics down in Chapters Four and Five, we can switch to more natural ways of thinking later.

Reinforcement. We need more examples of how marginal utility sets the price-value. Here I give some examples without going through the details. Practice seeing that it is not the average utility, or the total utility that sets the price-value, but the marginal utility.

Joe has many bicycles. He and Amy agree that Amy can use 1 bicycle for 1 day in exchange for 1 basket of peaches. 1 basket of peaches exchanges for 5 small baskets of tomatoes or for 3 pints of blueberries. So Joe lets anybody rent 1 bicycle for 1 day in exchange for 1 basket of peaches, 5 baskets of tomatoes, 4 baskets of corn, 3 pints of blueberries, or any equivalent. Joe does this for any 1 of his bicycles. Joe takes in exchange any appropriate equivalent amount of food, from anybody, no matter how much that other person has. Other people who own many bicycles learn to do the same. There is now a "going price" for bike rental.

George has a large collection of high density DVDs. He decides to rent them out each for 5 days at a time. He does the same thing as Joe did for bicycles, at the same rates. 1 DVD for 5 days exchanges for 1 basket of peaches, and so on. In addition, now we know that 1 DVD for 5 days exchanges for 1 bicycle for 1 day.

Larry needs help on his small farm. He asks 5 people to work on his farm for 1 day. If Larry had hired the people 1 at a time, he knows this: The first person would have been the greatest benefit (gained for Larry the greatest marginal utility); the second person would have increased the total benefit to Larry, but not as much as the first (declining marginal utility); the third person would have increased the total benefit to Larry, but not as much as the second; and so on. Larry knows that the fifth person gives him about the same benefit as does 1 large basket of rice. Larry agrees to give the fifth person 1 large basket of rice in exchange for 1 day's labor. He also agrees to give each person the same amount. Since it is hard to tell among the 5 which person is the first worker and which is the last, this seems reasonable. Most of the time, Larry needs 5 workers, not 4 and not 6. From now on, all daily workers get 1 large basket of rice in trade for 1 days' labor, not just at Larry's farm but at all farms.

Crimes and Grimes, the average law firm in the average city, usually employs 10 young lawyers. The last (marginal) of the 10 young lawyers, whichever lawyer that might be, brings to the firm the equivalent of 10 wagons of produce every month in business. So, all young lawyers, at this firm and at all other

comparable firms, get paid 10 wagons of produce every month. If a particular young lawyer can demonstrate that he-she brings in more than the marginal lawyer, the Crimes and Grimes might consider raising his-her particular salary.

(C1) Cost. A good not only has a utility but a cost. Cost affects utility and therefore value-price, especially production cost. The next few short sections address cost. They are labeled with a “C” before the section name.

Listening to the radio has little cost for Ralph. Cost affects value because cost detracts from utility. In real life, most utilities have greater costs than passive listening. Sometimes the costs are material, sometimes trouble, sometimes non-material such as risk, and sometimes non-material as foregone opportunities (lost time) that we could have spent doing something else.

In “The Fellowship of the Rings”, Merry and Pippin like to steal mushrooms from a farmer’s field but do not steal as much as they might steal because the farmer sets his dogs to guard the fields. The dogs are a cost that detracts from the intrinsic utility of the mushrooms. The final utility that Merry and Pippin actually get equals the raw utility that they would have gotten without the dogs minus the fear the dogs put into them. Merry and Pippin steal as many mushrooms as they can, but when the raw-utility-minus-the-fear-cost declines far enough, they stop.

Mark sets off to steal fruit from various neighbors. (1) The apple trees are not guarded at all, (2) the pear trees are guarded by dogs that are slow and not very ferocious, (3) the peach trees are guarded by dogs that are fast but not ferocious, and (4) the cherry trees are guarded by dogs that are both fast and ferocious. Without the dogs, Mark would get 2 pounds of apples, 3 pounds of pears, 6 pounds of peaches, and 8 pounds of cherries. With the dogs, Mark gets 6 pounds of apples, 4 pounds of pears, 2 pounds of peaches, and 1 pound of cherries. Cost matters. In real life there are many kinds of costs and they all have different effects.

When cost changes, we adjust what we choose. One day the dogs guarding the peach trees are off visiting the owner’s grandchildren, and so Mark takes 5 pounds of peaches instead of 2, and he takes fewer pears and apples. We do the same thing when peaches go on sale at the supermarket.

(C2) Scarcity, Cost, and Prices. The idea of cost includes the idea that nearly all the goods that people want are scarce, are not in unlimited supply.

Some goods, such as air, are almost in unlimited supply, and are called “free goods” – although this too is likely to change with global warming and increased pollution. Already good quality air is not a free good in large cities where people pay for the cost of clean air by buying filters.

Nearly all other goods have a cost because they are scarce. We have to search for the right pair of shoes and we have to trade something for them (buy them) once we find them. Resources are a type of good too, so that resources have their costs. The cost of resources and goods affects in how we use them and in how we choose between them.

One definition of economics is “the study of how people strategically pursue scarce goods through

limited means (resources)". This definition is not the only one but it does show the importance of choice, the need to allocate, and the role of cost.

We will see that value, cost, and price are all aspects of the same thing: trade ratios. Because all goods and resources are scarce, they are all tied together into one system for everybody at the same time, the system of public prices. All goods and resources have a price. The price is the same thing as the cost to somebody that wishes to use the good or resource. The prices of goods and resources are signals that tell people about the relative importance of goods and resources, and that help people to decide how much of any good or resource they want and in what order they want them. The system of public prices that arises from the scarcity of goods and resources is the backbone of an economy. We can see many things about how the economy works by looking at how the system of public prices arises and how it operates.

(C3) Public Prices; Private Utility. The free trading of many goods gives rise to a public price system and to related features that deserve special mention. Here are two. First, once a system of prices is set up, the price of any good is the same to a person no matter who that person is and no matter how much he/she buys (I do not look at apparent exceptions such as "volume discount" here because they are not really exceptions but take too long to explain). Whether a person is Bill Gates or a single mother, the price of a loaf of bread is the same. If Bill Gates buys six loaves and the mother buys six loaves, the price is the same for the six loaves for both of them. Prices are public, not private.

Second, money (value, price, or cost) is not the same as utility, so the utility of a loaf of bread to a rich person is not the same as the utility of a loaf of bread to a poor person – yet both pay the same public price for the loaf of bread, for the same good. Prices come out of the search for utility, constrained by costs, yet price diverges from utility in clear and systematic ways. We have to explain both how price arises from utility and cost and explain how it can consistently diverge from utility.

(C4) Objective Cost and Subjective Value. It helps to appreciate the role of choice if we are clear about how cost does not influence value. We tend to think that something is more valuable because we (or somebody) puts more labor into getting it or making it. It seems that a handmade table is more valuable than a factory made table because the handmade table took more labor, tools, and resources to make. In fact, the opposite is true: we will pay more for something because we like it more (get more utility from it); and so some persons or business firms are willing to put more labor and resources into goods that consumers will pay more for. Some people will pay more for a handmade table and so some other people are willing to put the labor into making the table. Nobody would pay a lot of money for handmade silly things of no use, such as string balls. I had a friend who liked precious stones, which to me were just pretty rocks. I could never see why people would pay as much as they did for an opal. He said I would see why if I could go down into an opal mine in Australia and appreciate what it took to get a good opal. I tried to explain that the opposite is true: miners are willing to go into the pit to get the opals because some people are willing to pay a lot for the opals. An opal does not increase in value simply according to the amount of trouble it takes to find the opal. A work of art, such as a painting, is not more valuable in proportion to the labor that went into it but in proportion to how people see beauty (utility) in it regardless of how long it took to paint.

Subjective satisfaction (utility) is the basis for value. We adjust the labor and resources that go into a

good according to what people are willing to give in exchange for the good. People are willing to give more when they get more subjective satisfaction. Cost modifies the effect of subjective satisfaction but it does not change the fundamental role of subjective satisfaction.

(C5) Adjusting Cost. Because we live in an advanced money economy where the price of goods is pretty much fixed (a pair of shoes costs what the sticker says it costs), we tend to think of cost as something that is just there and about which we can do little, as something objective. That is not true. We can do something about some costs even though cost is not completely malleable. Final cost is a mixture of what nature imposes on us and of what we can do about nature. How much we want to do about cost depends on how much we like the good, that is, it depends on the intrinsic utility the good has for us. The more we like a good, the more we are willing to work on cost to reduce cost so that we can have more of the good. The more nature allows us to do, the more gets done.

Wild trees did not bear fruit in the same abundance as cultivated trees bear now. Thousands of years ago, people worked on wild trees to make them bear more. People worked on types of trees according to the extent that they prefer that fruit and according to the extent that tree species can respond to selection. People like apples, and apples responded pretty well to selection, so apples are much bigger now than they were in the wild, and we have dozens of varieties of apples. It would be nice to do the same for cherries but nature allows only so much.

We also make adjustments in different ways. A farmer has 20 acres of land on which she plants fruit trees according to how the yield satisfies her family. She plants 8 acres in cherry trees, 6 acres in peach trees, and 3 acres each in pears and apples. If demand for fruit changed, then she would change allotments of land to respond to the demand. This is another aspect of economic self-regulation. If the cost of cultivation changed, that would also change the amount planted and the final result on the market. If cherry and peach trees could be made hardier against frost, and thus the cost reduced, we would have more peaches and cherries, and the cost of peaches and cherries would decline. Fruit growers would switch some land from apples and pears to peaches and cherries.

(C6) Investment. The effort and resources that went into developing fruit trees is investment. The allocation of so much land to cherries or to apples is investment. Switching from cherries to apples according to taste or to what a grower gets in return is investment. Investment requires that people guess about the future. Investors try to invest so that they get an equal return in utility, or money, from all of the alternatives.

(C7) Objective Costs. The “objectivity of costs” means that costs are fixed and cannot be changed according to investment. If the number of pine trees was absolutely fixed, and the yield would not respond to selection, spraying, or more labor, then pine trees would have an unvarying cost. This cost would be an objective fact to which furniture makers, hobbyists, house builders, and all other people that used pine would have to adjust. There are almost no costs like this in the long run, although in the short run it seems as if almost every cost is like this. To Classical economists, it seemed as if many costs were objective like this, especially labor costs. This is one of the biggest differences between Classical and neoclassical economics.

(C8) Overcompensation. Classical economists stressed supply and objectivity of cost because they did

not have the ideas to understand the role of subjective value, demand, the role of investment, and the role of capitalists in changing costs. When neoclassical economists figured out how to describe subjective choice after the 1880s, they overstressed the role of the subject, that is, the role of demand. Since then, the balance has swung forth between production (supply) and demand, objectivity and subjectivity.

When Conservatives want to stress subjective choice and overlook the role of cost, they show how cost can be changed through research, development, investment, state interference, and chance. They point to the resilient flexibility of nature. They say we need not worry about deficits, oil depletion, pollution, or the environment because we can always adjust cost.

When Liberals want to stress the role of subjective choice and overlook the role of cost, they say, "We can do anything we want". We can end all poverty and social inequality forever. We can give every child the finest education that only the rich can afford now. We can provide the means for all people to develop their full potential in multiple ways.

Conservatives overlook the limitations imposed by nature that determine costs while Liberals overlook that human nature is a part of objective nature. We can change costs to some extent and we can redirect human nature to some extent; but we can only go so far.

Value, Price, and Cost. Now we are done with a focus on cost, and return to the main thread. The fact that average marginal utilities set exchange rates lets us see different aspects of exchange in the same way: The value of 4 baskets of corn is 5 baskets of tomatoes. The price of 5 baskets of tomatoes is 4 baskets of corn. The cost of 4 baskets of corn is 5 baskets of tomatoes. The price of 4 baskets of corn is 5 baskets of tomatoes. Not only does exchange rate determine value, but it also sets price and cost, and it makes sure that "value", "price", and "cost" really are all aspects of the same thing. They all should be seen in terms of exchange ratios. We have to keep the basic role of exchange rate in mind in later chapters when we deal with money because money easily hides what is going on at the level of goods.

Resource Cost. The outcome of trade sets not only the value of the particular goods traded but also influences the value of the resources used to make the goods. The outcome of trade for final goods (corn) sets the value of the resources used to make the goods (land, labor, water, and fertilizer). The outcome of trade for final goods works with natural abundance to determine the value of the resources used to make the final goods.

The desire for handmade tables affects the cost of the tables – the cost of the materials to make the tables does not directly set the cost of the tables or the price of the tables. The scarcity and quality of resources does affect the value of final goods somewhat – if good hardwood was easier to find then hardwood tables would be less expensive. Foresters need resources to grow good hardwood; foresters need the right kind of land in the right kind of climate.

Land can represent the role of resources behind exchange. Suppose that land grows corn more abundantly than tomatoes. It takes less land to grow corn than tomatoes. There is more corn available than before. The marginal utility of corn goes down compared to the marginal utility of tomatoes. Corn growers have to trade away more corn before the marginal utility of their remaining corn rises to equal

the marginal utility of the tomatoes they receive. The new trade rate might be 6 baskets of corn for 5 baskets of tomatoes.

Now assume that land grows tomatoes more abundantly than corn. Tomatoes are now more abundant and have a lesser marginal utility in trading. Tomato growers can give more tomatoes before the marginal utility of their tomatoes declines to the marginal utility of corn. The exchange rate might be 4 baskets of corn for 6 baskets of tomatoes.

Single Market Equilibrium. When average marginal utilities for corn and tomatoes have emerged, and the exchange rate for corn and tomatoes is stable, then the market for corn and tomatoes is in “equilibrium”, or in balance. In the early days of neoclassical theory, one of the pioneers, Leon Walras, used the image of an imaginary auction to portray market equilibrium. This is a variation on his image:

Suppose that all the corn growers are on one side of a large hall while all the tomato growers are on the other side. An auctioneer stands in the middle. The auctioneer calls out exchange ratios of corn and tomatoes. For each ratio, the auctioneer asks how many pounds of tomatoes the tomato growers are willing to supply and how many pounds of corn the corn growers are willing to supply. When the amount of corn supplied equals the amount of corn demanded, and the amount of tomatoes supplied equals the amount of tomatoes demanded, then the market is in balance. The market is Smithian.

For example, to begin, the auctioneer suggests 8 baskets of corn for 2 baskets of tomatoes. At this rate, the tomato growers all offer a lot of tomatoes but few corn growers offer any corn. The auctioneer suggests 3 baskets of corn for 6 baskets of tomatoes. At that rate, the corn growers offer a lot of corn but few tomato growers offer any tomatoes. Somewhere in the middle, the auctioneer finds a rate at which the total amount that all corn growers offer equals the total amount that all tomato growers wish, and the total amount that all tomato growers offer equals the total amount that all corn growers wish.

This rate should be 4 large baskets of corn for 5 small baskets of tomatoes, the same rate as determined by the balanced average marginal utilities. I do not explain here why they coincide, but they do coincide except in cases of flaws in a market.

Modern economists describe the auction in terms of the balance between one good with money: All the corn growers are one side of the room. All the people that want to get corn, the consumers, are on the other side of the room with their money. The money is in grains of silver. The auctioneer calls out 20 grains of silver for 1 basket of corn. At this rate, the corn growers offer vast amounts of corn but no consumer wants to give any money. The auctioneer calls out 1 grain of silver for 3 baskets of corn. At that rate, the corn growers are unwilling to give any corn but the consumers want as much as they can get. Somewhere in the middle the auctioneer will find a rate so that the amount of corn offered equals the amount of corn that consumers want. The price of 3 grains of silver is 4 large baskets of corn while the price of 4 large baskets of corn is 3 grains of silver.

In other words, the average marginal utility of 3 grains of silver just equals the average marginal utility of 4 large baskets of corn.

When a market is in balance this way, economists say the market “clears” or is in “single market equilibrium” or is in “partial equilibrium”. When all markets are in partial equilibrium together, the entire economy is in “general equilibrium”, and “everything affects everything else”.

There is no difference between trading-corn-for-tomatoes versus trading-corn-for-grains-of-silver as long as we think of grains of silver as a good too. The price-value-cost of 4 large baskets of corn is either 3 grains of silver or 5 small baskets of tomatoes. Modern people do not think of trading silver for corn in the same way as they think of exchanging tomatoes for corn. They think of using silver to pay the price-cost of corn. They think that the silver rate is a true price in a way that the tomato rate is not a price. That kind of thinking makes sense given our daily experience but it is not correct on the deep level that we need. Superficial daily experience can confuse people. When people think of the tomato price, they have to think about how cost affects the growing of tomatoes and the price, and they have to think about how the taste of tomatoes affects the price. When they think about the silver price, they can ignore the cost of silver or the demand for silver.

Equilibrium Price. There is only one particular price at which a market clears. This is called the “equilibrium price”. We can understand a lot about a market by knowing its equilibrium price. Economists search for this price as a key feature of the market. This idea of an equilibrium price is one of the basic ideas for the public price system.

When economists began to see links between markets and began to develop the idea of general equilibrium, they saw there would be one coherent set of linked prices, one price for each market, in which all markets would clear at once, and the entire economy would be in general equilibrium. This set of prices is the public price system. Real economies rarely find this set all at once, but they tend toward it. We can understand how real economies work, and their flaws, by how closely they approach a workable set of public prices.

Magic of the Big and Small. The biggest effect of a public price system I call the “magic of the big and small”. Any one person can always trade as much as he-she wishes. No matter how much or how little any one particular person trades, his-her trading does not change the public price of the good for everybody, and it does not change the amount of goods that are available to everybody. If a person wishes to trade a lot, he-she can always find trading partners to provide as much as he-she needs. If Carl could not find Teresa with whom to trade corn for tomatoes then he could have found Ursula or Vernon or Wanda because there are a lot of traders in a public price system. Carl could have traded for zero baskets of tomatoes, 3 baskets, or 3000 baskets without changing the price of corn or tomatoes and without causing a shortage for other people that want to get corn or tomatoes. People can always trade until they are satisfied, and they need trade only until they are satisfied.

Action on the little level of the individual person and the particular business firm gives rise to results on the big level of the whole system of public prices. Then people and firms (the little level) respond to the results they created (the big level) to reproduce their strategies (the little level) and to reproduce the results on the big level. The little level and the big level make a circle of mutual creation. To understand the circle properly, we have to look at the little level first. All the people and firms in the little level as a whole build the big level but no one person or business firm can alter the big level all by itself. It appears as if the big level determines the little level, especially in the short run. But really the little level

determines the big level. We have to see the basic role of the little level to understand either level. Usually we can see it more clearly over the long run. We will be able to understand the flaws and problems of capitalism as violations of these relations and results.

The magic of the big and small is not really magic. It comes from logical relations that are too hard to go into here but that are not magic. I call it magic because to say that is convenient. If it bothers you not to have an explanation here, please see the bibliography.

Transitivity. If 4 large baskets of corn exchange for 3 grains of silver, and 5 small baskets of tomatoes trade for 4 large baskets of corn, then 5 small baskets of tomatoes should trade for 3 grains of silver too. The transfer of trade ratio from one good to another is “transitivity”. Transitivity binds together the economy as a whole and leads to a general balance (general equilibrium) of all markets rather than just particular markets.

Transitivity helps hold together value, price, and cost. To a lover of barbecued corn on the cob, the value of the corn is 3 grains of silver or the price of the corn is 3 grains of silver. To a baker of corn bread, the cost of the corn in the corn bread is 3 grains of silver. What is value or price from one view is price or cost from another view. The value given to the corn bread from the corn is the same as 3 grains of silver.

Transitivity pertains both when a good is consumed directly (barbecued corn on the cob) and when a good is used as a resource (corn) to make another good (corn bread). This is important in business strategies, how we understand value, and how we understand economic growth.

Try to see transitivity and its results without using money as a crutch. It might be easier to think in terms of pounds. 4 large baskets of corn weigh 20 pounds (5 pounds per basket) while 5 small baskets of tomatoes weigh 10 pounds. 1 pound of peanuts exchanges for 2 pounds of tomatoes. 5 pounds of peanuts exchange for 10 pounds of tomatoes (5 small baskets). In that case, 5 pounds of peanuts should exchange for 20 pounds of corn or 4 large baskets of corn. From the other way around: 5 pounds of peanuts exchange for 20 pounds of corn (4 large baskets), so 5 pounds of peanuts exchange for 10 pounds of tomatoes (5 small baskets).

Public Price Remakes Itself: Big and Small Again. Each pair of goods has its own exchange rate and public price, corn and peas, tomatoes and peas, or wine and olive oil. Because of transitivity, all the prices (exchange rates) for all goods are tied to the prices for all other goods. Together, all exchange rates for all goods, is the system of public prices. People make the system of public prices through strategies, and then people adjust their strategies to conform to the system of public prices. In adjusting their strategies to conform to the system of public prices, people remake the system.

Fairness 1. Everybody benefits from the public price system yet the public price system is not all we want in fairness.

Suppose David has only a small patch of land while Emily has a large patch of land. David and Emily are both better off through trading what they can grow on their land to exchange for other goods but that does not make them equal or make them equally better off. Emily is always richer than David. Free trade makes people better off but it is not a “great equalizer”. David might benefit more in proportion from trade

than Emily but we cannot prove that, and it would not make their plots of land (their basic wealth) more equal anyway. Whether one person benefits more than the other person does not take away from the fact that both David and Emily benefit. We could not do much to make the situation better even if we could figure out that one benefited more. As long as both benefit and neither is hurt, there is no point in interfering.

Whether any difference in wealth is compatible with fairness depends on how big the difference is to begin with, if it gets bigger along the way, and if the difference is ever so big that it endangers the life chances of David and his family. If Emily is twice as wealthy as David, we probably don't care. If she is 1000 times as wealthy, and gets wealthier everyday by somehow absorbing all the little David's around her, we should be worried.

Peanut Money. With transitivity, anybody can use any good to get any other good. To see how, it helps to use temporary money. Peanuts keep better than corn or tomatoes. People acquire peanuts not just to eat but also to use to get other goods. One day Carl brings his corn to the market looking for tomatoes but Teresa does not come. So, instead, Carl trades his corn for peanuts, which he does not eat but keeps. The next week, Carl has no corn but he brings the peanuts to market. Teresa is there, and is willing to trade her tomatoes for Carl's peanuts. With the peanuts, Teresa can get corn from someone else if she wants that, or she can just eat the peanuts if that is what she wants. In this way, Carl gets his tomatoes, but indirectly. This is one of the ways in which money arose. The next chapter gives a formal term for this aspect of money. I introduce this aspect here to make a particular point.

Opportunity Cost, Transitivity, and System. Opportunity cost is what we pay when we could have gotten something else, especially when the something else is better (has more utility for us) than what we did get. Opportunity cost is the force that comes of trying to get the best out of a range of choices, and that comes of seeing what we did not get. The "cost" refers to what we lose if we do not take the best choice. It is the sting we feel when an office mate says that he got his smart phone on sale for half what we paid. Opportunity cost drives transitivity; keeps cost, price, and value linked; and ties together exchange rates into a system. Do not focus on the numbers below. Focus on the ideas.

Example 1. One afternoon, Richard goes to the market to exchange filberts (hazel nuts) for eggs. The usual rate is one pound of nuts for one dozen eggs, but today there was a shortage of eggs, so Richard had to give two pounds of nuts for one dozen eggs. Because he had one pound less nuts for other exchanges, he was not able to get the pound of bacon that he wanted to cook with his eggs the next morning. Richard is unhappy at the opportunity cost.

Example 2. The next week, the same thing happened again. This time Richard was angry, and determined to do something. So he came early the next day when eggs were abundant, and traded all his filberts for eggs at a reasonable rate. Then he took the eggs home and put them in a cool place in the basement where they would not spoil and would look fresh. The day after that, anticipating a shortage of eggs in the afternoon, Richard took the eggs to the market, where he traded them for filberts, bacon, and whatever else he wanted, at a rate that made up for what he had lost two days ago. This time he was on the gaining end. By minimizing opportunity cost, Richard helped restore the more general exchange rates.

Example 3. Richard was not the only victim of circumstance. Other people suffered opportunity cost from the fluctuating exchange rate for eggs. So other people did the same as Richard. Soon, there was always a steady supply of eggs at the market, the exchange rate for eggs and other goods remained stable, and people did not suffer much of an opportunity cost except that sometimes they had to store eggs to make sure of the price.

Example 4. This example is longer and more complicated. Frank has a huge peanut farm that yields a large supply of peanuts, and that Frank likes corn much more than he likes tomatoes. Several dairy farmers make cheese. Ordinarily, these rates prevail: 5 pounds of peanuts for 20 pounds of corn or for 10 pounds of tomatoes or for 5 pounds of cheese. Frank decides that he will give 8 pounds of peanuts for 20 pounds of corn but still only give 5 pounds of peanuts for 10 pounds of tomatoes or for 5 pounds of cheese. What happens?

-As many corn farmers as possible try to trade with Frank, resulting in less corn available to trade for other goods.

-People stop trading their goods for anything but corn. People want corn so that they can trade it to Frank for peanuts. With the peanuts they can trade for other goods and get more of those other goods than before. For example, a cheese farmer no longer trades cheese directly for peanuts or for tomatoes. Instead, the cheese farmer trades the cheese for corn, and then trades the corn for whatever else he-she needs such as tomatoes. Suppose originally the cheese farmer traded cheese directly for tomatoes, at a rate of 5 pounds of cheese for 10 pounds of tomatoes. Now, the cheese farmer trades 5 pounds of cheese for 20 pounds of corn. The cheese farmer takes the 20 pounds of corn to Frank, and gets 8 pounds of peanuts instead of the 5 pounds at the old going rate. With the 8 pounds of peanuts, the cheese farmer can get 10 pounds of tomatoes (or more) and still have some peanuts left over to eat or to trade for something else entirely.

-If the cheese farmer did not do this, then the cheese farmer would not be getting the greatest benefit (utility) from trading. The cheese farmer would "suffer an opportunity cost" of 3 pounds of peanuts.

-Eventually Frank discovers that he gets less corn than anybody else and he gets less of any other good too. By trading more peanuts for corn than the going rate, Frank has fewer peanuts left over to trade for other goods. Frank suffers the opportunity cost of other goods that are lost such as tomatoes and corn. Frank can trade peanuts for tomatoes or cheese with which to get more corn, and still be better off than he would be giving a special rate of peanuts for corn.

-Frank might keep up his unusual rate for a brief period but eventually the loss of other goods exceeds any benefit he might get from more corn, and Frank is best off trading at the prevailing rate.

Exchange rates transfer between all goods in a system. Opportunity cost makes sure that no unusual exchange rate can hold up for long. The thought of what we might have gotten but did not get (opportunity cost) is a powerful force driving us to seek as much as we can get. Eventually exchange rates form a single whole system of public prices-costs-values. Public prices tell people what is going on, and allow people to adjust strategies to get the most for themselves.

Sum of Costs Again. The sum of costs for the components of a good equals the price of a good. Transitivity helps to keep the relation “in line” for all goods throughout the economy. The cause runs from final good to resource cost rather than from resource cost to final good.

Symptoms. We can anticipate flaws and problems of the economy by looking at the symptoms that Frank produces when he disturbs the public price system. We use these symptoms in later chapters to recognize flaws and problems:

- (1) Goods do not cost the same for everybody. The price system is not public. Some people pay more for the same good while some people pay less for the same good.
- (2) Some goods are in short supply. Even when people are willing to pay what the correct public price, people cannot buy enough of the good.
- (3) Some goods are in surplus. Producers cannot sell all they make at the price they expected to be able to sell. People do not want all of the good at the usual price.
- (4) The costs of production do not equal the selling price. Some producers make unusual profits while other producers go bankrupt.

Sometimes these problems arise from the normal business cycle and sometimes they arise from imperfect competition. Sometimes the state causes them.

Sometimes the state steps in to correct these problems, even if it was the original cause of the problem. Usually an attempted correction is like trying to freeze the system in some way, to thwart the normal dynamic process of self-regulation. It is as if the state guaranteed that Frank could buy at his price and everybody else could buy at his-her price, and the state would take care of any disparities. Beginning in the 1920, the United States actually tried to do something like this with agricultural prices, as a response to what happened to farmers in the Depression. This is very hard to maintain in practice.

Biggest Difference at the Margin. We are not done understanding strategies yet. We need two more conceptual tools to talk about how people choose and about the implications.

The first tool consists of directing our attention to whatever makes the biggest difference in utility “at the margin”. Return to peanut money, and suppose that Steve goes shopping at the market. Steve has parceled out his peanuts into little one-pound bags. He has 30 bags with which to trade for what he needs.

With each bag, Steve thinks, “How can I trade this particular bag to get the most utility?” Each particular bag is the bag “at the current margin”. The utility that Steve gets with each bag is the current marginal utility for each. Steve assesses his options each time so as always to trade his good (peanuts) for whatever brings him the greatest marginal utility. Whatever brings Steve the greatest marginal utility is whatever makes the biggest difference to Steve at the time, or “at the margin”. Steve chooses whatever makes the biggest difference at the margin.

Suppose Steve starts by trading 5 bags of peanuts for 2 large fish. Those fish represent the greatest marginal utility that could come to Steve at this point in the trading process, and also represent the greatest difference in utility that Steve could make by using his marginal good-for-trade (bags of peanuts).

After the first 5 bags, Steve then trades 4 bags for 12 eggs. Those eggs represent the greatest marginal utility that could come to Steve at this point in the trading process, and also represent the greatest difference in utility that Steve could make by using his marginal good-for-trade. If Steve got any other good, or if Steve did not trade at all, he would get less utility for his peanuts and Steve would make less of a difference in his total utility.

After those 4 bags, Steve trades another 4 bags for cabbage and carrots to go with the fish and eggs. Those cabbage and carrots represent the greatest marginal utility that could come to Steve at this point in the trading process, and also represent the greatest difference in utility that Steve could make by using his marginal good-for-trade. If Steve did anything else, he would get less utility, and he would get less utility overall.

We can usually figure out what would bring in the greatest total utility over a variety of trades by looking at what maximizes our current marginal utility. We can usually get a good sense of what maximizes our current marginal utility by looking at what would make the greatest difference at the margin. So we can maximize our total utility by continually getting what makes the greatest difference at the margin. We don't even have to think directly in terms of maximizing our total utility. In later chapters, we will see that these ideas also apply to using resources most efficiently and to maximizing profit.

Cost Effectiveness. "Cost effectiveness" is the second tool. The technical terms for maximizing at the margin are "maximizing marginal utility product" for people and "maximizing marginal revenue product" for business firms. Business people do not use maximizing "marginal revenue product" but instead more often use the term maximizing "cost effectiveness". The same logic lies behind the business person's idea of cost effectiveness and the idea of a person maximizing utility through making choices at the margin.

The term "cost effectiveness" is used in two related ways. People sometimes confuse them.

(1) Something is "cost effective" when it brings in more utility than it costs to get. It is cost effective to continue to hunt for rabbits as long as we get more utility than we lose through fatigue and annoyance. I call this use of the term "more gained than lost".

(2) The idea of opportunity cost tells us this is not the whole story. It is not enough to get something; we have to get the most utility out of the range of alternatives. If not, we "suffer an opportunity cost". If we make a choice that leads to less than the most utility now, then we effectively lose utility. Then we are not fully cost effective. Suppose we can choose between hunting rabbits, squirrels, or doves. As long as hunting any of them brings in more utility than we lose, we can say that hunting is cost effective in a way; but it is not the fullest way. If we wish to be most cost effective, we need to hunt rabbits when that brings in the most, then switch to squirrels or doves in case one of them should bring in the most, and then switch again if that works. In this way, we always make the biggest difference in utility at the margin, and we always maximize our total utility too.

We do the same thing when we switch between dials on the radio, or go from table to table at a yard sale, or think about what course to take in school. When we gain the most among available alternatives, we almost always also gain more than we have lost.

This second use of the term “cost effective” means “most gained among available alternatives”. The second use almost always includes the first use.

People use the term “cost effective” to mean both “more gained than lost” and “most gained among available alternatives” without always being clear what they mean. Usually people really mean “most gained among available alternatives” when they think they mean “more gained than lost”, probably because “most gained among available alternatives” includes “more gained than lost”. In this book, I always mean “most gained among available alternatives” unless I specify “more gained than lost”. I use the term “cost effective” as a way to summarize the idea of strategically seeking the greatest utility, including taking into account opportunity cost. It will become shorthand for all the major tools for understanding strategy.

It helps modern people to understand cost effectiveness to think in terms of allocating time. Josh finds himself idle at 4 o'clock on a Saturday afternoon. He finished most of what he really needs to do for the day. He has two hours before dinner. He can use the two hours in many ways: watch football; read a book for fun; read for his work; get a jump on something he has to do for work; fix the garbage disposal; wash the car; watch a classic movie on TV; watch a bad action movie on TV; help his wife with dinner; etc. Whatever he does, he cannot also do something else. Whatever he gains in utility from one thing, he will miss in utility from other things. Josh needs to spend his last two free hours of the day getting whatever maximizes his utility in those last two hours. If Josh does that, he is using his last two hours cost effectively. If Josh spent them in some other way, even so that he gained utility but did not gain the most utility that he could have gained, then he would be using his hours in the first sense of cost effective: “gain exceeds cost” – but he would not be using them in the second sense of cost effective “most gain over cost”. Josh has to compare alternative uses of his time. If Josh spent his two hours any other way, he would “suffer an opportunity cost”. Josh is most cost effective when he most minimizes opportunity cost. Opportunity cost and cost effectiveness work the same way. Pre-modern people think of allocating effort rather than of allocating time while modern business people think of allocating capital or of allocating money.

People strive to be cost effective in their lives by being smart consumers, by getting the best jobs, and by getting the best for their children.

Summary: Perfect Competition. We can summarize the chapter so far by listing the features of perfect competition. Only under the right conditions does individual strategic pursuit of utility guide interaction to the best outcome, without need of interference. The right conditions are called “perfect competition”. Luckily, in a developed economy, it is not hard to approach the right conditions. The flaws and problems of capitalism come when the economy is not near the right conditions. The right conditions occur when the magic of big and small works well to set up and maintain a public price system and to keep the economy moving towards general equilibrium.

The interaction of many free individuals leads to balanced markets that clear for all particular goods

(partial equilibrium) and to a balance between all markets too (general equilibrium). "All markets" includes the markets for finished goods and the markets for resources. The interaction of many independent individuals leads to a system of public prices. Once set up, the system of public prices seems to be something outside of individuals to which individuals have to adjust. It takes on a life of its own.

A good to one firm (electrical supply store) can be resource to another (electrician). The idea of a public price means that the price of any good-resources is the same for anybody in the economy regardless of their own situation or their use for the good-resource. The cost of corn bread is the same to a poor person or to a rich person, and the same to a household or to a restaurant (with allowances made for wholesale and retail that do not affect the fundamental argument). The price of a good to one person or firm is the cost of the good to another person or firm.

"Price" and "cost" are another way to say "value". Value comes from exchange ratios based on marginal units. Transitivity and opportunity cost help to hold the system together, to insure that prices are public, and to insure that "exchange ratio", "value", "price", and "cost" all mean the same thing.

In a public price system, no particular individual or particular business firm can by itself influence the price of a good (or resource) or influence the quantity of a good produced. Each particular person or particular business firm is so small in relation to the system as a whole that it cannot change the system. No matter how much corn bread any family orders, or any restaurant orders, they cannot change the price of cornbread. Nor do their orders change the total quantity of corn bread made in the system. No matter how much corn bread any bakery makes, it cannot reduce the general price of corn bread, and its production does not change the total production of the entire economy. No matter how much any bakery withholds corn bread production, it cannot change the price of corn bread or change the total amount of corn bread baked in the economy as a whole. Behind this balance, all consumers together and all producers together set the price (exchange rates) and quantities for all goods and resources.

No business firm or group of workers by itself can influence the price of a good or the quantity of the good offered. No business firm or group of laborers by itself can change the rate of wages for any occupation or the number of people that get jobs.

If perfect competition held throughout the economy, there would be no flaws or problems. In particular, employment would be full and, in a modern developed economy, all people would make enough to live decently.

Perfect competition requires that individuals and firms act independently. Firms have to compete fairly. Groups of consumers, groups of workers, and groups of business firms cannot collude.

Imperfect Competition. Imperfect competition arises when any of the conditions above are not met. Imperfect competition arises whenever any business firm or group of workers can influence the price or the quantity of a good offered. Imperfect competition arises whenever any business firm or group of laborers can influence wages or the number of people that are hired. Imperfect competition also arises when any coalition of business firms, or of workers, or of consumers can influence the price of any good or the quantity of any good.

We can understand the effects of imperfect competition in terms of the same effects we saw above when we interfered in a market: odd prices, shortages of some goods, and surpluses of other good – including wages and workers.

Whenever imperfect competition gives rise to problems such as unemployment, we are tempted to interfere. The interference is another source of imperfect competition. Unless the interference cures the problem, and we can limit the interference only to the effects of the problem, then likely we cause more problems and more harm than by doing nothing. This is a hard lesson, but one of the major lessons of neoclassical economics.

Perfect competition is not just hard striving between business firms or between applicants for a job. Perfect competition is not just the absence of cheating. Perfect competition requires the magic of the big and small, and requires that the economy move toward general equilibrium. Imperfect competition does not arise only out of cheating; in fact, cheating likely is not the most important cause. Often imperfect competition arises when firms do strive mightily. Imperfect competition just arises sometimes when any firm or group can influence the quantity or price of a good to deviate from the ideal market price, whenever the magic of big and small does not apply. The conditions under which it arises are the subject of Chapters Six and Seven.

Practical Guidelines. It is one thing to say that a business firm, a group of firms, or a group of workers, ideally should never influence price or quantity in any market. It is another thing to specify practical measurable guidelines as to when influence does not occur, does occur, occurs but is tolerable, and occurs to the extent that we have to intervene. Providing guidelines is part of what professional economists do. Guidelines vary by market and by situation but I can give some general ideas here. Basically, the guidelines say that markets should remain Smithian, and that no firm, group of firms, or labor union, can capture a market for its benefit.

To remain near perfect, a market should have at least six providers of any good. There should be at least six automobile makers, tire makers, toaster makers, or beer brewers. There should be at least six independent workers in any given field such as brewer, or there should be at least six independent labor unions for every occupation.

Even if the market has at least six providers, power should not be concentrated in any one provider. Competition would not be perfect if one firm controlled 90% of the market while five other firms had to share the remaining 10%. The largest business firm should not provide more than 40% of the goods for any market. The largest labor union should not provide more than 40% of the labor for the market. The largest automobile maker should not sell more than 40% of the cars. The largest automobile workers' union should not provide more than 40% of the automobile workers.

No coalition of firms or of unions should act as if it were one large provider. No coalition of firms should control more than 40% of the market. No coalition of labor unions should control more than 40% of the jobs. If two or more firms together supply more than 40% of the market, they cannot cooperate in any way. If Ford and GM together supply more than 40% of the cars, then they cannot cooperate in any way.

These conditions are not always met in real life. In particular, workers have to get together to control most of the jobs in a market so they can deal with powerful business firms. Hopefully, these conditions are met well enough most of the time so that we are better off not interfering. Chapters Six through Nine look into when conditions are not met and into responses. Another big part of the job of professional economists is trying to understand deviant situations and advise people what to do.

Fairness 2. It is worth repeating that even perfect competition does not always satisfy our need for fairness. When perfect competition is not fully fair, it is hard to know how to make things fairer because any interference with perfect competition leads to less total wealth and less total utility, even if the interference makes some people better off. To make a situation fairer for some people, we have to distort markets (exchange rates), and that makes things unfair for other people. The comments in this section depend on perfect competition. The flaws of imperfect competition almost always make things even worse.

To see how unfairness persists under perfect competition and the public price system, we need to understand an odd relation between public price and marginal utility cost. Suppose Jim has 10 cans of soup while John has 1000 cans of soup. The marginal utility of a can of soup is less for John than for Jim, more for Jim than for John. The public value-price-cost of 1 loaf of bread is 1 can of soup, the same for everybody. When Jim gives 1 can of soup for 1 loaf of bread, he gives more in marginal utility (more in benefit) than when John gives 1 can of soup for 1 loaf of bread. The bread costs Jim more in utility than John even though they both pay the same price. When everybody is middle class, or everybody has about the same wealth, we don't pay much attention to this effect. Even when some people have five times the wealth of other people, this effect usually is not very important. This effect becomes important when some people have so little wealth that they are struggling for the basics of life, or when some group in the economy has dozens of times the wealth of other people. This effect becomes critical when the mass of people are poor and one group is rich and powerful.

There is a counterargument, but it does not have much force. Suppose Jim is not as wealthy as John. Jim not only has less soup than John but less bread too. Say Jim has 1 loaf of reserve bread in his pantry while John has 6 loaves. If you don't want to think of reserve loaves of bread, think of pounds of hamburger in the freezer. The loaf of bread that Jim gets in exchange for the 1 can of soup has more marginal utility (more utility) than the loaf of bread that John gets in trade for 1 can of soup. Jim pays out more, but he also gets more back. This is one way the public price system stays public and stable. Still, the somewhat greater utility that Jim gets from the loaf of bread does not make up for the greater utility that he lost compared to John. It would take too long to step through the reasons, and the reasons work best when we allow an "inter-subjective comparison of utility" (see Chapter Three). To get a feel for what is going on, substitute dollars for cans of soup. Jim has 10 dollars while John has 10,000,000 dollars. The dollar that Jim gives out for 1 can of soup has a lot more marginal utility for him than the dollar than John gives out. The increased utility that Jim gets from the can of soup compared to John does not make up for the big difference in utility lost.

One price for everybody means that a single working mother pays the same price for a loaf of bread as does a rich person. We can be sure the dollar that the poor mother pays for the loaf of bread has much greater marginal utility for her than for a rich person. In effect, the mother pays a much higher price-cost

(marginal utility for exchange) for the same loaf of bread than does the rich person. The same public price-cost for everybody does not mean that everybody pays the same utility price-cost. This is not fair in a way that hurts and offends. One reason to study marginality theory is to understand this situation clearly.

Of course, the plight of the poor mother is always better under perfect competition than it would be under other conditions (except direct private charity), and the situation of the mother will get better over time as well because of how efficiently perfect competition adopts innovation. As long as the poor mother really has enough for her and her children to get by safely, and for her children to get a decent education, we probably do not want to risk interfering.

Likely, the poor mother will not get better off over time compared to the rich person. Her situation in comparison to the wealth of the rich person might get less, stay the same, or increase, but is most likely to stay about the same. Perfect competition does not guarantee that people get more equal in wealth over time. Perfect competition is not necessarily a universal leveler over time. Again, as long as she keeps her head well above water, we still probably don't want to interfere.

How great a disparity we can stand is an additional important question. When answering this question, we have to consider if the disparity gets worse, if the disparity leads to other problems, and if our interference will really help. In the real world, we also have to keep in mind that competition is imperfect, and that disparities in wealth play out in the context of an imperfect economy. It might be that interfering would not help in the ideal world of perfect competition but could really help in the real world of imperfect competition.

To give good answers to these questions, we have to disentangle unfairness that might persist in perfect competition from unfairness under the dynamic ideal and from unfairness due to flaws and problems of imperfect competition. To do that, we have to look at the strategies of business firms in Chapter Five, and at the sources of profit and imperfection in Chapter Six.

Natural Growth. Natural growth is the implementation of innovation, by business firms, so as to sell products, to consumers, as long as implementation adds to the utility of the consumers. It happens by itself. It stops by itself. Promoting growth other than natural growth does not solve the problem of fairness and does not solve flaws and problems such as with employment. Yet some economists, and many politicians, promote forced growth as a way to solve all problems with wealth, the economy, and society. Chapter Nine looks at policy directly. Before getting there, we need some background that depends on marginality theory. It is best to provide the background here while marginality theory is still fresh in our understanding.

To anticipate the conclusions: I recommend the state not interfere in the market to induce any growth. Let natural growth do its own job. The state can help natural growth through subsidizing research that business firms could not otherwise carry out, as with the technologies that came from the space program.

Diminishing returns imply natural limits to growth. Implementing innovation adds to productivity, wealth, and utility for a while, but, as common sense and experience tell us, not forever. A new innovation

adds a lot. As time goes by, the innovation “experiences diminishing returns” and so adds less and less. In the end, the innovation is completely absorbed into the economy. While the innovation is implemented, it creates natural growth. Recent examples include computers and digital imaging equipment such as cameras and modern phones.

We cannot force the economy to grow by interfering. We cannot magically undo the effects of diminishing returns through interference. It is hard to see what the state could do to make an innovation continue to add to utility after it had stopped adding any more than any other product. The state could not increase consumer utility more by forcing Apple to make more pads (“iPads”), and forcing consumers to buy them, than consumers already add to their own utility simply by buying the pads that Apple offers. The state could not add to consumer utility by forcing the dairy industry to produce more milk and forcing consumers to buy it.

Decreasing Efficiency and Productivity. Robert has three comfortable chairs already in his apartment. Another chair adds to Robert’s total utility but not as much as did the previous chairs. This result is basic diminishing returns and marginality theory. In the same way, in a healthy mature free market economy, adding additional resources to an industry might increase the total output of the industry but not by as much as did previous doses of resources of the same amount. As every gardener knows, at some point, adding more labor, fertilizer, water, and chemicals to a plot of land reaches serious diminishing returns. Eventually additional inputs are no longer worth it. Diminishing returns reduce the efficiency and productivity of all industries. Suppose the laptop industry already is worth 10 billion dollars. Putting another 1 billion dollars of engineers, screens, chips, cases, and advertising into the industry would increase total output and sales but not by as much as any of the previous billion dollar investments. People who advocate forced investment or forced savings to stimulate growth often overlook this fact.

Forced Transfer of Resources. When people buy more smart phones, they buy fewer big screen TVs. When people buy more hybrid cars, they buy fewer gas-guzzling SUVs. When people save more from their salaries, they spend less. At least in the short run, and often in the long run, any increase in one part of the economy is a decrease in other parts. Any increase in one part of the economy is a movement of resources from other parts to that part. As that part receives more resources, it becomes less and less efficient. People who advocate forced investment or forced savings often overlook these facts as well.

Sooner or later, state revenues (taxes) have to pay for all state expenditures. Sooner or later somebody has to “pay for it all” through taxes. As a result, when somebody pays less in taxes, somebody else has to pay more in taxes. Tax breaks for one industry are, in effect, a forced movement of resources from consumers, and/or from other industries, into that industry. Tax breaks for one group of tax payers is an extra burden on other groups of tax payers. Tax breaks follow the same rules as other forced movement of resources.

Marginality, Diminishing Returns, and Say’s Law. People can believe in Say’s Law (“Supply Creates Its Own Demand”) only when they think that cost and production are rigid and objective. If you give farmers 100% more resources (double the farm budget), and force farmers to use all the resources, then farmers will produce 100% more food, farmers will pay their to their workers and to related industries 100% more, and consumers will buy all the 100% of more food that is made using the 100% more resources.

This is obviously false. Only if there are no diminishing returns can you always get back in (demand) exactly what you put out (supply). Say's Law only works if diminishing returns is not true. Just by thinking about Say's Law in terms of the food industry rather than, say, the car industry, we can see that diminishing returns thwarts Say's Law. Americans already eat too much. We could not force ourselves to eat more, and the state could not force us to eat more. Already American farms are about as productive as they can be. The extra labor and resources that was forcibly applied to farms would not be as productive as the resources and labor already applied. The additional labor and resources that were spent on related industries such as farm equipment, insurance, and chemicals would not be as productive as the resources and labor that were already used on those industries. Consumers would not, and could not, buy the additional farm production.

This paragraph is finicky. The result above puts us in a theoretical bind. If diminishing returns is not true, then marginality theory cannot be true. Without marginality theory, we cannot describe how particular markets come into partial equilibrium or how the economy as a whole comes into general equilibrium. But Say's Law can only be true in a circular, closed, self-reproducing system that tends toward general equilibrium. If we are not in such a circular, closed, self-reproducing system that tends toward general equilibrium, then nothing like Say's Law could be true. On the one hand, if Say's Law is true, then marginality theory (diminishing returns) is not true, we do not have a system, and thus Say's Law cannot be fully true. On the other hand, if marginality theory (diminishing returns) is true and the economy works well, then Say's Law cannot be fully true. Either way, we cannot force the economy to grow by forcing an increase in production.

Say's Law can still be approximately true around equilibrium, and can still help out in some short term, limited-scope policy actions. But it cannot be the basis for policy in general, and especially it cannot be the basis for induced expansion.

Say's Law can still be approximately true for modernizing economies such as China or India that are a long way from reaching diminishing returns. There it can make sense to force production. But the governments in established capitalist economies such as the United States cannot take new economies as examples of what to do and how much growth can be achieved.

Mutual Influence in Production. Production often is mutual. One industry affects a second, the second affects the first, and they mutually reinforce each other. The circle can include more than two industries. For example, iron tools help to dig and process the iron ore that makes the tools that dig the ore, and so on.

Mutual reinforcement seems to defeat diminishing returns. Yet even this process succumbs to diminishing returns in the long run. I saw the development of fishing, shrimp farming, and catfish farming in a couple areas of the world. These new industries not only grew through adopting innovation, they also stimulated developments in other industries that provide innovations to them: developments in fish biology; food processing; feed; pond, water, and land management; mechanical aeration; and various chemicals. All of these developments in turn helped catfish farming and shrimp farming. In the early decades, all the linked industries almost exploded, and it seemed as if the process would never slow down - but it did. Now we have as many shrimp farms and catfish farms as we need. In traditional

Southeast Asia, pig farming and rice farming always spurred each other when a new tract of land opened up. The rice provided food to the pigs, leftover from what people would not eat, and the pigs provided fertilizer for gardens and fields. When a new tract of land opens up, for a while life booms; but eventually that mutual support process slows down through population growth (people, pigs, and rice plants) to find some balance.

Modern mercantilists see mutual stimulation of industries, especially new industries, and decide that diminishing returns can be defeated along the lines of Say's Law. Every additional amount of investment seems to create more than the investment, not slightly less. In the short run, that can be true, but in the long run it cannot. Modern mercantilists take short run experience in some industries as a general warrant for continual intervention to promote expansion, and as a way to get state programs to serve their clients. We have to be clear that there is always an ultimate ceiling of diminishing returns, even when different activities mutually help each other along, even in new industries.

Reduction in Utility from Transfer of Resources. People buy more smart phones and fewer big screen TVs because that is what gives them the greatest utility. That is one definition of a free market. People save at a particular rate because that also is what gives them the greater utility. People would save more and consume less, or save less and consume more, only if they got more utility from the change. It is reasonable to assume that whatever people save now is pretty much what gives them the greatest utility.

Assume people already achieve the greatest utility from the current ratio of hybrids to SUVs, and from all other choices, trade-offs, and market balances. Forcing the SUV industry to grow moves resources from other industries to the SUV industry. Moving resources from other industries reduces the utility that people get from those industries. Moving resources to the SUV industry increases the amount of SUVs past the point where the average marginal utility says it should be, so that the utility gained from additional SUVs is not worth the cost of the SUV. We have moved resources from where they created appropriate amounts of utility to where they have created lesser amounts of utility. Even if this is somehow growth as measured in SUV units, or even in some money currency like dollars, it cannot be growth in utility and so cannot be real growth.

Every forced growth is a forced movement of resources away from where they already produce the greatest utility to where they produce less utility, and so cannot be real growth.

Forced Savings as Transfer of Resources. Savings are a resource too. If the state forces savings (resources) into one industry, it deprives other industries of savings (resources). If the state forces savings (resources) into one industry from others, it reduces the utility that consumers gain from the other industries more than it increases the utility that consumers gain from the target industry. We do not always think of these effects from savings because savings are not obviously goods with a utility such as SUVs, hybrids, and computer tablets, but savings are a resource, and the result is the same.

In a healthy free banking market, the amount of savings in the banks about equals the amount of investment in the rest of the economy. It is tempting to think that forcibly increasing the amount of savings automatically also increases investment because more money (resources) is available to invest. Because investment equals savings at equilibrium, if we increase savings, we can force an increase in

investment, and thus cause growth. Like Say's Law, that might be true a little, but the increase is not in the right proportion, and the net result is a loss of utility.

If the state forces people to save more than people wish, in effect the state moves resources from other industries into savings. Savings give people utility too or they would not save. When the state forces savings into other industries, it reduces the utility from savings more than it causes a gain in utility from other resources. The same is true in reverse in case the state forces people to save more. It deprives other industries of resources in order to move those resources into savings. The utility lost from the other resources is greater than the utility gained from increased savings.

Usually the state causes savings to increase or decrease by changing the rate of interest. An increase in the rate of interest leads to more savings while a reduction leads to less. The rate of interest is what keeps savings equal to investment in a natural health banking market. If the state raises the rate of interest to attract savings, it also raises the rate of interest in nearly all other industries, and that means nearly all other industries are not as efficient as they were. They cannot make as much, so they provide less utility to consumers. They cannot produce as much even if they borrow some of the extra savings that are available now. The loss of utility from other industries more than destroys any increase in utility from the higher interest rate and the increased savings.

Sacrifice as Savings and Investment. Sometimes people wrongly think increased savings has to produce increased investment, more than enough to make up for any loss from the increased savings, because of an honest mistake, and because of confusion about terms. "Savings" can mean:

- (1) What we sacrificed in the past so as to do even better now. This is real growth.
- (2) What we forego now so as to do even better in the future. This is real growth.
- (3) The money in the bank that business firms can borrow from so as to meet current needs and maybe so as to take advantage of an innovation. This might or might not be the basis for real growth.

When state officers force an increase in savings type (3), they have in mind the first two cases, in which a sacrifice did result in an even greater gain. Forced savings of type (3) is not the same as the first two types, and does not usually lead to even greater gain in productivity and growth than the savings. The above sections explained why. It helps to look at cases of types (1) and (2) to see how state officers could be misled.

If farmers had never invested in better varieties of corn in the past, how much they put into corn farms would be different now. If farmers had never developed good varieties of tomatoes in the past, the effort that current gardeners put into tomatoes would not produce the frequent gifts to neighbors now. Investment can delay diminishing returns.

"Never eat your seed corn". Past investment required some kinds of savings. Ancient farmers had to save the best wheat for seeds and the best calves for breeding stock. They had to clear the land, during which time they could not be plowing the land or gathering a harvest. When modern business people invest they usually borrow somebody else's savings or reputation so as to get the resources to invest.

Usually, the more that is invested the better the final return. More investment requires more savings and less immediate consumption. The better the land is cleared in the beginning, the better the final harvest in the end. The more a herder puts into selective breeding, the less he/she eats of his-her own cattle, the better the breed in the long run.

Jack and Diane want a car. If they buy a car “on time”, they pay \$20,000 for the original price of the car and another \$10,000 in interest over five years. If they ride bicycles, take the bus, and take taxis, for three years, they can save enough to buy the car outright. During the three years, they sacrifice, and they have to pay for bicycles, bus passes, and taxi rides in the total amount of \$1500, but they get the car. By sacrificing now, they gain \$8500.

Harold has saved \$20,000 for a vacation cruise. Then he sees he could invest the money in his motorcycle business by taking on another brand, say by adding BMW. In doing so, over the next three years, he would more than make up the \$20,000, and then he would make \$10,000 a year more income every year thereafter. Harold sacrifices current consumption to make even more in the future than what he gives up now.

Yet even savings, foregone consumption, and investment have their diminishing returns. Every farmer knows that there is only so much good to clearing the land. A successful farm usually does not look like a flower garden. If the farmer puts all his-her energy into clearing the land and does not plant anything for five years, the entire family will die and all the early sacrifice, savings, and investing goes for nothing. You have to eat as you go along, and eventually heavy sacrifice no longer pays for itself in the future. Students know that they have to give up some fun to study so as to get good grades, but that too much study wears a person out, a little fun helps us perk up, and then we make even better grades. Martial artists know not to practice more than about four or five hours a day or they actually do backwards.

Forced savings into banks now (3) is not like the other cases of savings-for-investment. In cases (1) and (2), people clearly see alternatives, see that sacrifice now definitely would lead to even bigger gain in the future, and can tell when to stop saving-investing and start doing. Forced saving at the hands of the state is just forced savings. It is not necessarily an investment now. It is not necessarily an investment now that leads to an even bigger payoff later. It is not often real growth. There are not necessarily any great opportunities waiting to use the forced savings. If the financial market was free to begin with, there is a good chance that all the efficient ways to use savings have already been taken. Any investment as a result of forced savings is likely to be less efficient than previously and less efficient than hoped for. There is no way to know when to stop saving-and-investing appropriately. There is a kind of heroic mythic aura about saving now for even greater benefit later, I applaud individuals who do that, and I applaud states that save up in good times to help the economy in bad times. But we should not be misled into thinking that it must work in all cases.

“Production Possibility Frontier (Curve)”. During the time of the Cold War, arguments about forced growth often used an idea called the “production possibility frontier”. It is related to the idea of mutuality in production. I do not discuss this idea here. I mention it for completeness. I return to it later in Chapter Nine when it makes more sense there.

No Beneficial Intervention? Are there no ways in which the state can circumvent diminishing returns so as to intervene to cause real benefit, including sometimes real growth? Should we simply rely on the market in all cases? Are there no flaws and problems in capitalism? All state action can be seen as interference, including all taxes and all spending. All taxes and all state spending forcibly move resources from one group to another, from one industry to another. Yet few people advocate abolishing the state in favor of pure private enterprise. We need the police, courts, fire department, environmental protection, emergency management, and many other useful state services. Some state services actually do contribute more in the long run than they take out in taxes. They are like the beneficial savings of Jack and Diane above. I think the police force is like that.

There are some cases where state intervention in the economy is warranted and can produce more good than harm, particularly interference to alleviate problems from the business cycle. The state can even interfere sometimes in savings and investment without causing more harm than good. The state is welcome to sponsor research that private business cannot carry out. But these cases are so tricky, and so prone to abuse, that it is best to avoid interference if possible. It would be too much of a diversion to go into them here. I return to them in Chapter Nine and in the Suggestions.