

05 Marginality Theory 2: Business Firms

This chapter continues from the previous one. Using marginality theory, this chapter describes how a business firm works and describes the results for the economy. This topic is called the “theory of the firm”.

05 Marginality Theory 2: Business Firms; Synopsis.

Individual people decide what to buy on the basis of the price system and according to how much benefit (utility) they receive from their latest purchase of any particular thing. If my ten dollars give me more satisfaction from some peaches than from another jump drive, I buy the peaches.

For business firms, the counterpart to utility is profit (or revenue). In offering goods to consumers, business firms decide whether to make movies or TV shows according to how much more profit they can make on one more or one less TV show or movie. Business firms allocate resources according to how much more profit they can make by giving the resource to one use as opposed to another use. A movie studio decides how to use its young star according to whether the studio is likely to make more money with her in another action movie or in another romantic comedy. A car maker decides whether to use steel or plastic in the body of its car according to whether the last few kilograms of steel or of plastic is likely to bring in the most money over cost.

When particular business firms independently decide on this basis, all business firms together also automatically set for the whole economy: what will be made; how much will be made; the price-cost-value of raw materials such as wood and wire; the wages for particular occupations; the price of final consumer goods; how many people work in a particular occupation; how large a factory, office, or storefront will be; how much of the total wealth (capital) of the economy goes to what use; how fast to grow the economy; and how much to grow it. All the business firms acting together replicate the price system on which consumers and business firms originally based their actions, and so replicate the economy.

When the economy works as it should, two unexpected things happen. First, no one firm can do this by itself. Particular individual business firms have only very little leeway to set prices. The independent action of all business firms together sets a price to which any one firm responds as if that price was given to the firm. The firm buys materials from other firms at the going market price and sells its final goods to consumers at the going market price. To the average American now, it seems as if business firms just set the price at whatever they like and we have to pay, but that is not true. The system sets the price, and the business firm has to sell for the going rate. If Amazon sells its Kindle too high, then Barnes and Noble jumps in with Nook to drop the price to the proper place. The business firm is a consumer when it buys raw materials to make products to sell. As a consumer of raw materials, business firms face a market price just like consumers face a market price for finished goods. Economists say that consumers and business firms are “price takers”.

Second, there is no profit in the long run, and little loss. “No profit” does not mean all business firms go bankrupt, or all owners make nothing. Business firms continue acting rationally, always seeking profit, but always just breaking even. Employees and managers get paid according to how much they contribute to the business. Owners make a good salary as high level managers. Owners always have the right to use their capital to seek profit temporarily in new ventures. Apologists for bad capitalism and for the accumulation of wealth dislike this conclusion. Wise conservatives and liberals learn to live with it.

Money as a Convenience. The previous chapter introduced peanuts as a medium of exchange, a kind of money. For rigor, mostly I stick to barter but sometimes it is easier to use money. We can use most metals, such as copper and silver, as money. Here, money has no features of its own other than the features that it has accidentally as a good in itself. Silver as money has no features as money other than what silver has as a good in itself. Money is only a neutral medium of exchange. There is no interest on money, as in real economies. In later chapters, we will see that money does have traits of its own even when it is only symbolic paper money, and that these traits affect the economy.

Types of Business Firms. The modern corporation defines most aspects of modern lives. From it we get nearly everything we buy and all that we earn, from cradle to grave. It provides jobs for the vast majority of people. It is not a good idea to get on the bad side of a corporation if we need a job or we want to be a business person. With modern corporations, we also get the franchises, dealerships, and the “storefronts” that present the “face” of most corporations and with which we are most familiar (any particular Wal-Mart store or Burger King restaurant).

We tend to think of the corporation almost as a natural force, like rain, that has been around forever. Yet corporations have played their dominant role only for a bit over 100 years. Before modern corporations, business was done by various kinds of firms: ownership by one person; ownership by a family such as the Du Pont family or Rockefeller family; and partnerships such as with a clinic of dentists. The type of firm influences how business is conducted but not so much that the question needs to be considered here. We can think of all business firms as having the traits listed in the section below.

Business Firm Traits and System Features Condensed. Here is a second longer synopsis. This section presents the chapter as a list, in jargon. The rest of the chapter fleshes out the list. The reader can return to the list for reference. Unless stated otherwise, all the features arise under near perfect competition.

Individuals wish to maximize utility; business firms seek to maximize profit.

Revenue is how much a business firm takes in while cost is how much a firm pays out. Profit comes when revenue exceeds cost.

A good can be physical good such as a toaster, a service such as medical care, or an experience such as going to the Super Bowl.

To gain revenue, and to seek profit, business firms offer a good for trade (sale) on the market.

A particular kind of business is the selling of a particular good, such as “the bread business” or “the computer business”. A firm is one unit in a particular business, such as Apple or Dell in the personal computer business.

A “venture” or an “enterprise” is the efforts of a business firm in a particular kind of business. Developing and marketing a particular computer game, such as “Prince of Persia”, is a venture. Selling apples at a corner fruit stand is a venture. Opening a corner dry cleaner is a venture.

To maximize profit, it helps to minimize costs. Business firms seek to use their resources as cost effectively as possible. Business firms also seek to minimize opportunity cost by looking for the most profitable way to use their resources. Firms allocate their resources so as to use them most cost effectively, minimize opportunity cost, and maximize profit.

For people, there is no objective measure of utility, and people can seek utility in many different ways. In contrast, for business firms, there is an exact and absolute measure of success: profit. Business firms have to do only one thing: seek profit as measured by money. Business firms do very well the one thing they do.

People work for business firms so that people can indirectly gain utility through their wages. For people, the pursuit of utility should be above the pursuit of profit.

Yet people tend to internalize the values and methods of the institutions in which they live, including the firms for which they work. People can mistakenly put the pursuit of profit (money) above the pursuit of utility. This can be a mental illness. Thankfully, contrary to popular myth, this type of confusion does not happen often enough to make a point of it in this chapter.

Business firms can engage in more than one venture at a time. Dell sells whole computers and parts too; and Nestle deals in raw foods, the processing of food, and finished foods. Business firms switch ventures. They abandon old ventures and take up new ventures. In Asia, Singer now sells refrigerators and it hardly makes sewing machines at all. Business firms do all this to minimize opportunity cost and maximize profit. Still, for now in this chapter, it is easier to think of one venture at a time per business firm.

In seeking to use resources best in the pursuit of profit, business firms reinforce the public price system. They reinforce the fact that any good has the same price-cost-value for everybody. They reinforce that value, price, and cost are all aspects of exchange ratios.

“Imputation” (also called “derived demand”), means that the demand for a final good determines the price-cost-value of the resources that compose the final good, and that the cost of resources does not determine the value of the final good. The demand for apples determines the cost of apple trees; the cost of apple trees does not determine the value of apples. In seeking to use resources best in the pursuit of profit, business firms reinforce imputation.

The sum of the costs of the components for a final good equals the price of the final good.

The price-value of my refrigerator equals the sum total of the costs to make the refrigerator. This relation is not true because the costs determine the price of the final good but because of imputation, because the value-price of the final good determines the value-cost of components.

The activity of business firms reinforces the fact that the cost of the resources that are used to make a final good adds up to the value of the final good.

The fact that the costs of resources add up to the value of the final good means that ordinarily in perfect competition there is no sustained profit. If there were, imputation would not hold. Business firms pursue profit, and sometimes make real profit, but, ironically, their pursuit of profit insures that real profit disappears.

In a real economy, profit does not disappear. In later chapters, we will use the sources of profit to understand a real economy in contrast to an ideal economy.

Business firms do not seek to maximize the quantity of profit by itself but seek to maximize the "rate of return on invested capital". They seek to maximize the rate of profit. It is better to get a 10% return on a slightly smaller total amount of capital than to get a 5% rate of return on a slightly larger total amount of capital.

Business firms move capital from one kind of business to another kind when the other kind makes a greater rate of return than the present kind of business.

Although in theory business firms seek to maximize the rate of return, sometimes they just seek to maximize the amount of profit, especially in the short run. Business people that speculate in bonds can make a great deal of money on a fraction of a percent when they deal in hundreds of millions of dollars all at once.

Over a moderate time span, business firms seek to maximize the rate of return within particular kinds of businesses, such as making plastic food containers. It is a lot of bother and expense to switch between different kinds of ventures, so firms tend to stick with what they know best.

Over a longer time frame, business firms move capital from one kind of business to another kind when the difference in rate of profit is enough. If a firm can make a greater rate of return by selling mainframe computers than by selling micros, it moves resources. Opportunity cost drives firms sometimes to switch from one kind of venture (electronics) to another (movies) when the difference in profit is high enough.

There is a "magic of small and big" with business firms too. No business firm by itself can determine: the price of a final good, the total quantity offered on the market by all firms, the cost of resources, or the total quantity demanded of any resource by all business firms. Yet all firms together determine those features. Business firms, with consumers, together create the markets for final goods and resources. Business firms then respond to the markets that they created. In responding to market characteristics, firms and consumers recreate market characteristics.

The magic of big and small among business firms is a powerful force in making the public price system; in maintaining the imputed relations between final goods and resources; and in keeping the identity between price, cost, and value.

Maybe the biggest reasons we need to know that cost effectiveness sets the price-value-cost of any good or resource are: (1) labor is a resource and (2) the price-cost-value of labor is wages. We need cost effectiveness to understand labor, wages, employment, and class relations later.

Although profit disappears in idealized economies, we can still understand the actions of business firms, and the results of their actions, in terms of pursuing potential profit. Deviations from perfect competition show up with deviations away from the magic of small and big, distortions in the public price system, distortions in imputation, and when the sum of costs for a good does not equal the price of the good.

Resources and Input Factors. “Resources” are also called “input factors” because firms take in resources (wood or iron) so as to out put goods (furniture or cars). In this chapter, I use the term “resources” more often because readers are more familiar with it while in later chapters I use the term “input factors” more often for technical reasons. Labor is a resource and an input factor. A thing can be a good at some times but an input factor at others, as a car is used for pleasure, for business, and for family errands.

The “finished good” for one type of business is the input factor for another type of business, as when a smelting plant provides sheet metal to a carmaker. The output from one business is the input for another business, and so on through the line from raw resources, to intermediate input factors, until we get to a final consumer good. For convenience, in this chapter, I argue mostly in terms of the last step from processed resources to final consumer goods, as when a Dairy Queen turns cream into treats. I describe the strategies of the firms that take that last step.

Few firms start with raw materials to produce finished goods. Firms start with the output from other firms. Most firms are part of long chains in which raw materials become finished goods only through many steps. Even apparently raw materials, such as lumber or corn, require inputs that are processed products, such as fertilizer and bug spray. Raw materials are part of the circularity of the entire economy.

Consumers choose among goods so as to achieve greatest utility. Firms choose among input factors so as to achieve greatest potential profit.

In the same way that the needs of consumers determine the value-price-cost of final goods, so the needs of firms determine the value-price-cost of input factors. This is true not just in the final step from some input factors to a finished good, as when a factory assembles a computer, but for every intermediate step from raw materials to input factors to finished goods, and for all the circular connections among the intermediate steps.

Best Use of One Resource. In jargon: A firm best uses a resource when it allocates the

resource so that the return it gets from each marginal use of the resource in any alternative use is the same for all alternative uses. In this way, a firm maximizes its return from the resource, and maximizes any potential profit it might make from the resource.

An example: Barney runs a bakery. To his baked goodies, he adds raspberries from his garden: directly in the batter, as part of the filling, or as an icing. Barney uses raspberries in tarts, pies, cakes, turnovers, cheesecakes, fruit bars, and other stuff. He spends time and labor growing raspberries and picking them. Barney hates to do all housework such as vacuuming, mopping the floor, cleaning the bathroom, and laundry. Barney can tinker on cars but needs professional help sometimes. Barney needs help with his webpage. Barney trades his baked goods for help with work of all kinds. Barney has to think about how to allocate the raspberries from his garden into his baked goods in the best way so as to get people to do the most work for him in return. Barney has to use raspberries cost effectively to get the greatest return.

Barney uses raspberries cost effectively by putting the correct amount in the various baked goods. Everyday, Barney has about 20 cups of raspberries from his garden that he can allocate among the various baked goods so as to please the customers and so as to make them willing to trade their labor in exchange for his goodies.

Barney could directly follow his own sweet tooth (his own utility). He could put a lot of raspberries into a chocolate cheesecake while putting few into a standard pound cake. If he does this, he is likely to end up eating most of what he made and end up not getting much in exchange for his goods. He cannot run a business firm this way. He has to please his customers or other bakers will do it instead. As a business firm, Barney has to pursue only the maximum return for his goods, as measured in some objective way such as the number of hours people are willing to trade for his goods or the number of silver coins people are willing to trade for his goods. This is the difference between acting as a private individual versus acting as a business firm.

Barney starts by dividing 15 cups of raspberries into various uses, in large lumps to each use. This is the “part that goes before”, the part that is not on the margin, the part to which marginality theory does not pay much attention (marginality theory can deal with this allocation as well but to do so here would not be very helpful and would take a lot of space).

That leaves 5 cups to allocate. Barney does not allocate this amount in large lumps such as a cup at a time. Rather, he allocates just a few spoonfuls at a time, carefully considering where each few spoonfuls will do him the most good. This is the marginal amount, the amount “right now”, with which marginal theory is most concerned.

Barney thinks, “Where can I put a few spoonfuls so as to get the greatest interest in my baked goods? Where can I put a few spoonfuls so as to inspire people to trade the most for my baked goods? Should I put three more spoonfuls in the cheesecake, two more spoonfuls in the tarts, and one more spoonful in glazes? Then, if I have more left over, I can put more into other various uses.” Barney does this with each spoonful until the raspberries are all gone.

Another way to see Barney's strategy is: "Where can I put this marginal spoonful of raspberries so as to most enhance the appeal of a particular goodie so as to get people to exchange the most labor in return for this marginal spoonful of raspberries? How can I use each marginal spoonful of raspberries so as to maximize the marginal return I get from labor in exchange?" This is how a business firm thinks about using resources except that it thinks in terms of maximizing profit in return rather than in terms of maximizing labor in return.

By allocating the raspberries so that Barney gets the maximum return on each marginal spoonful of raspberries, Barney gets the maximum total return on the raspberries as a whole.

When Barney has finished allocating his raspberries so as to get the maximum total return on raspberries, the return that Barney gets on every last (marginal) spoonful of raspberries is about the same as he gets on any other marginal spoonful of berries. The return that Barney gets from the last (marginal) spoonful of berries in the cheesecake is about the same as the return that Barney gets from the last (marginal) spoonful of berries in the glaze for a chocolate tort. If this were not so, Barney would not be getting the greatest total return – Barney would suffer an opportunity cost. If this were not so, Barney would move one spoonful from here to there until it was true.

Typically in balanced strategies, balanced markets, and all kinds of balances in economics, the return from marginal units is the same for every use to which they are put.

To be precise, I would have to take cost more into account than I have done with Barney, but that complication would not change the basic principle of equal returns from all marginal uses of all resources. This is one way we can recognize a balanced situation.

By getting the maximum return out of any resource in the same way, Barney maximizes his total return of labor in exchange for his baked goods. By allocating cream, sugar, butter, milk, white flour, wheat flour, nuts, raisins, eggs, and all resources in the same way, Barney maximizes the return that he gets on the marginal use of each particular resource, on the total use of each particular resource, and on the total use of all his resources. Real bakeries, and real firms in other businesses, actually go through these kinds of considerations when they think about how to run their ventures.

Why does Barney allocate exactly 20 cups of raspberries? Why does he not use 12 cups or 25 cups? Barney has to work in his garden to get the berries that he allocates. The work is a cost to Barney. The more that Barney works in his garden, the greater is the cost while the lesser is the reward. Barney gets labor from his customers in return for his own labor in the garden. As Barney gets more labor from his customers, that source of utility declines. Eventually, the return of labor from his customers does not make up for the labor that Barney has to expend himself in his own garden. At that point, it is no longer worth it to Barney to cultivate more raspberries to put in goods to exchange for labor from his customers. There is a certain amount of raspberries that maximizes the gain that Barney gets from trading his labor for the labor of others; that is 20 cups of raspberries per day.

All firms do the same thing to the extent they can allocate resources between uses. If a firm has only one resource that it transforms into only one good, then it acquires the resource, and transforms it, until the gain from selling the finished product only just makes up for the cost of the resource. A woodcarver buys wood and carves it only as long as the gain from the sale of the carvings makes up for the cost of the wood (leaving out of consideration the cost of tools, medical care, advertising, etc.).

Most firms can use resources in various ways, even within one venture. A woodcarver can make little pink flamingoes or can make copies of Michelangelo's "David". Firms acquire a resource up to the point where the gain in exchange only just makes up for the cost of the resource. Firms allocate the resource between various uses so as to maximize return. They use the marginal return from alternative uses to guide them to the maximum return. A woodcarver carves various figures. A house builder first puts wood into those parts of a house where he-she has to put wood such as the frame and the underlay for floors. Then the house builder allocates wood in various less critical uses such as banisters, window frames and cabinets. In so doing, the builder gets the most out of the uses of the wood. Hospitals allocate nurses between units while school districts allocate teachers between schools.

In Money Terms. Now that we have introduced silver money above, we can use it to restate Barney's actions in more familiar terms.

Barney spends 100 silver grains on 20 cups of raspberries. He wants to allocate the berries so that he gets the most silver grains in exchange for them.

Barney does exactly the same thing except that he thinks in terms of silver grains instead of labor. Barney starts out by using 15 cups in obvious places. Then he allocates the last 5 cups spoonful by spoonful so that he gets the most in return for each spoonful. If he puts too much in the tart fillings and not enough in the cheesecake, then customers will not pay as much as he asks for either, and will not buy all of them.

Why does Barney buy only 20 cups for 100 silver grains? Barney has learned that the most additional return that he can get for all uses of raspberries is 100 silver grains, and that he needs 20 cups of raspberries to get this much silver in return. If Barney uses 15 cups for 75 grains, he gets only 60 grains in return. If he uses 25 cups for 120 grains, he gets only 110 grains in return. 20 cups for 100 silver grains maximizes his return in silver for his investment, just as, above, 20 cups maximized the labor that he got in exchange.

It is simpler to talk in terms of money but it can be misleading. It is worth laying a foundation in exchange first so that we can be confident and precise when we do use money for convenience. Barney's use of 20 cups for 100 silver grains says nothing about whether he makes a profit. In fact, under perfect competition, he does not make a profit, but we have to wait to see why.

Lessons from Barney's Allocation of One Resource.

Opportunity Cost. Barney allocates raspberries (resources or input factors) cost effectively so as

to get the greatest return from the marginal use of the resource. If Barney did not allocate resources in this way, then Barney would suffer an opportunity cost at each misuse of raspberries. If Barney put an extra spoonful of raspberries in a glaze when that spoonful would have brought a greater return in a tart, then Barney has lost some return from that spoonful of berries. Barney suffered an opportunity cost. So, another way to think of his actions is as minimizing opportunity cost. Barney acts cost effectively both when he minimizes opportunity cost and when he directly maximizes return; in a well-run firm it should all amount to the same thing.

Equalized Marginal Returns. When Barney has carried out his strategy fully, then the returns from each marginal use of every resource are equal. This is just another way of seeing the force of opportunity cost. If this were not true, then Barney would not be getting the greatest return from some marginal use of some resource, such as raspberries. Barney would shift spoonfuls of raspberries from one use to another use (muffins to pound cake) until it was true.

Sum of Costs. The sum of the labor that Barney puts into getting raspberries to put into his baked goods to exchange for labor from his customers equals the labor that Barney gets in exchange. The cost of the component that goes into a final good equals the price of the final good. This relation would be true not only for raspberries but for all components. This relation is true not because the cost of the component determines the final good but because of what Barney can get in exchange for the final good. This relation is true because the price of the final good determines that the sum of costs for the components equals the price of the final good.

Public Welfare. When Barney uses raspberries most cost effectively to get the greatest return for his bakery, he also uses raspberries so as to provide the greatest utility to his customers from raspberries. Barney uses resources most efficiently to yield the greatest total welfare among the general public. If customers did not get the greatest utility from Barney's use of resources, they would go to another shop that did use resources so as to give them the greatest utility. The same is true of any other resource such as cream or eggs. When Barney uses resources most cost effectively so as to gain the greatest return for his firm, he also automatically uses resources most efficiently so as to provide the greatest utility (welfare) to people in general. This is true not only of Barney's use of resources in his bakery but is also true in all cases, although I do not point it out for each case.

Two Terms. The return that Barney gets from each marginal spoonful of raspberries is the "marginal revenue product" from that spoonful. The extra (marginal) labor that Barney gets from his customers in return for each marginal spoonful of raspberries is the marginal revenue product from that spoonful, expressed in terms of labor. The term "marginal revenue product" is actually a technical term from mathematics, so I change it slightly to "marginal revenue productivity", which has more intuitive sense. I have been stating return in terms of labor for this example so that we do not rely too much on money, but usually marginal revenue productivity is stated in terms of money. With money, Barney thinks about how much more money revenue he can get from one more spoonful of raspberries put to a particular use.

The idea of marginal revenue productivity applies not only to raspberries but to any resource,

so Barney can think about how much more revenue he might get from the next (marginal) spoonful of cream, chocolate, or cheese in any particular use.

Marginal revenue productivity is almost always positive because, if it were negative, that means a firm lost revenue (money) with each additional bit of resource – and firms will not do that.

Because marginal revenue productivity is almost always positive, it is easier to think of it in terms of cost effectiveness. The marginal revenue productivity of any resource is the cost effectiveness of that resource. Because people respond to the term “cost effectiveness” better than to the term “marginal revenue productivity”, I use “cost effectiveness” more often; but I sometimes include “marginal revenue productivity” in parentheses to remind the reader of the more technical term.

Change at the Margin. We could also understand Barney’s strategy by looking at what makes the biggest difference at the margin. We can take a spoonful of raspberries out of any particular use, such as cakes, and put it into every other possible use, such as tarts and pies, to see what happens. Which returns change the most? We can put in another spoonful of raspberries to see which use (cakes or tarts) increases revenue (labor in exchange or silver grains in exchange) the most. We can see if revenue from some use actually declines. This technique of varying at the margin gives a sense of what is most cost effective, and why Barney uses the proportions that he does.

Economists often use this technique to understand the effects from several resources at once. They vary several resources at the same time, at the margin, to see which has the most effect on revenue. You should know of this technique for multiple resources in case you run into it in readings but the details are not needed here. In later examples, we will use this technique with several input factors at the margin to get a sense of what is most important, to get a sense of “what is really going on”.

Everything Together. As it is with raspberries, so it is with all other input factors too, including honey, sugar, flour, cake pans, ovens, baking powder, yeast, and the time (wages) of employees. Think of how to apportion honey between various baked goods so as to get the most in exchange from those goods – not necessarily so that they taste best to the baker. As it is with bakers, so it is with all firms and all their resources including carmakers, doctors, lawn care, bicycle shops, musicians, politicians, universities, etc.

Best Use of Multiple Resources. In jargon: Business firms use a bit from each of several resources together so as to maximize their return from all the resources. Firms use marginal (additional) revenue from a marginal (additional) application of each resource to guide their use for all the resources together. When firms maximize their return on several resources together they also maximize their total return. We can see this well enough in the use of two resources together in the same good. From two resources in one good, we can generalize to many resources in many goods.

In example: Sally runs a local diner. Sally makes jambalaya, shrimp Creole, goulash, stew, barley-and-beef soup, and other thick and hearty soup-like food, served with various breads.

She makes about 20 varieties. She makes soups in large 20-gallon pots. Like Barney, Sally has to decide how to apportion ingredients between different uses.

Like Barney with his raspberries, Sally has to decide how much meat to put in the stew, beef and barley, lentils, or chili so as to get the most in exchange for a bowl of any of them. Sally does not put labor into raising beef but instead exchanges little pieces of silver for the beef, and she gets little pieces of silver in exchange for her various bowls of soup. Even so, it is the same problem, and she solves it the same way. Think about having 50 pounds of cut-up beef and apportioning it out to the various pots. I do not go through the details.

Sally has another problem: how much of each of various multiple input factors (ingredients) to put into each particular pot. How many potatoes, and how much meat, should go into the steak-and-potatoes soup? How many beans, and how much meat, should go into the chili? How much tomato, and how many carrots, and how many alphabet bits, should go into the vegetable soup? How does she best use multiple resources together in one soup? If we can solve this problem for two resources together at once for one kind of soup, then we can extend the idea to many resources and to many different final goods (soups).

Sally could follow some recipe but that recipe might not match Sally's taste or the taste of her customers. Sally could follow her own taste, but her taste might not match the taste of her customers. Like Barney with raspberries, Sally has to learn what works best by trying out the ingredients to see what her customers respond to.

Sally figures out her problem of multiple resources much as Barney did with one ingredient. Suppose Sally makes a big pot of chili. At first, she adds a double handful each of meat and beans. These initial handfuls are the parts that go before the margin, about which marginality theory does not have to pay close attention here (but which could be handled by marginality theory if we needed to be exact and tedious).

After this big lump at the start, then Sally has to start working on the margin. Into the chili, she adds a cup of beans, and then a cup of meat, to see which has the best results. As long as beans keep working best, she adds more beans until they start having less effect. Then she adds beef chunks until they begin to have less effect. Eventually she figures out how much beef and beans to add in her chili so as to most please her customers and to get the most from them in return. She has used beef and beans together so as to be most cost effective.

Sally does not add too much because she does not add more than causes her to get at least as much in return. Sally does not add another cup of beef to the pot of chili if the beef cost 2 silver coins per cup but brings in only 1 more coin in trade. That would not be cost effective. The same is true for beans or any other ingredient.

When Sally knows how much of each ingredient to put in each pot, she has used her ingredients most cost effectively to maximize the return-in-exchange that she gets from her venture. She maximizes her return. She gets an equal return from each marginal use of every resource. She has used her opportunities fully and suffers no opportunity cost. This is the basis for maximizing

any profit she might get as well. Even though the ingredients act together, and their effects cannot be easily separated, by using this method Sally can still be sure to get the most return for her inputs.

We can get a good sense that Sally has succeeded by seeing what makes the biggest difference at the margin. Sally can take out a cup of beans first to see what difference that makes on sales. If sales diminish more than the cost-price of the cup of beans, then she puts it back in. Sally can add another cup of beans. If sales diminish more than the cost-price of the cup of beans, then Sally takes it out. She can do the same with a cup of beef. She can even do the same with both beans and beef at the same time. Eventually she can be sure that she has put in exactly the right amount of both ingredients, no more and no less. Real cooks in real restaurants actually do all this. So do real cooks for families at home but they measure success not with silver in return but with how hearty the appetite of their small customers.

As with meat and beans, so with tomato sauce, chili, peppers, onions, garlic, bits of carrots, and anything else we might put into any pot. Eventually Sally has to learn how to balance ALL the ingredients for any particular kind of soup, and between all the various soups. The more ingredients there are, the longer it takes, and the more minor variation the customers can stand; but the general idea is no different than with two ingredients for one kind of food.

A Few Complications, Same Results. Real business firms have to take other considerations into account, but the technique is no different than when Barney apportions resources between goods or when Sally decides how much of each resource to use in any one particular good. I do not give details on how to solve these problems, but only list the problems to make readers comfortable.

Value Rather Than Physical Quantity. The biggest difference is in a shift from physical quantity to value-price-cost. Instead of thinking in terms of cups or spoonfuls, Ralph, Sally's rival, thinks in terms of the value of ingredients. He has to think in terms of the value-price-cost of ingredients in relation to the value-price-cost of final baked goods. If money is used in his economy, he has to switch to think in terms of that money.

Sally already thinks of her ingredients in terms of small grains of silver rather than in terms of physical quantity. The cost of ingredients differs per unit of physical quantity, so that a cup of beans might cost one silver grain while a cup of meat might cost two silver grains. In this case, Sally has to figure how to get the best return not per cup but per grain of silver.

She can do this by adding the beans and meat not per cup but per grain. For example, when she thinks about adding a cup of meat, she really thinks about adding two silver grains worth of meat; if she thinks about adding a cup of beans she really thinks about adding one silver grain worth of beans. In this case, she is liable to add meat one-half cup at a time (one grain at a time) and to add beans one cup at a time (one grain at a time) for a more accurate comparison.

All firms have to figure out the return per unit of value. In real economies, they use money to assess value, such as the return per dollar.

Simultaneous Variety. Most firms make more than one good, or make more than one variation on one good. A business firm both has to use the correct combination of ingredients in any one good (Sally) and to apportion out its resources to its various goods (Barney). Even with one good there is often some variation. Dispensing legal advice can be a good. No law firm specializes only in divorce cases between Asian middle class couples with exactly three. The “product” of a law firm includes a diversity of cases and situations, even when the firm specializes. Moreover, the young lawyers (input factors) in every firm differ a bit in their abilities. Wise senior partners learn how to apportion out the young members to their strengths.

Sets. Ingredients tend to come in sets, so there is some constraint on how resources can be used and can be mixed. A car takes so much steel, a house takes so much wood, a cake takes so many eggs and flour. Even so, there is “wobble room” in all but the most fixed recipes, and so the general idea is true even if there are some constraints.

Lumps. Some resources come in large fixed amounts, such a cruise ship or an intercontinental jet passenger plane. It would be hard to fine-tune the service by offering half-a-boat or a plane-and-a-third. Still, the techniques of Barney and Sally work better than alternative ways of trying to figure out what to do, and lead to the same results for the economy.

Influence between Types of Business. Barney and Sally use some ingredients in common, such as eggs, milk, and corn syrup. Barney’s use of corn syrup depends to some extent on Sally’s use of corn syrup, and vice versa. If Sally is more efficient at using a cup of corn syrup then she gets a greater return on corn syrup than Barney. She can use more of it, and she can pay more for it as well. In that case, some bakeries will go out of business. Resources will flow from bakeries to eateries. This is familiar from Adam Smith. The difference is that now we can see that the flow depends on the marginal return to the resource in each kind of business. I will not go through the details. Figuring this out exactly was one of the advances of neoclassical economics.

Diversity from Unity. Corn syrup is only one of many products from corn, including: corn on the cob, corn meal, canned corn, ingredients in animal food, corn flakes, artificial sweeteners, and even ethanol as a fuel in cars. Corn is allocated between these uses according to its marginal efficiency (cost effectiveness, marginal revenue productivity) in each of the various uses. This would be easier to see if one business firm took care of all the corn products at the same time, like Barney with his raspberries in his bakery. Instead, many firms each take one, or a few, aspects of corn products. Corn is allocated between these businesses by how each business uses its corn products most cost effectively to maximize its return. When each firm in each business uses its corn products most effectively, then all corn is most efficiently turned into all its various products. It is the same way with all resources in all businesses, and business firms, in the entire economy.

Capital. Business firms see all resources as if the resources were variable ingredients in one complicated soup that can be pored into one venture or that can be pumped from one venture to another: the soup is called “capital”. Training, education, gasoline, land, work, planning, sales campaigns, concrete, wood, pipes, wires, electricity, etc. are all ingredients in a capital soup that can be

fed to farms, shopping malls, dental offices, law offices, dentists, lawyers, teachers, gin mills, computer factories, programmers, or whatever, according to opportunity.

Capital is all resources considered from the point of view of being able to lead to revenue and to potential profit; able to move within ventures according to cost effectiveness; or able to move between ventures according to cost effectiveness.

Capital includes not only physical goods such as corn, or services such as legal advice, but also includes reputation and credit. In the modern world, reputation and credit are probably the most important forms of capital.

To think of capital by itself, not in terms of any specific resource that makes it up, is to think of capital in the abstract. We think of capital in the abstract in terms of money value. Capital in the abstract can be a little mysterious but it helps if we keep in mind that it always refers back in the end to some kinds of specific input factors. Money does not build a shopping mall until it turns into bricks and hours of sweat.

Value-Price-Cost of an Input Factor (Resource) as Its Marginal Revenue Productivity (Cost Effectiveness).

In the previous chapter, we saw that marginal utilities governed trade, and thus that marginal utilities set exchange rates. Exchange rates define the value-price-cost of goods. Carl and Teresa traded corn and tomatoes until they agreed on four large baskets of corn for five small baskets of tomatoes. This ratio of corn and tomatoes became the trading rate for corn and tomatoes in general. The value-price-cost of four large baskets of corn is five small baskets of tomatoes; the value-price-cost of five small baskets of tomatoes is four large baskets of corn.

We used Carl and Teresa to represent average people, and so they represented the average marginal utility that develops when many people trade the same final goods, and when opportunity cost and transitivity come into play. Their case showed the average marginal utility that arises even when people have a range of tastes. The trading rate develops among a group on the basis of this average marginal utility.

In jargon: In the same way, cost effectiveness (marginal revenue productivity) governs the process of manufacture, and therefore sets the substitutability of input factors (resources) in a final good. The ratio of substitutability for resources is like the trading ratio for final goods. It indicates how much influence any particular resource has on the value-price-cost of a final good. The substitutability ratio determines the price-cost-value of input factors (resources). An average ratio develops among all kinds of business firms despite modest differences in particular conditions of production. This average substitution ratio depends on the average marginal productivity, or average cost effectiveness, for a resource among all kinds of businesses despite modest variations between them. Average cost effectiveness (average marginal revenue productivity) of any input factor for making final goods determines the price-cost-value of the input factor for the whole economy.

In example: For now, it is easier to work through physical quantities rather than through price-value-cost. Sally discovers that she is best off using beans to meat in the ratio of three pounds of

beans to one pound of beef. At the margin, three cups of beans can substitute for one cup of meat, or one cup of meat can substitute for three cups of beans. This substitution ratio determines the value-cost-price of resources just as the exchange ratio determines the value-cost-price of final consumer goods. Any other substitution ratio will result in less interest by her customers, and will result in a chili that is less valuable, that has a lower price. The value of three pounds of beans is one pound of meat, and the value of one pound of meat is three pounds of beans.

Suppose that Sally's use of beans and beef represents the average use in the economy among many different kinds of producers. Other users of beans and meat find that they can substitute them in about the same ratio for use in the final goods that they make. This ratio shows the cost effectiveness (marginal revenue productivity) in bringing revenue to various kinds of businesses. This ratio sets the cost-price-value of beans and beef throughout the economy.

Carl and Teresa did not use money. Barney used labor time as a kind of money to evaluate the return he got on raspberries. Sally used silver grains. It does not matter, but it is easier to use silver grains.

Other business firms have to think of other trade-offs (substitution) but the result is the same because opportunity cost and transitivity tie together the entire economy. Burger joints have to think about the trade off between meat, buns, and condiments. Vegetarian soup restaurants have to think about the trade off between beans, carrots, and alphabet bits. If any one place did better with beef or beans than any other, resources would flow, and recipes would be adjusted. Eventually the price of beef in terms of other ingredients would be the same for all restaurants, and the price of beans in terms of other ingredients would be the same for all restaurants. And so it is also for the trade-off between beans and cooking gas, beef and cooking gas, and etc. for all of businesses all through the economy. The balance in the market for any one particular resource (beans or beef) is a particular equilibrium that gets tied into a general equilibrium.

Values. Now, instead of using physical quantities, we can rephrase in terms of value-cost-price, using money, with less danger of being misled and with more accuracy. In this case, I change the substitution ratios a bit to make sure the reader sees this situation in its own terms. Suppose a cup of beef exchanges for 2 silver coins while a cup of beans trades for 1 silver coin. If Sally uses 1 cup of meat for every cup of beans, then she loses some potential value; she over-uses meat in comparison to beans given their prices. If Sally uses three cups of beans for every cup of meat, then she loses some potential value; she over-uses beans in comparison to beans given their prices. For Sally to use beans and meat most cost effectively given their prevailing prices (costs) she needs to use 2 cups of beans for every cup of meat. This use equalizes the marginal cost of beans and meat even though it does not equalize marginal quantities. The public price-cost-value is more important than the physical quantities. Here the public price-cost-value is stated in terms of silver coins but it could be stated in terms of any medium of exchange, including the labor that Barney used.

The price of ingredients should reflect their effectiveness at the margin in drawing customers to exchange for the final product. The price of ingredients reflects the effectiveness of physical

quantities. At the margin, Sally discovers that 1 cup of meat makes as much difference as 2 cups of beans. The substitution ratio of beans for meat at the margin is 2 for one. Looking the other way, Sally discovers that it takes 2 cups of beans to make as much difference at the margin as only 1 cup of meat. Sally has to use twice as many cups of beans as of meat or else she will not use beans and meat cost effectively. It takes twice as much quantity of beans to equal one quantity of meat. This is another way of saying that meat costs twice as much per physical quantity as beans, or that meat costs 2 silver coins per cup while beans cost 1 silver coin per cup.

Ingredients get their value-cost-price initially based on their physical substitution ratios at the margin, according to their effectiveness in making final goods that are traded to customers. Their value-cost-price reflects their substitution ratios. Once ingredients get their value-cost-price based on their physical substitution ratios, their value-cost-price serves as a shorthand telling a firm how to use the ingredients.

Non-Circle. Using silver grains to assess value-price-cost points out a small circle in logic. This small circle is not really a problem but I mention it so that readers do not worry about it. I change the ratios to focus attention on the logic. In using silver grains to assess how much beef to put into a pot, Sally already uses the value of beef in terms of silver – say that beef has a value of 4 silver grains per pound. If the value of beef were different, Sally would use a different amount of beef. If the value of beef were 5 grains per pound, she would use less. If she used less, the substitution ratio with beans would change. The substitution ratio of beef with beans determines the value of beef, and so the value of beef would change. Here is the circle: If the value of beef was different, then that difference would lead to another value of beef. From the other way around, if the value of beef were 3 grains per pound, Sally would use more beef in relation to beans. The ratio of beef to beans would change, and so the value of beef would change. So we use value to derive value, and that is a logical circle. It is not a circle if we realize that we actually used the cost effectiveness of beef in relation to beans a long time ago in the background to give beef the value of 4 silver grains to begin with. The original value of 4 silver grains depended on substitution ratios that we forgot to mention. Silver grains now only measure a value that we determined directly through exchange and cost effectiveness a long time ago in the background. Changes in value can happen. Changes in value start with old values as a reference. So they do not necessarily trap us in a logical circle. This is all part of the magic of big and small for firms.

Using silver grains makes it easier to see changes in value and to assess the effects of changes in value. Even so, we need to keep in mind that value-cost-price are always based on exchange ratios or substitution ratios, that is on real stuff, real utilities, and real revenues.

Next Steps. Now that we know how a particular firm uses resources, we have to see how firms and consumers fit together into a whole economy. We have to see how firms create the public price system, then respond to the public price system, and then recreate the public price system in their response to it. The first step is to see how firms decide how much to produce, in particular how firms decide how big to make a plant (bakery or soup restaurant), and at what capacity to run a plant (how “hard” to run the plant).

Background to Plant Size. A “plant” is the production unit of a firm. For a carmaker, a plant is a factory. For a law firm, a plant is an office. For a retail chain store, a plant is one particular storefront such as the neighborhood Kroger.

Operating in Perfect Competition. In perfect competition, the idea of a public price means that everybody pays the same price for a good no matter how much of the good that they buy. A person pays the same price for chocolate cakes no matter how many he-she buys. The output goods from one factory are the input factors (resources) for another factory. The idea of a public price also means that a firm pays the same for units of a resource (pounds of sugar) no matter how much the firm uses for production and how many units of its own output (chocolate cakes) come from the resource.

We all know about wholesale versus retail, and about volume discounts. These seeming aberrations are really not large problems. Marginality theory can easily account for them but it would take too much space to do that here.

In perfect competition, a firm sells all units of any good that it makes for the same price no matter how few or how many units it makes. No matter how many cakes Barney makes, he sells them all for the same price. If this were not so, then resources (input factors) would not all sell for the same price because what is a resource (input factor) to one firm is only the output (good) from another firm. A constant buying price and a constant selling price are two sides of the same coin.

How Many Units to Make. If the selling price is the same no matter how many units of a good a factory makes, and the cost of resources is the same no matter how much a factory uses, then the only thing that a factory can control is how many units of a good that the factory makes. The next few sections describe how a firm decides how many units of a good to make. Later sections tie this result into ideas about cost effectiveness and into implications for the economy.

Business people tend to think of the issues in this section in terms of average cost per good while economists tend to think in terms of cost per marginal good or in terms of marginal cost. The average method and the marginal method lead to the same results. It is harder to think in terms of the marginal method but more exact, and the reader will need to think in marginal terms if he-she ever goes on to take a course; so I talk in marginal terms where I can.

Marginal Cost and Marginal Revenue. The extra cost per each extra good made is the marginal cost per marginal good, or just “the marginal cost”. The cost of making one more cake or one more bowl of soup is the marginal cost. The revenue from any additional (marginal) unit made and sold is “the marginal revenue”. Because the price is the same no matter how many goods are made and sold, the marginal revenue is just the price of the good. The marginal revenue from the hundredth loaf of bread is the same as the marginal revenue from the tenth loaf of bread – just the public price of a loaf of bread – because that is the price of bread under perfect competition. Marginal revenue is constant.

Varying Costs. If the price per unit did not vary and the cost per unit did not vary either, then

there would not be much for me to talk about. No matter how many units a factory made, the results would be the same. As it turns out, the cost per unit does vary. There are four kinds of costs to consider. As it turns out, the first three are much less important than the fourth, but they have to be described because people know about them and want to consider them.

(1) Start Up Costs. Before a restaurant, factory, or office can begin operation, it has to set up. Start up requires resources too. Before Sally can begin her diner, she has to build a storefront, decorate the place, buy cups and saucers and spoons, buy stoves and heaters, buy large soup pots, and hire employees. These are “fixed costs”. Sally has to pay these costs no matter how much she sells or how little she sells.

(2) Necessary Regular Costs. Sally also has to pay some costs regularly every month. If she does not buy her building outright, she has to rent one. She has to pay monthly electricity, gas, and water. She is likely to have monthly plumbing and similar repair bills. She has to maintain a skeleton crew no matter how little or how much she sells.

Necessary regular costs include the salary to the owner-manager of a business as the manager. They do NOT include any profit of any kind. They specifically exclude the normal profit that many business people expect on any investment, about 5% to 15%. We have to see where profit might come from; we cannot mysteriously assume profit from the beginning.

The start up costs and the necessary regular costs together are sometimes called “fixed costs” or “fixed capital”.

(3) Monthly Costs. Usually fixed costs, including start up costs, are arranged so that they do not have to be paid off all-at-once at the beginning of a business venture but are spread out over a long period of time through monthly payments. Suppose that a restaurant usually has to go into debt for \$100,000 to start out. The restaurant would arrange to make monthly payments of \$5000 to cover the fixed costs, including start up costs such as equipment and necessary monthly costs such as rent and insurance. For simplicity, we can consider the monthly payments of start up costs and necessary regular costs as the monthly costs.

Monthly costs represent the fixed costs.

(4) Variable Costs. This is the most important cost. Variable costs vary with the amount of production. As Sally increases production, she has to replace what she uses up in production, and eventually she has to buy more. She has to buy more meat, vegetables, and other soup ingredients. She has to hire more employees. She has to bring in repair people more often. She might have to hire an accountant and a lawyer.

Together, fixed costs and variable costs determine how big Sally’s operation will be. They set the operating capacity of any plant in any venture, including factories, restaurants, offices, and store fronts. At first, fixed costs are more important, but then variable costs dominate. Eventually variable costs set the number of units made, the operating capacity of the plant.

Some costs are on the borderline between categories, such as if Sally is buying her diner with

monthly payments rather than renting it. Borderline cases do not alter the main argument, so I do not consider them.

Rising Marginal Cost: Sally's Diner Again 1: No Profit.

This section explains the size of Sally's operation without any consideration of profit. The next section considers profit.

No matter how many bowls of soup Sally sells, the public price system fixes the maximum price per bowl that Sally can charge; say 5 grains of silver. Marginal revenue is the price per bowl, so marginal revenue is constant.

Marginal cost seems to start low because fixed costs dominate at first. Suppose monthly fixed costs are 100 silver grains and that production is 1 bowl of soup. The first bowl of soup is also the latest, or marginal, bowl of soup. The cost for the first bowl of soup is the entire 100 silver grains, so the cost per marginal bowl is also 100 grains. Suppose production goes up to 2 bowls of soup. The cost per bowl is now 50 grains, and the marginal bowl is the second bowl, so it cost 50 grains less per bowl to produce the second bowl than the first bowl. Marginal cost has fallen from 100 grains to 50 grains! This sound good but it is only an illusion. Sally's marginal cost dropped to 50 grains but her marginal revenue (selling price) is still only 5 grains. If Sally sells only 2 bowls of soup, she will go bankrupt, so we cannot take this situation seriously. Marginal cost continues to fall until rising variable cost dominates fixed cost. For Sally to make any profit at all, marginal cost due to fixed cost has to fall below marginal revenue (selling price) of 5 grains per bowl. That happens at about 20 bowls of soup. Say that Sally makes and sells a minimum of 100 bowls of soup, so that marginal cost due to fixed costs is only a small fraction of the total cost of producing 100 bowls of soup, about 1 grain per bowl. If Sally sells much more than 100 bowls of soup, then marginal cost due to fixed costs can be ignored. Now we can concentrate on the effects of rising variable cost.

Eventually marginal cost rises because rising variable cost dominates fixed cost. Eventually the cost of ordering supplies, paying existing employees, hiring new employees, making a lot of soup, making a lot of soup sometimes in a hurry, taking deliveries, and hiring accountants all begins to be more important than fixed costs spread out among all bowls of soup, and these costs begin to rise. Variable costs begin to determine the cost-per-bowl.

Suppose we have reached the point where variable costs are important but have not yet started to rise much. Assume that fixed costs make a small contribution in the background so we can just take fixed costs for granted and ignore them.

As long as marginal cost is below marginal revenue (selling price), Sally should increase production by making more bowls of soup. So, when Sally makes 100 bowls of soup, the cost due to ingredients, labor, napkins and other variable costs is 1 silver grain per bowl. 1 grain per bowl is well below the selling price (marginal revenue) so Sally is making money and should continue to increase production.

Sally increases production to 200 bowls. Now marginal cost increases and Sally feels its effect. The

cost per bowl goes up from 1 grain per bowl to 2 grains per bowl. Marginal cost, the cost of making another bowl, is now 2 grains per bowl. If the cost of making another (marginal) bowl of soup is 2 grains of silver but the price is 5 grains, then Sally still makes a profit of 3 grains per added (marginal) bowl. So she should make more.

Sally increases production from 200 bowls to 300 bowls. Marginal cost rises from bowl 200 up through bowl 300. The cost per bowl (marginal cost) goes up to 3 grains per bowl at bowl number 300. Do not worry about average cost or total cost. The marginal cost is now 3 grains per bowl. Yet marginal revenue is still 5 grains per bowl, so Sally should still keep making more bowls.

Sally increases production from 300 bowls to 400 bowls. Marginal cost rises from bowl 300 up through bowl 400. The marginal cost goes up to 4 grains per bowl at bowl number 400. Again, do not worry about total cost or average cost. Even though marginal cost has now risen to 4 grains per bowl, marginal revenue is still 5 grains per bowl, so Sally should still keep making more bowls.

Sally increases production from 400 bowls to 500 bowls. Marginal cost rises from bowl 400 up through bowl 500. The marginal cost goes up to 5 grains per bowl at bowl number 500. At this point Sally makes no more profit from more bowls of soup. If Sally made less than 500 bowls, her costs per bowl would be below marginal revenue (selling price) and so she would miss out on some potential profit she could have made. If Sally makes more than 500 bowls, her costs per additional bowl (marginal bowl) will be above marginal revenue and so she will lose money. She should make about 500 bowls.

This process of increasing production keeps going until marginal cost rises to equal marginal revenue. When marginal cost rises to reach marginal revenue, Sally should stop producing any more bowls of soup. That point sets the optimal capacity of Sally's diner. The same is true of all plants for all kinds of business for the whole economy.

As long as marginal cost (cost per bowl of soup) is below marginal revenue (price per bowl of soup), Sally makes a potential profit on each bowl of soup. As long as marginal cost is less than price, Sally makes a potential profit. When marginal cost equals price (marginal revenue), Sally can no longer make a potential profit, and should stop. If cost ever exceeds price, then Sally would make a loss, and so Sally should scale back production.

In real life, plants can rarely hold production steady at the point where marginal cost exactly equals marginal revenue. Some days Sally sells 450 bowls while other days she sells 550 bowls. Some days broken dishes make variable costs (marginal costs) higher while some days good tips make marginal revenue higher. But real firms know about what level they do best at. Real restaurants know about how many customers it takes to make a really good day, and know that they actually make less if they have too few or too many customers.

This account leaves out of consideration the exact role of fixed costs except as something in the background, and it leaves out the full interplay between fixed costs, variable costs, and marginal cost. Sally has to cover fixed costs as part of her marginal costs. She does that when she covers marginal cost. I cannot give any more detail without going into too much detail.

Sally's Diner Again 2: Profit Considered.

Pick up where Sally has just increased production from 100 bowls to 200 bowls. The marginal cost for the first 100 bowls was 1 grain per bowl.

It would be great for Sally if the cost of the second 100 bowls (from 100 to 200) had no influence on the first 100 bowls, but it does. The rise in cost of the second 100 bowls (from 100 to 200) changes the cost of the first 100 bowls so that now all bowls have the same effective marginal cost. The marginal cost of all 200 bowls, from 1 bowl to 200 bowls, is now 2 grains per bowl. This outcome is a bit mysterious but it comes from the same roots as the fact that marginal utility sets the exchange rate for goods as in the previous chapter. To explain it further would require a really long version.

This “contagion” of the cost of the marginal bowl to all the bowls that go before does not matter though, as long as Sally’s costs per bowl are still below marginal revenue, or price per bowl. Even though the cost per bowl is now 2 grains for all bowls, as long as marginal cost is below marginal revenue, Sally still makes a profit, and she should continue to increase production. As long as the marginal cost is 2 grains of silver and the price that Sally can charge is 5 grains of silver, Sally makes a potential profit, and she should make as many bowls as she can.

Sally increases production again. As she increases production, marginal cost rises again, forcing up the effective cost for every bowl that is produced. Effective marginal cost has now risen to 3 grains of silver per bowl. Cost per bowl has now risen to 3 grains per bowl for all bowls, even the bowls that Sally made before this increase in production. Sally still makes a potential profit, and so should still continue to produce more.

As Sally increases production, eventually marginal cost rises to 5 grains of silver per bowl. Then, effective cost equals marginal revenue for all the bowls that Sally makes, including all the ones that went before. When marginal cost equals marginal revenue, effective cost per bowl equals revenue. Now Sally cannot make any profit, potential profit or real profit. Sally cannot make any profit on the most recent bowls, and she cannot make any profit on the previously cheaper bowls that went before. Any potential profit has disappeared entirely. Sally makes no profit, although she does break even. She runs a healthy business and earns a good salary as the manager of that business.

Reaching the Goal. At this point, Sally has now found the optimum capacity for her plant (restaurant) and she has found the optimum size for similar firms in the same business. Other diners are likely to be about the same size, and this is what we find in real life. In the same way all fast food restaurants are about the same size even if they are of different ownership like McDonald’s, Wendy’s and Burger King; most department stores are of similar size such as Penny’s, Sears, Dillard’s, and even Macy’s; and most supermarkets are nearly the same size such as Wal-Mart, Kroger, and Safeway.

Some firms in the soup diner business have only one plant (restaurant) while some have more than one. The combination of all the soup restaurants for all the firms in the soup diner business makes up the production for the whole business. The combination of all the production for all

the plants, for all the firms, for all the businesses, in the whole economy makes up production for the whole economy. The production for the whole economy determines how much salary all workers together get. The salary of all the workers together needs to be enough so that they can buy the total production. The production of the whole economy determines how much revenue the firms get so that they can buy all the raw materials to make the goods.

No Profit. This is a happy outcome but it leaves out profit. That is what happens in perfect competition. Even so, people find this result a bit odd at first. So, to be sure, we need to look again to see if Sally could have done anything to make a profit.

Sally had been doing well by increasing production, yet now finds herself unable to make any profit. She increases production again to see if that helps. When she increases production again, she finds that the marginal cost has risen to 6 silver grains per bowl. Marginal revenue is still only 5 silver grains per bowl. Now Sally is even losing money! The restaurant is crowded, the workers get in each other's way, people get the wrong food and do not pay, food is wasted, some people file lawsuits, and deliveries are not received on time. So many things go wrong that seemed to go right when the diner was running at a lower capacity for these facilities.

So Sally scales back production. She tries to drop back to a marginal cost of 4 silver grains per bowl so that she can make a profit of 1 gain per bowl, or a 20% rate of profit. That is a good rate of profit. Too bad for Sally, here the Invisible Hand reaches in. Steven, her competitor, had been in the same situation as Sally, operating at a marginal cost of 5 grains per bowl and making no profit. He tries to scale back too, and he tries to lower his price to capture as much of the market as he can. Steven does not lower his price to 4 silver grains per bowl, to marginal cost, because he sees that, if he did, 4 grains would become the new market price, and he would not make any profit there either. He would be in the same situation as before. So Steven holds cost at 4 grains per bowl but he charges 4.5 grains per bowl. At first this works. All the customers go to Steven. Steven makes a profit.

But it cannot work for long. Serena, the owner of another soup diner, gets the same idea. She scales back to a cost of 4 grains per bowl but charges 4.4 grains per bowl. Then she gets all the market from Steven. Then Sebastian does the same thing to Serena, lowering the price to 4.3 grains per bowl. This goes on until all firms are driven to a production level with a marginal cost of 4 grains per bowl, and to a public price of 4 grains per bowl, and there is no profit at all again.

In that case, all the firms might as well have accepted the original situation with a production level that yielded a marginal cost of 5 grains per bowl and a public price (marginal revenue) of 5 grains per bowl. That is the most stable situation, and that is what the market moves to.

When firms were trying to make a profit, they did it by scaling back production below the level where production would have been on a free market. This result is typical of imperfect competition, where production is reduced to below what would have prevailed on a free market so as to take advantage of the gap between marginal cost and selling price (marginal revenue). When firms can get away with this tactic, it leads not only to reduced output levels but also to perceived shortages and a misuse of resources.

Now we go the other way, up from 4 grains per bowl. Suppose the price reaches a temporary new stable point at 4 grains per bowl, so that marginal cost equals marginal revenue at 4 grains per bowl. To hold marginal cost at that low level, the quality of product had to deteriorate. Cheaper price necessarily requires a switch to cheaper ingredients – this is part of imputation. The customers are not satisfied by cheaper product even at a cheaper price. By offering increases in quality, better service, and other amenities, some diners are able to increase production costs to 4.5 grains per bowl but can charge 5 grains per bowl. They capture a portion of the market through a different tactic in a different direction. Soon all diners follow suit in that way too. Then some diners offer a better quality of product that costs them 4.6 grains per bowl, and the customers go to them. Then some diners invest 4.7 grains for an even better product, and customers go to them, and so on. The market edges up-and-up again until marginal cost is 5 grains per bowl and the marginal revenue is 5 grains per bowl.

Eventually the market stabilizes at this marginal cost and this marginal revenue, 5 grains, where it all began. Nobody makes a profit, but good managers make good salaries, the bills get paid, all the workers get an appropriate decent salary, and customers get a decent bowl of chili or chowder for a decent price. Nobody can lower the price or raise the cost. Firms can only decide on the size and capacity of their plants.

Key Ideas. The key ideas are:

- (1) At first, fixed costs dominate. Marginal cost starts below marginal revenue (market price). As long as marginal cost is below marginal revenue, the firm can potentially make profit, and so the firm should increase production.
- (2) Then variable costs dominate. Marginal cost rises while marginal revenue remains the same. Still, as long as marginal cost is below marginal revenue, the firm can potentially make a profit, and so the firm should increase production.
- (3) Eventually marginal cost rises to meet marginal revenue. If the firm increases production beyond this level, marginal cost would exceed marginal revenue, and the firm would lose money. Here the firm can no longer potentially make any profit, and so the firm should stop increasing production. This is the normal operating capacity.
- (4) Although the firm seemed as if it were going to make some profit, when it reaches the point of potential maximum profit, all profit disappears. The rising marginal costs ate into the potential profit that seemed to go before.
- (5) This point is stable. Firms cannot long maintain conditions away from this point.
- (6) Only if potential profit disappears in this way can imputation strictly hold. I go into this topic in later sections of this chapter.
- (7) Business firms set the conditions to which they respond. In responding, they recreate the conditions

to which they respond. This is part of the magic of big and small, and it is how the public price system works.

(8) Even though ultimately firms do not make a profit, they pursue potential profit. We can still understand what they do by looking at how they pursue the potential, even if they get little of the real. We can still understand Joe's Garage by Joe's hope of making a lot of money even if Joe does not make any real profit but only makes enough to pay himself a decent salary according to his cost effectiveness.

Range of Plant Sizes. Firms can delay the rise in cost per good (increasing marginal cost) by expanding the size of the office, factory, or storefront; by dividing internally into sub-units such as personnel and maintenance; by creating hierarchies; and by delegating authority.

These tactics work only up to a point. A clinic of forty doctors can avoid some of the bottlenecks in a clinic of two doctors. It can more exactly use various kinds of secretarial help, and can use server computers instead of multiple micros for all the employees. But a clinic of forty doctors has its own problems that lead to high costs per patient; and even in the large clinic the cost per patient has to go up eventually. The same is true of a bakery or of a factory to make cars. Even a GM plant or Toyota plant has a maximum best size.

At any given time, there is usually a range of good plant sizes, all with about the same efficiency, varying a bit in their particular specialties. An office run by one dentist who specializes in orthodontics (braces) can co-exist with a clinic of eight dentists with various specialties; a factory making 1000 computers can compete with a factory making 10,000 computers.

Some Comments.

In one business, the combination of outputs of all the plants of all the firms, each operating at its own best capacity, makes up the total output for the industry as a whole. This is the same output for the market when it is in partial equilibrium. The total output for all the dentists in the U.S. makes up all the capacity for dental work in the U.S. The total output of all corn farms in the U.S. makes up the total corn output in the U.S. This is the output when consumers and producers can agree on a price and quantity, as in the imaginary auction.

The combinations of outputs of all the types of businesses for all markets makes up the total output (total supply) for the economy as a whole.

Each type of business is in partial equilibrium in its market, and all the interlinked markets together are in general equilibrium. In general equilibrium, the salaries of all the workers together are enough to buy all the products of all the firms in all the businesses. All the firms in all the businesses make enough from selling their products to buy all the resources that they need and to pay their workers enough so that workers can collectively buy all product.

If firms could cooperate to thwart the normal self-regulation of the market, then they could make a real profit rather than a potential profit. If the firms in the case of Sally's diner could conspire to maintain production where marginal cost was 4 grains of silver per bowl but the public price was still 5 grains per bowl, then they could all make a profit. In perfect competition, they cannot do

this. In imperfect competition, some firms can do this.

Very large factories play a role in imperfect competition, particularly in modern economies after World War I. In those cases, the costs of production are below the selling price on the market, and the firm does make a profit. That topic is best taken up in the Chapter Six on profit and imperfect competition.

Coming Together at Equilibrium. The imaginary auction can help us to see some of the ideas of the previous sections.

Recall how the auction works: At a low price per unit of good, consumers wish many units but firms are willing to supply only a few. At one coin per loaf, Barney and the other bakers might be willing to sell half-a-dozen loaves each per day for a total of 200 loaves per day while the consumers would want a total of 5000 loaves per day. At a high cost per unit of good, consumers wish only a few units but firms want to sell many. At 20 coins per loaf, Barney and all the other bakers would supply 200 loaves each per day for a total of 10,000 loaves per day while all the consumers together could afford only a total of only 100 loaves per day. At some price in between, the total number of loaves that all consumers together wish exactly equals the total number of loaves that all firms together supply. At some price in between, the market balances, or “clears”. At 8 coins per loaf, Barney and the other bakers will supply 20 loaves each per day for a total of 1000 loaves per day, and the consumers together want a total of 1000 loaves per day. The market is in “partial equilibrium”.

In partial equilibrium, the price-cost-value of bread per loaf is the same for all consumers; it is a public price. This is the same result as when exchange ratio (value-price-cost) is the same for everybody in a public price system in a barter model from the previous chapter. Partial equilibrium helps make the public price system, and the public price system helps make partial equilibrium by guiding the actions of consumers and business firms.

In perfect competition, in partial equilibrium, the contribution from each plant from each business firms coincides with the optimal capacity for that plant. When the consumers and producers have come to agreement at the imaginary auction, the contribution from each plant is just that amount where marginal cost equals marginal revenue (the public price of the good), and where all profit disappears. This much coincidence can seem a bit amazing at first, but it is a true implication of all this logic. This is how resources get used efficiently.

If partial equilibrium did not coincide with optimum plant capacity, then marginal cost would have to deviate from marginal revenue. If partial equilibrium did not coincide with optimal plant capacity, then cost would have to differ from price. In that case, imputation could not be true. It could not be true that the value of the final good determines the cost-price-value of the resources that make it up. Because imputation is so important in the price system, we need to see that, in perfect competition, partial equilibrium coincides with optimal plant capacity.

When all this is true for partial equilibrium in each particular market for all goods and resources, it is true for the links between all markets and for the economy as a whole. It is true for general

equilibrium.

In the previous chapter on exchange, both traders gained in the same way, so there was not much difference in roles and there were no points of view. Here, bakers sell bread to consumers while consumers buy bread from bakers, so there are points of view. To consumers, the buying cost is the same for all consumers and from all bakers; no matter how much any consumer buys. To bakers, the selling price is the same for all bakers to all consumers; no matter how much any baker sells. This is also an effect of the magic of big and small.

We need to look at another level too. Just as bakers sell bread to consumers, so also bakers buy corn syrup from suppliers. Besides bakers, a lot of other firms and people use corn syrup and buy corn syrup from suppliers as well, such as homemakers, and makers of ice cream, soda, most breakfast cereal, and animal feed. The same idea of partial equilibrium applies in the market for corn syrup. At a low price of 1 coin per gallon, the suppliers will provide only 100 gallons to the user of corn syrup while the users of corn syrup want 40,000 gallons. At a high price of 20 coins per gallon, the sellers will provide 100,000 gallons but the users want only 1000 gallons. At an intermediate price of 10 coins per gallon, the total amount provided by all suppliers just equals the total amount desired by all users – 40,000 gallons.

From the point of view of the firms and people that want corn syrup, there is one public cost for all corn syrup for everybody regardless of what they use it for, and no matter how much any user buys. From the point of view of the suppliers, there is one public price at which they sell to anybody that wants corn syrup, no matter how much any particular suppliers provides and no matter how much any particular user buys.

The same is true “up and down as well”. Corn syrup makers have to buy raw corn. Corn farmers have to buy seed, fertilizer, bug spray, and land. Bakers sell to consumers but they also sell to retail grocery stores and to institutions such as schools. What is a good from one point of view is a resource from another point of view. The same is true “sideways”. Corn farmers buy bread and they even buy corn syrup for various needs. Realtors buy bread and buy lots of other products from bakers and from farmers; and so on. The demand (by consumers and firms) for all goods connects to the supply for all goods. Eventually all markets connect in a single system of public prices. Each particular markets has its own partial equilibrium. All the markets together form a general equilibrium. All markets together clear when a set of prices can be found, one for each market, with all the prices linked together.

The real economy actually approaches this ideal closely enough to be amazing.

Everything Together. Under perfect competition, for each market in partial equilibrium, this is also true:

- (1) The amount desired by all consumers coincides with the average marginal utility to consumers of the good, the average marginal utility that creates the stable exchange ratio for that good.
- (2) The amount of each input factor used by any producer coincides with the marginal revenue

productivity of each input factor. The total amount used of each input factor leads to its average marginal revenue productivity, the average marginal revenue productivity that creates the stable substitution ratio, and the stable exchange ratio, for that input factor.

(3) What is true in partial equilibrium for each separate market is true of general equilibrium for all markets.

Under perfect competition, partial equilibrium, average marginal utility, average marginal revenue productivity, exchange ratios, substitution ratios, and general equilibrium, all coincide and all reinforce each other. This result is a strong version of marginality theory. This strong version does not have to hold for the arguments in the rest of the book but it is useful to keep this strong version in mind.

Looking Backwards and Forwards. Recall from Chapter Two on Adam Smith and Classical economics that “total supply” is everything that firms make while “total demand” is everything that consumers want. The proper neoclassical term for total supply is “aggregate supply” while the proper neoclassical term for total demand is “aggregate demand”. In perfect competition, aggregate supply equals aggregate demand at general equilibrium when a set of prices (the public price system) leads all markets to clear at once, within each market and across all markets.

General equilibrium usually occurs when three things happen at once:

(1) The rate of interest leads savings to equal investment.

(2) Aggregate demand equals aggregate supply.

(3) Full practical capacity for the economy, including full employment and the greatest practical welfare attainable.

Profit tends to zero. Interest is a kind of profit, so we expect the rate of interest to dwindle to zero. In that case, interest could not serve to keep investment equal to savings. Interest could still play that role if banks pursued interest on loans, and bank customers pursued interest on savings, even if, in the end, interest vanished – just as firms pursue profit even though in the end profit vanishes. This alternative is needed for perfect competition but it is not needed in the real world where interest does persist. For now, we can still think that conditions two and three hold without worrying too much about condition one.

In the next few chapters we will see where profit and interest come from, and we will see that a lot of profit and interest depend on not being near perfect competition. Under imperfect competition, can the rate of interest still serve as an intermediary between savings and investment, and can it still serve as the pillar that holds up, and holds together, these conditions? Can we rely on the dynamic ideal to move us toward greatest welfare even if we are not there right now all the time? The answer is “yes, mostly”. But it is complicated and we have to consider situations in which the economy might not be at full capacity, savings might not equal interest, and aggregate demand might not equal aggregate supply.

Some Results for the Price System.

Cost Effectiveness. The beneficial results happen because business firms use resources cost effectively while consumers maximize utility. A kind of average cost effectiveness for any resource, among all business firms, determines the price that the firms will pay for that resource. A kind of average cost effectiveness for any resource, among all business firms, determines the price-cost-value of that resource. An average cost effectiveness for any resource determines how much of the resource is used totally among all business firms.

Magic of Big and Small. Together, all firms set the price-cost-value of any resource according to the average cost effectiveness for the resource among all the firms. Together all firms set the price-cost-value of all resources. This is the magic of the small.

Once all firms together have set the cost-price for any resource, any firm faces that cost-price as a given to which it has to adjust. The firm adjusts its strategy for seeking the greatest potential profit according to the prices-costs for all resources that it faces on the market. The firm adjusts its level of production so as to seek the potentially greatest profit.

No one firm can influence the cost-price of any resource, no matter how much it demands of the resource, or how much it supplies of the resource to other firms that demand the resource. No one supplier of corn syrup can influence the cost-price of corn syrup no matter how much corn syrup it can supply.

No one firm can influence the total quantity of a finished good (bread) or of any resource (corn syrup) bought-and-sold at market equilibrium, no matter how much the firm can supply. Barney cannot change the total number of loaves of bread in the bread market no matter how much he supplies.

That a firm cannot influence either price or supply is the magic of the big. Firms face the big market as if it were something outside of themselves, something given, to which they have to adjust.

Even though no one firm can influence price or supply, all firms together, and in cooperation with demand, set the total supply and price – the conditions to which firms respond. In responding to the conditions that they created, firms recreate the conditions to which they respond. This relation can seem circular but really it is not. This is the magic of the big and small together under perfect competition.

Of course, sometimes price and quantity change. That is a dynamic adjustment that we will look at in later chapters.

Caution about the Price System. The price system results from the simultaneous operation of the magic of the big and small in many markets. The price system can seem a little magical too. Sometimes economists write in a holistic way as if the price system were something in-and-of-itself, apart from the actions of particular business firms. Usually they write this way to stress the usefulness of the price system and to warn about interfering. Those are good points but we should not forget that the price system arises out of the actions of consumers and business firms.

We cannot think of “the price system” or “the economy” as something that exists on its own apart. That is how we lose sight of flaws and problems, or how we justify modern mercantilism. Nor can we think of the price system as a magic guide to economic action without also realizing that consumers and firms make the guide before they use it. The price system is not the economy, nor is it a convenient substitute for strategic action. We have to think in terms of the actions of consumers and business firms in many steps through many chains.

Cost Effectiveness at the Margin, and Price. Barney uses 20 cups of raspberries per day in baking. It is not the first 15 cups that determine the price of raspberries but the last few spoonfuls at the margin that Barney distributes among various uses. It is cost effectiveness at the margin that determines price for all the units that are used, even those units that went before the margin.

The problem is that it can seem as if cost effectiveness at the margin is zero.

When Barney finally reaches the limits (margins) of cost effectiveness, the loss from expending the resource equals the gain from his customers that Barney gets from selling (trading) his baked goodies. In money terms, if raspberries cost 2 silver coins per cup: the last cup of raspberries that Barney distributes among various baked goods, a spoonful at a time, brings in only 2 silver coins’ worth of labor in exchange from his customers. The value-price-cost of what Barney expends on the last cup of raspberries brings in not much, really. So where is the cost effectiveness that serves as the basis for price? If we push this to the tiny limits, we see that one spoonful of raspberries brings in not much at all. This is like the paradox of the two traders who exchange goods of equal value but both gain. Where does the gain come from? If all resources are used so that they bring in about the same at the margin, and all resources bring in only a little tiny bit at the margin, how can we assign a price to the resources? This might seem an odd and finicky point, but people get confused about it.

The solution lies in varying things a bit at the margin to see what difference they make. We can see this solution in the last cup of raspberries. If Barney had NOT used this last cup, then Barney would have missed out on 2 silver coins’ worth of value-price-cost. If Barney had used another cup, he would have gained almost another 2 silver coins worth of return – but not quite the full 2 coins’ worth. The last cup that is fully worth using gains Barney 2 silver coins; and that is what it is worth, its price-cost-value. That final price determines the price for all units up to the marginal unit, for all 20 cups, not just the last.

To find the price, we vary the balance by a typical unit at the margin, and see what difference that variation makes in the exchange. That variation is the typical exchange rate for that typical unit. If a cup of raspberries typically makes a difference of 2 silver coins, then that is the price-cost-value of one cup of raspberries. If one cup of cream typically made a difference at the margin of 1 silver coin, then that would be the price-cost-value of one cup of cream.

Economists refined the technique of making variations at the margin to see effects. The point is not to understand the technique but to see that cost effectiveness at the margin sets the price for all resources, for all alternative uses of resources, for all business firms, for all businesses.

In later chapters, we will need to use this technique to understand how particular occupations get their wages, and how different occupations get their share of the total wealth of the economy.

Some Implications.

Do Not Interfere. With no flaws or problems in the public price system, any interference destroys the balance of cost effectiveness. The public price system leads to the most efficient use of resources. Thus any interference, except to cleanly correct flaws or problems, leads away from cost effectiveness and leads to less efficiency. It leads to poor use of resources and to less total capacity for the economy.

Adding Up, Imputation, and Time. Although, in the long run, the demand for a final good sets the price of the resources that make up the final good, this is not the way that most people see the relation, and it is not the way the relation works in the short run. Most people think that the price of a final good has to “cover” the cost of the resources that make it up, and that the price of a final good is the sum of the costs of its input factors plus some modest mark-up for profit. In the short run, the common way of seeing is true. The price of jet fuel went up from about 85 cents per gallon in 2002 to about \$4 per gallon in 2006 due to the Iraq war. Airlines had to raise their ticket fees or they would have stopped. The same was true for other businesses that used petroleum products. A similar increase went on in 2012.

In the long run, this common way of seeing the relation is not true. Instead, imputation is true. The long run relation shows us the importance of both demand and natural abundance in setting the price of final goods and of input factors. In the long run, people adjust their use of airlines, or cars, or plastics, or heating oil, or whatever. The price of a ticket depends not just on the new scarcity of jet fuel but also on how much people want to fly and on how much they are willing to sacrifice to keep on flying. If enough people decide not to fly, then jet fuel will become relatively more abundant, and its price will decline.

Risk, Time, and Reward. This section switches topics to risk. The idea of risk closes out the static ideal. A venture is risky when the result cannot be known for sure but when we can apply good odds to the various possible outcomes. A venture is uncertain when we can only make a guess; we cannot even apply good odds. This chapter explains risk while the next explains uncertainty.

For example, the insurance business depends on accurately assessing risk. We can give good odds on the probability of how many men age 50 will live to reach age 75, or how many airplanes out of 10,000 will crash. We cannot know which particular man will die, or which particular plane will crash, but we can know the rate overall. That is enough to give good odds, and enough to carry out normal business. In contrast, politics in the Middle East is uncertain. In 2008, and again in 2012, we had no clear idea of how stable oil production from the Middle East would be. We could not be sure of what gasoline prices would be although we could be fairly sure they would rise. This is not as much information as we might like on which to run our business firm, but we have to try anyway.

Surprisingly, risk has little overall effect as long as firms can calculate odds and can arrange their strategies accordingly over a long enough time frame. Risk has almost no effect on business firm strategies, marginal revenue productivity (cost effectiveness), switching resources, the price system, the magic of big and small, perfect competition, or imputation. Risk makes calculating cost effectiveness more difficult but does not change calculations in principle.

No return is ever certain when risk enters. There is no “sure thing”. It is always possible to fail. Even when 99 out of 100 succeed, 1 will fail. We need to accept this fact when we think about what it means to invest and where to invest, especially with state funds. We need to look not just at the occasional great success but also at the failures, and, most importantly, at the long-term average yield.

Generally, the lower the risk and the shorter the time span for a venture, the lower is the potential profit on the venture. The greater the risk and the longer the time span, the greater is the potential profit. The potential return on building small, cheap apartments quickly is less than the potential return on building large, solid housing slowly. The more quickly a piece of land is developed for a sure return, as for a small mall, the less the return. The longer it takes to develop the land, as for a downtown upscale shopping center, the greater the eventual return.

People tend to think that the greater risk and the longer time span cause the greater potential return, but this is backwards. People are willing to endure the greater risk and the longer time span because of the potential reward. People search for sunken treasure or for diamonds because, if they find them, the reward is great. People will not endure a great risk and a long time span when the potential reward is small. Nobody spends a great deal of time and effort developing a punk polka band. Strategic action causes the relationship between risk, time, and reward; the relationship does not determine strategic action.

It is easier to understand if we hold up some silly counter-examples. Putting more time into a project does not thereby make the outcome more valuable. Think of obsessive gardeners and auto hobbyists. Their tomatoes and their wax are not the more valuable than anybody else’s just because they take three times as long. Putting more risk into a project does not thereby make the outcome more valuable. If Johnny climbs a steep cliff and fights off a bear to pick roses for his girlfriend, that might impress his girlfriend, but it does not make his roses any more valuable than the roses that Old Aunt Myrtle grew in the flowerbeds around her little home.

Suppose there were some ventures that had a very low risk, took only a short time, and had a great yield. At first, a few gold mines were available where the gold could be picked up right out of the dirt. These ventures would be taken up so often, and exploited so quickly, that they would soon disappear. The easy gold is soon found, and then people have to take the risk, and the time, and the cost, to dig for deeper gold. On the other hand, suppose there were some very risky ventures, that they took a long time, and they had a very low potential yield. Who would undertake these ventures? This is the case with growing cotton in the United States now.

Short term, low risk, high yield ventures disappear quickly. We overlook long term, high risk, low

yield ventures. Normal ventures are in between. We sort out normal ventures in between according to the relation between risk, time, and return mentioned. The greater the potential yield, the more business people are willing to wait a long time and to take a greater risk. The less the potential yield, the less business people are willing to wait and the less risk they are willing to take. The relation between time, risk, and yield results from the rational strategies of business people, not due to any magic in time or risk. Time alone does not cause higher yield. Greater risk alone does not cause higher yield. Thinking that they do is to make the same mistake as to think that the sum of costs determines the value of the final good, to think that costs are an objective reality apart from the wishes of consumers.

Business people sometimes think profit is a reward for waiting, a reward for risk, or a reward for roundabout production. Business people often think increased capital brings increased potential profit because more capital often involves more risk, more time, or more roundabout ways. All this is plausible on the surface, but, at a deeper level, it is untrue and backwards. Profit is related to time, risk, and amount of capital but not in the sense that those cause profit. For the true relation, we have to look in the next few chapters.

We have to keep inevitable loss in mind when enthusiasts for privatization advise we could “make a killing” in some scheme, or that we could always do better by putting state assets into the stock market. They say we could always get a better return on the Social Security fund if we invested it in the stock market instead of in federal bonds. That might be true in some cases, but only if we are also willing to accept the risk and the real failures in other cases that go along with the risk. We have to be willing to accept that a portion of the fund gets wiped out from time to time. In the end, when we average the gains and the losses, the result is the same as leaving the fund in federal bonds. I invite people to look up long term statistics.

Answers to the Four Questions. The previous chapter began with sets of questions that economists pose to help us understand the economy. Now we can respond to the first four sets. All the answers have this in common: the economy achieves what it does automatically through

(A) the interaction of many independent consumers each rationally acting to seek his-her own greatest utility, B) the interaction of many business firms each acting to seek its own potentially greatest profit (even if profit dwindles to zero), and (C) the interaction between consumers and firms.

(1) What gets made? What gets made depends on what people want, with some consideration for the abundance of resources in nature. If people want more beef and less corn, that is what they get; with the balance depending also on how much land is suitable to each. If people want cars instead of bicycles, that is what they get; keeping in mind that cars are harder to build and maintain than bicycles.

(2) How does it all get made? Are resources used efficiently? It all gets made through business firms pursuing profit. It all gets made through business firms using resources at maximum efficiency to make just what people want made. It is not possible to use resources more efficiently in any other way than through business firms using resources according to the public price system.

One aspect of the efficient use of resources is that resources are fully used. Under perfect

competition, at public prices, there is no shortage of any good and there is no surplus of any good. All the goods that are provided at the market price can be sold at the market price. Anybody that is willing to pay the market price for any particular good can buy as much as he-she wishes. Shortages or surpluses are usually a sign that something has gone wrong, such as imperfect competition taking over a market.

A particular result is that there is no unemployment, or, in other words, there is always full employment. The prevailing wages should be enough for a person to live decently on, and should be enough for most parents to raise their families on. Anybody who is willing to work for prevailing wages should be able to find a job. Any employer willing to pay the prevailing wages should be able to find as many employees as he-she needs. Unemployment and poor employment are signs that something went wrong.

(3) Who gets what? Why do workers, managers, capitalists, and capital itself get such-and-such a share of the total wealth? What determines the distribution of total wealth and the comparative wealth of social classes?

A better first reply is to ask another question: "What gets what"? How much does iron get in comparison to corn? What is the price-cost of iron in comparison to the price-cost of corn? Iron costs as much as it takes to call forth the amount of iron that is needed to meet the wants of the consumers, and compared to the need for all other resources. Iron costs as much as warranted by its cost effectiveness (marginal revenue productivity). Iron gets as much as it gets because that is how much it deserves according to its cost effectiveness. The price-cost-value of iron is its cost effectiveness. The same is true of corn, petroleum, and any other resource. In a normal economy, iron would get as much, iron would cost as much, as was just needed to replace the stock of iron for all normal uses of iron. This would happen automatically through the action of consumers and business firms in making the public price system. If any input factor received less than its cost effectiveness, suppliers would not supply it. Eventually due to the lower quantity, price-cost-value would rise, and then suppliers would begin production again. If any input factor got more than its cost effectiveness, suppliers would flood the market until the price dropped to match cost effectiveness.

People are an input factor like any input factor: workers, managers, owners, and professionals. People are paid according to their cost effectiveness, according to their ability to contribute to the satisfaction of demand throughout the economy – neither more nor less. People get what they deserve according to their cost effectiveness (marginal revenue productivity). People are not paid according to any intrinsic worth as humans or according to their social group, ethnic group, age, or religion. People are not all paid equally because they do not all do the same job and they do not all contribute equal cost effectiveness. Even so, in a modern, complex, wealthy economy, the prevailing rates of return (wages) to various occupations should be enough for everybody to lead a decent life. Prevailing wages should be enough for most parents to raise their family on.

Real life does not match up to this ideal. People are overpaid or underpaid when the economy is not near perfect competition. We will look at this situation in later chapters.

(4) How does the economy grow? How fast? How much? The full answer depends on looking at profit and the dynamic ideal in the next chapter. In brief, the economy grows automatically by implementing the innovations that people want, to the extent that people want. Then it stops. The economy also changes when people change their taste, often in response to innovations such as cell phones and computer pads. There is no need to stimulate growth or to direct growth. Trying to do so distorts and damages the economy.

The rest of the question sets from Chapter Four are picked up in later chapters: (5) profit, (6) socio-economic classes, (7) greatest welfare, (8) stability and reliability, and (9) effects that are out of the public price system such as pollution.

Scarcity Again. Together, the answers to these questions reinforce points made in Chapters Two, Three, and Four:

(1) Except under conditions of general growth, to make more of one good is necessarily to make less of other goods (unless the first good supports the other goods or unless the other goods are necessary to make the first good). To seek one good is necessarily to seek less of other goods. To grow more corn is necessarily to grow less barley and oats. To make more SUVs is necessarily to make fewer small trucks and passenger sedans. We cannot have as much as we wish of all goods. We cannot make the economy grow as large as we wish so we can have as much as we wish of all goods. We have to choose what and how much. We choose when we pursue our interests in the free market.

(2) Only if the economy grows naturally through the implementation of innovation can pursuing more of one good not reduce the availability of other goods. Even then, it only works for the goods that the innovation affects. An innovation in LCD screen technology might bring more computer tablets but it probably would not have much effect on barley production.

(3) Any forced shifting of resources necessarily distorts and shrinks the economy. If we force resources away from cars toward making airplanes, we necessarily distort the economy and shrink the economy. We necessarily have less wealth than if we left the market alone. If we force resources toward farming by helping farmers, we necessarily move resources away from other activities, shrink and distort the economy, and have less total wealth than if we left the market alone. If we subsidize house buying, we necessarily take resources away from other industries, and so we make the whole economy smaller.

(4) We can only successfully shift resources if we respond to an obvious flaw, and only if our interference does not cause more harm than help. We can only help the poor if their poverty results from an obvious flaw, and to the extent that their poverty results from an obvious flaw; and even then only if our help does more good than harm. The same is true with business firms or the military.

Not Necessarily Smithian Wealth. The idea that the economy gives the people what they want really does mean that the economy gives the people what they want. If the people prefer soap operas to Shakespeare, cheap tin flash buckets to sensible cars, gas-guzzlers to hybrids, cocaine to bibles, porn to sutras, services such as palm readers to real material goods such as cars, speculating in real estate to hard work making HD TVs, or current consumption to savings,

then that is what the people get. The people do not necessarily get the kind of wealth that serves as the basis for a powerful nation. The people do not have to become morally upright or spiritually strong because they have a free economy.

In a real, complex, advanced, already-wealthy economy such as the United States, we should get enough of all kinds of wealth through the automatic operation of the economy to satisfy the needs of the people directly and to satisfy the needs of the people indirectly as the basis for a powerful nation. We get both MTV and the know-how to build tanks. But there is no guarantee. We have to take this on faith. It is part of the leap that is required by the free market.

Whether we are willing to take this leap depends on the world situation. When the world is fairly peaceful, then we trust ourselves, our neighbors, and other nations. When we think we have formidable enemies, we want to make sure the economy provides the factories and the other material wealth that serves as the basis for power. Then the state intervenes, and we have another version of mercantilism.

If we feel the need to force the economy to provide the kind of wealth that can serve as the basis for power, we have to realize that we distort the economy directly through state intervention, and we distort our lives indirectly by giving the state an excuse to intervene in all aspects of our lives.

The Price System and the Definition of Economics. Chapters Four and Five seem to reinforce the common idea that economics is only about whatever good has a money price on the market, and is not about what does not have a market price, such as time spent with the family or effort put into church. These chapters seem to reinforce the idea that humans are naturally strategic about some things but naturally not strategic about other things. This is not so. All these chapters do is explain how goods that have a price actually get a price. They do not say anything about goods that do not have an obvious money price on the market. Sometimes it is strategic to leave a good out of the public price system. Because of how mates want to get along after marriage, usually it is not strategic to buy a spouse; but buying a spouse has worked; and many people around the world have to pay a dowry or bride wealth. Some goods have a tacit [shadow] price even if those goods do not have an obvious market price. The tacit price of time spent with the family is income lost from the business, and some people do think like this even if they do not want to admit it. Before we decide that some aspects of human life are not strategic because they do not have an obvious market price, we have to decide why some goods do have a market price and why some goods do not even though people strategically pursue non-market-non-money-priced goods. I think nearly all goods have some kind of price, at least in terms of what we forego to seek them (opportunity cost) and I think that people really do act strategically about nearly all aspects of life including love, children, and religion. Economics applies more broadly than the public price system. Still, the public price system is the most important application of economics in modern life, so I focus on that. These questions belong to economic anthropology, so I cannot consider them here.

Static Ideal. This chapter completes the static ideal, and the reader should realize that it is an ideal. No economy lives up to this paradise. The reader should already sense many ways in which the real deviates from the ideal even before I describe the most important deviations in the

next few chapters. Yet real economies actually come close enough to this ideal so that we need to seriously respect the ideal. It works. It works well enough so that we can see flaws and problems as deviations from this ideal. The static ideal works well enough so that we do not want to interfere unless we see a clear need, are sure that we will not cause more harm than good, and sure that we will not set a bad example.