CHAPTER 24

FURTHER TOPICS IN THE THEORY OF CONSUMER DEMAND[1]

In Chapter 23 we extended our understanding of demand and supply by introducing the concept of price elasticity and by discussing some specific applications of demand and supply analysis. The present chapter is devoted to further consideration of the demand side of the market. In Chapter 25 we shall discuss production costs, which, we shall discover, are the major determinant of supply. The goal of Chapters 26 to 29 is to use our understanding of demand and supply in analyzing pricing and output decisions under the various market structures which were outlined in Chapter 22.

Now for a more detailed look at the two main objectives of the present chapter. First, we seek a more sophisticated explanation of the law of demand. Second, we want to understand how consumers allocate their money incomes among various goods and services. Why does a consumer buy some specific bundle of goods rather than any one of a number of other collections of goods which are available to him?

TWO EXPLANATIONS OF THE LAW OF DEMAND

Thus far we have accepted the law of demand as a common-sense notion. We have simply appealed to observation in claiming an inverse relationship between price and quantity demanded. A high price usually does discourage consumers from buying; a low price typically does encourage them to buy. Now let us explore two complementary explanations of the downsloping nature of the demand curve which will back up our everyday observations.[2]

Income and Substitution Effects

One explanation of the law of demand says in essence that as the price of a product declines, consumers will be both *able* and *willing* to buy more of it.

As the price of steak declines, you are obviously able to buy more of it with your money income. With a constant money income of, say, $10 per week you can purchase 10 pounds of steak at a price of $1 per pound. But if the price of steak falls to 50 cents per pound and 10 pounds of steak is bought, $5 per week is freed for buying more of this and other commodities. A decline in the price of steak increases the real income of the consumer. This is called the *income effect.*

[1] To the instructor: This is an optional chapter which may be omitted without impairing the continuity and meaning of ensuing chapters.

[2] A third explanation, based upon *indifference curves,* is in some respects more precise than the two we now discuss. The complexities of this approach, however, make it more suitable for an intermediate course in economic theory. The interested reader should refer to Richard H. Leftwich, *The Price System and Resource Allocation,* rev. ed. (New York: Holt, Rinehart and Winston, Inc., 1960), chap. 5, or John F. Due and Robert W. Clower, *Intermediate Economic Analysis,* 4th ed. (Homewood, Ill.: Richard D. Irwin, Inc., 1961), chap. 5.

But being able to buy more steak at a lower price is not a complete explanation of why you actually do buy more. As the price of steak falls—the prices of other products being unchanged—steak will become more attractive to the buyer. At 50 cents per pound it is a "better buy" than at $1 per pound. Consequently, the lower price will induce the consumer to substitute steak for some of the now less attractive items in his budget. Steak may well be substituted for pork, mutton, veal, and a variety of other foods. A lower price increases the relative attractiveness of a product and makes the consumer willing to buy more of it. This is known as the *substitution effect.*

The income and substitution effects combine to make a consumer able and willing to buy more of a specific good at a low price than at a high price.

Law of Diminishing Marginal Utility

A second explanation centers upon the notion that, although consumer wants in general may be insatiable, wants for specific commodities can be fulfilled. In a given span of time, wherein the tastes of buyers are unchanged, consumers can get as much of specific goods and services as they want. The more of a specific product a consumer obtains, the less anxious he is to get more units of the same product. This can be most readily seen for durable goods. A consumer's want for an automobile, when he has none, may be very strong; his desire for a second car is much less intense; for a third or fourth, very weak. Even the wealthiest of families rarely have more than a half dozen cars, despite the fact that their incomes would allow them to purchase and maintain a whole fleet of them.

Economists put forth the idea that specific consumer wants can be fulfilled with succeeding units of a commodity in the *law of diminishing marginal utility.* Let us dissect this law to see exactly what it means. A product has utility if it has the power to satisfy a want. Utility is want-satisfying power. Two characteristics of this concept must be emphasized: First, "utility" and "usefulness" are by no means synonymous. Diamond rings and paintings by Picasso may be useless in the functional sense of the term yet be of tremendous utility to senior coeds and art connoisseurs, respectively. Second—and implied in the first point—utility is a subjective notion. The utility of a specific product will vary widely from person to person. A nip of Old Tennisshoes will yield tremendous utility to the Skid Row alcoholic, but zero or negative utility to the local WCTU president.

By marginal utility we simply mean the extra utility, or satisfaction, which a consumer gets from one additional unit of a specific product. In any relatively short period of time, wherein the consumers' tastes can be assumed not to change, the marginal utility derived from successive units of a given product will decline.[3] Why? Because a consumer will eventually become saturated, or "filled up," with that particular product. The fact that marginal utility will decline as the consumer acquires additional units of a specific product is known as the *law of diminishing marginal utility.*

We have noted that utility is a subjective concept. As a result it is not susceptible to precise quantitative measurement. But for purposes of illustration, let us assume that we can measure satisfaction with units we shall call "utils." This mythical unit of satisfaction is merely a convenient pedagogical device which will allow us to quantify our thinking about consumer behavior. Thus in Table 24–1 we can illustrate the relationship between the quantity obtained of a product—say, product A—and the accompanying extra

[3] For a time the marginal utility of successive units of a product may increase. A third cigarette may yield a larger amount of extra satisfaction than the first or second. But beyond some point we can expect the marginal utility of added units to decline.

TABLE 24–1. THE LAW OF DIMINISHING MARGINAL UTILITY AS APPLIED TO PRODUCT A (hypothetical data)

Unit of product A	Marginal utility, utils	Total utility, utils
First	10	10
Second	9	19
Third	8	27
Fourth	7	34
Fifth	6	40
Sixth	4	44

utility derived from each successive unit. Here we assume that the law of diminishing marginal utility sets in with the first unit of A obtained. Each successive unit yields less and less extra utility than the previous one as the consumer's want for A comes closer and closer to fulfillment. Total utility can obviously be found for any number of units of A by cumulating the marginal-utility figures as indicated in Table 24–1. The third unit of A has a marginal utility of 8 utils; 3 units of A yield a total utility of 27 utils $(10 + 9 + 8)$.

Now how does the law of diminishing marginal utility explain why the demand curve for a specific product is downsloping? If successive units of a good yield smaller and smaller amounts of marginal, or extra, utility, the consumer will buy additional units of a product only if its price falls. The consumer for whom these utility data are relevant may buy, say, 2 units of A at a price of $1. But due to diminishing marginal utility from additional units of A, he will choose not to buy more at this price because giving up money really means giving up other goods, that is, alternative ways of getting utility. Therefore, it is "not worth it" unless the price (sacrifice of other goods) declines. From the seller's viewpoint, diminishing marginal utility forces the producer to lower the price in order to induce buyers to take a larger quantity of the product.

THEORY OF CONSUMER BEHAVIOR

In addition to providing a basis for explaining the law of demand, the idea of diminishing marginal utility also plays a key role in explaining how a consumer should allocate his money income among the many goods and services which are available for him to buy.

Consumer Choice and Budget Restraint

We can picture the situation of the typical consumer as being something like this:

1. The average consumer is a fairly rational fellow. He attempts to dispose of his money income in such a way as to derive the greatest amount of satisfaction, or utility, from it. This is not to say he is always able to achieve the maximum amount of utility from his money income; for example, inadequate knowledge of the goods available to him and the force of habit work against achieving the utility-maximizing pattern of expenditures. But we may safely assume that the typical consumer wants to get the most for his money.

2. We may suppose, too, that the average consumer has rather clear-cut preferences for various goods and services available in the market. Buyers have a pretty good idea as to how much marginal utility they will get from successive units of the various products which they might choose to purchase.

3. The consumer's money income is limited in amount. Because he supplies limited amounts of human and property resources to businesses, the money income he receives will be limited. Whether the consumer finds himself at the top or bottom of the income pyramid, his income will be a finite amount. With a few exceptions—perhaps Bing Crosby and King Faisal—all consumers are subject to a *budget restraint.*

4. The goods and services available to consumers have price tags on them. Why? Because they are scarce in relation to the demand for them, or, stated differently, their

production entails the use of scarce and therefore valuable resources. In the ensuing examples we shall suppose that product prices are not affected by the amounts of specific goods which the individual consumer buys.

Obviously, if a consumer has a limited number of dollars in his pocket and the products he wants have price tags on them, the consumer will only be able to purchase a limited amount of goods. The consumer cannot buy everything he might want when each purchase exhausts a portion of his limited money income. It is precisely this obvious point which brings the economic fact of scarcity home to the individual consumer.[4]

> In making his choices, our typical consumer is in the same position as the Western prospector . . . who is restocking for his next trip into the back country and who is forced by the nature of the terrain to restrict his luggage to whatever he can carry on the back of one burro. If he takes a great deal of one item, say baked beans, he must necessarily take much less of something else, say bacon. His job is to find that collection of products which, in view of the limitations imposed on the total, will best suit his needs and tastes.

In short, the consumer must make compromises; he must do some picking and choosing among alternative goods to obtain with his limited money resources the collection most satisfying to him.

Utility-maximizing Rule

The question then boils down to this: Of all the collections of goods and services which a consumer can obtain within the limits of his budget, which specific collection will yield him the greatest utility or satisfaction? Bluntly put, the rule to be followed in maximizing his satisfactions is that *the consumer should allocate his money income so that the last dollar spent on each product purchased yields the same amount of extra utility.* We shall call this the *utility-maximizing rule.* When the consumer is "balancing his margins" in accordance with this rule, there will be no incentive for him to alter his expenditure pattern. The consumer will be in equilibrium, and, barring a change in his tastes, his income, or the prices of the various goods, he will be worse off—his total utility will decline—by any alteration in the collection of goods he is purchasing.

Now a detailed illustration to help explain the validity of the rule. For simplicity's sake we limit our discussion to just two products. Keep in mind that the analysis can readily be extended to any number of goods. Suppose that consumer Brooks is trying to decide which combination of two products—A and B—he should purchase with his limited weekly income of $10. Obviously, Brooks's preferences for these two products and their prices will be basic data determining the combination of A and B which will maximize Brooks's satisfactions. Table 24–2 summarizes Brooks's preferences for products A and B. Column 2a shows the amount of extra or marginal utility Brooks will derive from each successive unit of A. Column 3a reflects Brooks's preferences for product B. In each case the relationship between the number of units of the product obtained and the corresponding marginal utility reflects the law of diminishing marginal utility. Diminishing marginal utility is assumed to set in with the first unit of each product purchased.

But before we can apply the utility-maximizing rule to these data, we must put the marginal-utility information of columns 2a and 3a on a per-dollar-spent basis. Why? Because a consumer's choices will be influenced not only by the extra utility which successive units of, say, product A will yield, but also by how many dollars (and therefore how many units of alternative good B) he must give up to obtain those added units of A. First example: Brooks may clearly

[4] E. T. Weiler, *The Economic System* (New York: The Macmillan Company, 1952), p. 89.

TABLE 24–2. THE UTILITY-MAXIMIZING COMBINATION OF PRODUCTS A AND B OBTAINABLE WITH AN INCOME OF $10* (hypothetical data)

(1)	(2) Product A: price = $1		(3) Product B: price = $3	
Unit of product	(a) Marginal utility, utils	(b) Marginal utility per dollar (MU/price)	(a) Marginal utility, utils	(b) Marginal utility per dollar (MU/price)
First	10	10	24	8
Second	9	9	21	7
Third	8	8	18	6
Fourth	7	7	15	5
Fifth	6	6	9	3
Sixth	4	4	3	1

* It is assumed in this table that the amount of marginal utility received from additional units of each of the two products is independent of the quantity of the other product. For example, the marginal utility schedule for product A is independent of the amount of B obtained by the consumer.

prefer to own a Cadillac than a lowly Ford; he may be twice as happy with a Cadillac than with a Ford. Yet he may buy a Ford because a Cadillac costs three or four times as much as a Ford. Brooks may feel that *per dollar spent* a Ford is a better buy. Second example: In Table 24–2 you will note that the first unit of B yields 24 units of utility, whereas the first unit of A yields only 10. However, B costs $3 per unit and A only $1. This means that by passing up the first unit of B and the 24 utils it entails, Brooks can use the "saved" $3 to buy 3 units of A, which yield 27 utils of satisfaction. In other words, if Brooks had just $3 to spend, he would not spend it on B, despite the high marginal utility of the first unit, but rather on A. The point is this: To make the amounts of extra utility derived from differently priced goods comparable, marginal utility must be put on a per-dollar-spent basis. This is done in columns 2b and 3b. These figures are obtained simply by dividing the marginal-utility data of columns 2a and 3a by the assumed prices of A and B—$1 and $3, respectively.

Now we have Brooks's preferences—on unit and per dollar bases—and the price tags of A and B before us. Brooks stands patiently with $10 to spend on A and B. In what order should Brooks allocate his dollars on units of A and B to achieve the highest degree of utility within the limits imposed by his money income? And what specific combination of A and B will he have obtained at the time that he exhausts his $10?

Concentrating on columns 2b and 3b of Table 24–2, we find that Brooks should obviously spend his first $1 on the first unit of A. Why? Because its marginal utility per dollar of 10 utils is higher than B's. Then Brooks should spend another $1 on the second unit of A. The reason? The marginal utility per dollar spent on this second unit of A (9 utils) exceeds the marginal utility per dollar of the first unit of B (8 utils). But now Brooks finds himself indifferent as to whether his further expenditures go for the third unit of A or the first unit of B. Both yield the same marginal utility per dollar of 8 utils. Suppose he buys both of them: Brooks now has 3 units of A and 1 of B. Note that with this combination of goods the last dollar spent on each yields the same amount of extra utility. Does this combination of A and B therefore represent the maximum amount of utility which Brooks can obtain? The answer is "No." This collection of goods only costs \$6 [(3 × \$1) + (1 × \$3)]; Brooks has \$4 of income remaining, which he can spend to achieve a still higher level of total utility.

Examining columns 2b and 3b again, we find once more that Brooks is indifferent about choosing between the next units of each. Marginal utility per dollar of the fourth unit of A and the second of B is the same—7 utils in each case. Let us again assume that Brooks purchases one more unit of each. Marginal utility per dollar is now the same for the last dollar spent on each product, and Brooks's money income of \$10 is exhausted [(4 × \$1) + (2 × \$3)]. *The utility-maximizing combination of goods attainable by Brooks is 4 units of A and 2 of B.*[5]

It is to be emphasized that there are other combinations of A and B which are obtainable with \$10. But none of these will yield a level of total utility as high as do 4 units of A and 2 of B. For example, 1 unit of A and 3 of B can be obtained for \$10. However, this combination violates the utility-maximizing rule; total utility here is only 73 utils, clearly inferior to the 79 utils yielded by 4 units of A and 2 of B. Furthermore, there are other combinations of A and B, such as 5 of A and 3 of B *or* 3 of A and 1 of B, wherein the marginal utility of the last dollar spent is the same for both A and B. But such combinations are either unobtainable with Brooks's limited money income (as 5 of A and 3 of B) or fail to exhaust his money income (as 3 of A and 1 of B) and therefore do not yield him the maximum utility attainable.

An Algebraic Restatement

We are now in a position to restate the utility-maximizing rule in simple algebraic terms. Our rule simply says that a consumer will maximize his satisfaction when he allocates his money income in such a way that the last dollar spent on product A, the last on product B, and so forth, yield equal amounts of additional, or marginal, utility. Now the marginal utility per dollar spent on A is indicated by MU of product A/price of A (column 2b of Table 24–2) and the marginal utility per dollar spent on B by MU of product B/price of B (column 3b of Table 24–2). Our utility-maximizing rule merely requires that these ratios be equal. That is,

$$\frac{\text{MU of product A}}{\text{price of A}} = \frac{\text{MU of product B}}{\text{price of B}}$$

and, of course, the consumer must exhaust his available income. Our tabular illustration has shown us that the combination of 4 units of A and 2 of B fulfills these conditions in that

$$7/1 = 21/3$$

and the consumer's \$10 income is spent.

If the equation is not fulfilled, there will be some reallocation of the consumer's expenditures between A and B, from the low to the high marginal-utility-per-dollar product, which will increase the consumer's total utility. For example, the consumer may spend his \$10 on 1 of A and 3 of B. But here we find that

[5] To simplify, we assume in this example that Brooks spends his entire income; he neither borrows nor saves. Saving can be treated as a utility-yielding commodity and incorporated in our analysis and is to be treated thus in question 4 at the end of the chapter.

$$\frac{\text{MU of A: 10 utils}}{\text{price of A: \$1}} > \frac{\text{MU of B: 18 utils}}{\text{price of B: \$3}}$$

The last dollar spent on A provides 10 utils of satisfaction and the last dollar spent on B only provides 6. On a per dollar basis, units of A provide more extra satisfaction than units of B. The consumer will obviously increase his total satisfaction by purchasing more of A and less of B. As dollars are reallocated from B to A, the marginal utility from additional units of A will decline as the result of moving down the diminishing marginal utility schedule for A, and the marginal utility of B will rise as the consumer moves up the diminishing marginal utility schedule for B. At some new combination of A and B—specifically, 4 of A and 2 of B—the equality of the two ratios and therefore consumer equilibrium will be achieved. As we already know, the net gain in utility is 6 utils (79 – 73).

Now there are admittedly a number of criticisms of this theory of consumer behavior. Most obviously, we have no "utilometer" by which the consumer's preferences can be set down precisely as in Table 24–2. Nor is it easy to incorporate large, indivisible products such as houses, automobiles, pianos, or a college education in our analysis. Nevertheless, there is little doubt that the theory accurately describes the basic rationale underlying consumer behavior. In a general way the theory does explain how consumers behave. Albeit in a loose fashion, consumers do seek to maximize their satisfaction. And though the process may be crude, consumers do make marginal comparisons in allocating their limited incomes. In formulating its budget, a family must choose between, say, a food freezer, a television set, and building a recreation room in the basement. And the college student must weigh the relative satisfaction to be derived from spending $10 on a Saturday-night date as opposed to a new pair of shoes or a couple of shirts. Despite its limitations, the utility-maximizing rule is a meaningful general statement of how consumers behave.

SUMMARY

1. The law of demand can be explained on the basis of the income and substitution effects or the law of diminishing marginal utility.

2. The income effect says that a decline in the price of a product will enable the consumer to buy more of it with his fixed money income. The substitution effect points out that a lower price will make a product relatively more attractive and therefore increase the consumer's willingness to substitute it for other products.

3. The law of diminishing marginal utility states that beyond some point additional units of a specific commodity will yield ever-declining amounts of extra satisfaction to a consumer. It follows that a lower price will be needed to induce the consumer to increase his purchases of such a product.

4. We may assume that the typical consumer is rational and acts on the basis of rather well-defined preferences; consumers act sensibly and know roughly the satisfaction they will derive from successive units of various products available to them. Because his income is limited and goods have prices on them, the consumer cannot purchase all the goods and services he might like to have. He should therefore select that attainable combination of goods which will maximize his utility or satisfaction.

5. The consumer's utility will be maximized when he is allocating his income so that the last dollar spent on each product purchased yields the same amount of extra satisfaction. Algebraically, the utility-maximizing rule is fulfilled when

$$\frac{\text{MU of product A}}{\text{price of A}} = \frac{\text{MU of product B}}{\text{price of B}}$$

and the consumer's income is spent. Though subject to limitations, this rule is a meaningful guide in explaining consumer behavior.