

## ***MAN, ECONOMY AND STATE, ORIGINAL* CHAPTER 5: PRODUCER'S ACTIVITY**

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(EDITED BY PATRICK NEWMAN)

### **EDITOR'S FOREWORD**

The present work is an unpublished chapter of Murray N. Rothbard's *Man, Economy, and State* (hereafter MES) (2009 [1962]). Titled "Chapter 5: Producer's Activity," it was meant to be the fifth chapter of the book and the first on production theory. In it, Rothbard discussed the optimal production and investment decision of the producer, and used familiar analytical tools such as perfect competition, the isoquant-isocost framework, and the competitive versus monopoly price distinction. It was written when Rothbard still planned to write a textbook of Ludwig von Mises's *Human Action* (1999 [1949]) before deciding to write a full blown treatise. Rothbard's decision to do so was heavily influenced by his concurrent decision to abandon the chapter and rewrite his production theory, as he thought that the new material he would have to present and argue for would be unsuitable for an introductory textbook. In particular, the above mentioned analytical tools were all subject to trenchant criticism by Rothbard in his final production theory.

The chapter is meant to serve as both a compendium for Newman (2015), which is the concurrent paper written by the present author that discusses the evolution of Rothbard's thought on production theory and its implications for modern theory, and as a source for scholars interested in Rothbard's thought, Austrian economics, and historians of production theory to use for their own research projects.

The chapter was found and reorganized by the present writer at the Rothbard archives at the Ludwig von Mises Institute in Auburn, Alabama. Over the years, Rothbard had saved many of his draft pages for MES on various topics, including those that would eventually be put in the book and those that would not. Rothbard did not neatly organize his draft pages, so many of the pages that could be found in the archive boxes and were right next to each other could concern completely different topics. Fortunately, Rothbard did number his pages, so the present writer was able to reconstruct the chapter by sifting through the archive boxes and linking up pages based on their number and whether the sentences which ran from one page to the next corresponded with each other. The document that follows pieces together the missing chapter as much of what was possible from the available surviving resources.

The chapter is in a rough stage, as Rothbard appears to have written only one draft before deciding to revise his production theory and remove the chapter from his planned work. However, it was written very clearly and is easy to understand, so in terms of editing the paragraphs for the most part I have only had to make a few grammatical and stylistic changes regarding his numerical examples. In some cases, exclusively in the last section, I had to add a few words and sentences in order to clarify Rothbard's argument. The largest of such additions occur towards the end of the chapter, where several of Rothbard's draft pages could not be found. Consequently, I had to fill in with some summary transitional sentences and in one case a paragraph of what I believe Rothbard discussed in these pages, based on what Rothbard referred to later in the chapter. All additions I have made are in brackets [ ], and the observant reader will see that I have faithfully written what can be inferred from the rest of the chapter and in a style consistent with it. In addition, I have provided information in footnotes (prefaced with *Editor's footnote*) about various references Rothbard makes to either previously written or planned chapters of MES.

I have also had to make some minor changes to the structure of the chapter. The three sections I could find were sections 1, 2, and 4, as there was a missing third section of the chapter that I could not find. Furthermore, Section 4 included all of the material that is now Section 3, which made it considerably large and unwieldy. Therefore, I have split up Section 4 into two based on respective topics and given Section 3 an appropriate title so that there are four well organized parts that smoothly flow from one to another.

In the first section, titled "The Demand for a Firm's Product," Rothbard concentrates on the production function of an individual producer for a given good. With fixed prices for inputs, Rothbard investigates the optimal production choices in situations where the firm either has or does not have an influence on the output price. In Section 2, "Competitive Price and Monopoly Price," Rothbard introduces the terms perfect competition, competitive price and monopoly price, and defines a monopolist as someone who receives a grant of state privilege. In Section 3, titled by the present author "The Product and Outlay Schedules of the Firm," Rothbard returns to the firm's production decisions and analyzes factor ratios and production coefficients. Rothbard derives constant cost (isocost) and constant product (isoquant) schedules as well as rates of constant outlay and constant product substitution. Rothbard shows that the cost minimizing level of output is when these two rates are equal. In a subsection he presents a mathematical and graphical formulation of the above theories and briefly mentions the relation of them to the determination of factor pricing. Rothbard finishes up the chapter with Section 4, titled "The Output and Investment Decisions of the Producer," by constructing "The Law of Investment Decision" using the concepts of rates of net income, marginal, and average rates of return. Rothbard argues that the investor will not produce at the outlay where either his profit amount or percentage rate of return is maximized, but rather up to the last outlay where the average and marginal rates of return are greater than or equal to his average and marginal rates of time preference. This theory may be useful for those scholars interested in an Austrian "Theory of Investment" as it is a portfolio theory of how the capitalist-entrepreneur allocates his money across various enterprises. This is linked with a brief criticism of firm analysis, which undoubtedly influenced him to drop the chapter and revise his production theory.

In conclusion, this chapter will be a fertile source for both historians of thought and contemporary theorists interested in Austrian economics and production theory.

–P.N.

## SECTION 1: THE DEMAND FOR A FIRM'S PRODUCT

We have seen that the money prices of goods on the market are set at the intersection of the demand and supply curves. Setting aside the relatively simple problem of the market for old stock, the market price and quantity exchanged are determined by the intersection of the market supply curves of the producers, and the demand curve. We have seen above that the stock thrown on the market in any given period is largely determined by *previous* anticipations of market conditions in this period. This notion has been presented in terms of the “final supply curve” of producers. In other words, if the selling price of a certain line of washing machines is expected to be 20 ounces of gold next September, how many washing machines will Smith begin to invest in *now* so that the final product will emerge next September? We have described this final supply in terms of the *present* price calling forth a *present* investment for a *future* production; strictly, of course, it is the *expected future price* that calls forth investment now for future production. All present production is necessarily the result of such previous anticipation.<sup>1</sup>

Thus, all producers' activity—the central nexus of the economy—is based on certain anticipations of future selling prices. We have analyzed above the determinants of market price for consumer goods, durable and nondurable, and now we must analyze the “final supply curve,” and the process of producers' activity. Consumers' goods, the end of human activity, must be produced by producers, and the overwhelming number of *exchangeable* goods must be produced through the monetary exchange process outlined

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<sup>1</sup> *Editor's footnote:* Rothbard's reference to his earlier presentation of the “final supply curve” is absent from MES. Rothbard's discussion of supply and demand for an already produced stock of goods and his introductory analysis of entrepreneurship and production can be found in Rothbard (1962, 153–161, 249–257). See below (pp. 557–59) for Rothbard's further discussion of final supply curve.

in Chapter III.<sup>2</sup> Therefore, analysis of producer activity is vital; not only will it provide the final clue to the analysis of consumer goods' prices—through discussing the determination of the size of the stock thrown on the market—it is also the key to the analysis of the determination of the money prices of factors of production. All other goods but consumer goods are factors, and all of these are demanded and bought solely by producers. It is producers that purchase with money, capital goods, land, and labor, and it is producers that use other factors to produce the capital goods. It is only through a more detailed analysis of producer activity, therefore, that the prices of factors can be explained.

To analyze the actions of a producer let us take a hypothetical case, Mr. Jones. Jones, like all others, must decide on the allocation of his money assets to investment expenditures, consumption expenditures, and to his cash balance. Let us postpone discussion of changes in cash balance to a later chapter on the demand for money and its utility.<sup>3</sup> Jones must allocate his expenses between consumption and investment expenditure. The motive that impels him to spend money on present consumption is the gratification of his desires through present consumption. What is the motive that impels him to *save* a certain amount of money by restricting his possible consumption, and invest that money in expenditure on various factors of production? This motive must be the expectation of *greater* money income in the future. We have already seen that every man prefers a satisfaction of a desire earlier than later, and therefore that a given amount of present money is always preferred to the same amount of money in the future.<sup>4</sup> At any given point, he will have a certain rate of time preference, a rate by which he will prefer *present money* to the *present prospect of money at some date in the future*.<sup>5</sup> We have seen that the more he allocates

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<sup>2</sup> *Editor's footnote:* See Rothbard (1962, pp. 187–231).

<sup>3</sup> *Editor's footnote:* See Rothbard (1962, pp. 755–874).

<sup>4</sup> *Editor's footnote:* See Rothbard (1962, p. 219).

<sup>5</sup> "In every case the choice made is, at the moment when made, a present choice. We have no future desires though we may have a present forecast of a future desire. 'Future desires' means desires that will be present at some future time. Present desires are all those desires now being weighed in choice. Present desires may be either desires for present uses or for future uses (either in the same or in different goods). A present desire for future uses is but the anticipation of a future

to investment, the greater will be the marginal utility forgone of present consumption, and the less will be the marginal utility of each additional future ounce of money income.<sup>6</sup>

"Investment opportunities" for a greater supply of future consumer goods are always open to man, because investment in capital goods adds to the capital structure, and increases future product of consumer goods. On the other hand, man must satisfy his present needs first. Thus, men must always balance their prospect of future gain as against their rate of time preference for present as against future satisfactions. The primary activity in deciding whether or not to be a producer is the weighing of the anticipated future gain against the person's rate of time preference. In the words of Professor Fetter, "The different time-periods, present and future, and their different economic situations are bought into comparison... by conscious choice between the thing actually present and the future good more or less clearly pictured in the imagination."<sup>7</sup>

We must postpone detailed consideration of time preference and its effects to later chapters of this work.<sup>8</sup> Here it suffices to point out that each individual has his own rate of time preference, expressed as a percentage premium of present over future goods, and that the more he saves at any time, the greater his subjective premium will tend to be.

Let us suppose now that Jones is considering whether or not to invest 1000 ounces of gold, or spend this money in consumption. Let us say his rate of time preference for these 1000 ounces is 6% per annum. In other words, if he anticipates a return on this investment of 6% or less for the following year (assuming for simplicity that only one year is taken into account), he will not make the investment. Thus, in deciding on productive investment or not, his minimum return for the year will be an anticipated 1060

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desire, though the two may be of unequal magnitude. It appears therefore that all time-choices are, in the last analysis, reducible to choices between present desires for psychic incomes occurring at different time-periods" Fetter (1915, p. 247). See also Fetter (1915, p. 239).

<sup>6</sup> *Editor's footnote*: See Rothbard (1962, p. 220).

<sup>7</sup> Fetter (1915, 240).

<sup>8</sup> *Editor's footnote*: See Rothbard (1962, pp. 367–451).

ounces. If he anticipates this or less, “it will not pay for him” to make the investment.<sup>9</sup>

Now Jones surveys the prevailing conditions, and estimates that he has available four different lines of investment. For the sake of simplicity, we will now assume that all of these lines are in the production of consumer goods (since we have not yet explained the determination of any capital goods prices), and we will also assume that the *period of production* for each of these processes is exactly one year. This period of production, as explained in Chapter I, is the length of time from the beginning of the action—the investment—to the reaping of the final product.<sup>10</sup> It should be clear that it is a simple task to make the necessary adjustments in calculation if one or other of the processes takes more or less time to complete. The four lines of investment open to Jones he estimates will net him, in the year to be considered, net money returns of 10%, 8%, 7%, and 5% respectively.<sup>11</sup> In other words, with an investment in factors of 1000 ounces now and in the near future, Jones will be able to reap the following returns for lines of investment A, B, C, and D:

**Table 1**

LINE	GROSS MONEY RETURN	NET RETURN	% OF NET RETURN ON INVESTMENT
A	1100	100	10%
B	1080	80	8%
C	1070	70	7%
D	1050	50	5%

It is clear that Jones will not invest in line D in any case, since his rate of time preference is 6%, and he would prefer to spend his 1000 oz. on consumption now rather than make the investment. If all of his prospects were like D or worse, he would make no investment at all. In this case, it is clear that he will invest the 1000

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<sup>9</sup> *Editor's footnote:* See the editor's footnote below on p. 552.

<sup>10</sup> *Editor's footnote:* See Rothbard (1962, pp. 13–17).

<sup>11</sup> It is of course likely that Jones will weigh his decision on the basis of expected returns over a much longer period, say a decade, in which these returns may be considered to take place for a ten year period. We can adjust his calculations to cover any desired time period.

oz. in line A, where the greatest percentage net money return is to be found. Here, we must remember the qualification that he will only choose such a course if other psychic factors are neutral. Thus, if he has a special fondness for the production of Good B, or a special hostility toward the production of Good A, the 8% money return may be worth more to him on his value scale than the 10% return to be made in Good A. Noting this qualification, however, it will be convenient for us to set it aside, and assume that psychic factors are neutral in our example, in which case the investor will always choose the greatest prospects for money return.

We must now investigate the line of production more closely. Suppose that we confine our attention to the line of production that produces Good A. Jones is eager to maximize the percentage return from his investment. What are the factors that will determine the size of his return? These factors are: a) the money prices of the factors purchased b) the selling price of his product c) the physical productivity of the factors in their transformation into the product. It is obvious that, other things being equal, the *lower* the prices he must pay for the factors, the greater will be his return; the *higher* the price of his product, the greater his return; and the *greater* his physical productivity the greater his return. Let us assume for the moment that the prices of the factors are given. Jones also discovers that there is available to him a range of technical possibilities in the production of the particular good. For the sake of simplicity, let us suppose that only two factors, X and Y, are required in the production of Good A. The money price of X and the money price of Y are fixed on the market—say it is 4 ounces per unit of X, and 10 ounces per unit of Y. Jones knows (or believes) that there are several possible proportions of X and Y that he can buy with his 1000 ounces in order to produce Good A. These may be the following:

**Table 2**

1)	40 X plus 84 Y
2)	50 X plus 80 Y
3)	60 X plus 76 Y

With prices at 4 and 10, these combinations will all add up to expenditures of 1000 ounces. In the first combination, Jones spends



160 ounces on X and 840 on Y; in the second, he spends 200 ounces on X and 800 ounces on Y, etc. Now the question arises: which combination does Jones choose to adopt? First, this depends on the physical productivity of each combination. This physical productivity is the effect of the production *recipe*, a recipe which is known to the producer in making his decision. The relationship between physical input and product is sometimes known as the “production function.”<sup>12</sup> Let us say that the above combinations of input would yield the following products:

Table 3

	COMBINATIONS OF INPUT	RESULTING PRODUCT
1)	40X plus 84Y	96 units
2)	50X plus 80Y	100 units
3)	60X plus 76Y	110 units

It would certainly seem that Jones will pick that combination which will yield him the *maximum physical output*. In this case, it would be Combination 3, by which we can produce 110 units from 1000 ounces’ worth of factors. There is one qualification to this course of action, however, and that would be if his increase in units produced would so lower the market price of the product as to *decrease* his gross revenue from the sale of the produced stock. In other words, suppose as Case (a), that the price of his product will be 10 ounces per unit, and that he correctly estimates it as such. Furthermore, suppose that regardless which production process he chooses, the market price will continue to be 10 ounces. In other words, whether he chooses to produce 100 or 110 or 96, etc. units, the market supply curve will not be affected sufficiently to lower the price. In this case, the gross revenue from the various combinations will be as follows:

Table 4: Case (a)

	COMBINATIONS OF INPUT	RESULTING PRODUCT	PRICE OF PRODUCT	GROSS REVENUE
1)	40X plus 84Y	96 units	10 oz. /unit	960 oz.
2)	50X plus 80Y	100 units	10 oz. /unit	1000 oz.
3)	60X plus 76Y	110 units	10 oz. /unit	1100 oz.

<sup>12</sup> See Boulding (1941, pp. 456–457) and Stigler (1946, p. 109ff).

Jones will choose Combination 3, yielding the largest gross revenue and hence the largest net revenue with a given investment (1000 oz.) and the largest percentage net revenue on the investment. It is evident that, regardless of the number of alternative combinations available, where the price is constant, the combination chosen will be the one that maximizes the physical product from a given amount of money invested in factors.

Now suppose Case (b) where Jones' production is important enough in the market supply of his product so that a change from one combination to another *does* affect the market price at which the product will be sold.<sup>13</sup> Within the range of choice of combinations, a larger output will increase the market supply curve enough to lower the price of the product. It is evident that this is the usual rule on the market. Strictly, indeed, even in Case (a) there must have been *some* effect on the market supply curve from the change in output, however small, and this minute change will tend to affect the price. In Case (a), however, the change was too small to alter the point of intersection. In Case (b), the price is affected by the change in quantity, but not so much as to lower the gross revenue with an increased output. Thus, a typical situation might be:

**Table 5: Case (b1)**

	COMBINATIONS OF INPUT	RESULTING PRODUCT	PRICE OF PRODUCT	GROSS REVENUE
1)	40X plus 84Y	96 units	10.5 oz. /unit	1008 oz.
2)	50X plus 80Y	100 units	10.4 oz. /unit	1040 oz.
3)	60X plus 76Y	110 units	10.0 oz. /unit	1100 oz.

In this case, the increase in product and supply of the producer lowered the market price, but not in any case enough to lower revenue. Strictly, this condition only need prevail, in Case (b), *at and above the point of maximum output*. Thus, it would have been possible for the price, at a supply of 96 units, to have been 11 oz. per unit, and the gross revenue therefore to have been 1056 ounces.

<sup>13</sup> Here it must be noted that the constancy of price assumed in Case (a) did not necessarily follow for all possible decisions of Jones. Thus, if he decided not to produce the good at all, the price might well be affected, and be, say 12 ounces instead of the 10 ounces if he did go into production. But the constancy of price is only assumed for the *relevant range of choice*—in this case between the three different combinations. Case (a) only needed to assume that, between a product of 96 and 110 units, market supply would not be affected enough to change the price.

In this situation:

**Table 6: Case (b2)**

	COMBINATIONS OF INPUT	RESULTING PRODUCT	PRICE OF PRODUCT	GROSS REVENUE
1)	40X plus 84Y	96 units	11.0 oz. /unit	1056 oz.
2)	50X plus 80Y	100 units	10.4 oz. /unit	1040 oz.
3)	60X plus 76Y	110 units	10.0 oz. /unit	1100 oz.

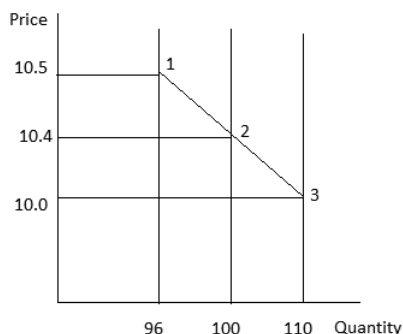
Here, it is true that as the supply increases from 96 to 100 units, the configuration of the demand curve and the market price is such that the revenue is lowered. However, the important consideration is that *the point of maximum output is also the point of maximum revenue*. Should Jones shift to another than the maximum combination in order to restrict the product, the higher price will not be sufficient to compensate for the loss of revenue. In both Case (b1) and Case (b2), the producer will choose the point of maximum output, which will also be the point of maximum revenue.

This data can be translated into terms of the *demand curve to the individual producer*. The individual producer, after all, is not concerned with what the market demand curve will turn out to be—he is concerned what the price will be for his particular product. He must ask himself the question: if I produce so many units, what will the selling price be; if I produce so many more units, what will be the effect on the selling price? In other words, he in effect is estimating what price the buyers will pay for different possible supplies of *his particular product*. *This analysis applies whether or not the producer is one of hundreds producing the same product, or whether he is the only one producing that good*. In any case, he must estimate at what price he will be able to sell his product to the buyers.

For Cases (b1) above, the *demand curve to the individual producer* can be constructed as follows:

**Figure 1: Case (b1)**

	SUPPLY OF PRODUCER	PRICE OF PRODUCT
1)	96 units	10.5 oz./unit
2)	100 units	10.4 oz./unit
3)	110 units	10.0 oz./unit



When the supply of Jones is 96, the market price will be 10.5—in other words, consumers will be prepared to demand 96 of Jones' units at a price of 10.5. This gives Jones one of the points, 1, on the *demand curve for Jones' product*. The price and supply at 10.4 and 100 respectively, and the various other items on the schedule, yield the other points on this demand curve (such as 2 and 3). These points are drawn together in one line for convenience. The schedule above also tells Jones how much of his product will be demanded at any particular price. Thus, it is clear that the producer knows that if he produces 96 units, they will be sold for 10.5, and 100 units will be sold for 10.4, etc. He *also* knows that, regardless of the size of his stock, if he sets the price for his product at 10.5 he will be able to sell only 96 units; if he sets the price at 10.4 he will be able to sell 100 units, etc. Thus, the supply and estimated market price yield him an estimate of a true *demand curve for his individual product*. Not only will he know that a supply of 110 units will provide him with the maximum revenue, he will also know that, once the 110 units are produced, *it will not pay for him to destroy or withhold some units in order to raise the price on the remainder*. Thus, with this type of demand curve for his own individual product, it is to his interest to produce his maximum physical product, and not to deliberately restrict or withhold his product to obtain a higher price. Even if he can obtain a higher price, restriction will not compensate him in revenue for the lesser quantity sold.

This property of the demand curve for the individual producer, determining whether decreased production will raise or lower revenue, is called its *elasticity*. We remember from Chapter II that a demand curve is termed “elastic” over any given range if the total outlay of the sale will be greater at a lower than at a higher price.<sup>14</sup> In the money economy, this means that a demand curve is *elastic* between a range of two prices *if the amount of money spent at the lower price is greater than the amount of money spent at the higher price*. In the case of the demand curve to the individual producer, the money outlay by the consumers constitutes his gross money revenue at that price. Thus, in Case (b1), the gross revenue obtained by the producer at a price of 10.5 and supply of 96 is 1008 oz.; at a price of 10.4 and supply of 100 units is 1040 oz., etc. What we are concerned with in this problem is the elasticity of the demand curve for the individual producer at and above the point of maximum output. We compare the revenue at that point with the revenue at possible lower outputs. In the case of (b1), the gross revenue at the point of maximum output—the price of 10.0—is *greater than* any revenue that could be obtained from restricting Jones’ production to sell at a higher price. Thus, Jones will sell at a point of maximum output when the demand curve for his particular output is *elastic* at and above that point.

What of Case (b2)? Here, the demand curve for Jones’ product is inelastic, if we compare the price of 10.4 and supply of 100, and the price of 11.0 and the supply of 96. *Between these two points on the curve, the demand is inelastic, and it would be more profitable for Jones to restrict his production from 100 to 96 in order to take advantage of the greater money revenue. However, this is irrelevant for Jones’ action, because the demand curve is still elastic relative to the point of maximum output.* The point of maximum output yields the point of maximum revenue, and hence with respect to this point, the demand curve for Jones’ product is elastic throughout its range. The choice will still be Combination 3, the supply of Jones will still be 110 units, and the market price will still be 10.0.

If Jones were in the situation of Case (a), the analysis would be even simpler. It is obvious that if the price were 10 regardless of Jones’ product in the relevant range, the demand curve for his

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<sup>14</sup> Editor’s footnote: See Rothbard (1962, pp. 126–130).

product is completely elastic, and it would always pay for him to be at his most productive, and produce the maximum physical output with a given monetary investment on factors. In this case, too, the producer strives for maximum physical productivity, and maximum output coincides with maximum revenue.

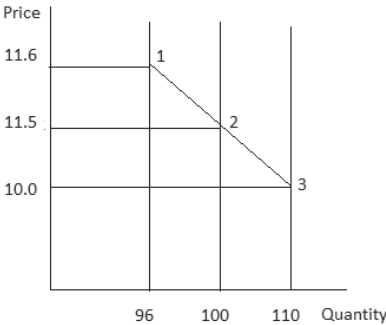
Another conceivable case is Case (c), where the demand curve for the individual producer is inelastic at the point of maximum output. Suppose, for example, that the following conditions obtained:

Table 7: Case (c)

	COMBINATIONS OF INPUT	RESULTING PRODUCT	PRICE OF PRODUCT	GROSS REVENUE
1)	40X plus 84Y	96 units	11.6 oz. /unit	1114 oz.
2)	50X plus 80Y	100 units	11.5 oz. /unit	1150 oz.
3)	60X plus 76Y	110 units	10.0 oz. /unit	1100 oz.

Or, diagramming this in the form of the individual demand curve:

Figure 2: Case (c)



With this sort of demand curve facing him, it pays the producer best to supply to the market 100 units instead of the 110 units which he could supply. With a price of 11.5 per unit instead of 10.0, the result is a larger gross revenue of 1150, and a net revenue of 150 instead of 100.

Jones can restrict his production in either of two ways, and it does not matter which course he takes. He may either use the less productive combination of factors, Combination 2 instead of Combination 3, thus reducing his physical productivity; or, he

may produce the maximum amount (Combination 3) and destroy the difference (the 10 units). Economically, it doesn't matter which course he takes, since the result is to supply less for the market than he could have done with the purchased factors.

We see that when a demand curve confronting the individual producer is inelastic as in Case (c), there are two major points of differentiation from the Cases (a, b1, and b2), where this curve is elastic. First, in the other cases, physical productivity (output on a given investment in factors) is at a maximum, and all of this output is supplied on the market. In Case (c), there is a restriction of productivity by the producer to obtain greater revenue. Secondly, the final market price is always lower in the other cases, other things being equal. The effect of the action in Case (c) is *always to raise the price to the buyer*. The effect of the restrictive action is always to raise the price of the individual firm's product *higher* than it would have been at the point of maximum supply and output.

## SECTION 2: COMPETITIVE PRICE AND MONOPOLY PRICE

When the market price of a firm's product is arrived at as in Cases (a) and (b) above, this is termed *the competitive price*; when it is arrived at as in Case (c), through the restriction of production and supply, the resulting price is termed *the monopoly price*.<sup>15</sup> The monopoly price can only be attained in the case of a demand curve inelastic to the producer, and is the result of a restrictive cut back from maximum productivity; it is always higher than the competitive price would have been. *How much* higher the monopoly price is, *how much* production is restricted, depends of course on the conditions of each particular case. Evidently, the more inelastic the demand curve for the individual producer, the higher, relatively, will be the monopoly price.<sup>16,17</sup>

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<sup>15</sup> On competitive price and monopoly price, see Fetter (1915, pp. 77–84, 381–385); Mises (1949, pp. 273–279, 354–376), Mises (1951 [1922], pp. 385–392), Menger (1950 [1871], pp. 207–225) and Wieser (1927 [1914], pp. 204, 211–212).

<sup>16</sup> See Brown (1908, pp. 626–629).

<sup>17</sup> *Editor's footnote*: Rothbard slightly modifies his definitions of monopoly and competitive price below (pp. 538–39).

Many writers have assumed that “competitive price” only refers to such conditions as Case (a), where the action of the individual producer has no effect on price. Such a rare condition is dubbed “perfect” or “pure” competition. More common situations like Case (b), where the action of the individual producer does affect the price, are termed, invidiously, “monopolistic” or “imperfect” competition, and it is assumed that this “monopolistic competitive” price is higher, and the quantity less, than would have obtained under “pure” competition.<sup>18</sup> We have seen that this contention is completely fallacious. If the demand curve for the individual producer is elastic at the competitive price, so that this point yields maximum revenue, the product will sell at the competitive price regardless of the fact that the action of the individual producer may have a strong influence on the market price. Thus, we see that there is *not* a large range of possible prices with the competitive price at the bottom, and monopoly price at the top, and a variety of “monopolistically competitive” prices that could be set in between. *There is only, the competitive price and the monopoly price.*

Whichever price is set, whether competitive or monopoly price, the determination of the price takes place in the way we have analyzed above—via the supply and demand schedules. The difference comes through the determination of the quantity of stock produced. Under competitive price the producer estimates what his selling price will be, or rather, what price he will be able to sell his stock for, and produces the maximum stock that he can from his investment. But if the demand curve to the producer is inelastic at that price, he can restrict his production somewhat, produce less stock, and increase his monetary revenue. The market price which will obtain as a result of such restriction is the monopoly price.

The extra revenue which the producer obtains from the monopoly price as compared to his revenue at the competitive price is a *monopoly gain*, and this concept, along with further details of the monopoly question, will be studied further in a later section.<sup>19</sup>

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<sup>18</sup> For example, see Chamberlain (1942). Recently, however, Professor Chamberlain has repudiated the implications drawn by his followers that the “pure competition” situation is the ideal; indeed, he implies quite the reverse. Chamberlain (1950, pp. 85–92).

<sup>19</sup> *Editor’s footnote:* This later section, whether or not it was intended to be included in the current chapter or a later one, was not found by the editor in the Rothbard



It is most unfortunate that traditional terminology in economics makes it necessary to use such terms as “competitive price” and “monopoly price.” The terms are highly misleading and can lead to serious errors in analysis, and they are highly charged emotionally—they are “loaded terms” to most people. “Competition” is usually regarded as fine and praiseworthy while “monopoly” as somehow sinister and tyrannical. There was good reason for the sinister attachments to the word “monopoly” in the public mind. The original meaning of monopoly was *a grant of special privilege by the State* to a person or group of persons to produce a good to the exclusion of other producers. As the great jurist Lord Coke defined monopoly:

A monopoly is an institution or allowance by the king, by his grant, commission, or otherwise... to any person or persons, bodies politic or corporate, for the *sole* buying, selling, making, working, or using of anything, whereby any person or persons, bodies politic or corporate, are sought to be restrained of any freedom or liberty that they had before, or hindered in their lawful trade.<sup>20</sup>

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archives. See Rothbard (1962, pp. 677–680) for his mature theory of monopoly gains on the free market. It is important to note that here he no longer uses the competitive versus monopoly price distinction.

<sup>20</sup> See Ely (1917, pp. 190–191). The famous Blackstone gave almost the same definition, and called monopoly a “license or privilege allowed by the king.”

The original meaning of monopoly therefore was a grant or exclusive trade in some area, conferred by the State to the hindering of the “lawful trade” of other would be traders, or “competitors,” in the same field. Such monopoly grants were historically important in the Western world, and it is not surprising that, with the growth of the spirit of liberty and of the libertarian movement, monopolies became more and more odious.<sup>21,22</sup>

Many present day writers have changed the original meaning of the word “monopoly,” and the result is an unwarranted transference of this acquired hostility toward entirely different conditions. Some define “monopoly” as any producer who is alone in the production and sale of any particular product, or “monopolistic” as the exertion of any perceptible influence over the market price. These conditions are far removed from privileged grants of monopoly. On such definitions, any individual producer of a good that the consumers regard as unique, and differentiate from other goods, is a “monopolist.” Ford has a monopoly over the sale of Ford cars; John Williams, lawyer, has a monopoly over the sale of the legal services of John Williams, etc. In this interpretation, every seller of an individualized commodity is a “monopolist.”

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<sup>21</sup> The battle of the equal-liberty movement against monopoly has had a long history in England. In 1603, the British courts decided, with respect to one of Queen Elizabeth’s numerous grants of privilege: “That it is a monopoly and against the common law. All trades... are profitable for the Commonwealth, and therefore the grant to have the sole making of them is against the common law and the benefit and liberty of the subject.” In 1624, Parliament declared that “all monopolies are altogether contrary to the laws of this realm and are and shall be void.” In the American states, the Declaration of Rights of the Maryland Constitution asserted: “monopolies are odious, contrary to the spirit of a free government and the principles of commerce” Ely (1917, pp. 191–192). See Walker (1911, pp. 483–484).

<sup>22</sup> *Editor’s footnote:* In this footnote Rothbard refers the reader to later chapters on the hampered market on various monopoly grants. Rothbard originally wrote multiple chapters on the hampered market before the publisher required that he cut the length of the book down and remove controversial parts of the manuscript. Rothbard then had to write a summary chapter of his analysis (Rothbard, 1962, pp. 875–1041). Rothbard’s multiple chapters on government intervention were eventually published as Rothbard (2009 [1970]). See Rothbard (1970, pp. 1089–1144) for his analysis of various grants of monopolistic privilege. Rothbard also mentioned in this footnote that copyrights and patents would be discussed below, see Rothbard (1962, pp. 745–754) for his analysis on patents and copyrights.

Labels for concepts are basically immaterial, the main requirement being that the original meaning continue in force to avoid confusion and error. In view of its historic origins, and emotional connotations, such a use of the term “monopolist” is highly inexpedient, and should be rejected. Similarly, to classify *trademarks* and *brand names* for individual products as grants of monopoly is an illegitimate use of the term. For the government to protect any individual in the use of his own trademark is identical with protection against Jack Smith calling himself “John Williams” and selling his own legal services in the guise of forgery. In other words, it is equivalent to the governmental function of defending an individual’s freely obtained property against violence and fraudulent theft.<sup>23</sup> Each individual, in a free economy, has the right to his own self, to *his own name*, and to the exclusive use of his own property. He is no more a “monopolist” over his own name, than he is over his own will or his own property. The governmental function of defense of person and property, so vital to the existence of a free economy and a voluntary society, necessarily involves the defense of each person’s particular name or trademark against the fraud of forgery. It is absurd to use the term “monopoly” or “monopolistic” with respect to the consumers’ differentiation of various individual’s products and services. If the consumers consider Williams’ and Smith’s legal services as different in quality and therefore as different goods, then they are different goods. To allow Smith to pass himself off as Williams, because of the latter’s greater reputation for quality, is to permit violation of each person’s ownership over his name and product.

To define “monopolist” as the exclusive seller of any given product is thus highly inexpedient. We shall employ the original definition of monopoly as a grant of special privilege by the State, confining a field of trade of produce to one individual or group, to the exclusion of others who would be eligible to enter such production in a purely free economy.<sup>24</sup> We shall define that

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<sup>23</sup> *Editor’s footnote*: See Rothbard (1962, pp. 162–169, 176–185).

<sup>24</sup> That such was the original definition of monopoly in economics as well as law is demonstrated by the definition of the economist Arthur Latham Perry: “A monopoly, as the derivation of the word implies, is a restriction imposed by a government upon the sale of certain services” (Perry, 1892, p. 190). Still earlier, Adam Smith discussed monopoly in similar terms, and pointed out how

voluntary society where there are no grants of monopoly privilege as a society of *free competition*, i.e., one where anyone may enter any field of production that he desired (so long as he does not usurp the name of another individual). His *ability* to do so in any case depends of course on the capital he can invest or borrow, and on his entrepreneurial ability in forecasting future conditions, but this of course is his *own* responsibility. He is *free* to compete, not only when he has the ability to do so, but generally when there are no coercive restrictions preventing him from doing so.

It should be clear by this time that there is a great distinction between the concept of “monopoly” and of “monopoly price,” and hence the misfortune of the same word applying to different concepts. The two are entirely different. The monopolist, in our sense, may or may not be able to achieve a monopoly price. The demand curve for his product may be elastic, or there may not be even any consumer demand for his product at all, in which case he could make no net return in producing the good. Thus, the State may grant Hiram Jones an exclusive monopoly privilege for the manufacture of kerosene lamps, but if so few people wish to buy these lamps as to make the production unprofitable, the monopolist is not able to achieve a monopoly price or a monopoly gain. On the other hand, the production may be profitable, but the demand curve elastic, so that the monopolist does not restrict production and sells at what would have been the competitive price. Similarly, the “monopolist” in the faulty sense of a single seller of any product, may not be able to achieve a monopoly price for his sale. A lawyer will probably not be able to gain more revenue by restricting his hours of legal service in order to raise the market price; a producer of a particular brand of breakfast cereal may not be able to make gains by restricting his production in order to raise the price and earn a monopoly gain.

Thus it is perfectly possible for a “monopolist,” either in the sense of a privileged seller or as the sole seller of an individualized commodity, not to be in the position of charging a monopoly price for his product. The result depends on the demand curve for his

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monopolists may use the government privileges to restrict sales and raise selling prices; “Such enhancements of the market price may last as long as the regulations of police which give occasion to them” (Smith, 1937 [1776], p. 62).

individual product. On the other hand, it is possible to be able to charge a monopoly price without being a “monopolist” in either of the two senses. Thus, let us suppose that there are several sellers of the same product, and that therefore there is no monopoly. For each of the producers, the demand curve for his individual product is elastic at the competitive price, and therefore there is no way to achieve an extra monopoly gain by restricting production and raising price. On the other hand, the demand curve for the product as a whole, the total market demand curve, might be decidedly inelastic at the market price. In such a case, there might well be a tendency for the various producers to get together and decide production and price policy as if they were one firm only. If they could make such an agreement, they could act as one firm, and the market demand curve would then be identical with the demand curve for that “firm,” and the inelasticity would permit a general restriction of production and a rise to a monopoly price. Such an agreement by many producers to act as one firm in the market is known as a *cartel*. A cartel arrangement can permit numerous firms to act as “monopolists” in the sense of sellers of an individualized commodity.

There are many stumbling blocks in the paths of firms attempting to form such a cartel, however. Although the demand for the whole product may be inelastic, the demand for each firm will be elastic. Therefore, each firm will agree that the total product and sale should be restricted in order to raise the price, but each producer will be reluctant to restrict *his own* product and sales. For if the other firms restrict their sales, each firm can gain considerably by expanding his own and taking advantage of the higher price. Hence, it is necessary for each cartel member to agree on a certain quota of the aggregate product and sales, and restrict himself to that quota. It is quite clear that the difficulties to the establishment, and the maintenance, of such a cartel are well-nigh insuperable. In the first place, there is likely to be a great deal of bickering about the assignment of quotas since each firm will try to acquire a larger quota. Whichever basis quotas are assigned are arbitrary, and will always be subject to challenge. As Professor Benham states:

Firms which have produced a relatively large share of output in the past will demand the same share in the future. Firms which are expanding—owing, for example, to an unusually efficient management—will demand a larger share than they obtained in the past. Firms with a greater

“capacity” for producing, as measured by the size of their... plant will demand a correspondingly greater share” (Benham, 1941, p. 232).

Particularly likely to be restive under a cartel system are the more efficient producers, those who are making larger profits, and who are eager to expand their business. These firms will be eager to take advantage of the elastic demand curve to their own sales, and to test their own mettle against the less efficient firms protected by the assured cartel’s quota. It is obvious that the cartel, increasingly as it persists, tends to protect the sales and earnings of the *inefficient* as compared to the more efficient competitors.

As Benham puts it:

The successful maintenance of a combination, once it is formed, is threatened both from within and without. Conditions will change as time goes on, and will make it difficult for the combination to retain the adherence or “loyalty” of some of its members. Some firms will find that consumers demand more of their particular products than before and will resent having to pass on orders (in excess of their quota) to be executed by other members of the combination. Again, some firms will outstrip others in taking advantage of the progress of technical knowledge, and will conclude that they have more to gain by expanding their sales at lower prices than by continuing their membership of the combination. If the demand for the products of the industry falls considerably, the proportion of “unused capacity” will increase, and this will strengthen the desire of some firms to break away and make fuller use of their plants, thus increasing their receipts, by selling at lower prices.<sup>25</sup>

The ever present temptation to each producer, particularly a venturesome and efficient one, is to defy the cartel, either secretly or openly, and expand his own sales. The great instability of the cartel stems from the fact that once the firm steps out of line, the others must do so as well. For with A, B, C, etc. restricting their output to maintain the monopoly price, if competitor D expands his output, and cuts the price slightly, he tends to take a great deal of business away from the other producers. Even if price is not affected a great deal, D’s expansion earns revenues while the

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<sup>25</sup> Benham (1941, p. 233). On the rapid breakup of even a relatively successful cartel, see Fairchild et al. (1926, pp. 54–55). Also see Molinari (1904, pp. 192–195), Fay (1923, p. 41) and Fay (1912).

others must limit theirs.<sup>26</sup> The result is a speedy breakup of the cartel and a return to competitive pricing and output conditions.

Just as great a menace to the existence of a cartel is the threat of outside competition from newcomers. As a matter of fact, the greater the success of the cartel in maintaining its internal cohesion, and earning monopoly gains which are apportioned to the members, the greater will be the temptation for new firms to enter the field. These new firms, unhampered by cartel agreements, can expand their production and sales to take business away from the cartel, and may cut the price of the product as well. This factor is a powerful one in causing the dissolution of the cartel agreements. As a result of these factors, it is not an exaggeration to state that almost no cartel agreement, unaided by special privileges from governments, has been able to survive more than a very short period of time.<sup>27</sup> The type of State privilege is varied, and will be dealt with in the chapters on State intervention and the Hampered Market.<sup>28</sup> One such measure in compulsory cartelization, another is the imposition of artificial restrictions in the freedom of entry of potential competitors into the field.

Another important factor tending to prevent the rise of cartels is that, in a free economy, an agreement to form a cartel *is not enforceable* in the courts. In other words, if Jones signs an agreement to join a cartel and only process 10% of the output of certain other firms, he may violate the agreement at any time without suffering governmental penalties, such as payment of damages of compulsion to abide by the contract. This is due to the particular scope which governmental enforcement of contracts has in a free economy. It was seen in Chapter II that the governmental agency, in a voluntary society, enforces contracts, not simply because they are contracts or promises *per se*, but because they represent *unfinished exchanges of property*.

Suppose, however, that a monopoly price has been established on the free market, either by an individual firm or by a remarkably

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<sup>26</sup> Menger (1950, pp. 222–225).

<sup>27</sup> In many cases, fear of possible outside competition prevents any formation of a cartel, even when other conditions seem favorable. This is known as the influence of *potential competition* on would be cartellists.

<sup>28</sup> Editor's footnote: See footnote 22.

stable cartel. Are the consequences necessarily sinister, as has often been assumed? In the first place, it must be realized again that the term “monopoly price,” used in contrast to “competitive price” is really a misnomer, although the terms must be used for traditional reasons. The monopoly seller or sellers are not immune from, or beyond the pale, of competition. Quite the contrary. The terminology is the result of an old neoclassical preoccupation with single “industries.” Every monopoly seller competes with every other seller for the money of the consumer. Every consumer allocates his money expenditure among all the available uses, and therefore this fundamental competition obtains between all sellers of all the goods and services. Producers compete for wide groups of laborers of various types, of lands and capital goods. Thus, Ford does not only compete with General Motors; it competes with the sellers of washing machines, of television sets, of houses, of caviar, of concert music, etc. Everyone on the free market is a mutual competitor. Thus the monopoly seller who obtains a monopoly price is not beyond competition. He does not dictate to the consumer or anyone else.

But even if the monopoly seller is subject to competition, isn't the consumer worse off when a monopoly price and restricted production obtains? Can we not say that there is a loss of consumer welfare in a monopoly price situation? Isn't this an important exception of the harmony of interests that prevails on the voluntary market? To answer these questions, let us recall the exchange situations detailed in Chapter II.<sup>29</sup> Jackson and Smith are in isolated exchange, the former has a horse and the latter has fish, and they bargain to make an exchange. Let's say the agreed upon terms of exchange are 90 barrels of fish for the horse. Now, critics could charge that Jackson is worse off than he would have been if the price had been set at 95 or higher, while Smith is worse off than he would have been if the agreed price were less than 90. Such charges however miss the point of the analysis. The point is that both voluntarily agreed on the price, that both believed that there were no better alternatives available. The same is true for every price in every exchange, regardless of the number of exchanges. The purchase or the sale

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<sup>29</sup> *Editor's footnote:* See Rothbard (1962, pp. 79–94).



of the unit of the good at the agreed upon price is considered the best possible alternative action by each party. Thus each is the best off, has the highest welfare, that he can obtain, consistent with the maximum welfare of everyone else. Smith could force Jackson at the point of a weapon to make the exchange for 80 or 70 or 60 or no fish at all. But in that case it is obvious that the use of coercion has made Jackson worse off, and that Jackson is being exploited by Smith. Furthermore, this action brings up all the problems of violence and an exploitative society, which have been mentioned previously and will be discussed fully in later parts of this book.<sup>30</sup> Within the framework of a voluntary society, the market price is the best price that either the seller or the buyer can get, and therefore comparing the welfare of either one with some impossible ideal is vain. In the same way, buyers and sellers on the market are “included” or “excluded” from exchange by their own voluntary action in accordance with their value scales.

But what of the case of a monopoly price? When it is set in the framework of the free market, again all parties to the exchange benefit. A coerced lower price or greater product could only exploit the sellers for the immediate benefit of the buyers. Monopoly pricing, on the other hand, is not the exploitation of the consumers, because the payment is voluntary. This conclusion is confirmed by a closer look at the inelastic demand curve, which must obtain in all cases of monopoly price. Thus, suppose that a firm’s maximum productivity would yield a product of 100 units at the competitive price of 10 ounces. Its inelastic demand curve is such that a stock of 50 units raises the market price to 30 ounces, the monopoly price. In the former case, the firm’s revenue is 1000 ounces from its investment; in the latter case, it is 1500 ounces. This means that consumers have *voluntarily* paid more money for the product in the monopoly price situation. How can it be deduced from this that the consumers are worse off under a monopoly price? After all, the inelasticity of the demand curve is not fixed in Heaven; it is the result of the voluntary action of the consumers in paying more money for the product at a monopoly price. If the consumers really felt that they were worse off than they could be because of the monopoly price, they

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<sup>30</sup> *Editor’s footnote*: See footnote 22.

could, individually or jointly, *boycott* the product and refuse to buy at the higher price. Such action, would, of course, render the demand curve for the good elastic, and force the firm or the cartel to increase its output and lower the price to the competitive one. The money withheld in the boycott could either be added to cash balances, spent on the products of competitors, or used to invest in a competitor to a cartel. There is therefore never any need to worry about the situation of the consumers in a free market. The shape of their demand curve, and therefore the final market price, is purely the result of their own voluntary action.

It should be clear from the above discussion that there is nothing particularly reprehensible, or frustrating of consumer freedom, in the establishment of a “monopoly price” or in a cartel action. A cartel action, if it is a voluntary one, cannot injure freedom of competition or, if is profitable, cannot injure consumers. On the contrary, they are, as are all other actions on the free market, perfectly consonant with a free society, with individual self-sovereignty, and the earning of money through serving consumers.

As Benjamin R. Tucker brilliantly concluded in dealing with the problem of cartels and competition:

That the right to cooperate is as unquestionable as the right to compete; the right to compete involves the right to refrain from competition; cooperation is often a method of competition, and competition is always, in the larger view, a method of cooperation... each is a legitimate, orderly, non-invasive exercise of the individual will under the social law of equal liberty....

Viewed in the light of these irrefutable propositions, the trust, then, like every other industrial combination endeavoring to do collectively nothing but what each member of the combination might fully endeavor to do individually, is, *per se*, an unimpeachable institution. To assail or control or deny this form of cooperation on the ground that it is itself a denial of competition is an absurdity. It is an absurdity, because it proves too much. *The trust is a denial of competition in no other sense than that in which competition itself is a denial of competition.* (Italics ours.) The trust denies competition only by producing and selling more cheaply than those outside of the trust can produce and sell; but in that sense every successful individual competitor also denies competition.... The fact is that there is one denial of competition which is the right of all, and that there is another denial of competition which is the right of none. All of us, whether out of a trust or in it, have a right to deny competition by

competing, but none of us, whether in a trust or out of it, have a right to deny competition by arbitrary decree, by interference with voluntary effort, by forcible suppression of initiative.<sup>31</sup>

This is not to say, of course, that joint co-operation or combination is necessarily “better than” competition among firms. We simply conclude that the relative extent of areas within or between firms on the free market will be precisely that proportion most conducive to the well-being of consumers and producers alike. This is the same as saying that the size of a firm will tend to be established at the level most serviceable to the consumers.<sup>32</sup>

### SECTION 3: THE PRODUCT AND OUTLAY SCHEDULES OF THE FIRM

Let us now return to the activity of the firm and its *production function*. We will assume now that the firm is competitive, and produces for a competitive price, so that its situation either fits Cases (a) or (b) above. In the production schedule drawn up for Jones shown in Table 3, the ratios between the quantities of the factors differ for the various technical alternatives available. Thus, 50X combined with 80Y produces 100 units of product, and 60X combined with 76Y produces 110 units. The ratios between the quantities of factors: 50/80, 60/76, etc. may vary considerably. The list of technological alternatives varies according to the specific “engineering” data of the product in question. In very rare cases, there might be cases where only one ratio, or one set of “production coefficients,” is permissible. In such cases, for example, the product could only be produced with a combination of 5X to 8Y, in that ratio. In almost all

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<sup>31</sup> See Tucker (1926, pp. 248–257). For a defense of voluntary combinations from a juristic point of view, see Cooley (1878, pp. 270–271). Also see Flint (1902) and Croly (1909, pp. 359–365) for the economic defenses.

<sup>32</sup> Does our discussion imply, as Dorfman (1949, p. 247) has charged, that “whatever is, is right”? We cannot enter into a discussion of the relation of economics to ethics at this point, but we can state briefly that our answer, pertaining to the free market, is a qualified Yes. Specifically, our statement would be: Given the ends on the value scales of individuals, as revealed by their real actions, the maximum satisfaction of those ends for every person is achieved only on the free market. Whether individuals have the “proper” ends or not is another question entirely and cannot be decided by economics.

cases, however, it is possible to vary the ratios of the factors. Thus, some might assume that the factor ratios in a firm producing, say, chemical dyes are inalterably fixed by the chemical formula of the dyes. This is a complete misconception of the problem, however. The point is that the variations can take place among the number of workers, the number of vats, the amount of land, management, etc., that will be used. The greater the development of the economy, the advance of technological knowledge, and the amount and variety of factors, the greater the opportunity for variability of factor ratios. It is doubtful, indeed, if there are any instances of production where the factor ratios are absolutely fixed.<sup>33</sup>

In Jones' case, given the factor prices, and the production functions available, it is clear that he will choose the combination 60X plus 76Y in order to attain the maximum output, and hence maximum revenue, from the original investment. In order to analyze more fully the problem of production combinations, the firms' production, and factor prices, we will assume a far greater range of production alternatives by extending Table 3. Suppose, for example, that with the price of Factor X at 4 oz. per unit, and the price of Factor Y at 10 oz. per unit, 1000 oz. will purchase the following alternative combinations of factors yielding the listed quantities of product:

**Table 8**

PRICE OF X EQUAL 4 OZ. PER UNIT	PRICE OF Y EQUAL 10 OZ. PER UNIT
1000 OUNCES WORTH OF ALTERNATIVE COMBINATIONS	UNITS OF PRODUCT
40X plus 84Y	96
45X plus 82Y	97
50X plus 80Y	100
55X plus 78Y	105
60X plus 76Y	110
65X plus 74Y	107
70X plus 72Y	105
75X plus 70Y	100
80X plus 68Y	96

These are the technological alternatives that can be accomplished with 1000 ounces' worth of factors. The maximum productivity is still at 60X plus 76Y, and this will still be chosen.

<sup>33</sup> See Stigler (1946, pp. 111–112) and Weiler (1952, p. 147ff).

Now, simply from the given factor prices, we can deduce the *rate of outlay substitution*, i.e., the rate at which one factor must be subtracted to compensate for the addition of another factor, so as to have a *constant outlay* (in this case, 1000 ounces). In the present case, 2 less units of Y have to be compensated by 5 additional units of X in order to arrive at the “constant outlay combination” of 1000 ounces. For example, starting from the first line, we know that 40 times 4 equals 160; 84 times 100 equals 840, and the sum equals 1000. If we add 5 units of X and subtract 2 units of Y to move to the second line, we know that 45 times 4 equals 180, 82 units of Y times 10 will give 820, to sum to 1000. It will be seen below algebraically below that the *rate of outlay substitution of one factor for another is equal to the ratio of the prices of the two factors*. Therefore, the rate of substitution of factor X for factor Y is 2/5, while the ratio of the money price of X to the money price of Y is 4/10, or 2/5. This ratio of 2/5 obtains regardless of what constant outlay is in view; whether it is 500 ounces or 700 or 1800 ounces.

As yet, we have not progressed far beyond the conclusion that Jones will produce at the (60X, 76Y) combination. However, this line of approach permits further insight into the activity of the firm, and the interplay of technological and financial factors. Let us now shift the focus of attention, and consider this type of question: assuming for the moment that Jones wishes to produce say, 105 units, what are the alternative combinations of factors which can produce them? The answer is a purely technological one, and in accordance with the technological knowledge available, Jones can draw up a list of alternative physical combinations that would yield this result. *So far*, in this sort of problem, no financial or monetary considerations have yet entered. We already know that 105 units can be produced by the combinations: (55X and 78Y), and (70X and 72Y). Let us say that the following are the combinations of the two factors that will yield 105 units of product:

Table 9

COMBINATIONS OF PRODUCING 105 UNITS OF PRODUCT	CHANGES IN FACTORS	
	PLUS X	MINUS Y
40X plus 100Y	-	-
45X plus 90Y	5	10
50X plus 84Y	5	6
55X plus 78Y	5	6
60X plus 75Y	5	3
65X plus 73Y	5	2
70X plus 72Y	5	1
75X plus 71Y	5	1

It is obvious, that in investigating any *constant product* combinations, an addition in the amount of one factor must be offset by a decrease in the quantity of the other, for the final product to be the same.<sup>34</sup> This can be deduced from the mere fact of these factors as instruments of production. It is *also* deducible from the very fact of the existence of factors. As more and more of one factor is added, and another factor is diminished, the added quantities must compensate less and less for losses in the other factor. Conversely, the more a factor is diminished, the greater will be the need to compensate by adding to another factor, to produce the same product. This is called the *imperfect substitutability of factors*. This imperfect substitutability is deducible from the very existence of human action. The very fact that consumer goods are scarce implies that factors of production are scarce, and the very fact that there *are* factors implies that there is more than one factor, since if there were only one factor it would be a consumer good and not a producers' good. The very fact that there is more

<sup>34</sup> It is obvious that, for each of these combinations, more of both factors will produce at least as much as, and probably more than, the particular product. Thus, if (40X; 100Y) can produce 105 units of product, so can (45X; 105Y). This follows from the nature of scarce goods and scarce factors. The use of the latter combination to produce 105 units, however, would clearly be senseless. The latter, obviously more expensive combination, would either produce more and the surplus thrown away—which would be a ridiculous procedure; or else would produce just as much, in which case the factors would still be wasted and needless money expended. In describing constant outlay combinations, therefore, we assume that those combinations which are obviously more expensive for each product—using *more of both factors*—will be discarded at once. The only question then comes from the partial substitutability of one factor for another.

than one factor, in turn, implies that the different factors are *not* perfectly substitutable for each other; otherwise, they would not be separate factors at all. The common example of such imperfect substitutability is that if labor were perfectly substitutable for land on a farm, constant production could be insured with a constantly diminishing area simply by adding to the number of workers, so that 100,000 workers in the space of a thimbleful of land could produce as much wheat as 100 workers on a hundred acres of land. The imperfect substitutability, however, applies to *all* factors of production in all cases, and not just to labor and land.

We may define the *marginal rate of production substitution* of one factor for another as the ratio of the amount of the second factor that can be diminished as a result of an increase in the first factor in order to yield a constant product. It is clear that the marginal rate is *diminishing* as the factor continues to be added. When the combinations change from (40X; 100Y) to (45X; 90Y), the marginal rate of substitution of X for Y is  $10/5$ , equal to 2; but later on in the proceedings, when the combination changes from (65X; 73Y) to (70X; 72Y) the marginal rate of substitution is  $1/5$ . What the actual rates are depend on the specific technological data, but economics does tell us that the *marginal rates of product substitution diminish*.

Suppose that Jones decided to produce 105 units of product; he could affect the production in each of the above different ways. Which alternative would he choose? Obviously he could choose that alternative that involved the least expense in money, and that would depend on the prices of the factors. *Technologically*, he would have no way to choose between the various combinations, because technologically all of them are equally effective. It is only the existence of factor money prices that permits the producer to choose among these combinations. With the original factor prices of 4 ounces of gold per unit for X, and 10 ounces for Y, the necessary money expenses he would incur for the production of 105 units of product would be as follows:

**Table 10**

COMBINATIONS PRODUCING 105 UNITS OF PRODUCT	
PRICE OF X EQUAL 4 OZ. PER UNIT	PRICE OF Y EQUAL 10 OZ. PER UNIT
COMBINATIONS	MONEY OUTLAY NECESSARY
40X plus 100Y	1160 ounces
45X plus 90Y	1080
50X plus 84Y	1040
55X plus 78Y	1000
60X plus 75Y	990
65X plus 73Y	990
70X plus 73Y	1000
75X plus 71Y	1010

In this particular example, Jones will choose either (60X, 75Y) or (65X, 73Y) either of which minimizes his required money outlay at 990 ounces. Given the amount of production at 105 units, the *minimum outlay combination of factors* will be the one chosen.

Some writers discuss the activity of the firm as if this were the most appropriate manner of analysis, as if a quantity of product is arbitrarily set, and the producer looks for the minimum outlay combination of factors to produce it. In reality, however, it is clear that the beginning point is the decision to invest a certain amount of money in factors, and the attempt to choose a combination so as to maximize the productivity of the factors, as we have seen above. The present analysis is subsidiary and supplementary to the previous one, but it is useful to revealing the relationship between technological and monetary elements.

Reverting back to the 1000 ounces' worth of combinations depicted in Table 8 we saw that Jones chose that combination which maximized production for 1000 ounces, at 110 units of product (60X and 76Y). We shall now demonstrate that this combination is also the minimum outlay combination of all the factor combinations that could produce 110 units of product. The demonstration of this truth is simple. In the first place, we may rule out those combinations which require less of *each* factor, such as (55X; 74Y). We have seen above that obviously wasteful combinations are discarded immediately; therefore, if (60X; 76Y) are *required* to produce 110 units, there could not be another constant product combination with less of each factor that could also produce 110 units. This follows from the very nature of scarce goods and scarce



factors. Therefore, the possible combination which might be able to produce 110 units for less outlay would have to be a constant product combination schedule such as listed above in Table 10 for 105 units, with more of one factor compensating for the subtraction of another. Now suppose that this supposed minimum outlay combination for 110 units has a quantity of X of more than 60, and a quantity of X of less than 76. But to be cheaper, the combination would have to have less of one factor—given the other—than the combination on the 1000-ounce constant outlay schedule. But for each addition of X (X is assumed for convenience to only change in blocks of 5 units, but this does not alter the fundamental result), the constant outlay combination produces *less* units of product: 107, 105, 100, etc. In order to be cheaper for any given X, the units of Y would have to be even less; and it is manifestly impossible for such a combination to produce as much as these amounts, let alone 110 units. Symmetrically, the same is true for combinations with less X and more Y. For constant outlay, each of the possible alternative combinations produces less than 110 units; to be cheaper than each of these, any other combination could only produce still less, and could not produce 110 units.

*It is therefore universally true that the maximum product combination for any given outlay of money is also the minimum outlay combination for that particular physical product.*

Thus, we see that, on the free market, each firm, in maximizing the product that can be produced from any given outlay, is also engaged in reducing the money outlay required for each product. Given the prices of the factors, there is only one way to increase his money income from the investment: to find a factor combination that will be the most productive of physical product, and that, in consequence, will be the cheapest method of producing that amount. This analysis enables us to see clearly the different roles played in production by technological and by economic considerations. Technological considerations yield knowledge of the various series of constant product schedules that would be available. At any given product that could possibly be considered, the prospective producer could command a series of tabulations that would yield him the production functions and combinations that could produce it. This would be the contribution of technology. But this knowledge by itself would tell the entrepreneur next to nothing about the crucial

questions in the whole problem of producers' activity: should he enter the business at all? How much should he invest? Which of the alternative constant product combinations should he choose? The answers to these vital questions can only be provided by *economic*, by *financial*, as opposed to *technologic*, considerations. Specifically, it is the establishment of money on the market which enables the businessman to make these decisions in a rational and intelligible manner. The prospective producer will invest in that line of business, in that particular firm, which will maximize his expected money income, over any period of time that he chooses. This rule, as we have explained before, is modified when psychic nonmonetary matters intervene, thus obeying the general, universal rule that in *all* action the actor maximizes his expected psychic income. Setting aside cases of conflict between money and psychic income, which have already been noted, investors drive to maximize their money income. They will enter that line of business which promises the greatest return on their investment, they will invest in accordance with their expected return balanced by their time preference, and they will produce that combination which requires the least monetary expenditure for the particular product. And to accomplish this they will sell their products for as much as they can—which we have seen will quickly tend to be the competitive market price; will try to buy their factors for as little as they can—which we will see below will be the competitive price; and will try to increase the physical productivity which can be obtained from any given set of factors, i.e., increase their *productive efficiency* to the utmost. But it is clear that none of these decisions could be made if the investor did not have the various price data and estimates to guide him in his choices. And it is only because the money commodity has become the general medium of exchange that such markets, and such price and income comparisons and estimates, are possible.<sup>35</sup> And these

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<sup>35</sup> The absurdity of the "technocratic fallacy" here becomes obvious. The technocratic charge is that business conducts "production for profit" instead of "production for use," and that the latter would prevail if engineers were granted dictatorial control over the productive system. It is clear from the discussion that technology cannot solve the production problem, and that therefore "production for (money) profit" is the only possible method of production beyond the very primitive level. Technology by itself could neither provide a guide to "maximizing production" nor to determining *what* should be produced. And it is also evident that business on the market takes account of the technological factor as much as is necessarily

price and income calculations and estimates are most emphatically *money* estimates; they can in no way be reduced to, or considered equivalent to, barter.

We have already demonstrated that the maximum product combination for any given outlay of money is also the minimum outlay combination for that particular physical product. It is therefore also true that every minimum outlay combination is the maximum product for that outlay. Let us then take the case of an investor with 990 ounces of gold to invest. His maximum product combination will produce 105 units, at either the combination (65X; 73Y) or (70X; 72Y), which are also the minimum outlay combinations for 105 units. We may see above the behavior of the rate of product substitution as the number of units of factors change; the rate of product substitution of X for Y changes from 2, to  $6/5$ , to  $3/5$ , etc. We notice that the minimum outlay combination is reached at the approximate point where the rate of product substitution is equal to  $2/5$ ; i.e. is equal to the rate of outlay substitution, which, given the prices, is constant throughout at  $2/5$ . If the rate of product substitution is appreciably less than or more than the rate of outlay substitution, it will pay for the producer to shift to other alternatives until the two rates are approximately equal.

Thus, there is a tendency for the firm to produce at such a rate and such a way that the *rate of product substitution between factors is equal to the rate of outlay substitution between them*. And, since as we have seen, the rate of outlay substitution always equals the ratio of the prices of the factors, the firm will always tend to produce so that the *rate of product substitution between the factors equals the ratio of their money prices*.<sup>36</sup>

In the particular case of Jones, he will tend to produce in such a way that the rate of substitution between the two factors is  $2/5$ .

Actually, this analysis does not help us in the specific determination of the productive combination that will be chosen: this will

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possible. It should also be clear that production for profit is necessarily production for "use." There is no reason to produce any good except to supply the demand for its use by consumers, whether the consumer is other persons or the producer himself (in the more primitive production situations). All production is for use.

<sup>36</sup> *Editor's footnote*: See below (pp. 535–37) for Rothbard's analysis when more than 2 factors are involved.

always be given by the requirement of maximum product per outlay (which will be the minimum outlay for that product). On the contrary, the two ratios will not by means always be equal, because the range of production alternatives available may not be sufficient. If there are only a few production alternatives, then there cannot be the small steps which are necessary to allow equality of rates, or meaningful discussion of such rates. Thus, if only two combinations can produce 105 units of product: namely, (45X; 90Y), and (65X; 73Y), Jones will choose the minimum outlay combination, but the "rate of product substitution" between such distant combinations will be  $17/20$ . However, the rate will still be the nearest approach possible to  $2/5$ , and in that sense we may still say that the tendency will be to approach that rate. The value of the concepts of rate of substitution will fully emerge as essential to an analysis of the prices of factors of production, and, specifically, the demand schedules for the producers for these factors.

### The Product and Outlay Schedules of the Firm-Mathematical Analysis

At this point it is now time to turn to an algebraic and geometric presentation of the above analysis for two factors.

The definition of a constant outlay schedule is that the total sum of money expended be constant, whatever that sum may be. In other words, for two factors, the sum of the amount of money spent on factor X plus the sum of the amount spent on factor Y is always equal. The amount of money spent on each factor, in turn, is always equal to the price of that factor times the total quantity of the factor that is purchased. Thus, if the price is 10 ounces per unit, and 5 units are bought, the total sum of money expended is 50 ounces. Therefore, for a constant outlay schedule, if  $p_x$  is the money-price of factor X;  $p_y$  is the money-price of factor Y,  $a$  is the number of units of X bought at any given point;  $b$  is the number of units of Y bought at any given point; and  $k$  is any constant sum of money outlay; then:

$$(1) \quad ap_x + bp_y = k$$

This equation defines any given point on any constant outlay curve for two factors. Now, suppose that we wish to move from

this point to any other point on the constant outlay curve. The amount of X then becomes  $a+m$ , while the amount of Y, which diminishes in compensation, becomes  $b-n$ . At this point then:

$$(2) \quad (a+m)p_x + (b-n)p_y = k$$

Now, we may multiply out in equation (2), and substitute from equation (1). Then:

$$ap_x + mp_x + bp_y - np_y = k$$

$$ap_x + mp_x + bp_y - np_y = ap_x + bp_y$$

$$mp_x - np_y = 0$$

$$mp_x = np_y$$

$$(3) \quad n/m = p_x/p_y$$

This gives us proof of the statement in the text that the *rate of outlay substitution between two factors is equal to the ratio of the prices of the factors*. As X increases, the ratio of the decline in Y due to the increase in X needed to maintain the same total cost is equal to the ratio of the prices of X to Y.

Returning to equation (1), let us solve for  $b$ , the quantity of Y at any given point:

$$bp_y = k - ap_x$$

$$b = (k - ap_x)/p_y$$

$$(4) \quad b = k/p_y - a(p_x/p_y)$$

Now, let us solve equation (1) for those points where  $a$  is equal to zero, i.e., there are zero quantities of X. Then:

$$0 + bp_y = k$$

$$(5) \quad b = k/p_y$$

This value of  $b$ , at the point where  $a$  equals zero, may be termed  $b_0$ .

Now, we may substitute (5) into (4), and the equation becomes:

$$(6) \quad b = b_0 - a(p_x/p_y)$$

Now, we can see that equation (6) is directly applicable to the case of Jones' 1000 ounces.  $b$  refers to the values of Y at each point, and therefore may be written as Y. Similarly,  $a$  refers to the values of X and can be written as X. The ratio of  $p_x/p_y$  is equal to 4/10 or 2/5.  $b_0$  is the value of Y when X is zero; it is equal to the constant outlay (1000) divided by the price of Y (10)—this equals 100.

Therefore, for Jones' condition of 1000 ounces and the given prices of the factors:

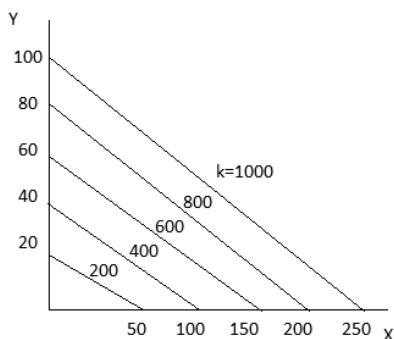
$$(7) \quad Y=100-(2/5)X$$

This is Jones' constant outlay curve for 1000 ounces.

All constant outlay curves for two factors have the shape of a straight line. The slope of the line is negative, and is the ratio of the prices of the two factors, which is also equal to the rate of outlay substitution between them. When  $X$  is zero (even though such a choice will never arise in practice),  $Y$  is equal to the constant outlay sum divided by the price of  $X$ ; and when  $Y$  is zero, it is easily seen that the value of  $X$  is the constant outlay divided by the price of  $Y$ .

This algebraic analysis enables us to establish a whole series of constant outlay curves for different values of  $k$  for different constant outlays. Whatever the constant outlay, the curve can be determined: it again will be of the same slope as the other curves, while the difference will be in its position. Thus, say the constant outlay is 800 ounces of gold. In this equation, when  $X$  is zero,  $Y$  will be equal to  $800/10$ , or 80. When  $Y$  is zero,  $X$  will be equal to  $800/4$ , or 200. And the constant outlay curve for 800 will connect the two points.

In this way, we can establish a whole *family* of constant outlay curves. All that is needed is the knowledge of the prices of the two factors, which are assumed to be given; and then for each possible constant outlay, the combinations of the factors can be determined. Some of the members of the family of constant outlay curves in Jones' case are as follows:

**Figure 3**

Now, it is important to realize that the prices of the factors are the sole determinants of the family of constant outlay curves. These prices are always approaching uniformity on the market. Therefore, the constant outlay curves are not only applicable to Jones; *the very same ones are applicable to all producers who use these two factors*. Thus, the given set of constant outlay curves and the given rates of outlay substitution are the same for all the firms producing with these factors, not just for one firm alone. At any one time, then, the family of constant outlay curves for any two factors is the same for all producers on the market. This family of constant outlay curves is a series of regular, similarly sloped lines, easily determined by anyone once the prices are given, and the same for all producers.

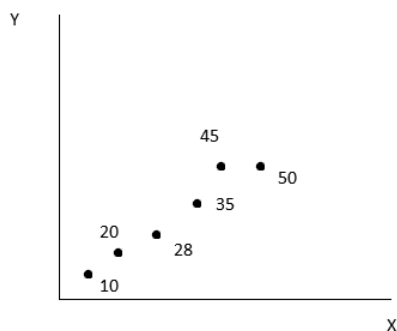
The *production function*, on the other hand, is *not* a given data to all producers. The production function is the estimate of the maximum quantity that could be produced from each combination of factors. Although this is technological rather than catallactic knowledge, it by no means follows that it is "given" to all prospective producers. This knowledge is not simply of engineering formulae; it involves numerous minute details of individual skills, correctness of estimates, judgment of materials and location, etc.<sup>37</sup> It is far more likely that each individual's production function differs than that it is the same, even with

<sup>37</sup> On the vital importance of knowledge of "particular circumstances of time and place" see Hayek (1945, pp. 77–91).

the same product and the same factors. As we will see below, this likelihood is made a certainty when there are many more than 2 factors of production, and, when, as is almost always the case, some of these factors are unique (*specific*), in some ways to the individual firm. Production functions, therefore, are irregular, and differ from one producer to another. Furthermore, they are not “objectively” given; they are only estimates in men’s minds.

What is the shape of the production function? Some might be of fixed proportions, i.e. only one combination of factors can produce each possible quantity of output. We have seen in the text that this is practically never the case, but if it were, a diagram would be as follows: the quantity of one factor on the horizontal axis (say X), and the quantity of the other factor on the vertical axis (say Y):

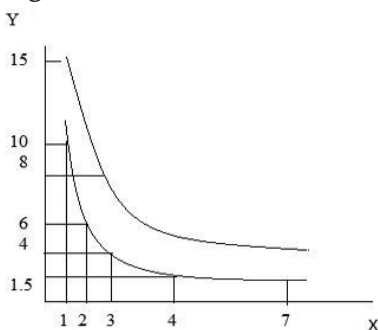
**Figure 4**



The numbers designate the quantity of output yielded at the various points. These quantities can be of any amount, but they must increase as the quantities of X and Y increase, by the nature of production.

With the existence of varying proportions of factors, so that there are alternative factor combinations for each quantity of product, we can draw up *constant product schedules*, and therefore *constant product curves*. If we assume that there are many possible combinations for each possible product, then we may ask the question: suppose for example that 1 unit of X and 10 units of Y combine to produce 10 units of product:



**Figure 5**

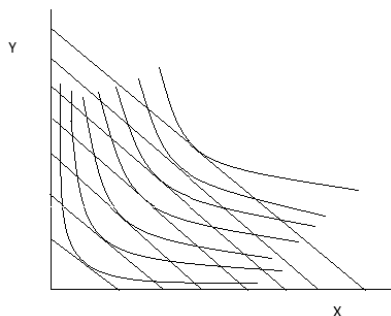
At this combination (1X; 10Y) there is very little of X and a great deal of Y. Now suppose that X is increased to 2; what will be the loss in Y to compensate and maintain production at 10 units? We cannot know the answer except for the concrete case, but it is clear that since the two factors are imperfect substitutes for each other by their very nature, where the quantity of X is low a slight addition of it will compensate for a big loss in Y to maintain constant production. Let us say that the constant production combination is (2X; 6Y). In the diagram we may connect the two points for the sake of convenience. Now, what if X is increased to 3 units? Since X has been increased and Y has diminished, it will now take a lesser loss of Y to compensate for an increase of X. Thus, the point (3X; 4Y) might be on the constant product curve. Between the first and second points, the loss of Y was 4 and the gain of X was 1 unit; the ratio of the two is 4/1, or 4. From the second to the third point, Y lost 2 and X gained 1; the ratio was 2. This ratio is the *marginal rate of product substitution* between the factors, or the rate of substitution of X for Y. It is evident that as X increases, this rate *diminishes*. As X increases and Y diminishes, more and more gain of X is needed to substitute for less and less loss of Y. Thus, the succeeding points on the constant product curve above may be (4X; 3Y), (7X; 1.5Y), with marginal rates of substitution at those points 1 and .5 respectively.

We have arrived at one constant product curve. At each constant product, it is evident that there will be a similar shape, in that the marginal rate of substitution diminishes throughout. However, it is obvious from the nature of production that the larger product calls

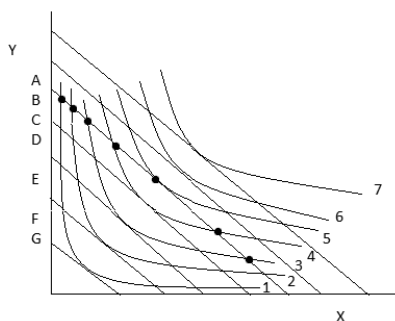
forth a larger quantity of both factors at each point. Thus, suppose that we are interested in a constant product curve at 20 units. Suppose X is 1 unit; it is obvious that Y will have to be more than 10 in order to produce these 20 units. What amount this will be we do not know; we only know it will be greater. Let us suppose that the point will be (1X; 15Y). We can now draw in a set of succeeding points, assuming only a diminishing marginal rate of substitution. It is clear that all these points will be above, or to the right of, the corresponding points on the lower constant product line.

Thus, we see that there is a *family* of curves for each constant product. The higher products are above (to the right of) the lower ones. The property of diminishing rates of marginal substitution make these curves tend to be convex to the origin. As the product gets lower and lower, the curves get closer to the origin, finally reaching that point itself at zero product; since zero quantities of factors yields zero product. On the other hand, the curves never cross the X or Y axes. Since both factors are assumed to be necessary ones for the production of the product, and hence the imperfect substitutability of the factors, no increase in the one factor, however great, can compensate for the loss of the whole supply of the other. A common classical example is the case of a wheat farm where no amount of labor, however great, can produce wheat when there is no land available; on the other hand, no amount of acreage can produce wheat without any labor. The point applies, however, to all types of production.

The point has come when this information can be consolidated. For any process of production using two factors, there are two families of curves: constant outlay curves, and constant product curves. Constant outlay curves hold for all producers who use the two factors, since they depend solely on the market prices of the factors. Constant product curves are estimates by the enterprising producers, and will differ from firm to firm. While the former are regular straight lines determined by the ratio of prices and total outlay in view, the latter are irregularly spaced, their only condition being the diminishing rate of substitution between the factors. The two families of curves will be somewhat as follows:

**Figure 6**

As we have seen in the text, at any given outlay, the actor will produce at the maximum product. What does this mean in graphic terms? Let us take, as in the figure below, a typical constant outlay line, and start at the top.

**Figure 7**

This diagram has seven constant product curves, marked 1 to 7, in ascending order of the size of the product. As the constant outlay curve begins at the top it intersects constant product curve 1 at point A. At point A, that combination of factors X and Y yield a total product of order 1. Proceeding further along the constant outlay line, (further in the sense of increasing X and decreasing Y), we intersect point B, at which point X the factors will produce products of size 2. So as we proceed along the constant outlay line, we arrive at higher and higher products—at curves further and

further to the right. Finally, we arrive at the point with the highest size product, and the point of production that will be chosen with this outlay. This is point E of size 5, the point of tangency between the constant outlay line and the highest constant product curve obtainable with that outlay. Beyond this point, the constant outlay line again intersects the lower-sized product curves.

For any constant outlay line then, the entrepreneur will strive to act so that his combination of factors will be at a point tangent to the constant product curve. Of course, the entrepreneur in practice does not need to know about such tangencies and curves; he is only concerned with maximizing his output for the given outlay. But we have seen that mathematically this is implied by such maximum output. It must be cautioned that in practice, the constant production curves are a series of dots, of discrete points, rather than continuous lines. A continuous curved line implies that the distance between the points of decision by the actor are infinitely small; actually, this can never be the case—human action of necessity deals with discrete objects and distances. However, in the realistic case, the choice of the maximum product is the closest approximation to such tangency that could be, or should be, achieved.

It is clear that this elaborate analysis of families of curves and tangencies is of no particular aid in this problem; however, it provides analytic tools that will be handy in later analyses of the pricing of factors of production.<sup>38</sup> For one thing, we know geometrically that the marginal rate of product substitution, which is always diminishing, is equal to the *slope* of the constant product curve, when the latter is a continuous curve. At a point such as E, of tangency with the constant outlay line, elementary geometry tells us that the slopes of the curve and the line are equal. The slope of the line equals the marginal rate of outlay substitution, which is constant throughout and equal to the ratio of the factor prices, and therefore, *at the point of tangency, the marginal rate of outlay substitution equals the marginal rate of production substitution*. Under real conditions, this is only an approximation rather than an actual fact, but this proves the assertion in the text that the producer sets

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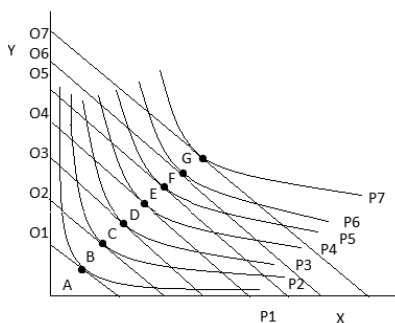
<sup>38</sup> *Editor's footnote:* This analysis of factor pricing was planned to be in a later section, however it was never written because Rothbard changed his mind on the usefulness of using this approach. See Newman (2015) for more information.

his production so that these two marginal rates tend to be equal. And this means, furthermore that, for each producer's decision, *the marginal rate of product substitution between the two factors tends to equal the ratio of their prices.*

This equality is only an approximation, since for the universal case of more or less discrete points; the point of decision will only be the nearest approach to such equality. However, because of the divisibility of money, the constant outlay curve tends to be (although never will be) a *continuous* line, while the more advanced the production structure and the more complex the alternative combinations, the nearer will the constant production schedules approach being continuous curves. The more highly developed the market economy, therefore, the greater will be the tendency to approach equality between the ratio of the prices of factors and the marginal rates of product substitution between them.

At each possible constant outlay line, therefore, the producer will pick his preferred combination of factors at the point of maximum output, or approximate tangency to a constant product curve. The higher the amount of money to be spent, and therefore the higher the constant outlay line, the higher and the further to the right will be the constant product curve, and the various points of tangency. Thus, a typical family of constant product and outlay curves may have points of tangency as follows.

**Figure 8**



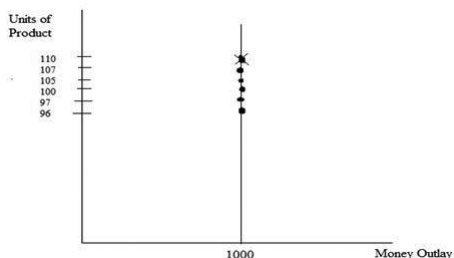
In this figure, we depict constant product curves, P1, P2, ....P7, and constant outlay lines, O1, O2, ... O7. They have points of

tangency at A, B, C, D, E, F, and G. The zero point is also a point of tangency, at zero input of factors. The points of tangency enable to producer to determine his *maximum product outlay curve*. For at any given outlay, the tangency points will yield the size of the maximum constant product curve. Thus, O1 will be tangent to P1 at point A. The same is true to every other alternative. Thus, the decision points A, B, C, etc., reveal to the producer: 1) the maximum product for each outlay, and 2) the best combination of factors for this production.

#### SECTION 4: THE OUTPUT AND INVESTMENT DECISION OF THE PRODUCER

We must now return to Jones and his outlay of 1000 ounces. We have already seen that, given an investment of 1000 ounces, Jones will select one combination which will yield him a maximum product. Out of a group of alternative combinations, he will select the best combination. We could diagram this situation as follows:

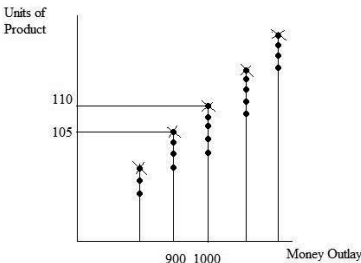
**Figure 9**



This diagram shows that, at an outlay of 1000 ounces of money, different alternative combinations could yield various amounts of product, namely 110, 107, 105, 100, 97, and 96, as listed in Table 8 above. The highest production, or the top dot on the line, will be the one that is chosen, and the combination of factors will be picked accordingly. This dot is crossed to represent the product of the combination that will be chosen. The same sort of process will be undertaken regardless of the amount that the producer has to invest. Thus, if he has 990 ounces to invest, he will choose the combination yielding him the maximum product, at 105 units.

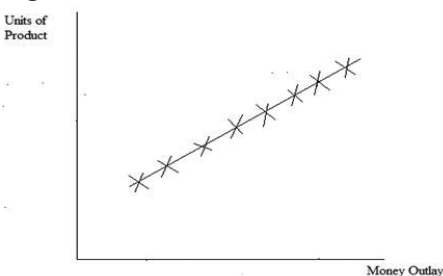
At each possible investment of money outlay, the producer will choose that factor combination which yields him the maximum product. Thus, the diagram of such a situation will be as follows:

**Figure 10**



For each straight line, the top crossed dot will be selected. Thus, we see a series of possible vertical straight lines, representing the constant outlay, with units of product on the vertical axis, and money outlay on the horizontal axis. Each vertical straight line is a constant outlay line, and the crossed top dot is the maximum product that would be selected in each case. The crossed dots can be joined for convenience to give us a connected line of potential products for each money outlay:

**Figure 11**



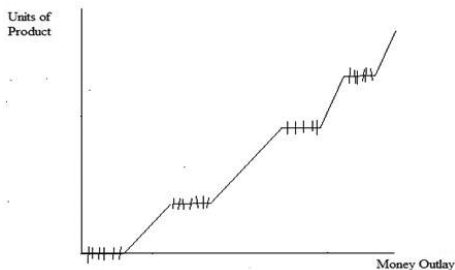
Each producer will try to determine the various points on this product outlay curve. As we have seen, he estimates the various alternative factor combinations for producing each particular quantity of product, and using these and the prices of the factors, the producer will be able to judge his constant outlay combinations,

and which combination will yield him the maximum product for each outlay. This will give him the series of crossed top dots for each outlay, and yield him the above diagram, which represents the *maximum product schedule* for each outlay.

What can economics say about the shape of this important curve? In the first place, it is obvious that a *greater outlay can never produce a lower maximum product*. We have seen above that the 1000 ounces will yield a maximum product of 110 units. A greater outlay, say 1050 ounces, cannot produce a maximum product of *less* than 110 units. This is obvious from the very nature of production and of factors. At the very least, the 110 units could be produced, even if the excess factors purchased with the other 50 ounces cannot be used. Thus, the maximum product schedule *always* slopes upward or remains horizontal when the money outlay increases. It never slopes downward.

Another characteristic of the maximum product outlay curve is an obvious one: it must pass through the zero point, since no expenditures will obviously result in no production. A typical product outlay curve might therefore look like this:

**Figure 12**



We notice that we may conveniently omit the crossed dots from the final connected line. From the line, we may read off the maximum product which would be yielded by the expenditure of any given outlay.

Without discussing at this moment when the curve is likely to be horizontal, it is obvious that no producer knowing the situation will pick any outlay along the horizontal except the cheapest: i.e., the point on the extreme left of each horizontal line. Thus, if 1000



ounces of outlay will produce 110 units maximum and 1050 ounces of outlay will also produce 110 units maximum, it is clear that there will be no hesitation in choosing the 1000 ounces, and not the more expensive outlays. Any other decision would be a pure waste of money by the producer. Therefore, without yet fully answering how much money will the producer decide to invest, we can immediately answer that he will never decide to invest that amount which lies along a horizontal line. Thus, if 1000 ounces will produce 110 units, and all greater expenditures up to 1100 ounces will only produce 110 units (with expenditures of over 1100 ounces yielding more units), we can be sure that Jones will not decide to invest a sum of between 1001 and 1100 ounces. He will either invest more or less. In Figure 12 above, we cross the horizontal lines with vertical marks to designate those sums that are ruled out from the producer's decision.

So far, from Figure 10 we know two definite points on Jones' maximum product outlay curve: 1000 ounces netting him 110 units of product and therefore 1100 ounces of money revenue; 990 ounces netting him 105 units of product and therefore 1050 units of revenue (selling prices are assumed to be 10 ounces per unit). In the former case, he makes a net money income of 100 ounces, equaling 10% of his outlay; in the latter case, he makes 60 ounces net, equaling about 6% of his outlay. Now, we must directly pursue the question of how much Jones, or any other producer, will decide to invest in any particular line of production, and how much he will decide to produce. It is clear that the determining influences are the expected net income, its amount and its percentage. Their exact nature, however, must wait on a more elaborate explanation of the relation between outlay, product, and revenue, in table and figure.

Before finally analyzing which point on the maximum product outlay curve will be chosen, it is necessary to extend the analysis to remove the restrictive assumption of 2 factors. What will be the situation with  $n$  number of factors? This is a vital consideration, since it is very rare to find an actual case where only two factors are used to produce any given product.

If there are  $n$  number of factors, with market prices assumed to be given, the producer's investment decision turns out to be almost identical with the case of two factors. The situation may not be diagrammed as in the case of two factors, but the greater mathematical difficulties in the description of the case of  $n$  factors does

not by any means signify difficulty for the producer. The producer is, again, confronted with a complex of technological alternatives, for producing various amounts of output. Now, the production functions will be combinations of various quantities of factors X, Y, Z, etc. Once again, a constant outlay will enable a certain set of factors to be chosen, in accordance with their market prices. The producer may draw up the list of alternative factor combinations and corresponding outputs, plus a list of factor combinations that can possibly be bought at each given outlay. And, once again, the producer will choose the maximum product combination for each outlay. The fact that there are now many factors does not change the desire of the producer to maximize his product for each possible outlay. The shape of the maximum product curve does not change; it is still true that a greater outlay cannot yield a lower product, and that those greater outlays which will not increase product will not be chosen. It is evident that the analysis based on the maximum product curve is not changed by permitting any number of factors.

What of the interrelationships between the factors and the factor combinations that will be chosen as points on the maximum product curve? Here, it is clear that the situation, with  $n$  factors, is more complicated. It is, however, essentially the same, and does not materially alter the analysis. It is still true that we can represent the producer as adjusting, and substituting, all of his factors for each other. Each factor is an imperfect substitute for each other factor, the degrees of imperfection varying with the data of each concrete case. There can be no perfect substitutes for different factors, and there are few or no cases of absolute fixed proportions between all factors, so that, within limits, more of one factor can be substituted for less of the others. The marginal rate of substitution *between any two factors* diminishes as one factor increases. The rate of outlay substitution *between any two factors* is equal to the ratio of their prices and the producer will still tend to approximately equalize the rate of outlay substitution and the rate of product substitution between any two factors. Even if ten factors are involved, if, *for any two factors*, for example, the rate of product substitution is greater than the rate of outlay substitution between them, it will pay the producer to keep substituting, say X for Z, until the rates are approximately equal. For this is equivalent to saying that substituting more X for less Z at constant outlay will yield a greater total

product. Conversely, if the rate of product substitution is less than the rate of outlay substitution, it will pay to use less of X and more of Z until the rates are equal.

Therefore, for a case of  $n$  factors, *the producer will always tend to produce at the point where the marginal rate of substitution for any two factors is equal to the ratio of their prices*. There is a simultaneous balancing and adjusting in order to find the maximum product for each outlay. It must be emphasized that there is still one maximum product for each outlay, that there is still an array of different products for the alternative combinations at each outlay. Out of this array, the producer selects the maximum product combination; the number of factors involved does not change this.

Now let us turn to the final production decision of the producer who has arrived at his maximum product schedule. How much does he decide to invest and to produce? For convenience, let us take the case of another producer, Smith, [who can invest in a different firm that produces Product P]. In addition to his maximum product outlay schedule, he estimates his future selling price, and this enables him to estimate his revenue outlay schedule. Thus, assume that his maximum product outlay schedule is as follows (assuming, for convenience, steps of 10 ounces of money outlay):

**Table 11**

SMITH—PRODUCT P	
TOTAL MONEY OUTLAY (GOLD OUNCES)	TOTAL MAXIMUM PRODUCT
0	0
10	0
20	10
30	18
40	28
50	40
60	50
70	55
80	55
90	65
100	70

This product outlay schedule is shown below in Figure 13.

Now Smith estimates the future selling price of his product. It is quite possible that, as Smith's prospective product decreases,

his selling price will rise. This estimate depends on his idea of the market demand schedule for his individual product.

At this point we must broaden slightly our application of the concept of monopoly and competitive price. A monopoly price situation will occur *not only* if less produced from a given money investment yields a greater profit, but also if a lower money outlay, and its lower product, yields a greater profit because of the higher selling price. It is clear, however, that this does not materially change our analysis of competitive and monopoly price. In the previous section we assumed a given investment and a lower than maximum product; here, a lower outlay can also yield the same goal of a lower product, and without the waste of the former. This, then, is the actual case. If the demand for the firm's product is inelastic, so that a lower product, thrown as stock on the market, will so raise the price that money revenue is increased, the firm acts as a "monopolist" to cut back production and outlay to the lower figure. Thus, suppose that at a money outlay of 60 ounces, and at a maximum product of 50 units, as in Table 11, the price of the product per unit is 2 ounces. The money revenue, then, will be 100 ounces, for a net income of 40 ounces. If the demand schedule for the firm's product is inelastic above this range, then, for example, a sale of 10 units will raise the price to 20 ounces, and a total revenue of 200 ounces. Now obviously, Smith will not invest 60 ounces, produce 50 units, and then throw 40 of these units away in order to acquire 200 ounces. We assumed this above, because we were dealing with the assumption that money outlay is fixed at a certain amount. Obviously, he will rather choose the minimum money outlay required to produce 10 units, i.e. 20 ounces. There will therefore be no need for him to throw away 40 units, and he will save 40 ounces which he would have needlessly expended.

There is therefore no change in our analysis of the demand curve for the firm, and its relation to the incidence of monopoly price. This curve depends only on the *quantity sold*, and bears no relation to how this quantity is produced. The change in our analysis of the monopolist is, that even *he* will choose the maximum product for the money outlay that he spends. Even the monopolist will choose a point on his maximum product outlay schedule, and therefore even he strives to gain further profits producing whatever units he makes as efficiently and as productively as possible. If his demand

curve is inelastic, he will simply reduce his money outlay from the amount that he would have invested under a competitive price. The reduction of his outlay will reduce his product to the most profitable amount.

On the other hand, there is no reason to restrict the definition of competitive price to a situation where the amount the firm produces has absolutely no effect on the price. It is clear that a change in the amount a firm produces always *does* change the market stock of the product, and therefore tends to affect the price. It may well be, of course, that, within the relevant range; the action of the firm is not large enough in relation to the product as a whole, to change the market price. There is no need, however, to restrict the discussion of competition to this limited case. The only criterion is that the demand curve is not such as to raise revenue for a restriction of output to a price above the competitive one.

The following is a tabulation of Smith's productive situation, [and the firm producing P that he can invest in], with the above total outlay and total product schedules, plus an *expected selling price* schedule for each quantity produced and sold of P. The selling price declines as the stock increases, but are not such as to yield a monopoly price situation (i.e. an increased total product for the firm does not lower its gross revenue). From these three columns we can deduce three others, which are also presented: *expected total money revenue* (which equals expected selling price times product); *net money income* (which equals money revenue minus money outlay); and *percentage net money income* (which equals net money income as a percentage of money outlay). These three schedules are derived from the primary three:

Table 12

TOTAL OUTLAY	TOTAL PRODUCT	EXP. PRICE	EXP. REVENUE	EXP. NET INCOME	EXP. RATE OF NET INCOME %
(1)	(2)	(3)	(4)	(5)	(6)
			(=2*3)	(=4-1)	(=5/1)
0	0	–	0	0	0
10	0	–	0	-10	negative
20	10	2	20	0	0
30	18	1.8	22.4	-7.6	negative
40	28	1.7	47.6	7.6	19
50	40	1.6	64	14	28
60	50	1.5	75	15	25
70	55	1.5	83	13	18.5
80	55	1.5	83	3	3.75
90	65	1.4	91	1	1.1
100	70	1.4	98	-2	negative

Figure 13

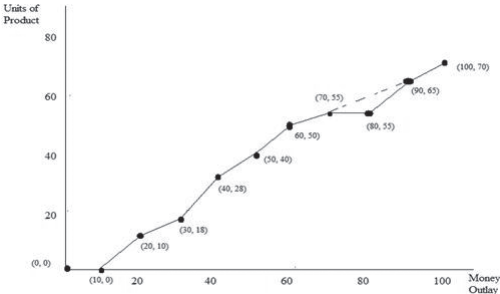
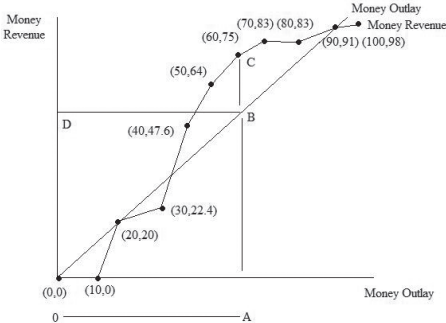


Figure 14



Figures 13 and 14 illustrate Table 12. In Figure 13, total units of product are plotted on the vertical axis, as against corresponding money outlay on the horizontal axis. The figure reveals the amount of maximum total product that could and would be produced at different amounts of monetary outlay. The result is the product outlay curve, which is read vertically. There is a dotted line bypassing the point at the money outlay of 80, because here the product curve is horizontal, and no producer would consider such a waste of his resources as to produce at such a point.

In Figure 14, the product schedule is multiplied by the expected selling price at each quantity of product, to yield the expected total revenue for each point of outlay. This yields the total revenue schedule of Column 4. In this figure, money revenue is plotted on the vertical axis, and money outlay on the horizontal axis, the result yielding a *revenue outlay curve*, which expresses the expected revenues for each amount of invested money outlay.

It is clear that there is a direct resemblance between the shape of the revenue and product curves, since the former is derived from the latter. At a 45 degree angle between the two axes, there is a diagonal straight line. Since the units on each axis of Figure 14 are exactly the same (money in gold ounces), with the same distances, such a 45 degree line can also (vertically) represent *money outlay* on the diagram. Thus, let us take a money outlay of 60 ounces. This is given by the distance OA on the horizontal axis. However, if we read vertically upwards from point A, we find that the distance between A and the intersection point B on the *money outlay line* is also precisely 60 ounces. Therefore, AB, and other such vertical distances, may be read as equaling money outlay on the chart.

This device makes figure reading a very easy task. At the outlay of 60 ounces, the money outlay equals AB. What is the money revenue? This can be read off from the revenue curve, and will equal AC, or 75 ounces. This permits a clear portrayal of *net income*, which will be the difference, or the vertical line BC.

Similarly, the expected net income can be read at any desired point. It becomes evident, for example, that there is a *negative* money income at such outlays as 10 ounces, 30 ounces, or 100 ounces.

Such a chart also permits the facile portrayal of the expected *percentage net income*, or *rate of net income*. This will equal the net

income divided by the money outlay. On the figure, for example, it will be the ratio of BC divided by AB, or alternatively, BC divided by DB.

Now, armed with this portrayal of the alternatives and their expected consequences, what amount [of P] will Smith decide to produce [in this firm]? It is obvious that this problem is a central one in the analysis of productive activity on the market. For the question is applicable to all producers, whatever the product or whoever the individual involved.

Smith has a list of alternative courses of action from an investment of 0 to 100 ounces. It is clear that he will not decide on 80 ounces, since this will be a wasteful act with 70 ounces able to produce the same number of units. It is also clear that he will not choose to invest: 10 ounces, 30 ounces, or 90 ounces, since he will suffer monetary loss from such investments. He will not invest 20 ounces, where there would be no income from his investment. Which alternative will he choose of the ones remaining?

Most writers on this important subject have gone astray in their answers to this question. They look at the schedules and simply assume that every producer is interested in "maximum money profits," or, in better terminology, "maximum net income." Almost invariably, they would conclude in Smith's case that Smith would choose a money outlay of 60, and the expected money revenue of 75, since this yields the highest expected net income, i.e. 15 ounces. This is greater than any of the other alternatives. At first sight, this assumption seems plausible. Further analysis, however, reveals the unsoundness of such a simple assumption. It is true that if Smith invests 60 ounces, he expects a return of 75, and a net income of 15. Yet compare this with the alternative of investing 50 ounces and obtaining a net income of 14. In the former case, his *percentage net income*, [or rate of net income], is 25%, while in the latter case it is greater, 28%. Isn't it plausible that Smith could invest 50 ounces at 28%, and then find a better and more rewarding way of investing the remaining 10 ounces? If we look at the *marginal* rate of net income, it becomes clear that, on the added 10 ounces of outlay, Smith is only making an extra 1 ounce in net income, a percentage net income of only 10% on these last 10 ounces. If, as seems plausible, Smith can find a greater *rate* of net income on these 10 ounces, it is clear that he will only invest 50 ounces in this product, and will invest the other 10 ounces elsewhere.



How many ounces [in this firm for Product P] then, will Smith invest? Will he invest 60 ounces to earn a net income of 15, and a rate of net income of 25%; or will he invest 50 ounces to earn a net income of 14, and a rate of 28%?

It is clear from our discussion that, in fact, *there is no precise theory of the determination of the investment in, and output of, the firm*. There is no theory of investment or output of *the firm*, because one firm cannot be considered in isolation from the other firms in the economy. Whether or not Smith will invest 50 ounces or 60 ounces in this firm depends, for example, on whether he will be able to invest the remaining 10 ounces elsewhere to yield more than 1 ounce of net income. The prospective investor considers, in various possible firms, the net returns that he will earn from various amounts of outlay in various possible firms. He must consider which alternative will be more remunerative: to invest 50 ounces here and 10 ounces elsewhere, or 60 ounces here. His marginal rate of return on the last 10 ounces is 10%; if he can earn 15% or 1.5 ounces elsewhere, he will invest them there, and invest only 50 ounces in this firm. Furthermore, the investor might invest *nothing at all* in this firm, for he might be able to earn a 30% return for 60 ounces in some other firm, producing some other product. It is impossible, therefore, to consider a firm in isolation, and attempt to determine how much will be invested in it, or how much it will produce.

Each investor, in a free economy, can range among a myriad of possible enterprises and invest in them. Indeed, by means of the device, to be examined more fully below, of parceling out parts of ownership of a firm's assets to different investors in various *shares*, each individual can invest a few ounces of money in one firm, a few in another, and several in a third, the investors hiring managers to supervise the actual production.<sup>39</sup> In all of his actions, psychic factors being equal, he will attempt to maximize the rate of net income from each unit of money that he invests, thereby maximizing his total net income from his entire investment in all branches. To pursue this approach will lead us to a theory of the savings and investment of the investor, rather than of the output of the firm, and thence to the theory of the savings and investment of all the investors, indeed all the individuals, in the economy. This

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<sup>39</sup> *Editor's footnote*: See Rothbard (1962, pp. 426–435).

will be inextricably connected with the problem of *time preference*, which we have already seen in Chapter I to play a determining role in the decision of the individual as to how much he will save and invest compared to the amount he will consume.<sup>40</sup> This will be discussed in a later chapter.<sup>41</sup>

It is evident that, in the pursuit of the maximum possible rates of net return, the investors will invest each sum of money, large or small, in that firm or in those firms where the rate of net return, for each size of money invested, will be at its maximum. Investors will spurn 2% return projects to invest in expected 20% return projects.

At this point we must make a crucial distinction in our analysis of investment and production—the distinction between the investor or investors considering investment in *new* firms, and those contemplating the extension or continuance of investment in *old* firms. New firms are those which are starting from the beginning. If Smith is a new investor, he will decide as follows: [with a given 60 ounces to invest], he will invest 50 ounces so as to produce 40 units [in this firm for Product P], and earn an expected 28% net income [and invest 10 ounces elsewhere to try to earn more than a 10% marginal rate of net income]. However, if he cannot earn [more than] 10%, or 1 ounce, on 10 ounces elsewhere [in another firm], he will invest 60 ounces to produce 50 units [of Product P], and earn 25% on the investment.

It is clear that there prevails on the market a tendency toward equalization of expected net income rates on *new* firm investments. Suppose that in one firm or product, the rate of net return is expected to be unusually high compared to other investments, say 28%. It is clear that the new investors will flock to invest in this firm, or in competing firms producing the same product. If the data on the market remain the same, then this flood of investments will tend to lower the price of the product, and raise the price of the factors, particularly those specific to that product, until the expected rate of return will be drastically lowered. Furthermore, in unusually unprofitable firms, such as those earning 2%, the *old* investors, given enough time, will allow their capital goods to wear

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<sup>40</sup> Editor's footnote: See Rothbard (1962, pp. 61–64, 68–70).

<sup>41</sup> Editor's footnote: See Rothbard (1962, pp. 367–451).

out, and shift their investments to the more profitable investments. Suppose we postulate, then, an *evenly rotating economy*, such that the data never change, i.e. on each day consumer demand, saving and investment, tastes and resources and technological knowledge, will be the same. *In this case, given enough time, the rate of net return will be equalized in every firm and every branch of production.* This will be an economy of certainty-since there will be no uncertainty of future price, demand, or supply. In this case, the *expected* rate of return will invariably be the realized rate of return, and this will be equalized for every firm and investment. This rate of return is called the *pure rate of interest*. What rate will it be, and how will it be determined, we must leave to further chapters.<sup>42</sup> In the evenly rotating economy, then, every firm will earn the same net return, say 5%. Since there is no uncertainty, every firm will be built and arranged to produce at its optimal level.

[Returning to the individual investor, Smith, in the above example we assumed that he was going to invest 60 ounces in one or more firms. But how does Smith choose the amount of money that he is going to invest at all? We have shown above that we cannot simply concentrate on maximum net income on an investment, but must also pay attention to its rate of net income.] Can we then say that Smith will invest that sum which will yield him the largest percentage, or *rate of net income*? No, we cannot simply make such a plausible statement either. Suppose, for example, we consider the investment of 40 ounces, yielding a percentage net income of 19%. An additional investment of 10 ounces would yield an additional net income of 14 minus 7.6 ounces, which equals 6.4 ounces, [for a rate of net income of 28% on his 50 ounces]. This is a return of 6.4 ounces on an outlay of 10 ounces, a marginal rate of return, or marginal rate of net income, of 64%. Yet, circumstances are conceivable when Smith would not make the additional investment. We must never forget, as we pointed out in Chapter III above,<sup>43</sup> that every individual is always engaged in balancing his various consumption, and his various investment expenditures, and additions or subtractions from his cash balances. Suppose, now, that Smith has a money stock of 200 ounces, which he is in

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<sup>42</sup> Editor's footnote: See Rothbard (1962, pp. 367–451).

<sup>43</sup> Editor's footnote: See Rothbard (1962, p. 220).

the process of allocating. It is entirely possible that, while he may choose to invest 40 ounces in factors of production yielding him a 19% net income, even so high an additional return of 64% on the next 10 ounces will not induce him to restrict his consumption further. In such a case, Smith prefers present consumption spending with these 10 ounces to the 64% rate of income; therefore, his *marginal rate of time preference* for these 10 ounces is higher than 64%, and he does not make the investment. His investment in the product will then be 40 ounces and his level of output will be 28, producing an expected revenue of 47.6, a percentage of 19%.

In every case, therefore, the amount of money investment by the producer, and consequently the amount of product made, depends on the interrelationship between the *expected rate of net income* and the individual's *rate of time preference*.

This interrelationship, specifically, is most important in its *marginal* aspects. The reader is referred again to Chapter I, the basic foundation for the later analysis.<sup>44</sup> There we saw how man allocates his stock of goods in accordance with their marginal utility in the various uses.<sup>45</sup> We also saw how man allocates his labor in accordance with the marginal utility of the expected products in the various uses, and with the marginal disutility of the foregone leisure.<sup>46</sup> This is particularly relevant. We recall that each man allocates his labor in units, say hours, to that particular use which provides the greatest value of marginal product on his value scale.

This analysis, in its essence, is applicable to the present problem. Smith is choosing, not between the utility of labor and its product versus leisure forgone, but between the *utility of an expected future net money income*, and between the *disutility of present consumer goods forgone*, by investing in factors of production. Again, his decision in every case is *marginal*, i.e. he deals with divisible units of a good. In this case, he is dealing with units of a money commodity used to purchase factors. He knows, or believes that he knows, the various technological alternatives by means of

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<sup>44</sup> Editor's footnote: See Rothbard (1962, pp. 1-77).

<sup>45</sup> Editor's footnote: See Rothbard (1962, pp. 21-33).

<sup>46</sup> Editor's footnote: See Rothbard (1962, pp. 42-47).

which certain quantities of factors will yield him certain quantities of product, and from this he estimates the expected money revenue that will accrue from the sale.

Thus, let us consider an expansion of Smith’s choices [for the firm producing Product P] as shown in Table 12 above:

Table 13

TOTAL OUTLAY	MARGINAL OUTLAY	EXP. NET INCOME	EXP. MARGINAL NET INCOME	EXP. RATE OF MARGINAL NET INCOME %
(1)	(8)	(5)	(7)	(9)
				(=7/8)
0		0		
10		-10		
20		0		
30		-7.6		
40	40	7.6	7.6	19
50	10	14	6.4	64
60	10	15	1	10
70	10	13	-2	negative
80	10	3	-10	negative
90	10	1	-2	negative
100	10	-2	-3	negative

*Money outlay* and *expected net money income* are taken from Table 12. The other columns require extended explanation. The purpose of the added columns is to better analyze Smith’s final investment decision in production. Column 7 sets forth the *addition* in net money income which will be yielded by an addition to Smith’s monetary investment in factors. This is the *marginal net income* expected from his various decisions. However, an investment of 10 ounces will immediately be rejected by Smith; the net income itself is negative. Similarly, an investment of 20 ounces, or 30 ounces, will be rejected for the same reasons. The first possible investment is that of 40 ounces; there is no choice for Smith between 0 and 40. Therefore, the space above that in Column 7 is left blank. Marginal decisions, and their features, refer only to actual choices confronting the actor. The differential in which we are interested in is the differential that is significant to the human actor, and not the convenience of algebraic manipulation. Therefore, for example, the marginal net income at an outlay of 40 ounces is *not* the difference between 7.6 and -7.6, equaling 15.2, since there is no possibility that Smith would ever consider an outlay of 30 ounces,

yielding a negative return. The *margin* is *not* between 0 and 10, 10 and 20, etc., but between 0 and 40 only. The marginal net income at 40 then, equals 7.6 minus 0, which equals 7.6. From then on, the margin occurs every 10 ounces, for that is the decision unit, so to speak. Smith estimates that the *next* 10 ounces of investment will increase his net income from 7.6 ounces to 14 ounces—giving him a marginal net income by these 10 ounces of 6.4. From 50 to 60, the 10 new ounces only increase the net income from 14 to 15 ounces, a marginal net income of 1 ounce. After this point, the net income declines; therefore, the marginal net income is *negative*. Thus, after 60 ounces, an additional 10 ounces will lower the net income to 13; thus its marginal net income is *minus 2 ounces*.

Immediately, we have learned something more about Smith's eventual investment production decision. It is obvious that *no one will knowingly invest additional money the marginal net income of which is negative*. Smith will not invest 10 more ounces in order to see his net income dwindle by 2. Therefore, in our example, all points above 60 are eliminated from Smith's final decision. This leaves us with three possible points of decision: 40, 50, and 60 ounces. Now, we may compute the *rate of marginal net income* for each of these amounts. This is equal to the *marginal net income* at each outlay divided by the *marginal outlay* listed in Column 8. The marginal outlay is the *additional* amount of money which each given amount of outlay represents in Smith's decisions. Thus, Smith may either invest nothing or 40 ounces, the next step. His *marginal outlay* for an investment of 40 ounces, is *40 ounces*. His marginal outlay at an outlay of 50 ounces is equal to *10 ounces*, or the differential between 50 and 40—the two successive points of decisions. The marginal outlay at 60 is also *10 ounces*. After that, there is no need to apply the concept, because these decisions have been ruled out. Column 9 lists the *rate of marginal net income*, and this gives the percentage of net income which each additional investment of units of money will earn. At 40, an addition of 40 ounces earns 7.6 ounces net; this is a percentage return of 19%. At 50, an addition of 10 ounces earns 6.4 more ounces of revenue—a marginal percentage return of 64%. At 60, the additional 10 ounces earns only one more ounce in revenue—a marginal rate of 10%.<sup>47</sup>

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<sup>47</sup> In Smith's particular case, marginal net income is only negative in the early and later stages. In some cases, there may well be points where the marginal net

The alternatives that remain for Smith's consideration are condensed in Table 14 below taken from Tables 12 and 13:

Table 14

OUTLAY MARG.	MARGINAL OUTLAY	EXP. REVENUE	EXP. NET INCOME	EXP. MARG. INCOME	RATE OF NET INCOME %	RATE OF NET MARG. INCOME %
(1)	(8)	(4)	(5)	(7)	(6)	(9)
0	0	0	0	0	0	0
40	40	47.6	7.6	7.6	19	19
50	10	64	14	6.4	28	64
60	10	75	15	1	25	10

To summarize how we obtained these columns: from technological knowledge, Smith could calculate the maximum physical product that could be obtained from each combination of factors, and this with the prices of factors, which we have taken as given, determine the maximum total product schedule for each possible alternative outlay of money investment. Horizontal spaces in the schedule were eliminated, i.e. where the marginal product is zero for each increase in outlay (it can never be negative). For each possible product, Smith estimates the selling price for which he could sell the product, and this times the quantity produced yields him the revenue schedule for each outlay. The net income is then easily calculated, and points where this absolute net money income is expected to be zero or negative are immediately eliminated from consideration. The *rate of net income* is the percentage that the net income bears to the money outlay at each point. *Marginal Net Income*, then, can be calculated: at each step this is the additional net income earned from the additional dollars invested. *Marginal outlay* can usually be taken at equal steps for each alternative,

income is negative *in between* points where it is positive. In such cases, the point of negative marginal income is skipped over, and marginal outlay is assumed to be the difference between the two nearest points of *positive* marginal outlay. Thus, Jones' schedule of outlay and expected net income may be as follows:

Outlay	Net Income	Marginal Net Income	Marginal Outlay
10	6	-	-
20	10	4	10
30	8		
40	14	4	20
50	19	5	10

but this must change when the net income turns out to be zero or negative in certain cases, in which cases the marginal outlay considered by the actor must be greater in order to skip these points. Those points where marginal net income is negative are then eliminated from consideration, since it would be obvious folly to invest additional funds where only losses would be earned. The two key concepts now are the *rate of net income* (which is equal to net income divided by outlay) and the *rate of marginal net income*, which equals marginal net income divided by marginal outlay. These are listed in Columns 6 and 9 respectively.

Before continuing to discuss the decision between the remaining alternatives, we might well consider the question: is there a fixed relationship between the *average rate of net income*, which shows us the percentage return from the total investment, and the *rate of marginal net income*, which gives us the percentage return on each successive dose of monetary investment? The answer is definitively yes; in fact, at any point, the *rate of net income is equal to the weighted average of the rates of marginal net income at that and preceding points*, the weights being the size of the marginal outlay at each point. Thus, at an outlay of 50, the rate of net income is 28. This is equal to the average of the rates of marginal net income at that and preceding points, namely 64 and 19. However, it is not simply 64 plus 19 divided by 2  $((64+19)/2=41.5)$ . This would be an *unweighted average* of the two numbers. Each number is multiplied by the *marginal outlay* at that point, and the sums are divided by the sums of the marginal outlays, which is total outlay at the final point. Thus, 19 times 40 plus 64 times 10 is divided by 40 plus 10  $((19*40)+(64*10))/((40+10))=1400/50=28$ . Or, at the money outlay of 60, the rate of net income equals 40 times 19, plus 64 times 10, plus 10 times 10, divided by 40 plus 10 plus 10  $((40*19)+(64*10)+(10*10))/((40+10+10))=1500/60=25$ .

Furthermore, at the *first* feasible marginal step, whatever it may be (in this case it is from 0 to 40 ounces), the rate of net income equals the rate of marginal net income, the net income equals the marginal net income, and the total outlay equals the marginal outlay. This is because the starting point is always zero—no investment—and the total of something after the first step is the same as the difference between the step and zero.

Thus, we see that the average rate of return is the weighted average of the preceding marginal rates of return, and that at the



first step, the two rates of return are equal. This indicates another important truth: *that the average rate at any point is equal to the marginal rate, if the distance between that point and zero is taken as the unit.* Thus, if Smith is considering the investment of 60 ounces, his expected average rate of net income is equal to the marginal rate of net income, if the “margin” is taken as a unit of 60 ounces. Thus, the decision on an investment of sum of money is a “marginal” one in two senses: a) in the sense of the last small unit of money and its return, and b) in the sense of the return to a marginal unit taken as the size of the sum itself. Both sizes of marginal chunks are discrete steps, and both are taken into consideration by the actor.<sup>48</sup>

[Now we must return to the important concept of the rate of time preference and integrate our analysis of the rate of net income.] Any man, in deciding upon the allocating of any given sum of money between consumption and investment purposes, estimates the expected yield of net money income to be derived from his investment (modified where necessary by other psychic considerations) and compares it with his *minimum* required monetary return from that sum of money, taking into consideration his total stock, and his value scale. This minimum rate of return is his rate of time preference: any investment which he expects will yield him a lesser return will not be made. [Thus Smith and his investment decisions in the firm producing Product P, as shown in Table 14, are compared with his rate of time preference.] This rate of time preference is set by his relative valuations of present and future satisfaction; it is his “minimum supply price”—the lowest “price” at which he will part with his present money in order to invest in a prospect of a higher income at some time in the future. As an individual allocates more money to investment and less to consumption at any time, his marginal rate of time preference increases, until it finally becomes prohibitively high for

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<sup>48</sup> This statement will be surprising only to those who have been misled by the use of the differential calculus in economics. In calculus, the steps between points are treated as infinitely small, and therefore the marginal is thought to be the infinitesimal. In that case, “small” sized units will be recognized as approximations to some “ideal” marginal unit, but a “big” unit will not be thought of as marginal. Actually, the size of a marginal unit can be any amount, depending on the decision to be made. There is nothing ideal about infinitesimally small units, and they are not relevant to the real world of human action in any case, since action always deals with discrete steps.

any investment. This fact is set by man's necessity to consume in any given present, before making investments for the future. The entire schedule of a man's time preference rate, therefore, increases as the invested outlay increases, finally nearing verticality. [It can be calculated in marginal and averages form like net income.] If the rate of net income from the investment outlay is greater than the rate of time preference, he will make the investment; if not, he will abstain from the investment.

The investor Smith, in sum, does not simply try to maximize his expected net money income. He, like every actor in every situation and every choice, tries to *maximize his psychic revenue* and attain a *psychic profit*. He cannot only consider money income from the investment. He must weigh this against his psychic time preference rates. His maximization of psychic revenue, therefore, impels his investing so long as the rate of average and marginal net income exceeds his average and marginal rates of time preference.<sup>49</sup> [Investment decisions in a firm, then, will always be where the average and marginal rates of net income are greater than or equal to the average and marginal rates of the investor's time preference. More precisely, Smith's investment decision in the firm producing P, will be at the last marginal outlay where this occurs. In general, then, investment in a firm will be pushed to the last marginal outlay where expected average and marginal rates of net income are greater than or equal to the average and marginal rates of time preference for the investor. We may call this the Law of Investment Decision.]

There is an important modification in this analysis of Smith that must be made, before our investigations into his output and investment decisions can be completed. In this example, we have assumed that the investor Smith faces only one alternative: either invest in the given line of production or don't invest at all. In actual life, as we know, the investor has open to him a choice in the investment of money in many lines of production or many firms. [As explained earlier, the production and investment of a firm

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<sup>49</sup> *Editor's footnote:* Strictly speaking, it must be greater than *or* equal to. An investor would still invest if the rate of return is equal to the rate of time preference, since his rate of time preference is the *minimum* he would need to earn in order to forgo the present money and invest. In the Evenly Rotating Economy, each investor only earns the interest rate, which is the societal rate of time preference.

cannot be considered in isolation.] Smith must not only choose whether to invest or to consume (or add to cash balance), he must decide between several alternative lines of production. How then must our law be changed to indicate the determination of his total investment, and of the investment in each line of production? In the first place, it is clear that Smith is primarily interested in maximizing his psychic revenue from the total of the investments in his portfolio. His interest is not in firm A or B or C, but in his income from all of these investments as a whole. Therefore, he weighs his average and marginal rates of time preference against the gross revenue that can be achieved from all of his investments at the given outlay. Thus, at any total outlay, say 120 ounces, he determines what distribution of money among the alternative investments will yield him the maximum total gross revenue, and hence the maximum net income, and maximum rate of net income for the given outlay. At each point of outlay he decided on the distribution that will accord him the maximum gross revenue, and therefore he is able to deduce the maximum average and marginal rates of net income for each outlay. He invests his money up till the largest amount at which the maximum average and marginal rates of net income are larger than his average and marginal rate of time preference, respectively. At this amount, he distributes his outlay among the various enterprises in accordance with the "maximum revenue distribution" at that outlay.

In the final form of the Law of Investment Decision, then, there is not the previous direct and complete link between investment outlay of the individual producer and the output of the individual product—as there is when the individual producer invests in only one line of production. It is still true that the actor invests in production—in general up to the last point that his expected average and marginal rates of net income exceed his average and marginal rates of time preference. Since this is true for each man, it is clear that the production of *all goods* in the society at any period is completely determined by these factors. It is *still* true for each individual product that the amount invested is such that the average and marginal net income rates at that point are greater than the time preference rates at that point. In this sense, the law still holds. However, no longer does the investor push his investment in *each particular firm* to the *last* point before his time preference

rates outstrip his income rates. He does not do so, because now he wishes to distribute his money outlays among several lines of production, in order to increase his revenue.

We must now return to our original question. How is the Smith, or in general, any investor's outlay in any given line of production, and therefore the output for that particular product, determined? To find the answer, we must look at a hypothetical illustration. Suppose now, that Smith has to consider, not only the product that we have explored in detail above, but also several other lines of production. Alongside the hypothetical money outlays, Smith lists, for each line of production, the expected *net income* from each outlay. Thus, let us say that he decided among firms producing products P, Q, and R, recalling that our illustration above consisted of product P. Then we might have the following schedules:

**Table 15**

NET INCOME			
MONEY OUTLAY	P	Q	R
10	-	2	-
20	-	7	8
30	-	13	7.5
40	7.6	16	9
50	14	18	15
60	15	20	14

These net income schedules reveal what net income Smith expects to enjoy when investing a certain outlay in any given line of production. But these schedules permit combination into *one maximum net income* schedule, which will determine the investment distribution that will yield the largest net revenue for each given outlay. Thus, suppose Smith is considering an outlay of 50 ounces. He might invest them all in the firm producing P, in which case his net income will be 14 ounces. If he invests them all in the firm producing Q, his net income will be 18 ounces; in the firm producing R, his net income would be 15 ounces. Clearly, if he can only invest in one firm or in the other, then he will choose firm producing Q. But, since he can distribute his investments, he also considers the various investment combinations adding up to 50 ounces which involve two or more firms. Thus 40 in producing P and 10 in producing Q will yield 7.6 plus 2, a net income of 9.6.

Mentally considering the various combinations, it becomes clear that prospectively the best is (30Q plus 20R) which yields a net income of 13 plus 8, or 21 net ounces. At each hypothetical outlay, the investor picks what appears to be that combination that will yield the highest net income. The following is Smith's *maximum net income* schedule with each money outlay, with the investment distribution in parentheses:

**Table 16**

MONEY OUTLAY	MAXIMUM NET INCOME
10	2 (10 in Q)
20	8 (20 in R)
30	13 (30 in Q)
40	16 (40 in Q)
50	21 (30 in Q; 20 in R)
60	24 (40 in Q; 20 in R)

The best combination for any outlay is that one for which the sum of the net incomes from each line of production is the highest. An equivalent property of this condition is that the *weighted average of the rates of net income from each line of production be the highest* (where the weights are the money outlay in each line). Thus, take the problem of the best investment of 50 ounces. 50 ounces all in producing Q would yield 18 ounces income, or a 36% return. This is higher than an investment of 50 ounces producing P or R. But an investment of 30 ounces in B yields 13 ounces income, or 43%. An investment of 20 ounces in R yields a return of 8 ounces income, or 40%. A weighted average of these two yields by the respective outlays is: 30 times 43, plus 20 times 40, divided by 50. This equals 42%, the weighted average, which also equals the *rate of maximum net income* (amount of maximum net income divided by money outlay). Thus, the best distribution can be determined from schedules of rates of net income for each of the various outlays in the various lines of production. In this case, the distribution is not confined to producing just Q, even though producing Q is more profitable than either of the others at any given total investment.

From the maximum net income schedule, there can be deduced schedules of rates of maximum net income, marginal outlay, marginal maximum net income, rates of marginal maximum net income, etc. Thus:

Table 17

OUTLAY	MAX. NET INCOME	RATE OF MAX. NET INCOME %	MARG. OUTLAY	MARG. MAX. NET INCOME	RATE OF MARG. NET INCOME %
(1)	(2)	(2/1)	(4)	(5)	(5/4)
10	2	20	10	2	20
20	8	40	10	6	60
30	13	43	10	5	50
40	16	40	10	3	30
50	21	42	10	5	50
60	24	40	10	3	30

Smith, or any investor, then proceeds analogously with the case of one product, investing money outlay (in the best distributions) up to the largest amount that his *rate of marginal maximum net income* is greater than [or equal to] his *marginal rate of time preference*, and his *average rate of maximum net income* is also greater than [or equal to] his *average rate of time preference*. Here again, average rate at any point is equivalent to the marginal rate (of maximum net income) at that point, with the size of the point itself considered as the unit.

We at last come to the end of the tortuous road of analysis of the determination of investor's decisions and of the amount of investment in any one productive firm. An investor will continue to invest rather than not so long as his expected average and marginal rates of return are greater than his average and marginal rates of time preference; and he will make his investment in that productive enterprise or combination of productive enterprises that will yield him the greatest possible net income, or rate of net income, for any hypothetical outlay. If we may eliminate the distinction between average and marginal by varying the size of the marginal chunk, then we may simply say that each unit of money outlay will be spent in the way that promises to yield the actor the greatest utility: in spending on consumer goods, if the rate of time preference for this amount is greater; or in spending on factors of production in that line or lines and in that firm or firm, where the rate of net return promises to be the greatest.

We have thus analyzed the principles according to which a man allocates his stock of money in accordance with expected greatest utility: the allocation of money units between investment in general and present consumption, and the decision between investment in various different firms and lines of production. The quest is for

psychic profit, and the course of action that will yield the greatest utility—in the usual case, this line of investment will be the one that is expected to yield the greatest net return from the outlay. Exceptions are cases where other psychic factors, such as particular like for, or dislike for, the production process or the product itself, alters the decision from a pure consideration of monetary return. Otherwise, a man invests in those enterprises which he expects will yield the highest rates of return.

We have thus seen what determines the amount of stock of any good that will be produced in any particular period—it will be the amount that the producer had invested in a previous period in order to aim at such production. The amount of previous investment depends on the producer's anticipated net monetary return. It is clear that an increase in anticipated rate of net income in any line of production will tend to increase the investor's outlay in that product, and that on the other hand a decrease in the anticipated return will tend to diminish his investment in that process. If we interpret the concept of "increase in rate of net income," as meaning an increase in the entire rate of net income schedule, so that at each outlay of product, net income is expected to increase, it is obvious that the rate of net income schedule will intersect the investor's time preference rate schedule at a further point, so that an increase in the expected net income schedule will increase the amount of investment outlay in that product, and contrary for the decrease. Furthermore, an increase in expected return for producing P will tend to shift more of the investment outlay to this firm from competing firms Q, R, etc., and the contrary will occur with a decrease in expected revenue.

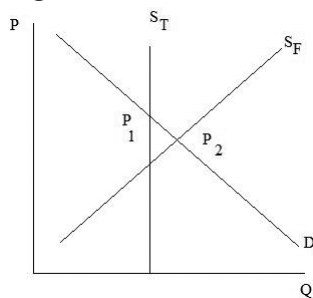
As a matter of fact, changes in anticipated rate of net income are most likely to take place throughout the entire range of the schedule. The factors that can change the rate of return are: a) expected future selling price, b) the prices of the factors, and c) the producers' production function—the physical efficiency in converting quantities of factors into quantities of product. It is evident that, with factor prices here assumed to be given, and known, the producer's anticipations of future income are governed by his anticipations of selling price and of his production function. It is clear that a rise in expected selling price for any good, will *ceteris paribus*, increase the amount of investment outlay in its production; and that an increase in physical productivity for any good will *ceteris paribus*,

increase the amount of investment outlay. Conversely, decreases in expected selling price, and/or decreases in physical productivity will, *ceteris paribus*, diminish the investment in that product.

We have learned, therefore, that consumers' goods prices are determined by consumers demand schedule and by the stock produced and sold; that the sales of produced stock depend on anticipated future price; that the amount of stock produced depends on previous investment in production; that the previous investment in production depending on the net money income that the investor anticipated receiving, and the amount of investment will be up to the last amount at which the anticipated rate of return exceeds the rate of time preference; that the anticipated rate of return depends on: expected future selling price, and production technique (given factor prices). In the last analysis, then, consumers' goods prices depend on: consumers' demand schedules, and general time preferences, producers' anticipations of prices, and productive techniques.

Many questions remain to be answered. Among them is the discussion in Chapter IV on the final supply curve of the producers as compared to the stock on the market.<sup>50</sup> The "final supply curve" is the amount that will be called forth in supply in the future by certain prices. The discussion in Chapter IV implicitly assumed that the present ruling prices would be the ones that would be anticipated in the future. Thus, the figure below:

Figure 15<sup>51</sup>



<sup>50</sup> Editor's footnote: See footnote 1.

<sup>51</sup> Editor's footnote: Although not discussed in terms of "final supply curve," a similar diagram can be found in Rothbard (2008 [1983], p. 27), which was not present in MES.



Implicitly assumes that the present prices of  $P_1$  is assumed to be the future price, and will call for the equivalent amount on the  $S_F$  curve, which will tend to lower the final market price to  $P_2$ . However, we may alter this restriction, and make the necessary mental allowances for any anticipated change in price. The main point of the diagram still obtains—that the present market price is not necessarily the “final” one toward which the market forces are tending. The question then remains: what principles determine the “final” equilibrium market prices? Even though this price is never attained in practice, it is important because it is the point (though always shifting) toward which prices tend to move. And a final selling price, given the productive technique, and given factor prices tend to set net entrepreneurial income. On what basis does entrepreneurial net income, the driving force in the money economy, tend to be determined? This problem, along with a discussion of time preference, must be taken up in subsequent chapters.<sup>52</sup>

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<sup>52</sup> *Editor's footnote*: See Rothbard (1962, pp. 367–451, 509–555).

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