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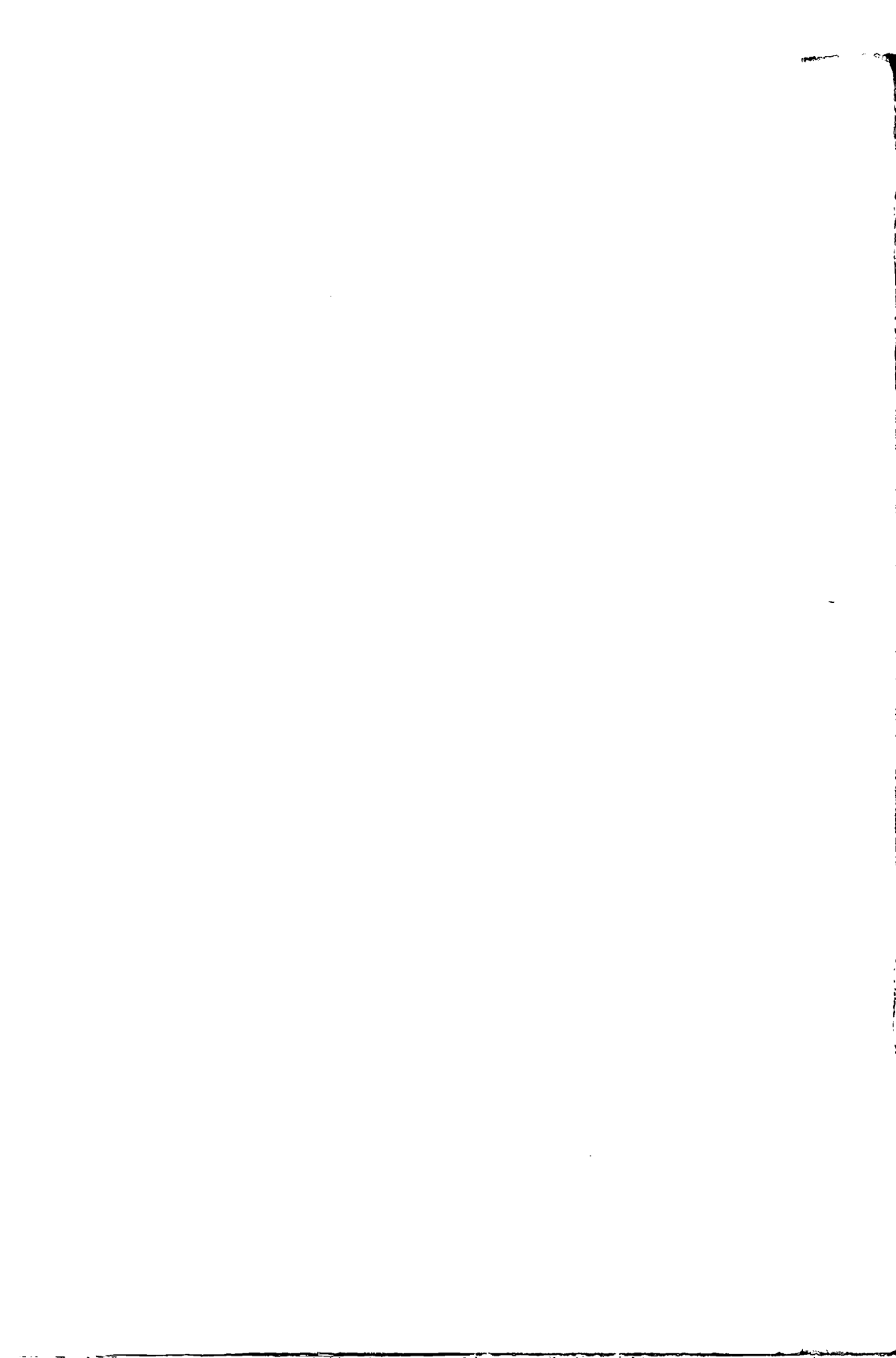
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COST, PRICES, AND PROFITS:
THEIR CYCLICAL RELATIONS



FACTORS THAT INFLUENCE PROFITS

Upswings and downswings in business activity mean, for most industries, upswings and downswings in the quantity of goods or services they sell. These fluctuations are accompanied by changes in the prices they receive and in their cost of doing business, changes which, in turn, affect their profits. The main purpose of the present study is to explore these effects.

By cost we mean not aggregate expense but cost per physical unit of product sold. Prices received and cost affect profit per unit sold and profit per dollar of sales. For example, if the price received for a product and its cost both increase, but the price rises by a greater amount than the cost, profit per unit of product increases. If the price rises by a greater percentage than the cost, profit per dollar of sales increases.

Aggregate profits are also affected by quantity sold. If profit per unit falls a little, but the quantity sold increases substantially, aggregate profit will rise. If profit per dollar of sales falls a little, but the aggregate dollar value of sales rises substantially, aggregate profit will rise.

It is therefore instructive to analyze profit changes in two steps. First, what happens to profits per unit, and second, what happens to quantity sold? Alternatively, what happens to profits per dollar of sales, and what happens to aggregate sales (in dollars)?

Either alternative has its merits. Profit per dollar of sales appears to figure more commonly than profit per unit of product in the thinking of businessmen and investors. The profit-per-dollar figure is often found in reports of management to stockholders, while profit per unit of product is hardly ever found, doubtless because most companies sell a variety of products and feel no need for a single composite measure of quantity sold. Often no information as to cost or profit per physical unit is available to the out-

side analyst, although the managers of enterprises have frequent occasion to compute such figures for individual products.

ARITHMETIC OF PROFIT MARGINS

In this volume we shall therefore inquire what has happened to profit margins during the course of upswings and downswings in quantity sold or sales. (Information is available only for some parts of the national economy.) By the margin we mean the ratio of profit to sales. Sometimes it will be more convenient to talk of its complement, the ratio of expenses to sales. By profit or profits we mean the aggregate as distinguished from the margin; by sales we mean the revenue, not the quantity sold.

The sales of any commodity, thus measured in dollars, equal the quantity of the commodity sold multiplied by the average price the vendor receives. Difficulties in the definition or measurement of quantity often make it impossible to separate the two factors. Where these difficulties can be overcome, however, it becomes possible to compute cost per unit of product. Since aggregate cost equals cost per unit times quantity, and sales equal price times quantity, the ratio of cost per unit to price is the same as the ratio of aggregate cost to sales.

Changes in cost ratios and margins can reflect various combinations of changes in prices and unit cost. A rise in prices received tends to widen margins, but they will not actually widen if cost per unit rises by the same or a greater percentage. A fall in cost also tends to widen margins but, again, margins will not actually widen if prices fall as fast or faster. The logically possible combinations of changes in prices and cost and their effects on cost ratios and margins are worked out in Table 1. Combinations involving no change in the price or cost factor, or equal percentage changes in cost and price, are rare and statistically suspect. The important combinations boil down to six. Wherever possible we shall analyze changes in margins in terms of these combinations.

Demand and Margins

Even when the analysis just described has been performed, margin changes have been explained only in a proximate and rather super-

TABLE I
Possible Combinations of Change in Price and Unit Cost and Their
Effect on Cost Ratios and Profit Margin

Change in Price	Changes in Cost Per Unit	Change in Cost Ratio	Change in Profit Margin
Rise	Greater percentage rise	Rise	Fall
Rise	Same percentage rise	No change	No change
Rise	Smaller percentage rise	Fall	Rise
Rise	No change	Fall	Rise
Rise	Fall	Fall	Rise
No change	Rise	Rise	Fall
No change	No change	No change	No change
No change	Fall	Fall	Rise
Fall	Rise	Rise	Fall
Fall	No change	Rise	Fall
Fall	Smaller percentage fall	Rise	Fall
Fall	Same percentage fall	No change	No change
Fall	Greater percentage fall	Fall	Rise

ficial sense. One still does not know under what circumstances prices and costs change at different rates or in opposite directions. To carry the analysis farther raises questions that may be summarized under the heading of supply and demand. In particular, we shall often find that prices rise faster than cost, so that the margin widens in spite of rising cost. This can occur, as we shall show, only if something happens that economists call an upward shift of demand. It should be useful at this point to review some of the ideas economists have developed on that subject and to note their relevance to fluctuations in margins.

Careful thinking about supply and demand almost inevitably leads to the notion of a demand schedule. "Other things being equal," people in a specified market will buy a small quantity of a commodity in any specified period of time if the price is high, a larger quantity if the price is lower, an even larger quantity if the price is lower still. For a graphically minded reader, the relation may be represented by a line like *DD* in Chart I.

Actually we can observe only one point on the curve at any one time. If a certain quantity was in fact sold at a certain average price in one period, we infer that this price and quantity represented a point on the schedule for that period. The curve as a whole is an inference from other information, or perhaps it is just a useful hypothesis. If "other things" change from one period to another,

DEMAND, QUANTITY SOLD, AND PRICE

A rise in demand (i.e., an upward shift in the demand curve), although it raises the price at which the initially marketed quantity could be sold, does not necessarily result in an actual rise in price. One must also take into consideration the response of suppliers. If they increase the quantity supplied fast enough as demand rises, the price will not rise; it may even fall. In Chart 1, if demand rises from DD to $D'D'$, while quantity sold increases from OA to OA' , the price will not change. Only if the quantity sold increases to some intermediate amount, such as OA'' , will price rise, as from AB to $A''B''$. In later chapters, however, we shall find many actual instances in which the rise in quantity is sufficiently limited to permit a rise in price.

Conversely, if demand falls price will not necessarily fall; it may even rise, if quantity is cut back sufficiently. In Chart 1, if demand is initially at $D'D'$ and falls to DD , and quantity falls from OA' to OA'' , price will fall. But if quantity is cut back to OA , price will not change.

DEMAND, QUANTITY, COST, AND MARGIN

Even if an upward shift in demand and the change in quantity sold lead to a rise in price, the combination does not guarantee a rise in margin, for cost may rise simultaneously with demand. If cost rises by a greater percentage than price, the margin will fall; only if it rises by a lesser percentage will the margin rise. Conversely, if a fall in demand and the change in quantity sold lead to a fall in price, the margin will not necessarily decline; that depends also on what happens to cost.

**SHIFT IN DEMAND ESSENTIAL
TO SOME CHANGES IN MARGIN**

Certain combinations of changes in quantity, cost, and margin cannot occur without certain shifts in demand. If quantity and cost both rise, there must be a rise in demand if the margin is to rise. For if demand did not rise, the increase in quantity would not be accompanied by a rise, but by a fall in price, and the margin would

be squeezed between falling price and rising cost. Conversely, if quantity and cost both fall, there must be a downward shift in demand if the margin is to fall. Otherwise, the fall in quantity would be accompanied by a rise in price; with cost falling and price rising, the margin would widen.

Statistical Procedures

CLASSIFICATION OF EXPENSES

The expenses a business enterprise incurs can be divided conveniently into three groups. One is labor expense, including salaries of officers and general office employees as well as salaries and wages of those workers more directly engaged in productive processes. The second is expense for commodities and services purchased from other business enterprises, including not only materials that enter into the products, such as cotton yarn used in a shirt, but other commodities and services needed to carry on operations, such as fuel, power, light, and business stationery. It is hard to find a single word to describe the third group of expenses, but for lack of a better term one may call them general or overhead expenses. They include such items as insurance, interest, depreciation, and taxes. For reasons presently to be described, we exclude taxes on profits. Payroll taxes might well be included in labor expense although the statistics often do not permit this to be done.

INCOME ACCOUNTS VERSUS INCREMENTAL COST

Cost to a vendor, as estimated by him, influences price insofar as it sets a minimum beneath which he considers it would not be worth his while to sell. The expense data we use to compute cost per unit of product sold are obtained, in effect, from business income statements. They include some items, such as depreciation, interest on fixed debt, and others that are not affected immediately by the volume of sales. At times businessmen may figure that these costs cannot be fully covered in any case, and it may be better to take a price which will cover some portion of them than to ask a fully inclusive price at which customers will not buy very much. On the other hand, income statement expense does not

include any return on the capital of owners. A businessman who could not expand sales without buying new plant or equipment would count some return on any equity capital that might be involved as part of the minimum price at which he would accept additional orders.

FOCUS ON PROFITS BEFORE TAXES

Only profits after income taxes (and excess profits taxes, when levied) indicate what proprietors or stockholders actually earned from the operation of their properties; but profits before taxes reflect more accurately the impact of changes in demand and in the cost of labor and materials. Profits after taxes have been affected by changes in the rate of income tax and also by the imposition and later expiration of the excess profits tax. Sometimes the exact taxes due on the profits of a quarter cannot be determined when the accounts for that quarter are made up and published. Under such circumstances corporations include a more or less arbitrary round sum in their quarterly income statements to represent their tax accrual. Tax liability for past periods may be readjusted, resulting in extra taxes or in refunds which are often included in the current income statement, although they do not result from current operations. We therefore center our attention on before-tax figures; by the margin, we mean the ratio of profits before taxes to sales unless we indicate otherwise.

FIGURES ARE SEASONALLY ADJUSTED

Wherever possible in the following chapters, we use quarterly or monthly data, since annual figures tend to minimize and blur the cyclical fluctuations in which we are interested. On the other hand, quarterly and monthly figures often show evidence of seasonal influence. Whenever we find such evidence, the figures have been adjusted for seasonal variation.¹ In an industry selling products like garden tools or swimsuits, the seasonal analysis might

¹The usual technique of seasonal adjustment cannot be applied to a series of figures that contains both positive and negative items. Profit margins are sometimes negative. Where this was the case, we circumvented the difficulty by seasonally adjusting the ratio of cost to sales and deducting the seasonally adjusted cost ratios from unity (or, in percentage form, from 100) to get seasonally adjusted margins. Seasonally adjusted profits could then be obtained by applying the adjusted margins to adjusted sales.

indicate the quantity sold should rise 20 per cent from the first quarter of the year to the second for purely seasonal reasons. If, in a particular year, the unadjusted quantity rose 30 per cent between those quarters, the seasonally adjusted figures we use would show a rise. If unadjusted quantity rose only 10 per cent, the seasonally adjusted figures would show a fall. In an industry that sells products like electric heaters or ski togs, a seasonal decline of, say, 20 per cent might be expected between the same two quarters. If the unadjusted figures declined only 10 per cent, the adjusted figures would show a rise; if the unadjusted figures declined 30 per cent, the adjusted figures would show a fall.

DIVIDING A CYCLE INTO STAGES

Cost, price, the margin, or profit may not change in the same direction throughout an upswing or downswing in quantity sold. For example, the margin may rise during the earlier portion of an upswing but fall during the later portion. To explore such possibilities, every expansion or contraction of quantity can be divided into a standard number of segments; and we can then ask what, if anything, usually happens in first segments, in second segments, and so forth.

Specifically, we cut up each expansion into the following periods: the trough quarter, the first third of the quarters between trough and peak, the second third, the last third, and the peak quarter. We divide each contraction in the same way, the trough quarter now of course being the last period. We call each period a stage. In a full trough-to-trough cycle the last stage of the expansion is identical with the first of the contraction, so there are nine stages in all, which we number consecutively from I to IX. Stage IX of one cycle is identical with stage I of the next. Usually II, III, IV and VI, VII, VIII contain more than one quarter, in which case we strike an average of the figures for the several quarters. If the number of quarters between I and V or V and IX is not evenly divisible by three, we make III or VII one quarter longer, or shorter, than its neighbors. The procedure is illustrated for the machinery group of industries in Table 2.

With five-stage averages, the change in a variable during a phase — i.e., an expansion or contraction — of quantity can be examined

TABLE 2
Illustrative Division into Stages of a Cycle in Quantity Sold,
Machinery Industry, 4Q 1949-4Q 1954

Stage	Quarters Included			Profit Margin (per cent)
	First	Last	Number	
I	4Q 1949	4Q 1949	1	9.1
II	1Q 1950	4Q 1950	4	12.4
III	1Q 1951	1Q 1952	5	13.1
IV	2Q 1952	1Q 1953	4	10.9
V	2Q 1953	2Q 1953	1	10.7
VI	3Q 1953	4Q 1953	2	8.2
VII	1Q 1954	1Q 1954	1	9.0
VIII	2Q 1954	3Q 1954	2	8.9
IX	4Q 1954	4Q 1954	1	7.8

in four successive segments. In an expansion, the first is the change from I to II, the second the change from II to III, and so on. In the machinery industry we observe that the margin rose in the first segment of the expansion from 9.1 to 12.4. By examining the first segment of other expansions in this industry and others, we can determine whether a rise commonly occurs in first segments.

Although the foregoing procedure indicates the characteristic direction of change in margins in any class of segments, it does not indicate what pattern of change margins follow in any single quantity expansion or contraction in any single industry. In one expansion in one industrial group, a variable may rise in every segment; the changes in the order of time may be + + + +. In another expansion in the same or another industrial group the variable may fall in the first two and rise in the last two segments; the pattern of change may be - - + +.

There are sixteen logically possible patterns of change in four successive segments. To simplify the discussion, some of these patterns can be grouped into eight categories; for example + + + -, + + - -, and + - - - can all be described as cases of rise, fall (Table 3).

The five-stage procedure cannot be applied to quantity expansions and contractions less than five quarters long. We can, how-

TABLE 3
Possible Patterns of Change in Four Successive Segments of
an Expansion or Contraction

Direction of Change in				Description of Pattern	Category Number
First Segment	Second Segment	Third Segment	Fourth Segment		
+	+	+	+	Continuous rise	1
+	+	+	-	Rise, fall	2
+	+	-	-	Rise, fall	
+	-	-	-	Rise, fall	
+	+	-	+	Rise, fall, rise	3
+	-	+	+	Rise, fall, rise	
+	-	-	+	Rise, fall, rise	
+	-	+	-	Rise, fall, rise, fall	4
-	-	-	-	Continuous fall	5
-	-	-	+	Fall, rise	6
-	-	+	+	Fall, rise	
-	+	+	+	Fall, rise	
-	-	+	-	Fall, rise, fall	7
-	+	-	-	Fall, rise, fall	
-	+	+	-	Fall, rise, fall	
-	+	-	+	Fall, rise, fall, rise	8

ever, note the quarter-to-quarter direction of change in shorter phases, and can apply some of the categories in Table 3. If the phase is two quarters long, the sequence of change can be ++, +-, -+, or --; it can be classified in category one, two, five, or six. If it is three quarters long, it may be assignable to one of these categories or to category three or seven. In this manner we can exploit our information for short as well as long phases.