THE THEORY OF THE FIRM AND COMPETITION
IN THE AMERICAN RUBBER INDUSTRY

DISSERTATION
Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

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* * * * *

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PART I

CHAPTER I

INTRODUCTION

"Sit down before fact as a little child, be prepared to give up every preconceived notion, follow humbly wherever and to whatever abyss nature leads -- or you shall learn nothing."

Thomas H. Huxley

It is commonly agreed that our economy is predominantly oligopolistic. According to the precepts of orthodox price and allocation theory the performance of our economy should be highly disappointing. Since it is possible to assert that it is not, then what has gone wrong with our theoretical constructs?

As more is learned about the dynamics of modern markets, prices, competition, innovation, and business behavior, the more apparent is the need for a theory of competition that takes account of growth. Existing models have been insufficient to explain the competitive process under present conditions.

A. Statement of the problem

It was the purpose of this study (1) To indicate the inadequacies of existing theoretical models for explanations of the competitive process under present conditions; (2) To synthesize recent theoretical and empirical findings into an eclectic theory

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1Quoted in the Graduate School Record, Ohio State University, Vol. 6, No. 9, June 1953, p. 12.
that offers an explanation both of the underlying forces at work and the actual practices that businessmen employ in setting prices; (3) To test the validity of this theory by exploring its adequacy for explaining or predicting what has occurred in the American rubber industry; and (4) To suggest some implications of the eclectic theory for public policy considerations.

B. Methodology

The materials came primarily from library research in published sources. Some information was elicited from executives of the major rubber firms by personal interviews. These materials were then analyzed by both hypothetical-experimental and descriptive-historical methods. Because of the non-quantitative nature of the relevant variables, there was no mathematical processing of the data, nor was use made of tabular or graphic presentation.

C. Validation

The economists' logical system requires the firm to know, as the basis for decisions, the variation of sales receipts with alternative schedules of output and with alternative outlays on advertising or other selling costs; the variation of costs of building plant and organization with alternative schedules of output; the variation of costs of production (with given equipment) with alternative schedules of output; and the variation of factor prices with changes in output. The firm then proceeds to
maximize its profits by building that scale of plant at which the cost of the last addition just equals the added revenue, and then by operating the plant at that level of output where marginal costs equal marginal receipts. This last demanding a simultaneous solution of the price at which output is sold and factors purchased. Such is the economists' formal solution to the problem of the decisions that confront a business executive.2

2Committee on Price Determination for the Conference on Price Research, Cost Behavior and Price Policy, New York: N.B.E.R., 1943, pp. 14-20. By conventional, orthodox, or traditional economic theory is meant that of such classics as Chamberlin's, Robinson's, Triffin's, etc., and the journal articles they have inspired; as well as the analysis in sophisticated text books such as K. Boulding, Economic Analysis, New York: Harper and Bros., 1941 and George Stigler, The Theory of Price, New York: Macmillan Co., 1946. While criticisms offered here are not new, they have not been integrated into the body of theory used and taught by the majority of economists.


Cf. Sydney Scheffler, Failures of Economics, Cambridge: Harvard University Press, 1956. Economics is fundamentally wrong in being based on analytical methods completely inappropriate to the subject matter. It is not a closed but an "open" system subject to influences of every conceivable sort. Neither sterile manipulation of concepts not relevant to actual behavior, nor the empiricists amassing of indigestible facts will produce useful economic truths. The businessman must admit all variables in a volatile world of spotty information and volitional actors.

"Businessmen will always have to rely on interpretation of all of these factors through experience, good judgment, and a sixth sense." Wassily Leontief, "Are the Economists All Wet?", Business Week, Jan. 21, 1956.
A market economy has no explicit production plan although a coherent pattern does emerge and generations of economists have sought to explain the "invisible hand" by which it is achieved. The behavior of the individual firm is still explained primarily by traditional marginal analysis although the assumptions of marginal analysis have been revealed as quite unsatisfactory. It is time to introduce greater realism into economic discussion with a theory of the firm consistent with recent results of factual research and recognizing that though competition is not perfect, it is nevertheless a powerful force in determining industrial development. This demands a theoretical restatement.

D. The Contributions of Price Theory

Not all critics judge past theory to be useless. Theory has provided questions for empirical study. The theory of monopolistic competition raised questions not before even asked. Theory has provided a guide to the selection of facts to reveal their importance. Theory has permitted the isolation of one force where many are at work thus contributing to the understanding of the effect of one variable.

But this does not mean that factors can be neglected that are known to be important in reality; nor factors kept constant that are known to change. There is no choice between factual evidence

and theoretical conclusions. If they differ then the theory is wrong, the facts are mistaken, or the theory has been applied to a situation it was not intended to explain.

On the other hand the contribution of empirical studies has been slim. After exhaustive study, Walton Hamilton concluded that no valid generalizations can be made about price behavior. The empiricists have offered no alternative theory of prices — only summaries of price observations.

The failure of sincere efforts of hundreds of competent scholars to produce a satisfactory explanation of price behavior strongly suggests that full and correct explanation is not to be found in generalizations deduced from an analysis of number of sellers and the similarity of the products they sell or statistical correlations. The failure may result partly from underrating the complexity, subtlety, and difficulty of the problem. Apparently, another approach is needed.


7 Walton Hamilton, op. cit., Chap. 6.
An important question then is, how much price behavior is explained by objective market conditions and how much by individual choices? Or are individuals constrained by their environment (the objective characteristics of markets) in making their decisions? The answer is a vital one. If a manageable number of objective characteristics account for price behavior, possibly public policy could be framed in a manner to eliminate the existing range of judicial discretion.\(^8\)

In the theory of a capitalistic economy price has always been the central problem. For a time it seemed that a methodological approach and a solution which could provide the main answers for the purposes of interpretation of economic policy and economic forecasting had been found. Then doubts concerning the general validity of the fundamentals of price theory began to grow and spread until the theory of imperfect competition opened new paths for refinement. "Great and important as was the advance it is now apparent that the new theory did not provide the tools that would cover all major aspects of the price making process".\(^9\)

Neoclassical price theory was simple and determinate. Price was the outcome of impersonal forces. Demand and cost conditions

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were outside the control of the firm. Free entry and profit maximization gave equilibrium.

Imperfect competition theory removed price from impersonal market forces and the firm itself became principal determiner through product variation and selling expenses. Analysis shifted from the industry to the individual firm's adjustment to market situations.

Triffin formulated no theory of price. Each case became specifically a game of bluff in a particular limiting environment much as in Neumann and Morgenstern's *Theory of Games.*

Everywhere there seems to be recognition of the need for a new methodological and conceptual framework. "The distinguishing feature of oligopolistic price theory cannot lie in additional psychological investigations but in the provision of a framework which will show the actions of a 'normal' businessman under the specific conditions of an oligopolistic environment."  

E. General orientation of this study

Since the evidence indicates that manufacturing is America's principal industry, and oligopoly is there the typical market

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condition, this study will be limited to the pricing of manufactured products as giving the most significant insights regarding price determinants in our society.  

It will be contended here that prices cannot be explained on the basis of a few _a priori_ assumptions. This study is posited upon a belief that prices can be understood if the environment where they are made is understood. Prices both reflect and influence this environment directly.

Some reluctance to investigate functional characteristics of markets may be attributed to the fact that behavioral aspects call for more interpretation and personal evaluation than do structural characteristics and may, therefore, involve some sacrifice of the "scientific" nature of rigorous determinate solutions possible only with the _a priori_ assumptions of "received doctrine".

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12About one third of the national income originates in manufacturing and mining, and in these areas fewness is very common. In manufacturing prior to the Second World War, fifty seven per cent of the value of the output was produced under conditions where the four largest producers of each product produced more than one half of the output. William Fellner, _Competition Among the Few_, New York: Alfred A. Knopf, 1949, p. 18.


Nevertheless, any value theory which neglects the phenomenon of fewness is sufficiently incomplete to be highly misleading.
Quite a system having been built on this a priori structure, some economists have developed a vested interest in their analytical apparatus and for that reason are reluctant to abandon it — even though its usefulness may have become only pedagogic. 13

J.R. Hicks reveals this bias when he states that:

It has to be recognized that a general abandonment of the assumption of perfect competition, and a universal adoption of the assumption of monopoly, must have destructive consequences for economic theory. Under monopoly the stability conditions become indeterminate; and the basis on which economic laws can be constructed is therefore shorn away — it must be remembered that the threatened wreckage is that of the greater part of economic theory. 14

However, as Frank Knight says, "If we have theory, it should be correct; and I am sure that we shall always have it with us. (Like the poor, and partly for that reason.)" 15

There is need for a theory of the firm consistent with factual research which will provide a framework showing the actions of a

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14 Value and Capital, Oxford: Clarendon Press, 2nd Ed., 1946, pp. 83-84. E. Chamberlin says that since Hicks feels that abandonment of the pure competition assumption will destroy the theory, it implies that he wishes to preserve the theory. "At another period of history one might have argued similarly for continuing to believe that the world was flat." "Monopolistic Competition Revisited", Economica, Vol. 18, Nov. 1951, p. 356.

normal businessman under the specific conditions of an oligopolistic environment in a dynamic business world.

Accordingly, this study is undertaken with the caveat in mind that "It is better to be vaguely right than precisely wrong". 16

This tentative first step may be crude and pedestrian compared to the polished elegance of traditional value theory. The answers may turn out to be inadequate or even wrong, but it is hoped that the questions raised are "correct" ones in the sense of being relevant to "what is" rather than "what would be - if".

This chapter has developed the general orientation of this study -- a review of value theory in an effort to explain business behavior (focusing on manufactured products and oligopoly) in an attempt to arrive at an applicable theory based on typical conditions.

With this background, chapter three will be devoted to a more detailed analysis of the limitations of traditional marginal analysis theory. This part one is negative -- the indictment of traditional theory.

Chapter four will attempt to summarize empirical findings regarding demand and supply - or costs; and more recent theoretical interpretations.

Chapter five will be devoted to synthesizing these materials into an eclectic framework that, it is believed, offers a reasonable explanation with present knowledge of both the underlying forces at work and the actual practices that businessmen employ in setting prices. This part two is positive — the formulation of a conceptual framework utilizing inductive findings for analyzing the decision-making process in a dynamic oligopolistic environment.

In part three an industrial case study to test the hypotheses of part two will follow. Chapters six and seven will develop the technology and structure of the American rubber industry and the objective characteristics of markets and attributes of the product influencing price behavior.

Chapter eight will involve an appraisal of the performance of the industry — with the implications of theory and practice for policy. Chapter nine will be a summary chapter of findings, conclusions, and recommendations.
CHAPTER II

THE EVOLUTION OF PRICE AND PRODUCTION THEORY

"Some theorists, pursuing their analysis on a high plane, refer to their work as 'teelmaking' rather than 'tool using'. A 'teelmaker' however, who constructs tools which no 'tool user' can use is making a contribution of limited significance."


A: The beginnings of price theory

The concept of "just price" seems to be the normal point of view of peoples whose goods and services are not evaluated in markets in an economic sense. This theory of price prevailed from the time of the Mosaic and Brahmanic laws, laying penalties on merchants who hurt the market for a commodity by selling it under its price or for more than it was "worth", down through the ages.¹ No genuine economic theory of price was possible until the gradual secularization or separation of economic thought from ethics-religious ideas. Value was an absolute quality inherent in a thing.

With the dawn of mercantilism, value came to be conceived as an extrinsic market phenomena dependent upon exchange. The spread of a wage system threw a new light on the problem of price and tended to emphasize costs. The leading Physicocrats recognized a prix fondamental established by competition and

based on an average expense of production but the *prix courant* depended upon the rarity or abundance of production or the mere or less competition of sellers and buyers, a supply and demand theory. Adam Smith distinguished "use value" and "exchange value" - the latter depending upon costs in tail and trouble in primitive societies - but later an allowance for profits on the accumulation of stock was necessary. Malthus contributed the principle of diminishing returns so necessary to later cost theory.

Ricardo drew attention to value from scarcity. Cost primarily determined value but in the case of unique things, utility governed.

John Stuart Mill's restatement of classical theory was an objective exchange theory of value based on cost of production working through supply. Lauderdale introduced some correlation of utility and costs but the 19th century Austrians swung all the way to subjectivism. Gossen, Jevons, and Walras brought marginal utility analysis to the fore.

Not till 1890 in Marshall's *Principles* was there accomplished an adequate synthesis of the Austrian utility theory and

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2 Ibid., p. 185.
3 Ibid., p. 587.
classical cost theory. Marshall achieved a genuine reconstruction of economics that is the starting point of neo-classical
theory.

B. Alfred Marshall's system

The key to Marshall's synthesis is his concept of the

science of economics as a two-sided study of "wealth" and "man" - the latter being primary.

His whole approach is based upon the concept of an equilibrium of causal forces. The "principle of continuity" leads him
to consider all human motives which act regularly, including ethical forces. He undertook to allow for changes which come
in time - for evolutionary continuity. This is the aspect of Marshall that most needs reemphasis in any modern reconstruction
of price theory.

Marshall's economics centers in the determination of value

which he consistently regards as a problem of equilibrium between
the dual forces of supply and demand. His greatness as an
economic theorist probably rests largely upon his success in
establishing the "price system" as a scientific explanation of
economic life. The time factor is kept to the fore in the prob-
lem of equilibration, and Marshall follows his classical prede-
cessors in distinguishing "market values" from "normal values".

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4Principles, pref. to 1st. ed., p. 41.
The former are "temporary equilibria" which "depend little, if at all, on calculations with regard to cost of production", but on present demand and stocks available. "Normal values" are "stable equilibria" which would be attained if sufficient time were given to allow the normal action of economic forces to work itself out. His conclusion is that "the value of a thing tends in the long run to correspond to its cost of production".

Normal economic action was that course of action that might be expected under certain conditions from the members of an industrial group; i.e., typical — like high or low water in the Spring or Fall. Marshall was the first to bring profits into the concept of normal price and to insist that a return on capital must be part of cost. He was the first to develop extensively the concept of price elasticity of demand. All of these elements, with Marshall's continual emphasis on "balancing the future against the present" indicate a primarily long run profits maximization concept.

In discussing business organization, Marshall uses the concept of the "representative firm". This is an average or modal firm "at which we need to look in order to see how far the economies, internal and external, of production on a large scale have

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5Ibid., p. 348.
6Ibid., p. 34.
7Ibid., p. 612 and p. 618.
8Ibid., Book III, Ch. IV.
extended generally in the industry and country in question? Marshall argues that an increase in the aggregate volume of production of anything will generally increase the size, and therefore, the economies, both internal and external, of such a representative firm and thus will enable it to manufacture at a less proportionate cost of labor and sacrifice than before. Andrews makes much of this principle in his Manufacturing Business, infra.

Nearly all dealings in commodities are affected by calculations of the future...we must be concerned with movements of price ranging over long periods of time...we have to consider the volume of production adjusting itself to the conditions of the market, and the normal price being thus determined at the position of stable equilibrium of normal demand and normal supply. This is the price, the expectation of which will just suffice to maintain the existing aggregate amount of production; some firms meanwhile rising and increasing their output, and others failing and diminishing theirs, but the aggregate production remaining unchanged.

Thus the long run equilibrium price concept of Marshall implies a stable supply. His conclusion that market price cannot be higher than the level which will bring new businesses into the industry seems a familiar result of modern theory as well. There is a significant difference, however. He defines the long run in terms of the stability of industrial output and not in terms of the stability of individual businesses.

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9 Ibid., p. 318.
10 Ibid., p. 318.
11 Ibid., p. 343.
He, therefore, does not require that all firms in an industry should be covering their costs even in a position of long-run equilibrium.\(^1\)

When the demand price is equal to the supply price, the amount produced has no tendency either to be increased or to be diminished; it is in equilibrium - and this equilibrium tends to be stable, forces reestablishing it when departures occur. The shorter the period which we are considering, the greater the influence of demand on value; and the longer the period, the more important the influence of cost of production on value.\(^2\)

This follows from each entrepreneur following the principle of substitution and pushing investment in each field to the margin of profitability.\(^3\)

Marshall distinguished only between monopoly and competition. A firm in competition faces the possibility of other firms producing a commodity with the same technical specifications and offering it for sale to its customers. This is a much wider concept than the purely competitive market of later theory with its assumed absence of all buyer's preferences and its stress on actual homogeneity of product.\(^4\) Marshall draws no distinction such as

\(^1\) Marshall, op. cit., p. 349.
\(^2\) Marshall, op. cit., p. 355.
\(^3\) T. Wilson, Oxford Studies in the Price Mechanism, p. 141.
is drawn by later theory between purely competitive and imperfectly or monopolistically competitive industries. So long as entry into the industry is possible, it will be competitive in Marshall's sense.

A monopoly exists when it is impossible for other businesses to offer the same type of commodity to a firm's customers. In this case the firm will have a determinate demand curve of its own. (Assuming that no technically distinct commodity is a sufficiently close substitute for the monopolist to have to take it into account in framing his own policy, and that the total receipts of the business will not form a large proportion of its customers total expenditure.)

If the monopolist strictly maximized net profits, Marshall's analysis is formally equivalent to the modern doctrine that marginal revenue will equal marginal cost. In this case there will be no a priori connection between price and the average cost of the output. In ordinary industries, Marshall thought that the possibility of entry of other producers would insure that long run price would be equal to the normal average cost of production. In the long run, no business would be able to get a higher price than any other business for an identical delivered product from a

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16Alfred Marshall; Principles of Economics, Book III.
17Marshall, op. cit., p. 480.
particular customer. Marshall did not imply (as does post-Marshallian analysis of pure competition) that the individual firm should be able to sell any amount at the ruling price. Similarly, supply price is defined so as to imply a stable supply - a price that cannot be higher than a level where new businesses will enter the industry. Stability is in terms of industrial output and not individual firms. All firms need not be covering their costs even in a position of long run equilibrium. This is in striking contrast to modern monopolistic competition theory.

Over the years, Marshall thought that a firm's cost of production would tend to decline as the individual business man acquired an increasing vigour and grasp of the situation as he attained mature industrial experience. Similarly, the business would decline as the management group lost vigour. The output of the industry however, will be stable, the declining proportion from established firms being offset by that of new entrants. New businesses need not get normal profits on entry since entry will be conditioned by estimates of what they can achieve at a more mature stage, derived from what seems to be happening to existing businesses. They will come in if it appears that they can meet paying-out-costs and achieve a sufficient level of output to reduce costs to satisfactory profit levels before exhausting their liquid resources. Marshall thinks then in terms
of a representative firm whose opportunities are the target which attracts entrants. The long run supply price for the industry tends to equal the normal costs of a representative firm. Any higher price invites entry and lowers price and profits for all. Marshall's development, unlike modern theory, is not in terms of equilibrium for the individual firm.  

C. Theory from Marshall to Chamberlin

From Adam Smith's day most non-socialist economists assumed a condition of competition in which monopoly was exceptional though they recognized frictions which made competition imperfect. Mostly, too, they were concerned with the long-run tendencies toward a condition not precisely attained. Mill and Cairnes somewhat refined the theory by distinguishing different "cases" of value determination. The problem of what constitutes a natural equilibrium and the definiteness of determination of natural value became more evident. In 1838 Cournot assumed monopoly and stated the law of demand in the form of a price determination equation - quantity demanded is a function of price. He then attempted a determinate solution for duopoly. Cournot's mathematical studies led him to assume that diminishing unit costs make perfect competition impossible, and lead to monopoly in industry.  


The acceptance in 1890 of Marshall's pseudo-definitive restatement, stalled further contributions until, in 1926, Emile Sraffa published the "Laws of Returns under Competitive Conditions". Sraffa assumed monopoly as a base. He argued that diminishing unit costs make for instability and tend toward monopoly. He adopted the negatively inclined price-determined demand curve for a single seller and argued that the position of such a seller is in kind, if not in degree, that of a monopolist.

Prior to 1926 the tendency had been to assume a rule of competition, although not assumed perfect, barriers to competition were thought to be of secondary importance. They were only frictions to the forces tending toward competitive equilibrium. To use Marshall's expression, in another context, they "were of the second order of smalls." Jacob Viner, writing so late as 1931 on competitive supply curves, says:

The analysis which follows is based on the usual assumptions and presuppositions of the Marshallian type of economics — like all partial equilibrium analysis — it rests on assumptions of the Hektoria Haribus order — for such logically invalid assumptions there is the pragmatic defense that they permit of more detailed analysis of certain phases of economic interdependence than would be possible in their absence, and that to the extent that they are fictions uncompensated by counterbalancing fictions, it is reasonable to believe that the errors in the results obtained will be almost invariably quantitative rather than qualitative in character, and will generally be even quantitatively of minor importance.  

Piero Sraffa in his now famous article "The Laws of Returns Under Competitive Conditions" argued that these frictions were in fact cumulative and yielded theoretical solutions more consistent with monopolistic equilibrium.

Given constant price, the condition for a determinate equilibrium, whether short or long run, is that marginal costs be rising. The concept of individual equilibrium makes it too easy to assume that such a situation had to apply with the result perhaps, that it became impossible to examine critically the reasons that traditional theory adduced for the existence of increasing costs.

Not until Sraffa posed the possibility of decreasing costs and growth of the firms to eventual monopoly did an answer seem to be required. He came up with a theory of monopoly based on selling costs differentiating the product, and irrational consumer preferences not related to quality preventing continual falling costs. Together with Chamberlin's concepts this provided the background for the kinked demand curve of Hall and Hitch.

In 1933 Robinson and Chamberlin offered an organized approach to the analysis of the middle ground between monopoly and competition. Previously only Cournot, Edgeworth, and Bowley "had offered a smattering of mostly improbable solutions to mostly improbable situations." 23

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D. Monopolistic competition theory

Edward Chamberlin's monumental work, The Theory of Monopolistic Competition, 1933, fuses monopoly and competition. Chamberlin's thesis is that both monopolistic and competitive forces combine in the determination of most prices, and a hybrid theory explains more than competition supplemented with monopoly. Older theory refined and perfected separate theories for monopoly and competition, ignoring their interweaving in the economic fabric. Chamberlin's conclusions indicate that previous assumptions are not in accord with the facts.

Phenomena are not either competitive or monopolistic, justifying two purified theories. Actual competition is not explained by pure competition theory. "Pure Competition" means no monopoly elements. Necessary conditions are a sufficiently large number of sellers that no one can influence the price of a perfectly homogeneous good. The sole seller of a unique product has a "pure monopoly". Chamberlin argues that monopoly and competition are not alternatives but that most situations are composites combining elements of both.

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24 Accepted as a doctoral dissertation by Harvard University, April 1927, Chapter III, "On Duopoly and Oligopoly", published as an article in the Quarterly Journal of Economics, Nov. 1929.

25 Mrs. Robinsen's, Theory of Imperfect Competition, 1933, contains no monopoly (in the traditional sense) and leaves the dichotomy as sharp as ever.
The usual condition is intermediate in which some element
of monopoly exists, and which Chamberlin calls "Monopolistic
Competition". This occurs when either the product is differen-
tiated, (each producer having some monopoly in his own product ac-
cording to the degree of differentiation) or, if homogeneous, the
number of sellers is sufficiently small that each has some
influence on the price. Once differentiation exists, no seller
can sell any output volume at the going price. Each producer
goes competition from "substitute" products which are net
identical, sold by other concerns, with various price policies
and sales expenses. These merely limit his "monopoly" of his
own product.

The individual firm's demand (or sales) curve is affected
by the market policies of other sellers of partial substitutes.
Total sales of the competing group of substitute products limits
the sales of any one seller. Under pure competition a horizontal
demand curve would exist for each seller. This would mean identical
prices and infinite demand. Chamberlin argues that selling costs
are not part of the costs of production but are incurred to increase
sales and thus affect the demand curve. Any differentiation of
product gives the seller some element of monopoly. It makes pure
competition impossible. Hence we have a gradual shading from pure
competition to pure monopoly.
Older theorists treated this "in-between" range only as duopoly. Chamberlin's newly emerging analytical technique adds oligopoly (his small numbers case), and monopolistic competition. Competition is in terms of substitutes, and is only partial. Feeling that the mutually exclusive theories of monopoly and competition were out of accord with economic realities, Chamberlin sought to effect a synthesis in a market-value theory not based on pure competition and fitted to the facts of actual competition. He asserts that the correct procedure is to start from the theory of monopoly. This has the merit of eliminating none of the competitive elements operating through the demand for the product, while on the contrary the alternative assumption of competition rules out the monopoly elements. Thus Chamberlin's approach is similar to that of Cournot. But it was much more. It was as his subtitle claims, "A reorientation of the theory of value", as manifested by the effect this work has had on all subsequent theory.

However, Alfred Shorrard feels that Chamberlin failed in his objective of a synthesis. Although the theories of imperfect

26Chamberlin, _op. cit._, p. 68.

27But while Cournot's analysis was in terms of numbers of competitors Chamberlin's is also in terms of substitution of products.
competition have become an accepted part of orthodox economics and \( \text{MC} = \text{MR} \) is a standard part of the economists apparatus. The theories of competition and monopoly have not been replaced.

They have only been added to - monopolistic competition having come to be identified as a separate type of market situation. Chamberlin achieved not a reorientation but an elaboration of the theory of value.  

E. Imperfect competition theory

Jean Robinson, attempts to state a general theory of which monopoly and competition are only limiting cases. She builds on Marshall and Pigou. Her approach is that monopoly swallows up competitive analysis entirely.

Her analysis is mostly in terms of equilibrium and particularly long run equilibrium. She treats the time factor only incidentally. The procedure is to impond all factors in \textit{ceteris paribus} and then examine the effect of each variable separately.

She candidly admits the unreality of her assumptions and the improbability of many of her models ever fitting the conditions of the real world; however, her analysis proceeds painstakingly


in terms of supply and costs and demand and price so that innumerable combinations of possible conditions may be derived. But she is explicit in pointing up that for instance no actual or probable cases would ever validate the usual comparisons between monopoly and competition (since the production functions are not the same). Monopoly price may be lower than for competition and output may be greater.

Aside from some technical differences, she comes to not very different conclusions from Chamberlin in spite of his assertions to the contrary.

Both authors offered the same indictment of pure competition theory and attacked the same problem. Market imperfections are much the same as product differentiation. However, their general approach differs as revealed by their tools and techniques of analysis—assumptions, definition of demand, diagrams, recognition of differences for large and small numbers, etc. They arrive at much the same solution except for Chamberlin's refinements on oligopoly and the concept of entry.

Limited competition theory (to avoid either Robinson's or Chamberlin's terminology) is exclusively concerned with static equilibrium. Time is ignored. The analysis is based on self-interest motivation working through a single firm's attempt to maximise profits, and little is done to generalise the theory to an industry.
F. Monopolistic competition and general equilibrium theory

Robert Triffin's work traces the origins of monopolistic and imperfect competition theories in the nee-Marshallian partial equilibrium analysis and attempts to integrate them with general equilibrium analysis (as exemplified in the theories of Walras and Pareto) in a general synthesis.

Triffin outlines the main deficiencies of monopolistic competition theory in their present stage - holding that the concept of the "industry" no longer has any theoretical significance. He extends the theory of external interdependence to questions of profit and entrance into the industry and opens up a new individual approach to concrete cases in economic theory.

The bridge between Marshallian particular equilibrium theory and Walrasian general equilibrium theory, Triffin feels, is to be found in monopolistic competition theory as developed by Chamberlin and Robinson. Two different types of propositions are those referring to individual behavior as consumer and producer and those referring to the interactions in markets of economic units. When all independent decisions are made compatible through interactions in the market, equilibrium is reached. Thus results a theory of the economic unit and a theory of external interdependence.

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While the whole theory of the firm can be derived from a single principle of subjective maximization, the theory of external interdependence necessitates a wide range of hypotheses of market conditions. A systematic treatment of the modes of firms' interdependence is the objective of this book.

Triffin feels that the criteria for these distinctions between market conditions should be sought in the relationship between competitors and not in the characteristics of the individual firm in isolation - (in the slope of the demand curve for example). Much attention has been devoted to the maximizing behavior of the economic unit. One would gather that substituting $MC = MR$ for $MC = P$ has been the main contribution of monopolistic competition theory to date. This is partly the case since the difference lies in treating price as a variable in seeking maximum profits. (Whereas in competition, price is an objective datum.)

The real contribution, however, has been the focus on the adjustment process in the theory of external interdependence. Particular and general equilibrium theory agree in analysis of the firm but diverge sharply in problems external to the firm. Monopolistic competition provides a synthesis. The center of Marshall's system was the industry. Monopolistic competition shifts the attention to the firm stressing the fact that there are conditions of equilibrium external to the firm necessitating general interdependence. This has still been limited to a group
er industry and Triffin proposes to extend it to the economic collectivity.

It is proposed to substitute for previous formulations of equilibrium requirements derived from special hypotheses of pure competition, absence of profits, etc., the single equation of \( MC = MR \), minimization of total cost relative to output, and stability of numbers of producers. Equilibrium is then analyzed in terms of relationships between relatively small units and the conditions external to the firm rather than the equilibrium of supply and demand within the industry. Doctrines linking pure competition and free entry with the absence of profit are held to be empty conventions. What is felt to be a more logical theory of value reconciles "institutional" and "theoretical" economics by emphasizing the need for factual investigations in the choice of assumptions. A plea is made for more empirical research to enlarge the list of assumptions of pure theory which will offer better explanations of concrete cases, even though generality may be sacrificed.

Here then is a sufficient resume of the evolution of price and production theory for a starting point.

George J. Stigler declares "Robinson's volume marks no break with the tradition of neo-classical economics, indeed, it contains the uncritical acceptance of the substantive content of
Chamberlin was a true revolutionary persevering to construct an analytical system to deal with the phenomena of economic reality.\(^{31}\)

But did Chamberlin develop a logically consistent theory of economic events? Does his theory contain more accurate or more comprehensive implications than the neo-classical theory?

Although Chamberlin introduces the concept of the "group", (page 81) firms producing fairly close substitutes, and deals with both individual and group equilibrium he assumes both demand and cost curves for the products are uniform throughout the group (page 82). Implicitly he is defining the group as producers of homogeneous products.

On page 73 he assumes buyers have perfect knowledge. With perfect knowledge and homogeneous products, the firm's demand curve would have to be infinitely elastic. On page 83 he assumes any adjustment of price or product spreads its influence over so many competitors that the impact on any one is negligible and does not lead him to readjust his own situation. He abandons the picture with which his analytical apparatus was designed to deal: If we drop the uniformity and symmetry assumptions, monopolistic competition theory contains no conditions of equilibrium.\(^{33}\)


\(^{32}\)Ibid., p. 13.

\(^{33}\)Ibid., pp. 18-19.
With Triffin throwing out the industry how are we to analyse interrelatedness among firms? Triffin abandons theory and advises us to tackle each problem with due respect to its individual aspects (page 123).

"Marshall's technique was appropriate to the world of competition and monopolies but it is lost in the sea of diversity and unsystematism, and Chamberlin (applying Marshallian techniques) is lost with it."34 Our theories are useless for prediction because diversity is too great for us to generalize or capture a common element in the infinitely diverse economic phenomena of business reality.35 It is at least statable that many seen discovered that the new theory involved a series of traps for anyone venturing policy recommendations!

Prior to WWII the theories of imperfect or monopolistic competition appeared to have resulted in an almost complete abandonment of Marshallian industrial analysis. Although there has always been some dissatisfaction, a remarkably long period has passed without any restatement of the older theories as an alternative body of doctrine.

The abandonment of the industry concept - while government administrators in terms of industries, business men think against an

34 Ibid., p. 22.
35 Ibid., p. 23 and p. 46.
industrial background and statistics continue to be collected on an industry basis - represents a great gulf between theory and practical thought. Marshall's industrial equilibrium analysis, being inconsistent with the newer theory of equilibrium of the individual business, the difficulty was resolved by dropping industrial analysis and retaining the static equilibrium theory of the individual business. It would have been equally legitimate to have abandoned the latter.

With this background of the evolution of traditional theory attention can now be given in Chapter III to a more detailed analysis of its limitations.
CHAPTER III

THE LIMITATIONS OF MARGINAL ANALYSIS

"Geometry ascended the throne left vacant by philosophy
and common sense; and ingenious youths and maidens, be-
guiled into the belief that here at last was a true
picture of the world, spent the best moments of their
young lives in memorizing (generally wrong) endless
fantastic patterns of tangencies and intersections."

...D. H. Robertson, "A Revolutionists
Handbook", Quarterly Journal of

A. Demand in theory

Modern analysis can be said to begin with the more intensified
study of the forces of demand. Marshallian assumptions included
given time, given constant prices and quantities of all other
goods, etc.¹

With these theoretical curiosities Marshall was able to fix the
position and shape of the demand curve for his analyses of equilib-
rium. It constituted "a refusal to deal with market interrelated-
ness."²

¹Marshall, Principles, Book III, Ch. 3 and 4, pp. 95-132.
However, one Marshallian student claims that although
Marshall contributed the demand curve as a functional
relationship between price and quantity, nowhere did he
completely define demand explicitly. The contents of
osteris paribus were left to be inferred and others have
filled the gap. For instance, it is alleged that Marshall
is inconsistent with regard to whether given income means
money or real income, and hence whether constant prices
or quantities of other goods is assumed.
Cf. M. Friedman, "Marshallian Demand Curves", Journal of
²S. Weintraub, "The Foundations of the Demand Curve",
Yet neither do Robinson nor Chamberlin offer any thorough discussions of the foundations on which their demand curves rest.

Robinson, like Marshall, merely turns away from the problem. She simply draws a demand curve and proceeds with her analysis — after brief mention of the difficulty.

In an industry which is conducted in conditions of imperfect competition a certain difficulty arises from the fact that the individual demand curve for the product of each of the firms composing it will depend to some extent upon the price policy of the others — it is not to our purpose to consider this question in detail. Once the demand curve for the firm has been drawn, the technique of analysis can be brought into play, whatever the assumptions on which the demand curve was drawn up.3

Chamberlin similarly "works the fiction" by developing a determinate solution with mutual dependence ignored, each seller assuming his rival's price constant 4 then each seller assuming his rival's supply constant, 5 and finally, recognizing mutual dependence and uncertainty about changes in the variables -- concludes that no determinate solution is possible. 6

The determinate solution and equilibrium of the firm in monopolistic competition theory is possible only with the ex post, objective demand curve, with its accompanying assumptions.

3Jean Robinson, op. cit., p. 21.
4Chamberlin, op. cit., p. 34.
5Ibid., p. 32.
Marshall assumed a large number of firms, seeking to maximize gains, selling a given product. Land, labor, and capital were the qualitatively different factors homogeneous within each category. Different levels of production permitted different techniques of production; and the entrepreneur's problem was primarily that of rationally deciding on the best proportion in which to combine these factors to achieve least-cost output. Marshall handled the problem of what the firm should buy. The problem of what to sell is only interstitial in his system. While trying to maximize profits the firm produces a given product and passively adjusts to external conditions.

Monopolistic competition introduces product differentiation, advertising, and non-price competition. Consumer tastes are no longer taken as given. Now the focus is on the firm's problem of what to sell. The usual assumption is that factor prices are given and constant - or the firm buys competitively and sells under conditions of monopolistic competition. But "what the buyer calls a factor is a product to the seller", 7

Nevertheless, Chamberlin's analysis proceeds primarily in terms of the demand curve from which the marginal revenue curve is derived. But the demand curve for what? There being an

7Triffin, op. cit., p. 113.
indefinite range of product variation can one draw a curve showing the relationship of price and output for each variant -- all others remaining constant? Can the firm then determine the most profitable price and output for each variant separately and then by comparison choose the most profitable price and product combination? For the businessman this solution, for all its elegance, is no solution at all. Possible variations are limitless and can not be arranged in any mathematical sequence. The entrepreneur can not be aware of all possible variants -- no less knew the appropriate demand curve for each.

Neither the businessman nor the economist is in a position to follow Chamberlin's suggested procedure:

If constructions such as figures 9 and 10 (conventional cost and revenue diagrams for a firm under monopolistic competition) are drawn for every possible variety of product that combination of product and price may easily be chosen which offers the largest total profit of all.

The businessman must necessarily choose between variants on the basis of trial and error, hunches, and judgment from experience. Not being able to discover the actual position or slope of real demand curves the only curves relevant for decision-making are entirely imagined or subjective. If firms are interdependent any one's demand curve depends on the others prices, output, product variant, etc. Since these are not given no one firm can ever know its marginal revenue.

8Chamberlin, op. cit., p. 80.
Similarly Chamberlin's statement that with respect to variations in selling costs "The magnitude of the result depends upon the amount expended" is not the whole truth. "The fact that one concern can grow to a certain size by spending, say one million dollars does not mean that another firm can reproduce this result. The results are unpredictable -- and for any given expenditure there is an indefinite range of ways of spending not orderable in any sequence. There are no laws relating selling expenditures to demand.

Alfred C. Neal's misgivings about monopolistic competition theory, as explanatory of real world phenomena, has led him to assert that the frame of reference of Chamberlin-Robinson theories is so limited that "uncautious users have made pronouncements about the real world which cannot be justified either in terms of the theories themselves or in terms of empirical observations."

Empirical findings with respect to demand have not been impressive. It should be carefully noted that the demand curve

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9 Ibid., p. 130.
10 Cost Behavior and Price Policy, p. 215.
which is obtained is quite likely not to hold true for periods other than the one studied, and cannot be treated as correspond-
ing to the demand curve of economic theory.\textsuperscript{13}

Among the statistical studies of demand that have been made, there are cases in which the same commodity has been studied by more than one investigator, and their results indicate varying degrees of elasticity of demand.\textsuperscript{14}

The statistical analyst and the economic theorist may be on paths so divergent as to be wholly out of touch with each other. Measured demand is complicated by changes in income, population, consumer habits, and time. The theorists \textit{ceteris paribus} curve is of another species.

Price comparisons over time are meaningless. The good may change in characteristics or quality, accompanying accessories, and services. It often cannot be determined whether price has advanced or declined.\textsuperscript{15}

Theory treats price as a simple fact whereas actually specifications of the \textit{terms of a transaction} that constitute "price" are quite complex, and inseparable from the definition of what constitutes a "product".


\textsuperscript{14}E. J. Working, "What do Statistical Demand Curves Show?", \textit{A.E.A. Readings in Price Theory}, Stigler and Beulding, editors, p. 98.

The answer to the question "what is price?" has no simple answer. Is it the published list price, a quoted price, or the price paid? The same buyer may be quoted different prices depending on the quantity he takes or the period of time in which he pays. Different customers may be quoted different prices for the same good based on an ability to pay principle. Qualitative changes in the product - or services accompanying or part of the "product" - may be equivalent to a "price" change. Or there may be no changes in the quoted price but the seller may give thirteen for a dozen - or coupons, prizes, credit. Even description is complex and a simple definition of real price nearly impossible. 16

Textbook theory assumes that all consumers can be divided into the two camps that will either buy or not buy at the given price. 17 Ex post the businessman can ascertain how consumers divided at Y price - but he can know nothing about how individuals would have divided at other prices than Y.

Conventional theory admits a different type of uncertainty. Sellers are uncertain as to shifts in the demand curve due to rivalrous reactions or subjective evaluations of consumers.

Sellers are sure of demand "as is" but are not sure it will stay "as is". Eiteman has argued sellers do not know demand "as is" either.

Furthermore, the producer does not know even the boundaries of the zone of uncertainty within which demand lies. If this concept of demand is accepted the precise solutions obtainable with a line demand curve are no longer possible. There would be no specific point where profits were maximized.18

It appears that plants are ordinarily designed and equipped so that at capacity operations efficiency is the greatest. Any decrease in output would cause the per unit costs to rise. The business man then establishes a price and focuses on sales at that given price - not on the shape of the demand curve.19

B. Costs in theory

Costs are primarily influenced in economic theory in the short run by the rate of output, the prices of input factors, physical productivity of the factors, and selling expenditures.

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18 This tends to conform to Freyman's analysis of the range of output over which MR would still equal MC, price being unchanged, with a discontinuous MR curve derived from a kinked demand curve.

In the long run costs are influenced by the size or scale of plant, and the stage of technology.

In the short run, theory concentrates on the relationship between costs and the rate of utilization of a given plant. Economic theory designates this as the short run cost function. All other determinants are assumed to be unchanged.²⁰

Given certain fixed factors it is then assumed that applications of successive identical infinitesimal increments of a variable factor will give a rising average product — up to an optimum output — and thereafter a declining average product. From this "law of non-proportional returns" is derived the traditional U-shaped cost curves — since per unit costs will decline as average product rises and increase as average product falls. With a falling marginal revenue curve and rising marginal cost curve, the firm will proceed to expand output to that point where the cost of producing one more unit of output just equals the revenue to be derived therefrom. At this point the firm will have achieved the maximum profit position (since it will have added every possible increment to total profit (MR=MC) and be in equilibrium (since there is no motivation to produce either one more or one less unit of output.)

Theory assumes these cost functions are empirically determinable and known. Actual firms do not know their cost curves

²⁰Cost Behavior and Price Policy, op. cit., pp. 51-54.
from experiment. They do not test utilization of capacity.\(^{21}\)

Costs change over time so a record as of different times of different levels of operation is of little use. Factor price changes affect costs and qualitative changes affect costs. These changes are difficult, if not impossible, to separate from cost changes resulting from purely quantitative changes in the variable.

All of the well-known criticisms of marginal productivity analysis vitiate theoretical firm cost analysis. Factor units are not homogeneous; they cannot be increased in infinitesimal increments; they cannot be separately varied while other factors remain fixed; factor prices are not constant; pure competition does not exist in both the markets for factors and products; and factors are not freely mobile. Marginal productivity (and hence marginal cost) are simply not calculable in a complex production process.\(^{22}\)

Theory disregards the complex problems of allocating actual costs between fixed and variable categories. One cannot uniquely define fixed costs and variable costs with reference to time.


If ten ditch diggers are increased to eleven the extra product is attributed to the eleventh unit of variable factor. Do eleven ditch diggers still operate with ten shovels? Or are eleven smaller shovels of the same value assumed? Fixed costs imply a factor that does not adapt to the variable.23

Furthermore, a pricing decision involves a complex time distribution of allocable fixed costs. In theory depreciation, for example, is a simple function of output or time (assuming no autonomous shifts in demand to change the prices of assets, and no general variations in all prices or supply conditions.) Actually asset values are changed by demand shifts, technical changes, and interest rate changes. All of these demand changes in "depreciation" rates.

The single product firm operating under static conditions in theory equates current marginal costs and current marginal revenues to maximize profits. Actually, current costs and revenues do not determine decisions for any real firm. Practically all costs and incomes, included in estimates upon which decisions are based, include elements of futurity. Expected future costs and revenues, techniques of production, demand trends - even the effect of present decisions on future trends -

are all part of the firm's considerations. Futurity then brings far more complicated reactions than under static assumptions - and Neal agrees with Sherrard that monopolistic competition theory cannot handle this element of futurity. Keynes "User Cost", for instance, (the cost of using a facility now - in terms of depreciation - as opposed to idleness now for future use when the price of capital facilities may have increased) - indeed all terms of opportunity costs, will not fit into any of the traditional classifications of costs in monopolistic competition theory.

As for the prices of the factors, what is the price of labor? It would have to include all the conditions under which labor is performed. How then prepare an index of wage rates if these other items vary?

Theory assumes that a firm sells but one product. It is evident that almost all enterprises sell more than a single product. The development of by-products, different sizes, models, colors, lengths, finishes, and "lines" of products point to the multi-product firm as typical. Executives are beset by a range of problems requiring cost allocation among products involving pricing, relative output schedules of different products, and the inclusion or exclusion of items.24,25

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For total income purposes cost allocation among products is immaterial. Costs are for joint products of the productive process. But with common costs for a product-mix the precise calculation of the marginal costs for any one product is impossible. Consequently, for pricing purposes businessmen appear to use rule-of-thumb methods. Non-separable costs are allocated primarily on the basis of actual direct labor costs, of man hours, or machine hours; or on the basis of relative sales value of the products. Many costs that are separable are not traced by accountants simply because of the clerical costs of doing so.

Cost and revenue functions are not independent. The demand curve is influenced by, and therefore partly depends upon, selling costs.

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26 Fixed costs have tended to become an increasing proportion of total costs in recent years in manufacturing from increased use of machines, increased property taxes, increased advertising and selling expenses, increased research, a higher proportion of salaried employees, increased fringe benefits and the great increase in record keeping from social and tax legislation and new techniques of management. Cost Behavior and Price Policy, op. cit., pp. 58-60.

27 Ibid., pp. 170-187.

28 Product differentiation fosters selling expenses. The less the consumers ability to judge the good the higher the expenditure on advertising - patent medicines running as high as 35% of net sales volume - and consumer products averaging a higher selling cost than industrial products. Cost Behavior and Price Policy, op. cit., p. 191.
The data from accounting records are not applicable for the economist. How do you isolate one variable from one hundred affecting costs? The attempt to isolate effects of a technological change on costs from the effects of a factor price change or a change in the rate of output eludes application in a dynamic world.

Nevertheless - "Costs provide the point of departure for pricing decisions because more detailed information is available concerning them than such factors as demand conditions, costs of competitors, and competitive sales and price tactics." Starting with a price that may be suggested (by a change in costs) the estimate is then revised in the light of expected volume of sales, price, quality and sales program of competitors, and similar demand considerations.

In theory, a long run cost curve is drawn for a firm based on short run curves which assume constant factor prices and homogeneity of factors as well as absence of change in technology. Such a ceteris paribus long run cost curve can seldom be relevant to the problems confronting an enterprise. Businesses can not ignore changes induced in prices of factors (or finished products) from changes in scale. If a business executive

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29 Cost Behavior and Price Policy, op. cit., p. 45.
evaluates, adapts, manipulates, etc. then the cost situation is to a great extent what he chooses to make it. "Costs are not given and static but a function of the firm's policy."30

Received doctrine is that the long run cost curve is the envelope of the family of short run curves, each of which represents the ideal combination of resources for that size of plant. This long run cost curve is the locus of positions that the plant may occupy in the long run, and in fact, that plant size will be selected where the long run curve marginal to this envelope intersects the marginal revenue curve. But when a price change ensues - what was an equilibrium size of plant at one time becomes a non-optimum size. This involves a short time alteration of plant. Usually plant is imperfectly divisible and partially adaptable. Constancy of marginal cost follows from the building of flexible plants with short run alterations of plant which permit movement between, as well as along, short run cost curves. The alteration of plant explains the fact that there are many costs neither completely fixed nor variable within specified short periods of time.31 "Dynamic changes constantly blur the distinction between short run and long run costs."32

Whereas theory assumes technology and factor prices constant, these actually change and cause the firm to seek a new equilibrium. Adjustment — but it cannot move along a given supply curve because the curve itself shifts from changes in the industry output as all try to adjust. Only by assuming some value for the total output could a manager move along a specific supply curve. Hence the calculation of an industry demand, the establishment of a fixed price, and firm supply of all the market will take at that price, reduces the battle of competition to that of "market share" primarily.

To the theorists, it appears obstinate to refuse to accept so obvious a distinction between costs as a function of time and costs as a function of output — but there is some wisdom in attempting to keep ready cash on hand. So much wisdom that, under certain circumstances, a firm may even produce when price is less than minimum average variable cost.

The firm in trying to achieve optimum size neither tries for least-cost nor maximum profits. It simply seeks a "profitable" scale of operation. Nor is plant built to produce a constant output. Maximum efficiency for a fluctuating range of output is

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sought rather than optimal efficiency for a given output. Flexibility for cyclical change, technological change, peak demands, and lateral transfer between products certainly indicates long run profitability is the goal.35

Empirical studies of cost functions have first to eliminate all factors affecting costs other than output and then to measure the residual relationship between costs and rate of utilization. The cost function of theory applies to only one point in time. All statistical observations must be made in different periods. In these different periods different production techniques may be used. Observations may be made in discrete periods of varying lengths and averaging the data leaves out of account changes attributable to output changes within the period. Also the size of orders or the rate of change of output within a period become determinants of costs along with the level of output itself.36

Observations are seldom made of the extremes in the volume of output, only for normal actual range of output -- and projection of such curves have little, if any, significance. The time for processing may cause the costs of one period to be related to the

36Straight line depreciation does not allow for the dependence of physical wear and tear on output and hence understates costs at high and overstates costs at low output.
output of another — giving a cost function that is meaningless;
and since firms do not produce the single homogeneous good assumed
in simplifications of theory, there arises a difficult problem
of the unit of measurement of output. Strictly speaking the
effects of all other cost determinants besides output can never
be certainly eliminated. 37

These studies indicating a linear cost-output relationship
are of particular interest since economic theory has presumed
markedly U-shaped curves deduced from "common-sense" propositions
implicit in the "law of diminishing returns". 38 Conditions of
diminishing returns may be as typical as theorists assumed (though
the evidence is to the contrary) but if decisions are made on the
assumption of a linear relationship (as break-even charts would
suggest) this alone is basic to any explanation of pricing, quite
apart from the "real" shape of the cost function.

The implicit assumption in most break-even charts that the
cost function is linear may be simply a reflection of the fact
that for all practical purposes of decision formation such an
assumption is adequate. 39

38 Ibid., p. 109.
39 Loc. Cit. Break-even charts (widely in use) assume cost
functions on the basis of constant factor prices, plant
scale and technology. The revenue function assumes selling
prices and product mix unchanged. The spread between these
two lines gives the profit function. Assuming other things
equal then the charts provide flexible projections of the
impact of output on expenses, receipts, and profits.
Joel Dean, "Cost Structures of Enterprises and Break-Even
Whereas theory assumed the fixed factors to be entirely indivisible, that is plant and equipment had to be operated as a whole or not at all; one explanation of empirical linear cost-functions may reside in the fact that fixed factors are more or less divisible. Parts of the plant or groups of machines may be shut down, or operated more or fewer hours a week. Similarly a plant may be built to produce a fluctuating output or different types of output rather than a specified volume or product.

Without suggesting that it is futile to try to derive exactly the cost function of the economist, the foregoing at least reveals some of the difficulties and bases for critical evaluation of available studies.

C. Maximum profits

One of the main lines of criticism of the marginal analysis has been the attack on the principle of maximization of profits as not corresponding to the actual principles that motivate and direct behavior.

First businesses have no way of knowing when profits are at a maximum. The marginal concepts simply are not calculable. Cost and revenue functions can only be subjective estimates - hence businessmen must resort to rule-of-thumb methods that fit their information but do not necessarily maximize profits. Even if businesses knew when profits were at a maximum and tried to maximize them, it is doubtful that they could. They do not know the position or slope of the demand curve or marginal costs at different outputs for multi-products. If the firm knew its point of output was not most profitable, leaving aside the question of how it would discover this, how would it backtrack, changing its output and price, along an average revenue curve the location and slope of which are unknown at any moment and which shifts over time? Theory should assume business decisions are made on the basis of information available to the businessman.\(^{43}\)

Granting that businessmen knew when profits were maximized and how to maximize them, there is still the question of whether they try to maximize profits. Conceding that theory cannot cover all cases but must select the typical for its generalizations,

it still remains that the maximum profits concept fails to cover
a great many cases of common and rational behavior. 44

Production may go beyond the maximum profit point for
prestige from the size of one's empire or domain, for a reputation
for benevolence in giving employment in depression, to avoid
anti-trust action, adverse public opinion, or forestall the
formation of cooperatives, buyer's combines, or competing
corporations, or from Keynes' sheer "Animal Spirits" (p.161).
Such slogans as "beat Chevrolet" may indicate that sales volume
may take precedence over balance sheet considerations. Certainly
market share or liquidity may at times take priority over
maximum profits. Political expediency, price wars, considerations
of health, safety, even religion are affecting factors. 45

44 Mrs. Robinson says she presumes maximizing profits since
she assumes businessmen act sensibly. She does not treat
'neuroses and confused thinking' (pp. 15 and 16). Her
concept of acting sensibly excludes most business activity
regarded as sensible." R. H. Coase, "Notes on Monopoly
1204. B. Higgins, "Elements of Indeterminacy in the Theory
of Non-Perfect Competition", A.E.R., Vol. 29, Sept. 1939,
p. 477.

45 W. Reder, "Reconsiderations of Marginal Productivity
M.J. Farrell, "Deductive Systems and Empirical Generalisations
in the Theory of the Firm", Economic Journal, Vol. 4,
A less than maximum profit might result from a desire to produce the best product for the money on the market - to raise the level of the future demand. Fear of loss of control of the firm may deter taking the necessary risks to maximize profits. Stock speculation opportunities may also cause maximum profits to be foregone. Examples could be multiplied but these should suffice to indicate that the statement "Businessmen have only one policy - to make money" is open to serious question.

In summary:

Much business behavior is non-rational, traditional, or motivated by extra-economic considerations. The number of variables is large, subjective, and non-measurable and the


"It is worth noting that the statements made by top executives of big corporations concerning the responsibility of the company to render service to the public are not altogether dishonest. They may often reflect one of the many objectives of the management." M. Reder, "Reconsideration of Marginal Productivity Theory", J.P.E., Vol. LV, Oct. 1947, p. 453.

E.S.Mason, too, avows that "we can no longer neglect the effect of the development of a professional management point of view on corporate policies...management has obligations to stockholders, labor, and the consuming public." Mason quotes one entrepreneur as saying "one no longer feels obligated to take from labor for the benefit of capital nor from the public for the benefit of both but rather to administer...fairly in the interests of all." "Price and Production Policies of Large-Scale Enterprise", A.E.R. Proceedings, March 1938, supplement, Vol. XXIX, p. 68.
range of output variation is small while the time range of
anticipations is long. There can be no numerical definiteness
of estimates to equate MC and MR. The static theory of the firm
then has limited applicability for policy.

It is time to introduce greater realism with a theory of
the firm consistent with the results of factual research and
recognizing that competition, though imperfect, is still a
powerful force in determining industrial development. This
demands a theoretical restatement. There is needed a conceptual
framework which will show the actions of a "normal" businessman
under the specific conditions of an oligopolistic environment.
Factors cannot be neglected that are known to be important in
reality nor factors kept constant that are known to change.

Part II seeks to synthesize inductive findings in a general
statement. This chapter has sought to indicate the need for such
a restatement. The following chapter presents abstracts of what
are thought to be significant recent contributions to be synthes-
ized in the theory of chapter V.
PART II

CHAPTER IV

ABSTRACTS OF RECENT CONTRIBUTIONS TO
BE SYNTHESIZED IN A RESTATEMENT

"In Behm-Bawerks famous phrase, he (the Theorist) acts like one who, urgently desiring to bring a white ball out of the urn, takes care to secure this result by putting in white balls only."


Coming new to a review of the more recent contributions to price and output theory, a highly selective process can only indicate certain contributions that have appeared to carry forward, in some significant respect, the development of theory based on factual observations.

A. The kinked oligopoly demand curve

Hall and Hitch¹ and Paul M. Sweezy² conceived the kinked demand curve independently and almost simultaneously.³

Significant developments have resulted from having recognized that the sales curve under conditions of oligopoly is not


necessarily continuous but may be kinked at the point representative of the current price. The inelastic lower part of the curve indicates the firm's expectations that its competitors would meet any price cuts, and the elastic upper part the expectation that competitors would fail to meet price increases. In either case, a given firm's total revenue would fall — hence stable prices. Haley thinks such a situation might be more frequent in depressions since an enterprise might well assume that its rivals were operating at less than capacity and hence would be reluctant to lose business as a result of price cuts by others and eager to acquire business as a result of other's price increases.4

Paul Sweezy has suggested the possibility of a demand curve with a concave kink.5 The upper demand curve is now relatively inelastic indicating the expectation that rivals will meet any price increases while the lower section is relatively elastic indicating the expectation that price decreases will not be followed by rivals. This might be the situation in prosperity at capacity operation. Several other types or forms of sales curves under conditions of oligopoly with different assumptions


as to probable rivalrous reactions are considered by S. Weintraub. The cases considered above, however, appear to be the two most likely to occur.

Sweezy finds the ordinary concept of the demand curve inapplicable to the study of oligopoly. The entrepreneur is little concerned with what would be sold at various prices if everything else remained unchanged. His interest focuses only on what could be sold allowing for rivals' reactions. Sweezy sees the relevant demand curve as the entrepreneurs' "imagined" curve.

Sweezy proceeds with an analysis in terms of imagined demand curves. Since there will be no motivation for the firm...

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8. N. Kalder in "Mrs. Robinson's 'Economics of Imperfect Competition', Economica, Vol. I, Aug. 1934, pp. 340-341 was apparently the first to distinguish between the imaginary and the actual demand curve. Indeed he offers, in conformity with Andrews, a rationale for the kinked demand curve which neither Hall and Hitch nor Sweezy provide.

"If a producer knows that if he charges a high price today a competitor will appear tomorrow whose mere existence will put him in a permanently worse position, he will charge a price which will afford him only a low profit, if only he hopes, to secure this profit permanently i.e. he will act in a manner as if his own demand curve were very much more elastic than it is." "Market Imperfection and Excess Capacity", Economica, Vol. II, 1935, in A.E.R. Readings in Price Theory, p. 392, (italics added.)
to change price as long as the marginal cost curve cuts the vertical segment of a discontinuous marginal revenue curve, the conditions of short run equilibrium are not at all precise. A strike for higher wages, for instance, would affect only the marginal cost curve and leave the price and output equilibrium unchanged (p. 570). 9

This analysis starts with the existing price. It does not explain it nor can it explain it. The starting point involves a given situation and expectations. These cannot be explained in terms of the expectations to which they give rise - so the equilibrium solution is of doubtful meaning. Any number of price and output combinations constitute equilibrium in the sense that there is cet. par., no motive to change. The focus is on processes of change - not equilibrium. 10

B. Full cost pricing

Oxford researchers under the direction of R.L. Hall and C.J. Hitch suggested in 1939 that entrepreneurs base price on a "full cost" principle. 11 The evidence was that entrepreneurs

9Unionists who insist that the effect of higher wages is only to lower profits may have more truth on their side than economists have generally been willing to grant?
10Sweezy, op. cit., p. 573.
seemed to think in terms of long run profits and long run demand and cost curves -- even in the short run. A price covering "full costs" was a "right" price that "ought" to be charged. Maximum profits were incidental. Either direct costs were ascertained and then a mark-up added or a conventional price was charged and the quality of the good adjusted until full cost equalled the price. Only a few adjusted price according to variations in demand. Competition seemed to have the role of inducing firms to modify the margin for profits added to costs so that approximately the same prices for similar products would prevail for the competing group.\(^\text{12}\) This was accomplished by following a price leader, or following the urging of trade associations to adopt and price on the basis of "standard" cost figures.\(^\text{13}\)

The entrepreneurs explanations of this full cost pricing had a strong ethical element including both fairness to competitors and customers good will. The formula was expedient since producers did not know their demand or marginal revenue curves, consumers' preferences, or rivals' reactions to price changes -- although they feared they would meet price cuts but

\(^{12}\)This is in accord with the major thesis of P.W.S. Andrews Manufacturing Business, \textit{infra}.

\(^{13}\)R.L.Hall and C.J.Hitch, \textit{op.cit.}, pp. 112-113.
net price increases. All had a general belief that the group demand was inelastic. There would be no gain from lowering prices by agreement and an agreed group price increase would invite new entrants. Small price changes were costly, a nuisance to salesmen, merchants, and consumers.

In stability the price tends to equal the full cost price of the representative firm through the "community of outlook" of businessmen, rather than each firm maximizing profit, neglecting competitors reactions, and ignoring variation in the number of firms. Stability is maintained when a price change follows a change in costs by all firms. Instability results only from independent firm policy — attributable to liquidity considerations, desperation in depression, a new firm trying to establish itself or, in prosperity, to the rationing of goods in short supply.

The study does not confirm the common short run analysis in terms of MC and MR. Long run analysis seems to apply to the short run. Little weight can be given to the applicability of conventional theory stressing changes in the elasticity of

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14 Certainly the group demand would be less elastic than the demand for the product of any one firm.


16 R.L. Hall and C.J. Hitch, op. cit., p. 120.

17 Ibid., pp. 121-122.
demand in the short run as a factor influencing entrepreneurs' price policy.\textsuperscript{18}

The kinked demand curve of Hall and Hitch, however, only illustrates the results of full cost pricing and businessmen's reluctance to change price is only partly explained. Full cost pricing justified \textit{any existing price}. Why the kink occurs at the normal cost level of price is not adduced and the rationale of the costing rules that produce that price are left unanalyzed. It now appears that price determination is less rational than before though it is based on what businessmen actually do. If such a method is so widely used it \textit{must} have a rationale.

P.W.S. Andrews' \textit{Manufacturing Business} has attempted to provide one.

C. P.W.S. Andrews' theory of normal cost pricing\textsuperscript{19}

This theory has stirred up sufficient controversy that an

\textsuperscript{18}Ibid., p. 124.

Outline analysis appears justified.  

Normal cost theory\footnote{Several journal articles - to be referred to subsequently - were motivated to be written, and the holding of at least one conference on Industrial Pricing - which the author attended at Northwestern University July 24 and 25, 1953 - where Mr. Andrews defended his theory during several hours of questioning by economists from fourteen universities.} assumes profit maximization and is therefore formally reconcilable with marginal analysis as such.\footnote{Manufacturing Business, p. XVI. W.R. Maclaurin of M.I.T. believes, "Mr. Andrews is essentially correct in outlining a theory of business behavior which preserves much of the classical emphasis." "Book Reviews", A.E&R., Vol. XI, Dec. 1950, pp. 968-970.} It differs from monopolistic competition analysis in that in normal cost theory profits are maximized only over the long run.\footnote{Elisabeth Brunner, "Competition and the Theory of the Firm", Economia Internazionale, Vol. V, No. 3, Aug. 1952, p. 511.}

\footnote{E.A.G. Robinson apparently fails to see this when he complains, "Despite the stress which he repeatedly lays on the competitive nature of industrial enterprise, (of. pp. 172, 270) he (Andrews) seems to go out of his way to repudiate the idea of firms' maximizing their profits as an element in the battle for survival", (e.g. p. 270).}

Andrews proceeds to develop a theory consistent with what businessmen actually do. Much of his theory depends upon his analysis of the effects of changing outputs on the costs of production of the firm. Traditional analysis begins with the theory of demand and prices - since sales are regarded as depending on price. Normal cost theory has a different emphasis - here prices are regarded as being dependent on costs and output - not a balancing of marginal costs and marginal revenue.

To leave the main points of this theory clearly in mind, a brief statement of its important propositions seems desirable.

1. Normal cost theory assumes profit maximization over the long run. A firm does not maximize its profits in every period.

2. In planning scale a plant is built larger than necessary for expected average output. Equipment and methods are not selected to give basic output at least cost - but to provide flexibility for product and technological innovation.

3. Granted this reserve capacity the fixed plant then is in fact substantially variable about the basic output giving constant average direct costs through the range of variation.

4. A business can calculate average direct costs with considerable accuracy but there are no objective criteria to determine overhead costs.

5. Hence price is determined by taking average direct costs and adding a gross profit margin the size of which is determined by competition.

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24As seen by an outside observer.
6. In the long run technical costs fall continuously though the fall gets less steep as scale increases. Managerial costs fall to a certain size and then rise but with diminishing strength. Put together they give constant long run average costs although a given manager tends to conceive only the falling technical costs. Hence, he always expects costs to fall with increases in output.

7. An oligopoly with differentiated products gives separable firm markets and short run sloping demand curves. However, these goods are technically standardized and the typical customer is another business which must sell competitively. In the long run a firm sees that orders will go to a competitor if he can supply a good of equal quality at lower price - or better quality at the same price. So in the long run a firm could have a sloping demand curve only if irrational preferences existed - or a spatial monopoly.

8. Therefore, the firm sees its long run demand curve as horizontal and its price changes are limited by long run competition. Short run goodwill from a continuing supply of a satisfactory article cannot be exploited or it will be lost in the long run. Buyers are always alert for better quality - or lower prices, so an individual firm cannot maintain an independent price policy over time.

9. Price is stable in established conditions and the firm will supply what the market will take - cutting price only as costs permit to extend its market. Here is the essence of the equilibrium tendency. If a firm exceeds normal cost price, it will expect its demand to shrink as others move into its market. Raising prices by agreement will motivate lateral transfer entry from inviting gross profit margins. Businesses are limited on the demand side by goodwill and on the supply side by entry and long run falling technical costs. So firms meet normal (non-cyclical) increased demand at an unchanged price, price changing only from long run shifts in factor costs. Prices are stable not from a lack of competition but because of it.
10. Mark-ups are simply formulas adjusted by experience to give the normal cost price that gives a gross profit (not firm net profit) that maintains market share and prevents entry. The price of inefficiency is a smaller mark-up. Multi-products are differently margined according to the competition to which they are subject.

Perhaps understanding of the normal cost theory can be facilitated by contrasting it to "pure competition" and "monopolistic competition".

Normal cost theory is an attempt to take account of the separableness of the individual producers market and at the same time to retain the particular equilibrium approach but in a manner different and logically more sound than imperfect competition theory. Normal cost theory is contrary to both pure competition and imperfect competition theories, although it accepts elements of both. From pure competition normal cost theory accepts the assumption of a technically standardized product and the knowledge and opportunity for every buyer to contact every seller. It accepts the law of one price of pure competition but rejects the inability of any one producer to affect that price. From monopolistic competition, normal cost theory accepts the separability of markets, although it rejects the idea of a separate price policy. It assumes a

25It is apparent from these conclusions that the term 'pure competition' comes very close to being a misnomer, since competition in any real sense is conspicuously absent?; H.R.Edwards, "Goodwill and Normal Cost Theory of Price", Economic Record, May 1952, p. 53.
standardized product but still goodwill gives separable markets yet no power for individual pricing policy.\textsuperscript{26}

If the product of a given seller has in the past satisfied a buyer, the need for a continuing supply will assure this seller the custom of this buyer so long as the product continues to do as well as any other product at the price. Satisfaction fosters the habit of buying from one producer. There is still goodwill with identical products since a buyer deals with at most a few and not all sellers. Only at times when goods are in short supply, or if he suspects his own source is inferior, will a buyer try others. Goodwill is from confidence so it cannot be exploited by lessening quality or increasing price.

Regularized production in response to a continuing stable demand is the \textit{sine qua non} of efficient manufacture.\textsuperscript{27} But a seller is not assured of the sale of all he can produce (as under pure competition) so reciprocal goodwill is necessary to assure stable production.\textsuperscript{28}

Buyers are incompletely attached. Most of their orders will go to one seller but they are susceptible to price cuts, advertising, etc. There will always be variations from "fleeter demand".

\textsuperscript{26}H.R.Edwards, \textit{op. cit.}, pp. 53-56.
\textsuperscript{27}Cf. W.J.Bitsman, "Price Determination", pp. 15-35.
\textsuperscript{28}This seems to help explain the businessman's concentration on maintenance of "market share".
It is this "floating demand" that is the field for the contest to extend demand. Goodwill does not permit an individual firm to maintain an independent price policy over time. Price is stable in established conditions and the firm will supply up to the limits goodwill commands - cutting price only as costs permit to extend its market. Here is the essence of the equilibrium tendency.

Normal cost price theory holds that output is not restricted to where \( MR = MC \) but a price is quoted on the basis of a mark-up over average costs that will not invite competitors in the long run. Then at that price, business will supply all the market will take - average costs varying only with factor prices, the business cycle or technology.

Prices then remain steady as long as costs do not change. The entrepreneur will not raise it in a strong market - or others may encroach on his sales; and he will not cut it in a weak one - for fear of retaliation. Consumers will not increase their total stocks anyway so price cutting only lowers total receipts of all producers without lowering their costs. All are worse off. The

29Existing goodwill is a datum of short run or static analysis. In normal cost theory goodwill separates the general market into particular markets of individual manufacturers - but manufacturing being a continuous process, it does not give a power to maintain an independent price policy.

businessman's aversion to price cutting is rational and not anti-social.\textsuperscript{31}

Businesses look to long run demand and use present short run costs for pricing policy. In monopolistic competition they use present demand and long run costs.\textsuperscript{32}

Normal cost theory offers a rationale of price determination which is consistent with business practice. It helps to explain how the stable price with a kinked convex demand curve is arrived at in the first place. In the long run identical products must command the same prices. So a firm's market share depends on the right price. A firm would charge what it could get but it must revise downward to meet and keep out competition. Goodwill will not support long run price differentials.

Business sees competition not as different elasticities of demand but cross elasticities of supply. Competition is rigorous in the sense of horizontal lateral transfer within and from other industries. All firms tend to adjust price together because the cycle affects factor costs similarly.

If costs are lowered from increased efficiency a price leader will lower price to increase its share of the market or forestall...

\textsuperscript{31}\textit{Ibid.}, pp. 180-185.

opportunities for new firms. A long secular decline may exhaust reserves and increase inventories so that desperation price cuts outweigh long-run considerations. This is a break down of normal cost pricing but price will rise over time again to a level of normal cost plus normal profit.\(^{33}\)

Whereas monopolistic competition theory does not explain normal prices, the normal cost theory arrives at a concept of price at a level of average costs (with few firms and a differentiated product) from long run potential competition.

In Andrews' theory once again the industry emerges as a natural extension of the theory of the firm. Manufacturing prices are competitively determined and the firm sells what the market will take at that price.\(^{34}\)

It is hoped that this comparison is sufficient to indicate the differences between normal cost, monopolistic competition

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\(^{34}\) This in itself implies an abandonment of any definition of equilibrium output for the individual business in the sense of the achievement of a balance between marginal revenue and marginal cost. There is no deliberately planned (or restricted) output. There is only an equilibrium price - not output - for the firm.

and pure competition theories. At least it should suffice to demonstrate that it is not "All there in Marshall", as alleged by D.H. Robertson, George Stigler, and Lionel Robbins.35

D. Eiteman's theory of inventory turnover

W.J. Eiteman argues that the data available to businessmen, with their customary ways of solving problems, are such as to cause some other price and output than that where MR = MC to appear as the most profitable combination.36

Rather than thinking in the economists terms of fixed costs and variable costs, Eiteman argues that businessmen think in terms of the possibility of a more intensive use of existing working capital. Conventional theory devotes too little


attention to the budgetary aspect of management and the balance sheet.\textsuperscript{37}

Eiteman argues that managerial decisions are governed by inventories — changes in which suggest when and to what extent prices or output should be changed.\textsuperscript{38}

Inventory reservoirs are only necessary because deviations in the rate of goods flow may be compensated for by variations in the level of inventories rather than by constant changing of price as consumer demand fluctuates.\textsuperscript{39}

\textsuperscript{37}Ibid., p. 15. K. Boulding agrees with Eiteman on this in Reconstruction of Economics, infra. If working capital is in inventories and accounts receivable a company must count on selling its products quickly and collecting its bills promptly in order to meet its obligations. A large new order might find a company pinched for the cash to buy materials and hire workers. If business drops off and inventories go slowly a cash shortage might result in layoffs. Balance sheet considerations are as important as profit maximization considerations. Cf. W.W. Cooper, "Theory of The Firm: Some Suggestions for Revision", A.E.R., Vol. 39, Dec. 1949, p. 1207.

A greater profit may be desirable but if it involves securing capital on terms which may imperil control, the firm will not choose the maximum profit path. M.W. Reder, "A Reconsideration of the Marginal Productivity Theory", J.P.E., Vol. IV, Oct. 1947, pp. 450–458.

\textsuperscript{38}W.J. Eiteman, op. cit., p. 36.

\textsuperscript{39}Ibid., p. 38. This is in accord with Andrews' frame of reference where price is stable and temporary short run fluctuations in demand are met from 'stocks'. "Studies in the Price Mechanism", op. cit., p. 125.
Thus the first effect of an increase in consumer purchases will be a decline in retailer inventories. Retailers may respond by raising their prices until consumption declines, or by increasing their purchases from wholesalers.

With traditional mark-ups and nationally advertised "fair-priced" items dominating the market it appears that an increased flow without changing price is more likely. The raising of prices is resorted to only if the flow cannot be increased because of an inability to obtain goods.40

Since businessmen feel that a rapid turnover at a lower mark-up is more profitable than a higher mark-up at a slower turnover, they are inclined to prefer an increased flow at the established price.41

If the disequilibrium occurs under full employment conditions, the manufacturer can meet his orders only by outbidding other producers for labor and materials. If the situation is general, the effect will merely be to increase costs without increasing total output. This rise in costs of the input factors would, according to accepted theory, shift the least

40 Ibid., p. 39.
41 This is completely compatible with Andrews — who also would add that businessmen are reluctant to lose long run goodwill by short run exploitation of it. Should the increased demand prove to be permanent, businessmen would forego inviting entry by raising prices but expect increasing profits from falling technical costs at the greater volume.
cost point to the left and result in curtailed output. Instead it appears that higher costs lead to higher factory prices which are then passed on down to the consumer. The resultant rise in the consumer cost-of-living leads to demands for higher wages. If these are met increased manufacturing costs lead to a second rise of prices.\(^{42}\)

Conversely, a decrease in consumer purchases increases retailer inventories. They may then reduce price by lowering their margin of profit or discontinue new orders and sell out of stock until inventories are restored to a normal level or combine a slight price reduction with a small reduction in orders to wholesalers. It is most likely that retailers will pass the problem on to wholesalers for solution. Again wholesalers may reduce prices or curtail orders to manufacturers. Wholesalers are just as reluctant as retailers to abandon their traditional mark-up so the usual result is a curtailment of producers' orders.

Each becomes aware of the problem by a tendency of inventories to rise. Each passes the problem on by reducing orders.

\(^{42}\)This also agrees with Andrews' contention that prices do rise when factory costs increase - to preserve gross profit margins - and without curtailing output. Post-war experience lends credence to Biesman's sequence of events?
In most instances then it is manufacturers' actions which re-establish equilibrium. He has the same alternates as the others but the close relationship between profits and turnover make reducing turnover unattractive. In the face of a persistent decline in demand then, the manufacturer will reduce prices. The allocation of fixed costs suggests maximizing production. When demand declines then the manufacturers' best interests are served by reducing prices. When demand increases, his best interests are served by increasing output.

Unfortunately, a price change by the manufacturer creates a serious inventory problem for the wholesaler. The anticipation of a price reduction will induce reduction of inventories to an absolute minimum to avoid losses on inventory. Conversely, anticipation of price increases will induce increased inventories.

According to conventional theory, increased orders will be supplied only at increased prices. Otherwise an expansion of output from an equilibrium position would increase marginal costs more than marginal revenue.

43Hence the importance of a theory of Manufacturing Business!

44Another argument for stable prices. Efficient management requires stable production, so manufacturers are anxious to avoid, wherever possible, this inventory speculation.
According to the turnover theory, increased orders will decrease inventories and cause the factory to step up production (prices unchanged).

Businessmen believe (rightly or wrongly) that their most profitable output lies close to capacity. Consequently, increased orders will be accepted with enthusiasm and prices raised only if production cannot be further expanded without increasing costs of production materially from increased costs of input factors.

The initial price must be one that will net a profit on the assets invested at the minimum scale estimated to be profitable. If the rate of return is to be ten per cent then ten per cent of the assets divided by the output will reveal the unit mark-up over cost necessary to net a reasonable return on investment. If an inquiry regarding possible sales at this price is favorable, the promoter may then construct break-even charts. It is undeniable that managers use break-even charts. No provision is made in such charts for raising or lowering the price experimentally. This suggests a fixed price. Further,

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45 This has previously been adequately documented here.

46 This conforms to Andrews' "Normal Cost" pricing theory.

47 Ibid., pp. 71-73.
break-even charts by their nature suggests capacity output means maximum profit. If managers use such charts, it must mean that they accept their implications.48

Now comes the problem of the most profitable scale of operation. This can be ascertained by probing. With output steady the manager increases prices until inventory starts to increase; or he holds price constant while increasing output until the same result is obtained. He cannot experiment with both. Consequently, the horizontal output increase is the more likely probe, being more in accord with business philosophy.49

This procedure enables the entrepreneur to locate his demand zone but only at one point. Further changes in output will be only in response to changes in demand as revealed by the inventory barometer.

Because operations involve turning working capital and the danger of inventory losses, businessmen use inventory changes and turnover rates as the basis for their managerial decisions on matters relating to price and output. Declining turnover rates or mounting inventories indicate prices or the scale of operations have advanced beyond the limits set by demand.

48Ibid., pp. 73-81.

49Ibid., pp. 81-83 and in accord with Andrews.
Eiteman concludes that under his theory output will be greater and price possibly lower than would be the case if businessmen actually restricted output to equate MR and MC as in the textbook theory. Under the Eiteman theory the businessman operates at what he thinks is the most profitable point based on average cost data and turnover information. This does not correspond to the theorists' maximum profit position as determined from known location and slope of fixed demand curves. In a world of reality the businessman can know only that he is operating profitably but never whether he is maximizing profits at any given time.50

E. Joe S. Bain's theory of limit pricing

Traditional analysis suggests that a collusive oligopoly will choose a price-output policy that will maximize the industry profit. Each firm then equates its marginal cost with the industry marginal revenue curve. Empirical studies fail to sustain these deductions.51

Bain suggests two modifications of current theory to take account of the relation of present price to future profit and of the impact of entry.

In the first case, an oligopolist sets price below where $MC=MR$ as long as the decrement to profit in period one is more


than offset by the increment to profit in period two. It depends upon the cross-elasticity between period one price and period two quantity.52

In the second case, a price that gave a less than maximum short run profit but discouraged entry might maximize the long run profit for the established oligopolists. The oligopolists may price to maximize industry profit - resulting in entry and the reduction of the share of the total profit by each existing firm; or they may price to avoid entry and keep the non-maximized profit for themselves; this may offer larger long run profit for each existing firm.

"Long run maximization of industry profit and of the profit of a group of currently established firms may not coincide."53

Bain develops his theory of limit pricing on the assumptions that established groups are aware of the threat of entry and adjust to it so as to enhance their own (as distinguished from industry) profits; and that potential entrants entry is influenced by the prices charged and the profits currently earned by the established firms.

The upper limit price is that price which will discourage all entrants. This will depend upon cost functions, entrants' estimates of their share of the demand, and expected competition.

52 Ibid., p. 450.
53 Ibid., p. 452.
as subjectively estimated by existing sellers relative to their estimates of conditions of demand after entry occurs in response to setting a price above the limit.

F. William Fellner's bargaining theory

Fellner's thesis is that in the case of fewness, decision-making units shape their policies in view of how they mutually react to each others moves. Under oligopoly conditions objective supply and demand curves are not determinable - because of mutual interdependence. All theory can do is set up long run limits for pricing. The actual operation points depend upon "conjectural interdependence" and are arrived at either by actual negotiation, or direct observation of others' responses.

Markets cannot be analyzed in terms of demand and supply functions derived from technological data and utility functions alone. Determinate equilibria cannot be established analytically without doing violence to obvious facts. Theory may explain without establishing uniquely determinate prices and outputs. A range of variation is a first step to which different apparatus may then be employed to determine what may happen within that range.

A complex model containing all relevant variables would still necessitate that the reaction functions express arbitrary assumptions about mutual behavior that are incorrect except
accidentally. There is no reason to assume that leaders will
act in this fashion or that followers will allow them to do so.54

This situation in which the behavior of all parties concerned
depends on the assumed reactions of the other parties leads
typically to "bargaining". Each party tries to find out from
the responses of the other parties what the ultimate consequences
of its own patterns of behavior are - thus trying to discover
which of the alternative patterns of behavior result in mutual
interactions that are more favorable from his point of view
than any other tacit agreement acceptable to the others.55

The resulting state of affairs leads to quasi-agreements
or conventions. The difference then between collusion and sponta­
neous coordination becomes theoretically almost indistinguishable.56

54William Fellner, Competition Among the Few, New York:
Alfred A. Knopf, 1949, pp. 1-14, p. 98. Fellner develops
numerous "cases" with different sets of assumptions regarding
rivalrous reactions to which his pertinent remark above
is most relevant. Much of the book is devoted to technical
analysis emphasizing the complexity and variety of the
variables in "conjectural interdependence". Cut-throat
price competition, non-price competitive forms, collusive
agreements, cartels, bilateral monopoly in labor management
relations and problems of appraisal and policy are expounded.

55This is essentially the contribution of Cournot.

Thus divergent opinions and inadequate knowledge interfere with the attainment of optimum total profit and instead, the actual prices set will approach those sought by the firms whose bargaining strength is greatest. The tendency is toward joint maximization of profits. Then agreement as to how this maximum sized pie shall be sliced. The actual profit depends on the factors above and is indeterminate in theory. 57

Economic behavior under fewness is imperfectly coordinated and remains competitive in a limited sense. The competitive element stays significant through the dynamic aspects. Entrepreneurs do not usually wish to maximize today's profits if thereby they diminish those of tomorrow to such an extent that the profits of the two periods are smaller than if they had not maximized today's profits. They are interested in long run profits because it is these that express themselves in the valuation of assets. 58

The only meaningful maximum profits concept is that of expected profits. These must be based on a rough probability judgement allowing for less favorable outcomes. Oligopolistic power cannot be exploited beyond a limit set by the real-cost advantage of the oligopolists. 59 Since they think of average

57 Ibid., pp. 24-35.
58 Ibid., p. 166.
variable costs as constant over the relevant range, and shifts in demand functions will not change the elasticity of demand, there is a constant mark-up over AVC - even in the short run regardless of shifts in cost and revenue functions.

This probably accounts for short period price rigidity. Market shifts are expected to cancel out in the long run - and short run changes involve administrative costs and invite speculation about future price changes. Speculative magnification of fluctuations makes the adjustment of output more difficult. Consequently, price is changed only and to the extent that it reflects long run changes.

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60 Ibid., pp. 146-156. Both Andrews and Eiteman argue for this same concept of costs.

61 Ibid., pp. 161-162. All of this is in accord with Andrews' long run concepts of demand, goodwill, maximum profits, lateral entry, etc. as previously presented.

62 Ibid., p. 167. This agrees with Andrews. A fixed price with production stable and adjustment being by inventory flexibility is Eiteman's variant.

An analogy seems convincing. In international trade theory, no adherent of flexible exchange rates is in favor of adjusting the rate to all fluctuations in demand and supply. Stabilisation funds are to iron out short run fluctuations. Flexibility means adjustment of exchange rates to such changes as are expected to prevail in the long run. In a commodity market we do not call this "flexibility of exchange rates" but a pathological condition calling for intervention!
G. Heflebower's "balance" theory of market position

Richard Heflebower weaves hypotheses together in an outline of a theory which appears useful in explaining the operation of industrial markets and in prognosticating their behavior. 63

Economic processes become orderly through a balance of forces giving equilibrium tendencies. This balance comes about because the structure of a market at a given time reflects an evolutionary process whereby firms come to acquire a workable relationship with one another. It is in connection with the adaptation of the firm to its environment that business decisions have their major influence. Once such decisions have been made, they set for some time the conditions under which shorter term operating decisions will be made. The firm consciously adapts to its environment. A balance is achieved among such forces as the desire for variety within a product area and the attendant services, the roles of the various firms in supplying them, and relative prices. Such a balance is more multivariate than is one of prices and outputs. In most markets a balance is feasible without collusion, and in such a balance margins between direct costs and prices differ among sellers, among brands of or channels

of sale by the same seller, and among physical variations of the product. 64

The fact that firms occupy somewhat different places in the market means that not all of them are in complete and direct competition with each other. But it also means that they cannot ignore or isolate themselves from one another, for their products are fairly close substitutes for each other and the analogous character of their production and selling operations facilitates entry into each other's backyards. 65 There remains, however, a zone within which they need not fear upsetting action by rivals.

This explains why changing prices relative to those of rivals is not a frequent source of disturbance of balance. If the balance has existed for long, presumably the relative prices of sellers (including the different prices in different segments of the market by one seller) are such that market shares are not shifted radically at the initiation of either buyers or sellers. Presumably, such a balance is optimal to the various firms under the existing conditions. 66

Less disturbing are other forms of competition than price changes. 67 Devices other than price changes do not shift market shares rapidly because their appeal is not so great or immediate

64 Ibid., pp. 124-125.

65 This is Andrews' concept of the industry in terms of processes rather than products.

66 Andrews does not presume this but attempts to offer an explanation for it.

67 Heflebower, op. cit., p. 126.
as is a price cut and their lesser effect stems from the multiplicity and effectiveness of countering moves of rivals. There is nearly always some change going on - but not enough to disturb the fundamental balance of forces. Short of some development which warrants a strenuous move by some participant, states of balance tend to be quite stable in the industrial sector of the economy. 68

The test for optimal industry performance cannot assume static conditions with respect to product, its costs, or demand. The consideration must be whether, with uncertainty present, the structure of the industry favors or inhibits both the best product and the best known method of production possible under the existing state of technical knowledge. The orthodox view is that fwness of sellers and product differentiation lead to output at less than the optimal rate and deter progressiveness. Heflebower agrees with J.M. Clark that some insulation from price competition is a necessary condition for the assumption of risks and uncertainties associated with innovation in product and processes, and uncertainties related to investment in the most efficient equipment. 69 Product quality and the structure of costs will be socially more favorable.

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There is a strong tendency for the market characteristics of goods to change over time in such a way as to undermine any differentiation that yields abnormal profits. Goods tend to become standardized as far as buyers are concerned. This reflects both growing buyer erudition and interfim rivalry.

The structure and operation of markets have a strong tendency to reflect the market characteristics of the good, the feasible conditions of its production, and the organization of adjacent industries. These forces define a zone within which management makes choices but of a sort which do not in most cases tie the hands of existing or potential rivals.

Entry into an adjacent industry, horizontal or vertical, is a widespread and powerful competitive force. For products that have the prospect of a long life, firms hold prices at a level that will provide good, but not high, profits because of confidence of better long-run results. A general policy as to margin over estimated total cost which reflects experience as to margins which discourage entry, is applied to a wide category of goods. Or specific potential entrants (large buyers) may be "bought off" by lower prices.

"If there are vertically adjacent businesses which would be able in terms of size, organization, and financial resources, to enter an industry and do not, this is prima facie evidence
that this industry is performing competitively.\textsuperscript{70}

What may be more feared than entry is the prospect that
abnormal profits will lead existing firms to expand market shares
by other devices than overt price cuts but which force down
realisations relative to cost. To the extent that these forms
of competition are effective, non-competitive levels of prices
and profits are subject to erosion - or entry erodes the
insulated positions of the established firms.

Thus factors held constant in a simple cost-price-output
model have, potentially, a major effect on economic results and
tend to undermine price when that price fails to reflect an
optimal combination of product quality, process and cost, and
output rate.

Firms sell many different items which have demand curves
of different elasticities; and different costs. If the revenue
curves for some products are perfectly elastic, this tends to
eliminate excess capacity - or uncertainty may be sufficiently
minimized that the optimum scale of plant will be actually
established. The general tenor of the argument is to suggest
that there is a strong tendency for economic results of indus-
trial markets to be closer to the optimum than one would conclude
from much of the literature about this sector of the economy.\textsuperscript{71}

\textsuperscript{70}Ibid., p. 132.
\textsuperscript{71}Ibid., pp. 129-135.
Heflebower argues that factor price movements tend to be reflected in corresponding price changes but that demand changes do not. Factor price movements do not directly affect market positions of particular firms, and consequently selling price responses are not apt to be disruptive. Firms recognize the tendency toward uniformity in impact of these cost changes.72

Assuming the marginal cost curve to be horizontal over a wide range of output, a demand change, followed by a roughly corresponding price change, would change the margin between direct costs and selling price. Customers will have experienced different changes in income - if that is the cause of the demand change - so the impact on sellers of the demand change tends not to be uniform and overt price changes would augment the effect.73

72Ibid, pp. 135-136. This is in accord with Andrews’ cost-price relationship concepts.

73This leads J.W. Markham to observe that "throughout his analysis Heflebower mostly disregards the analytical tools of orthodox value theory and appears to rely heavily upon something bearing close resemblance to the principle of cost-plus pricing - a strange skeleton to find in Heflebower's closet, considering the fact that he was assigned the task of burying this corpse at the Princeton meetings in June, 1952." "Industrial Pricing - Discussion", A.E.R. Proceedings, Vol. XLIV, May 1954, p. 153. Perhaps Andrews resuscitated the victim at the Industrial Pricing Conference at Northwestern in July, 1953.
Both because a decline of demand leads to excess capacity and each firm is sensitive to loss of volume and because a price cut would then threaten market position, firms hesitate to initiate such a decline and react strongly to a price cut by a rival. 74

If demand increases, firms are inclined to use such an occasion to cement relations with customers by failing to advance price. (Here the idea of the kink in demand is particularly relevant.) If marginal costs are sharply rising firms are apt to undertake a capacity expansion and to ration customers rather than to increase prices. All such conduct is motivated by the desire to preserve, and, if possible, to increase the strength of the firms market position.

Heflebower has pointed toward an inductive theory derived from observations of business behavior. 75 Much of his analysis rests upon the place of each firm in its industry so he employs a vehicle of "representativeness". The firm is treated as a unique entity existing apart from the industry for some purposes and as a "typical" member of an industry for others. He tries to retain the best of both the Marshallian and Triffin worlds.

74Heflebower, op. cit., p. 137.

75This is "a thoughtful treatment of price and market theory that is likely to be cited frequently in the future literature on this topic". J.W.Markham, "Industrial Pricing - Discussion", p. 152.
This dichotomy of interdependent and discretionary decision making is both novel and useful.

In essence Professor Heflebower's thesis is that diversity and variety in market structure and product forms give rise to zones within which "sellers need not fear upsetting action by rivals". This vent contributes to a stability in which collusion may have no part. 76

H. Kenneth Boulding's "Asset Preference" theory

In A Reconstruction of Economics, Boulding makes an attempt to establish some patterns of theory "which will be more useful in interpretation than the existing corpus of doctrine". 77

Boulding borrows from ecology—populations act and react upon each other and the equilibrium size is a function of the size of all others. 78 The organism, the firm, has a law of internal growth pressing against a complex external environment. His theory of the firm is a "homeostasis of the balance sheet" comparable to the physicochemical equilibrium of the body. The

76 This analysis, in my opinion, adds further to our knowledge of present-day industrial markets...and provides also an important contribution to oligopoly theory. Vernon A. Mund, "Industrial Pricing-Discussion", p. 154.


78 The concept is Marshall's in his comparison of the firms of an industry to the trees of the forest. A. Marshall, Principles, op. cit., p. 457.
balance sheet records everything the firm does and everything that happens to a firm. Every passive event will be offset by an active event under the pure homeostasis principle. This gives rise to activity of a highly complex nature. 79

Boulding contends that human behavior may well follow not the maximization of advantage, but the principle of inertia (nobody does anything unless he has to) and the principle of least resistance (if you have to do anything you do the thing that is easiest to do). The line of least resistance may merge with the line of greatest advantage through the slow retribution of natural selection. He prefers to maximize utility — this being done through a preferred asset ratio and applying indifference curve analysis to avoid quantification of preference. 80

Asset transformation is accomplished both through exchange and production. Production is thought of as a form of internal exchange whereby certain assets such as raw materials and money are transferred into finished goods. Marginal analysis operates


80 Ibid., pp. 34-94. The preferred asset ratio compares to the status quo "state" of an organism that calls for correction when departures occur. Buying and selling are likened to the bodies metabolic processes.
on the assumption that all goods produced are sold. "If all such limitation is removed the principle of profit maximization becomes nonsensical."

We cannot deal with the uncertainty problem by computing a "probable value" of an outcome and treating this as a "certainty equivalent". We are affected in our behavior by even the most improbable outcome as witnessed by the demand for sweepstake tickets - and in some cases, matrimony.

An important impact of risk and uncertainty on the structure and size of a firm is on the flexibility of its assets and program. An increase in uncertainty is likely to increase both liquidity and flexibility preferences even at the cost of a sacrifice in expected profits. This fact is of importance in interpreting the dynamic behavior of firms.

The equilibrium of production and consumption is usually considered to be brought about through the pricing system. The normal price is that which creates an equilibrium of production and consumption. The assumption is that the price-production and price-consumption functions are stable and that the main impact of excess production or consumption is upon price. But unplanned accumulation of inventory may result not in an adjustment of price but in a direct adjustment of production - or consumption.

\[82\text{Ibid., p. 117.}\]
To continue production, assets must be transferred back from final product to money at a rate approximately equal to the rate of output. If there is a sudden decline in demand unplanned inventories will accumulate. Storage facilities may be used up and the firm suffer acute industrial constipation – or money stocks dwindle until production cut-backs are forced rather than a reduction in price. Pricing becomes a matter of long-run policy to the firm under conditions of imperfection in the market – and cannot be used as a mechanism for adjusting production to consumption in the short run.

Excess consumption, leading to an abnormal decline in inventory likewise may not see a price rise because sellers regard price policy as a long-run matter not to be disturbed for temporary changes in demand. 83

In general equilibrium theory excess demands and supplies will in turn create price changes which will echo and reecho all through the system of related commodities until the turbulence subsides in the stillness of equilibrium. If excess supplies and demands do not, in fact, affect prices then the general

83 Ibid., pp. 120-158. Boulding agrees with Andrews' concept of the firm viewing the price as beyond its short run manipulation and producing what the market will take at that stable price.


equilibrium concept may actually be misleading and by emphasizing weak casual relationships divert attention from important problems.

It is possible to conceive of a non-price equilibrium in which adjustments to changes in tastes and techniques operate through other variables. Excess demand may be met by informal rationing or increased production. With no selling problem producers energies may well go into cost reduction so that there may be a faster rate of technical progress eventually pushing the supply curve to the right and eliminating the excess demand. Excess supply may be adjusted by production cuts or increased selling effort at the fixed price. It is not true that the movement towards equilibrium must be through the price structure.

I. Viability analysis

The long run "viability" analysis is borrowed from Spencer's Social Darwinism. Essentially it emphasizes uncertainty and probabilities with a natural selection or survival of the fittest concept. Where there is uncertainty a firm can not know the results of its actions in advance. Only positive profits, however, are necessary for survival. So traditional mark-ups, price leader following, etc. may be explained as imitations of observed success. Innovations are analogous to mutations.

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and their copying determines the evolutionary trend of industry. There is no need to attribute omniscience to entrepreneurs. The outcome is determined to a great extent by an environment beyond an individual firm’s control.

Edith Penrose misinterprets this to mean that viability analysis does not depend on human motives; that human decisions, ethics, public policy are abandoned to natural laws. Natural selection is a substitute for purposive maximizing behavior and has no predictive value. 85

Has the theory of evolution no predictive value? Do not firms adapt to an environment which may then change from aggregate effects and the particular firm be left in the position, of, say, a white polar bear, after the snow has all melted?

Certainly it appears that Marshall’s life cycle of the firm, like that of the trees in the forest, at any given time some being born, others growing, others dying, describes the situation firms find themselves in ever time. The essence of viability analysis is that firms cannot adapt once and for all to a given environment but must consider probabilities and retain flexibility for readaptation to a changing environment which is the result of all firms actions and, hence cannot be known in advance to any one firm.

Penrose confuses these particular relative to the general

effects when she, in her mind, gives the coup de grâce to
to viability analysts by pointing out that "man alters his environ-
ment as well as adapts to it". A strange argument indeed for
a marginal analysis defense where all conditions are taken as
given to which the firm can only adjust.

Viability analysis is an intellectually more modest and
realistic approach. It asks what happens when men try to reach
an objective - survival - but don't know the best route?

Each tries his own methods and there is a natural selection
through competition. It is straightforward if not heuristic.
Each team to win must get more points than opponents. This
does not mean that they know what to do or how to do it.

Viability analysis describes in aggregate terms some of the
qualitative characteristics of surviving firms but unlike marginal
analysis makes no pretense of prescribing quantitatively the
measures that will maximize the profits of an individual firm.

J. Homeostasis theory - or cybernetics

Conclusions at this point seem to reconcile with the general
theory of organization and behavior emerging in physiology -
i.e. homeostasis - a mechanism for stabilizing a group of variables within certain limits of toleration. "Any output error is fed back as an input correction." Profit and loss data are the output of the system to which firms respond. Eiteman's "inventories" are the thermostat. "Every organization has feedback mechanisms like a thermostat or governor to keep variables within a limited range of toleration, upper and lower limits demanding appropriate action."  

The control mechanism involves a receptor which picks up information about the divergence of the variable from the limit of toleration. This need be only qualitative information about the direction of divergence. Relayed to an executive, instructions are issued to effectors who control the variable.

A firm seems to have a choice of mechanisms. If inventories rise for instance, prices may be reduced - or a sales campaign launched - or production cut until existing sales lower inventories. The first two are applicable if the cause was faulty price or sales policy. The third if the cause was general depression and falling income.  

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90Clarence Jung, op. cit., p. 21.
92However, mere quantity of inventory is not sufficient to distinguish appropriate policy.
Social organizations have many variables each of which affects all others. When one problem is solved the solution creates other problems. This may make the problem of control seem insoluble.

What determines the limit of tolerance of variables? When do these limits change? Profit maximization implicitly assumes that upper and lower limits for variables coincide at the point of maximum profits. This is not likely to be realized.

No agreement on theories of rational behavior in the face of uncertainty has been produced. The only agreement seems to be that uncertainty is conducive to a preference for liquidity and flexibility in asset structure.\(^{93}\) In other words security - not profit maximization.\(^{94}\)

Since these abstracts were in themselves summaries, it is not felt that additional summarization at this point is necessary. In Chapter V concepts from the foregoing contributions will be woven into an eclectic theory based on assumptions derived from typical business behavior and attitudes.

\(^{93}\)K. Boulding, *op. cit.* , p. 41.

CHAPTER V

SOME BASIC HYPOTHESES AND AN ECLECTIC
THEORY OF OLIGOPOLISTIC COMPETITION

"When there is no dominant school, when theory is
in solution and truth may be anywhere, ideas of all
kinds mutually contradictory, jostle against
each other..."

...Alexander Gray: The Development
of Economic Doctrine, London:
Longmans, Green and Co., 1931,
p. 369.

A. Introduction

In previous chapters it has been indicated that in imperfect
competition theory the basic empirical assertions seem to be
that every firm has a known demand curve, that every firm has
known cost curves obeying certain physical laws, and that every
firm tries to maximize profits. Theory then merely describes
the equilibrium conditions for profit maximization—not
business behavior.¹ The practical utility of the theory to
date has been by analysis to focus attention on rivals'
reactions and on the importance of non-price forms of competi­
tion; but "whether the future elaboration of techniques of

¹Joe S. Bain, "Market Classifications in Modern Price
charged in a good many cases with selecting for definitive
rationalization a much simpler sort of behavior than occurs
in fact or alternatively with rationalizing observed behavior
in terms of an inadequate sample of the variables and environ­
mental factors which condition price making." Ibid., p. 561.
analysis yielding results of illusory exactness are useful is doubtful. 2

It is unlikely that even marginal analysts will take exception to Boulding's statement that,

Economists have had enough of asking businessmen whether they equate marginal this to marginal that, and being met with utterly blank stares of incomprehension. It is quite evident that marginal analysis, useful as it is as a tool of general static equilibrium economics, is not particularly useful as an instrument of analysis of actual business behavior. 3

It appears then that "The analytical economist must (view the problem as does the producer) if he would keep in touch with actual conditions." 4

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2 E.S. Mason, "Price and Production Policies of Large Scale Enterprise", p. 63. "Admitting the inevitably qualitative rather than quantitative character of policy studies, it must be remembered how large a role descriptive work plays in any science. Its weaknesses are no greater than those of the terrific abstractions to which we are accustomed in much economic theorizing or the fantastic unreality of the price quotations that neither record actual price realizations nor are identifiable with any good of known quality and yet are made the basis of statistical manipulations yielding four decimal answers. Whatever shortcomings price policy studies may have they are at least a half-way house to economic reality." E.G. Nourse, "Meaning of Price Policy", p. 205.

3 K. Boulding, "Implications for General Economics of More Realistic Theories of the Firm", p. 41.


Theories of price must then be in the direction of describing the heterogeneous tactics of the market, of calculating prices by convenient formulae, or "of attempting to penetrate the maze of contradictory appearances, with the hope of discovering underneath, some compelling tendencies of which businessmen are not entirely aware."5

There exists three rather distinct categories of price studies. Studies of value mechanics are concerned with the underlying theory or logic of supply and demand relationships and equilibria, specific and general. Price behavior studies attempt to present prices as an organic system emphasizing the deterministic influence of the economic environment. Price policy shifts from the deterministic aspects to the influence of volitional factors in the price making process.6

This study, as a reading of previous material will reveal, has overlapped and drawn from all three of the above categories. The attempt has been to get the overview necessary for the construction of any theory that purports to be congruent with actual business behavior.

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B. Some basic hypotheses

1. Profits maximization.

It is accepted here that cost and revenue functions can only be subjective estimates - hence businessmen must use some rule-of-thumb method that fits their information. The typical manufacturing corporation is one where management is separate from and dominant over the owners. Continued control will depend upon asset value maximization, rather than profits maximization. Managements will emphasize the stability of operations at a level of output, costs, price, and market share to insure a rate of return on capital satisfactory to shareholders at a level expected to be maintained in successive periods. The effort will be to reduce uncertainty rather than to maximize increments to income.

Stockholders are residuary risk bearers and emphasize capital gains possibly more than maximum dividends. The target is a reasonable long run profit conditioned by competition, antitrusters, labor unions, customers, and ethics. Certainly maximization of short period profit is not plausible.7

7"Imperfect competition theory is a consistent theory - but consistent with its premises and not with the world... debarred from consistency with reality the theory takes refuge in internal consistency." M. Bronfenbrenner, "Imperfect Competition on a Long Run Basis", Journal of Business, Vol. 23, April 1950, p. 81. Is maximization of both short and long run profits consistent?
If a business represents a large fixed investment which can pay off only over the long run, then an attempt to maximize short run profits would be made only if cost and revenue functions were thought to be independent of all previous price and output policies. 8

We can say that the businessman tries to maximize profits over the appropriate period. This means that while the analysis could be applied to either the long or short periods, it could not be applied to both; for maximizing profits in each of any sequence of short periods is not in general consistent with maximizing profits over the longer period composed of these short periods. This would be true only under the assumption above. 9

9 M. J. Farrell, "The Case Against the Imperfect Competition Theories", Economic Journal, Vol. LXI, June 1951, p. 424. E. H. Chamberlin quotes Farrell and agrees with him in "Full Cost and Monopolistic Competition", Economic Journal, Vol. LXII, June 1952, p. 324. Joan Robinson says "I assumed that entrepreneurs maximized their profits because that seemed at the time to be the best and simplest assumption to make... when the consequences of that assumption are displayed it is seen to be too simple to fit all the facts, and we how have to discover what in reality are the motives governing entrepreneurs decisions, to set up a more subtle and comprehensive hypotheses on which to base analysis, and to consider how much (if anything) remains of the "body of economic reasoning", traditionally used to justify (sic) the laissez-faire system when the simple assumption of profit maximization is removed." "Comment", Economic Journal, Vol. LXII, June 1952, p. 325.

With both the "father" and the "mother" of traditional theory jettisoning the maximum profits concept, it appears that the time is already late for the construction of theory with an alternate hypothesis.
It is plausible to assume the slopeing demand curve of monopolistic competition theory flattens or becomes more elastic in the long run than the short period curve. (Since both consumers' information and the number and availability of substitutes can be expected to increase.) This being true, a higher price now would mean a smaller demand in the future. A short run maximum profit then can only be the policy for a fly-by-night who feels no long run effects of his policy. It is not possible in manufacturing since markets have to be built slowly and large capital investment tied up in plant and equipment. 10

All business decisions include in estimates elements of futurity. Current costs and revenues alone do not determine decisions. Expected future costs and revenues, techniques of


"The firm will want to maximize its profits as has always been assumed by traditional economic theory, but it is the sum of the discounted quasi-rents of the firm over its expected existence rather than immediate quasi-rents that is maximized. Therefore, current marginal costs do not equal current marginal revenues. In the short run the firm may operate where current marginal cost exceeds not only marginal revenue but average revenue or price." P.W. Cartwright, "Marginalism, and Price Theory Reconsidered", Canadian Journal of Economics and Political Science, Vol. 17, Nov. 1951, p. 548.
production, demand trends, effect of present decisions on future trends - are all part of a firm's considerations. 11

Theory must allow for the fact that future expectations are the guides for present behavior. Determinate results are possible only under the assumption of constant expectations. There are too many stochastic variables and business estimates are not constants. They are modified in the light of observed consequences so that a chain time-process is involved. Decisions must be made on the basis of incomplete information - so a hedge is necessary against error. Uncertainty increases the inducement to lay plans so as to leave room for change. The adoption of devices for reducing uncertainty are then devices for maximizing income over time.

Flexibility for adaptation to technological change, and product diversification, are both uncertainty reactions as are liquidity, inventories, and stand-by capacity. Expectations appear to be based on short-run factors such as current sales, unfilled orders, overcrowded facilities, and inventories. Decisions are based on recent, apparently causal, uncomplex and familiar events and an attempt is made to compromise between the

highest gain and least loss - a minimax solution. This cannot mean short-run profit maximization - contrary to marginal analysis, but in accord with Eitsman and P.W.S. Andrews.

Again the well documented tendency to establish a flexible plant with reserve capacity indicates a long run planning for

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Rationality does not require that the entrepreneur equate best guess marginal cost to best guess marginal revenue because this makes no allowance for the probability that the best guess may turn out to be wrong. Such allowances are made and it is absurd to call them irrational. Entrepreneurs compromise the maximization of best guess profits and maximization of safety margins against the relevant varieties of unfavorable surprise when they produce an output for which the gap between price and unit cost is at a maximum rather than one for which MC equals MR. When an entrepreneur says that it is his policy to charge a price which covers unit cost, he means that he is trying to produce an output the probable price for which will cover unit costs, including the necessary uncertainty premium. This is the "full cost" price. W. Fellner, "Average Cost Pricing and the Theory of Uncertainty", J.P.E., Vol. LVI, June 1948, pp. 249-252.

Not only...is the future of business activity uncertain, businessmen even have a difficult task in interpreting the present. Not knowing how things will be, or even how they are, businessmen must rely on their best guesses, with a strong incentive to act cautiously so that no single mistake will be disastrous to their enterprise. Uncertainty and the desire for security on the part of all factors of production are among the most outstanding characteristics of the American Industrial System. A.R. Oxenfeldt, op. cit., p. 44.
dynamic change - not maximum efficiency for one particular situation. 13

Rational behavior is ambiguous when a firm is uncertain of the future. Each policy does not necessarily have one unique outcome. If there is no rational way in which a firm can determine the single best policy to follow, an economist cannot predict the actions of a single firm. 14 In a dynamic situation survival in the long run means only positive profits.

The aim of business is to stay in business. Maximum profits may be sacrificed for an impregnable financial position. Soundness may be more important than the last dollar of profit. 15


14 "Behavior that seems inconsistent with a desire to make near maximum profits often turns out, when scrutinized closely to be a judicious pursuit of maximum profit in the long run. The relations of a firm with suppliers, distributors, labor, customers and government are the major determinants of its success. Most of these relationships endure over a long period of time. Sacrifices of profit today may improve these relationships in ways that add substantial returns in the future". A.R. Oxenfeldt, op. cit., p. 123.


Large established corporations seek long-run secure profits. A price is quoted that in normal periods is not so low that it provokes retaliations from competitors, nor so high that it encourages new entrants or loses consumer's goodwill. Within these limits and the minimum which he regards as essential for continued stay in the business, the oligopolist will quote that price which will cover his expected costs and a fair profit. The full cost principle does not maximize profits but security.\(^\text{16}\)

Heflebower says the degree and method of adaptation to factor price and demand movements are considered with particular reference to whether external developments threaten to disturb the internal balance.\(^\text{17}\) Presumably, firms would not maximize profits if that disturbed the internal balance. Each firm operates within a zone where it need not fear rivals upsetting action. A maximum profit price may not be a parameter of action.

Cybernetics agrees with this stabilization concept - homeostasis requiring only that the receptor be able to distinguish the qualitative divergence of the stabilized variable from the norm. This norm is established by comparison - and need not be


maximum profits, but involves a range of toleration — only upper and lower limits demanding appropriate action. 18

Viability analysis requires only positive profits for survival. The essence of viability analysis is that firms cannot adapt once and for all to a given environment but must consider probabilities and retain flexibility for readaptation to a changing environment which is the result of all firms actions and hence cannot be known in advance to any one firm. Consequently, no firm can ever know when it is maximizing profits — hence can endeavor only to achieve positive or satisfactory prof- its. 19

Kenneth Boulding recognizes the difficulties inherent in the maximum profits concept and contends that human behavior may well follow not the maximization of advantage but the principle of inertia and least resistance — those merging only through the long slow retribution of natural selection (viability analysis). So his models are constructed by maximizing utility — this being done through a preferred asset ratio — this comparing to the "state" of an organism that calls for correction when departures occur (homeostasis). In general then his theory is compatible


with the assumption of long run **satisfactory** profits and not maximum profits** - he is essentially in agreement with Fellner that businesses maximize the present value of assets.

This should suffice to document the proposition that there are alternate hypotheses to profit maximization which are plausible **a priori** and which might prove more appropriate for analyses.

Flexibility for uncertainty results in a minimax solution allowing for best guesses being wrong. This is accomplished by maximizing the spread between average cost and price to the extent that competition permits - not by equating MC and MR. The full-cost price includes an uncertainty premium. The result is hypothesis:

1. **In a dynamic situation large established corporations seek long-run satisfactory, secure profits.**

This is compatible with maximization of asset values, with Heflebower's "balance" theory, cybernetics, homeostasis, viability analysis, and preferred asset ratios, as well as with full-cost and normal-cost price theory** but not with marginal theory.**

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21 P.W.S. Andrews assumes long run maximum profits - but it is not essential to his theory.
2. The role of the consumer.

It must be recognized that the scope of this study of price, and production policies, does not permit extensive study of consumption theory. Accordingly, only a few observations as a basis for a hypothesis as to the consumers' role (necessary for any theory of price) is offered here.

Comparative shopping is characteristic of the majority of consumers in the purchase of infrequently recurring items that have a relatively large unit price.

Comparisons of the price and quality of a given item in different stores may be superficial, but apparently the practice is sufficient, along with other considerations, to induce many sellers themselves to hire professional shoppers to make such comparisons and to assist them in establishing prices.22

Hence, it seems acceptable that, even without confining direction of manufacturing policies to customers that are other businesses (as Andrews does) consumer rationality is sufficient to insure equal price for like quality in the long run.

Andrews visualizes the distributor as did Marshall as an intermediary on the consumers' side.23 The distributor must


23A man may not trouble himself much about small retail purchases; he may give half-a-crown for a packet of paper which he could have gotten for two shillings in another. But it is otherwise with wholesale prices. A manufacturer cannot sell a ream of paper for six shillings while his neighbor is selling it at five." Alfred Marshall, Principles, p. 328.
secure the best values for the lowest cost - and sell these values for the lowest profitable price.\(^2^4\)

Andrews argues that continued sales come only from consumer satisfaction in experience. Traditional theory's separable markets on the basis of consumer loyalty extended by advertising can only be a short run phenomena. If consumers are rational, then a firm that can offer equal quality at a lower price will gain sales in the long run. A businessman is convinced that his demand will be elastic if he charges too high a price. Accordingly, he charges a competitive price and then meets the demand at that price up to his productive capacity.\(^2^5\)

Consumers Research has revealed that (in the short run) different brands may offer startlingly different values. Many product brands identical in quality and probably produced at equal costs, sell at widely differing prices. It has been suggested that there is a great need for a government consumer

\(^2^4\)Jules Bachman, \textit{Price Practices and Price Policies}, p. 429. Nevertheless "The consumer is poor relative to his abundance of wants. The struggle to balance the budget of wants makes him price conscious. He does not haggle down prices but exerts duress through his opportunity to go elsewhere or go without...hence...the merchant must find cheaper sources of supply or devise more economic means of distribution - mail order houses, chains, or federated independents." \textit{Ibid.}, p. 158.

\(^2^5\)Andrews, \textit{op. cit.}, pp. 145-147.
testing laboratory that would provide free information to equip the consumers to act as theory supposes.

It could be argued that consumer research organizations accept Andrews' thesis that over the long run consumers, with adequate knowledge, will not pay a price differential for goods of identical quality. Otherwise there would be little rationale for their existence.

With inadequate consumer information in the short run it may appear that goods of very different quality sell for the same prices, or goods of very like quality sell for different prices - but close study of the goods characteristics and ancillary services may reveal that there is a closer approach to like quality for a given price than is usually believed to be the case. What appear to be similar goods may be quite different when analyzed in terms of appeals to consumers' tastes for style, color, packaging, texture, weight, smell, flavor, length, breadth, thickness, durability, fragility, resistances and affinities.

Consumers do not have a fixed given scale of preferences as traditional theory assumes. For a given firm consumers may be lost unless shifts in consumer preferences are anticipated.

If these preferences are more conditioned by experiences in the use of goods than by advertising, in the long run it would appear reasonable to expect that a company would have to produce as good a product for the price as the next company if it expects to survive.

It is accepted here that the consumer is not an innovator; that the consumer votes only for production representatives; that businesses will try to bias consumers in their favor by advertising and limiting the consumers' alternatives; that producer's choices determine production and the consumer's role is judicial and not initiative. This leads to hypothesis 2. Over the long run consumers guide production by selecting for survival those firms whose production decisions have most nearly conformed to changing consumer preferences.

3. The nature of costs.

Cost theory was developed in Chapter IV. It was indicated that a re-examination of the assumptions underlying marginal analysis suggests that what is relevant is how costs are thought (by the decision-makers) to vary with output, factor prices, technology, management methods, and size of plant. Marginal productivity and marginal costs are simply not calculable in

in a complex multi-product production process. Cost functions are not determinable nor known.

Fixed and variable costs cannot be uniquely defined with reference to time. Businessmen must use rule-of-thumb methods for allocating non-separable costs. Cost and revenue functions are not independent of each other or of price. *Ceteris paribus* cost curves are hardly relevant for actual business decisions. Costs are not given and static but influenced by the firm's decisions.

It seems that the firm neither tries for least-cost nor maximum profits. It simply seeks a profitable scale of output. It seeks maximum efficiency for a fluctuating range of output rather than optimal efficiency for a given output. This flexibility indicates that long run profitability is the goal.

Businessmen seem to think that average costs decline until output is at or near capacity. Empirical studies seem to have established a quite definite tendency toward decreasing costs until almost full capacity is reached. If it is believed that average variable costs will increase if output is reduced, it does not appear likely that executives will employ that parameter of action to the extent that marginal analysis has
suggested.29

It is the concept of average cost and not marginal cost that is relevant for decisions. As Galbraith states, with his useful felicity,

No matter with what subtleties economists explore the intricacies of marginal costs, it remains true that to the businessman it is average costs which are known and understood. Moreover, they are used as a guide to price policy...if he chooses to base his prices which cover average costs rather than those which maximize returns...we may regret his ignorance but we cannot ignore it.30

29"Theory has viewed economic capacity (defined as the low point of the unit combined cost curve) as considerably less than physical capacity. I doubt that the disparity is great for production costs under modern technology. Total production costs seem to remain linear up to the point of extreme crowding of plant." Joel Dean, "Cost Structures of Enterprises and Break-Even Charts", A.E.R. Proceedings, Vol. 38, May 1948, p. 157. Again - "average costs decline over the whole range of output and marginal costs are constant. This behavior is quite general in manufacturing in normal times." Joel Dean, "Cost Forecasting and Price Policy", Journal of Marketing, Vol. 13, Jan. 1949, p. 280.


"It would be convenient if economists knew the shape of individual demand and cost curves and could proceed forthwith by comparison of price and marginal cost to conclusions regarding the existing degree of monopoly power. But the extent to which the theorists refrain from an empirical application of their formulae is rather striking. The alternative, if more pedestrian, route follows the direction of ascertainable facts and makes use only of empirically applicable concepts". E.S.Mason, "Price and Production Policies of Large Scale Enterprise", A.E.R., Proceedings, Vol. 29, March 1939, p. 62.
It has been assumed that a firm is limited in size under perfect competition if its cost curve slopes upward while under imperfect competition it is limited in size because it will not pay to produce more than the output at which MR=MC.

If firms produce more than one product, there is no prima facie reason why the size of the firm should be limited. Nor can any theory which assumes that in fact only one product is produced have very great practical significance.31

Since government supplied the plant and equipment and factors were supplied under price freezes (during World War II)...only the diseconomies of scale - an unfavorable combination of management with other factors - could be the cause of increasing costs.32 (Andrews assumes that only increasing managerial costs can limit the growth of the firm.) "The number of industries that were expanded for war purposes at increasing cost seems small. Certainly the number in manufacturing industry was extremely small...it is a fair conclusion that most industrial expansion during the war has been at constant or decreasing cost."33

It seems that sufficient documentation has now been provided to grant credibility to the following hypotheses regarding costs.

J.M.Blair, "Technology and Size", pp. 121-152.
33Loc. Cit. It was this tendency toward constant costs that helped price control, p. 487.
1. The relevant concepts for price analysis are how the decision makers think costs vary with output, factor prices, technology, management methods and size of plant.

2. Since variable costs are proportionate to output, giving constant average variable costs, marginal costs are constant over long ranges of output.

3. Average fixed costs decline as long as output is being increased.

4. Average costs decline over the whole range of actual output up to capacity.

5. It is average costs which businessmen understand and use as a guide to price policy - not marginal costs.

6. The most profitable output point is thought to be at or near capacity.

7. In the long run if managerial costs rise after an optimum point it is plausible to assume that they do so at a decreasing rate as successive levels of management techniques are employed.

8. Technical costs decrease with decreasing strength as scale is increased.

9. Long run expansion then takes place at decreasing or constant costs.


The numbers, commodity, and industry concepts have become nebulous ones. But some concept being necessary, a basic assumption regarding the nature of each will be set forth here.

What is a "firm"? Since Borden owns W.F. Straub and Company (drugs) and two plastic companies - and all their activities are subject to the control of the same persons, does this constitute
one firm? DuPont through its Christina holding company controls General Motors and U.S. Rubber - is this then all one firm?

Some students have concluded that the only meaningful definition of a firm must be in terms of ownership interests. Managements must be looked upon as investment trusts extending research and development into any profitable field. 35

In American manufacturing multi-plant firms, both horizontally and vertically integrated are typical. 36 It must be recognized that the economic atom is a big one. Capitalism has become collectivized and integration is not either horizontal or vertical - it is zig-zag.

It has been indicated that a strong tendency exists in American industry for both competitive and monopoly sellers to gravitate toward oligopoly. 37 Starting with pure competition, each seller is strongly motivated to develop a physical, psychological, (reputation) or service differentiation of his product which reduces the number of sellers who are closely competitive. Conversely starting with pure monopoly, the progressive encroachment of substitutes degenerates the monopoly position to oligopoly.

The history of electric refrigerators, automatic washing machines,

37 Cf. TNRC, Structure of Industry, (monograph 27), 1941, pp. 597, 608, 626.
radios, television sets, and frozen foods shows how monopoly can be eroded down to oligopoly by entry of competitors. In steel, oil, and paper the innovators produced not a new product but a new organization – the combine – by imitative mergers. Oligopoly comes about by accretion as well as by erosion and is the typical case in manufacturing.

We must adjust our thinking in analysis and policy to the new social realities. Time has altered both the character of enterprise and the social structure within which enterprise operates. The entrepreneur as an acting individual agent is no longer appropriate in analyzing large, modern corporate enterprise behavior. The time horizon is wider than that of the corporations personnel. Maintaining market position is more relevant than profit maximization today. The response of the firm to particular market developments may be significantly conditioned by its broader interests which cover the life of the organization as such.

The specialization by firms, even within large financial empires, is still sufficiently distinguishable to give the concept some usefulness. Especially with regard to pricing

38 Joel Dean, Managerial Economics, p. 428.
39 Joel Dean, Managerial Economics, pp. 215-218.
policy it does not appear that the nature of ownership conditions significantly autonomy or independence of decision-making. Ford's prices are still conditioned by those of Chevrolet's, and DuPont's by Allied's. The firm appears to play a rather neutral role. Prices are beyond determination by any one firm. Given the structure of the industry a firm's conduct is governed by the place it has come to occupy in the industry and most would react similarly in the same place.  

This only means that short-run policy is more than just a response to market forces, since the same situation gives alternate solutions. The view held here is that these short-run tactics determine the success of the long-run strategy and a selection from alternates must be conditioned by the long-run outlook for

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40 Agreeing with R. Heflebower and E.S. Mason (op. cit.) but although behavior is a response to environmental conditions giving stereotyping effects - a price system implying interrelatedness - deterministic factors are not completely controlling in the short run. The executive functions in a determinate situation but must evaluate it.

The environment limits the range of decisions. The terrain prescribes the general strategy but leaves room for tactical alternates. Broad decisions establish general principles over time; ad hoc actions meet particular situations of great diversity. It is doubted that any theory can cover these implementations of strategy. Cf. E.G. Nourse, "Meaning of Price Policy", Q.J.E., Vol. LV, Feb. 1941, pp. 182-190.
survival. As a firm matures, along with the industry, specialization limits the range of choice and the imprint of personalities becomes of much less significance. Ford and Firestone had a limited latitude in their decisions in their latter years.

The stage of development of the industry will determine to some extent entrepreneur’s knowledge of the market, probable reactions expected of rivals, and the intensity of competition.

Triffin argues that under monopolistic competition each competitor is producing a somewhat unique product. He competes in varying degrees with all other firms in the economy. The competitiveness of technologically similar products has no particular significance justifying particular equilibrium analysis for the "industry".41

Since, however, different brands of the same commodity do compete more closely than do different commodities, there appears to be justification for retaining the concept of the industry as a highly flexible tool aiding, not impeding, progress toward a general equilibrium approach.42

41 Triffin, op. cit., p. 89.
42 Chamberlin himself has now thrown out the "group" concept. Chamberlin's new version of monopolistic competition views the entire economic system as an elaborate network of interrelated firms, each one able to adjust price, product, or selling outlay. The problem of "entry" disappears along with the "group" and becomes absorbed into the larger problem of the distribution of resources throughout entire economic systems. "Monopolistic Competition Revisited", Economica, Vol. 18, Nov. 1951, pp. 361-362.
Chamberlin's contribution was his vision of a world of competing differentiated products. Triffin emphasized high cross-elasticities of demand among different kinds of products. Triffin's modification of monopolistic competition makes the "group" co-extensive with the economy. P.W.S. Andrews' variant seems to be the emphasis on high cross-elasticities of supply. At any rate, as Stephen Enke says, "we must look at... one firm at a time... but analyze it in terms of its environment." 43

Competition is visualized as being between rival organizations of capitalists, investing money against one another and the fact that they use physically differentiated products and firms as instruments of their warfare is rather unimportant to the fundamental analysis. Unless rival capitalists obtain unfair advantage from the State the attempts of each to increase his profits is likely to leave average profits rather nominal.

There appears to be a gap in economic theory between the assumption made for some purposes that resources are allocated

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44 Ibid., p. 576.

by the price mechanism and the assumption made for other purposes that this allocation is dependent upon the entrepreneur.

Businessmen say competition sets prices. Perhaps outside forces limit the range of prices but people actually set them. People must make the calculations, not inexorable market forces. Does price behavior then depend upon measurable characteristics of the market or individual choices? It is possible that individuals are compelled to set a particular price by the market environment in which they operate. Objective characteristics of the market are clearly strong influences on sellers' decisions.45

M. W. Reder builds a case for the continued adequacy of Marshallian supply and demand analysis.46 He argues that an industry supply curve without homogeneous products and uniform price is still meaningful as weighted average price and quantity. The firm's output then will depend on the average price in the industry, competitive relationship, and shifts in cost functions.

A firm's price in the short run will depend upon inventories, price expectations, liquidity position, ethics, fear of anti-trust, and market share considerations. The firm maximizes satisfactoriness not profits. Over the long period if supply exceeds demand


price will fall and conversely. Price movements depend on the differential between supply and demand and how long that difference endures.

Supply and demand curves are to be thought of as being drawn with the "broad side of the chalk." Price then is indeterminate within the zone of intersection.

Short run price may be controlled by "rules" which facilitate making long run competitive adjustments. Reder is convinced that price does vary proportionately and directly with the unit cost of the representative firm; and as for the abandonment of Marshallian industry analysis, he concludes that to "overthrow too much too soon (was) as ill advised as the well know converse."48

It is held here that both the goals toward which the firm strives...and the manner in which they are attained are subject to powerful influences from outside the firm. This is just another way of saying that the firm is a component of a much broader cooperative system which in its informal aspects, becomes coextensive with what we call society. In a typical firm and market economy we are confronted with a process of cooperation which is partly conscious and partly unconscious. Within the firm cooperation is of a deliberate character. In contrast to this - cooperation as it concerns the relations among firms...is

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47Ibid., p. 186 i.e. Etteman's "zones."

48Ibid., p. 197.
either conscious or) unconscious; the interfirm (or industry) coordination is supplied by the system of markets. 49

No less important is the unconscious influence provided by the mores, folkways, customs, institutions, social ideals, and myths of a society. More immediately relevant to any one firm's behavior are the standards and values of the groups and communities with which it comes into contact as an organization... and to which its members belong.

In addition are conscious influences exercised by a variety of groups affected by the firm's behavior: Owners, lenders, suppliers, labor, and buyers. The results sought by the firm are modified or radically changed by these influences. 50

Management is the focus of forces pulling in all directions and firm strategy is the result of all of these influences.

As for the industry - certainly it competes with the entire economic collectivity for the consumer's dollar. As maturity proceeds firm equipment and technology tend to become standardized and the specialization of production facilities and technological know-how limits somewhat the transfer possibilities. 51

50Ibid., p. 193.
51Of course equipment and technological knowledge can always be bought - but industry can price to make it appear unprofitable.
Certainly, in spite of ownership concentration, we can recognize that Du Pont makes chemicals; General Motors, automobiles; and U.S. Rubber, tires—and that the competition between the three is less important in the short run than with other chemical companies, automobile manufacturers, and tire makers respectively—although over the long run this may be the more important type of competition.

Initially it appears that competition in an industry is a free-for-all until industrial maturity is achieved; and then the focus is shifted from that of the firm in the industry to that of the industry in the economy. This may be expressed in terms of the following hypotheses:

1. The firm is still the unit maximizing satisfactoriness; with an identifiable product-line involving specific technological processes.

2. The industry consists of those firms engaging in similar production processes. It is defined in terms of these processes rather than products.

52 A sociological analogy seems pertinent. A child is first primarily conditioned by its family— but that family is in turn conditioned by its societies culture.

"Business takes a gestalt view. It does not understand a given factor's influence so it rubricizes." Clarence Jung, op. cit., p. 89.

53 To demarcate the industry we need a classification of market structures along technological lines. "Differences in market structure are ultimately explicable in terms of technological factors. It is these that give the differences in competitive practices." E. S. Mason, "Price and Production Policies of Large Scale Enterprise", p. 66.
3. The market includes all buyers and sellers of any product whose actions influence a firm's volume of sales.\textsuperscript{54}

4. Market forces condition the firm's reactions in a mature industry.

5. Costs of multi-product production processes not being separably determinable, the product is regarded as the output of the firm consisting of all items of the entire product line.

The threads for an eclectic theory have now been documented in previous material. There remains the task of weaving these threads together into a theoretical fabric.

C. The eclectic theory

There seems to be fairly general agreement among modern students of pricing that the large multi-product corporate firm operating in an oligopolistic industry is typical in manufacturing. The horizon of such firm is long run, the market position of the organization as such being more important than maximum profits or advantage for existing personnel. The firm is limited by cultural values, group pressures and the objective characteristics of the market in its profit-making decisions and the consumer selects for survival those firms whose decisions most nearly conform to changing consumer preferences. Those firms then try only for long run satisfactory secure profits. This is taken to be the equivalent of long run maximum profits since satisfactory

\textsuperscript{54}Ibid., p. 69.
profits would be the most possible taking into consideration
the security of capital values, allowance for conjectures
being wrong, and all other futurity elements requiring a
minimax solution.

The firm, as an instrument of rival capitalists, seeks a
profit on its output or product-matrix and not necessarily on
each item. The product being a matrix of all items the firm's
object is to recover costs in the aggregate - plus a satisfact-
ory return for the use of capital. This is facilitated, of
course, the larger the firm's share of the market.

The firm operates within industries consisting of firms
carrying on sufficiently similar technological processes that
any firm could laterally transfer its resources to the
production of an item in another firm's product line if abnormal
profits existed. A firm's output may consist of items in several
different industries.\footnote{A policy approach is comparatively rare in pricing. Most
manufacturing concerns have well defined advertising, product,
customer, and distribution channel policy - but pricing
decisions remain largely a patchwork of ad hoc decisions.
It depends on the competitive situation. Most multiple-
product firms typically sell different products under
different competitive conditions. One firm often sells the
same product at the same time in several markets that
differ in competitive characteristics and these character-
istics themselves change with the turnover in sellers and
product types. (The rubber industries "deals" with
different automobile companies in the original equipment
market, and competition with their own tires under mail
order house brands in the replacement market is a salient
example.) Cf. Joel Dean, Managerial Economics, p. 401, 403.}

For each product item then a firm
competes with other firms which constitute an industry of either actual or potential producers of a like item. The market consists of all buyers and sellers of any good exerting any influence on a firm's volume of sales. Primary competition is between firms in an industry until the market for that industry's good has achieved maturity and then shifts to competition between industries in the economy as effort is expanded to persuade the consumer to substitute unlike goods in the satisfaction of the same general want. All of these market forces condition a firm's reactions.

A firm knows only the direct or variable costs associated with each item of its product line. All overhead is regarded as simply a cost of operation. Fixed costs at some assumed volume of operation are apportioned to each item according to its burden-bearing ability. Different items encounter different degrees of competition. Hence, not all items can carry their estimated share of overhead costs. So full-cost estimates are adjusted and price lists forced into patterns by competition.

With an arbitrary allocation of fixed costs, price is a mark-up over average variable costs that will cover those fixed costs and provide a "fair" profit. A firm would like to allocate as much overhead and profit to any one item as it could bear.

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However, the mark-up is determined by the competition to which the item is subject. To get business, rivals' prices must be matched or beat. Estimated costs only determine how low price would go. Costs are a long run floor and demand and competition establish the ceiling. There is no right price for satisfactory results but a range for initial price. Once set however, competition may force like price for like quality toward the level of average costs over the long run as Andrews argues.

A firm thinks its variable costs to be proportionate to its output. Average variable costs then are regarded as constant over practicable ranges of output. No firm can charge a higher price for an item than does a rival producer of a like item. Short run consumer loyalty can't be exploited lest it be lost in the long run. After production processes and product design have become stabilized, production costs tend to become similar for firms producing similar items so competition limits not only the price but the gross profit margin (or the mark-up over

57 In theory the seller prices to obtain as great an excess of total revenue over total variable costs as possible. This price may or may not cover overhead costs. The average mark-up is not based on such reasoning. Mark-ups cover overhead costs over time and over the product line. He does not maximize profit at each moment on each item. Joel Dean, Managerial Economics, p. 384.
the similar average variable costs.\(^5\)

Since average fixed costs decline as long as output is increased, each firm thinks (average variable costs being constant) that any decrease in output will involve rising per unit costs, or average costs are thought to decline up to

\(^5\)Realized prices in the vast majority of industries tend to fluctuate with almost exactly the same amplitude as the weighted average of wage cost and materials cost, irrespective of whether the industries process agricultural or mineral products. Wage cost and material cost together represent a kind of direct cost of production, and the difference between this direct cost and total receipts can be thought of as a gross margin over direct costs. This gross margin shows remarkable stability for different industries, even when there are large changes in income and employment in the economy such as occurred between 1929 and 1931. "The form of industrial organization appears to have no significant effect, as far as I have been able to ascertain, upon the behavior of these gross margins, and thus price-cost behavior, in the economy. The traditional case for price inflexibility in certain sectors because of the industrial organization of these sectors is, therefore, in fact quite unfounded." Richard Ruggles, "The Value of Value Theory", A.B.R. Proceedings, Vol. XLIV, May 1954, p.151.

"The consumers willingness to pay a price may be influenced by the average cost of the industry manufacturing that article, or similar articles, but is not influenced to any appreciable extent by the costs of one individual manufacturer - and the industry average has to be modified by the costs of substitutes." R.S. Edwards, "The Pricing of Manufactured Products", Economica, Vol. 19, Aug. 1952, p. 304.

"Fundamentally the manufacturer sells his output for what he can get regardless of his preference or his costs. It is the interplay of competitive forces in the market, rather than arithmetical computations concerning his own costs, which determines the price at which he will sell." L.C. Lookley, "Theories of Pricing in Marketing", Journal of Marketing, Vol. 13, Jan. 1949, p. 366.
capacity. The firm, being interested in total profit on all items, wishes to maximize the output of all items. Hence the emphasis on volume. As Eiteman points out a lower margin is profitable the more rapid the turnover.

Eiteman's turnover theory reflects the emphasis on producing all the market will take at a fixed price. Businesses maximize the rate of return on investment and not dollar earnings. This would also mean that they would wish to maximize the present value of assets as Boulding and Fellner maintain. Since value of assets depends upon long-run profits prospects all of those concepts are tantamount to saying that the firm seeks long-run, satisfactory, secure profits. Eiteman argues that firms experiencing a declining turnover find their funds available for other purposes than working capital decreased and this may result in increasing costs and further lessening in profits. So firms watch inventories closely. Inventories are the thermostat for homeostasis analogies. Inventories provide the flexibility that a stable short run price necessitates.

Each firm is motivated to reduce price to gain volume as long as the market is expanding. Long run expansion is thought to take place at constant average costs. However, as the market expands, price tends to be cut to increase market share until it approaches the level of average costs. After maturity price
outs would lower the profit margin and could gain volume only at rivals' expense. These will not permit it. To avoid ruinous price wars price becomes stabilized at what is thought to be the full-cost level of efficient enterprises. Thereafter competition is through non-price parameters of action.

Each item eventually experiences this stabilization process in the industry in which it lies. Boulding's ecology analogy becomes relevant. The equilibrium size of each firm is a function of the size of others. When maturity arrives each firm has achieved a share of the market which it cannot expand and inroads upon which, by other firms, it cannot permit. Kink theory becomes relevant as far as pricing is concerned. The "right" price is changed only as it becomes necessary to protect profit margins, but not to affect market shares. It is changed then only when a factor has the same impact on all firms alike. All firms will raise price together when there is a general cost increase. However, a general increase in demand will not have a uniform impact on firms (since different individuals will experience different income increases) so firms will emphasize increasing good will, etc. by holding the price line while expanding capacity.

This gives us Heflebower's "balance" - a workable relationship with evolutionary origins. Firms are limited in their 'zone' of action to devices that will not disturb market shares. These
non-price techniques cause no immediate shifts in market shares but over time erode price and profits. Heflebower argues firms need insulation from price disturbances to induce them to assume the risks of innovation in product quality and process-cost reductions.

This "balance" then is the environment to which firms adapt but the adaptations in the aggregate change the environment itself. Firms then must adapt to a changing environment (viability analysis) and survival depends on their success in doing so. Boulding's homeostatic mechanism or thermostat is itself adjustable as conditions change. Boulding's preferred-asset ratio (a homeostatic "state") itself changes with probability conjectures and so calls for flexible assets and liquidity for satisfactory long run profits.

As Bain and Fellner point out long run profits mean not maximum industry profit but the best profits for each existing firm; hence stay out pricing to avoid entry - which is a factor forcing price toward the level of average costs over the long run.

With oligopolies 'in balance' then, with a stable price structure, firms adapt to this environment through non-price forms of competition, which are less immediate and disturbing but which nevertheless erode prices and profits.
With only slow changes in product improvement and technology and with relatively fixed prices for products, competition now seems to shift to interindustry competition. The changing environment to which the firm must adapt comes from this competition between industries. Innovation and the substitution of unlike goods in the satisfaction of the same general want becomes the essence of competition in American manufacturing industry.

The concept of the industry customarily employed by economists is quite inadequate. A more relevant concept may be constructed by forming the market group of the firm on the basis of cross elasticities and the industry group from technological criteria. The intersection of the market group and the industry group yields a more appropriate collection of firms for the study of firm behavior than either alone.\(^{59}\) This provides a frame of reference for interindustry competition.

If this is accepted as a plausible sketch then marginal analysis is not acceptable. Equation of marginal revenue and

\[59\] I submit that the competition between two firms which belong to two different oligopolistic subgroups but to the same market group is much more active. It is much more active because the firms in question probably do not take account of one another's reactions to their own actions. Andreas Papandreou, "An Appraisal of Economic Change - Discussion", A.E.R. Proceedings, Vol. XLIV, May 1953, p. 67.
marginal cost both in the short and in the long run cannot take account of potential competition, the reactions of substitute competitors, or the effects on future prices or patronage, all of which are vital factors in most pricing problems.

The economists solution must be modified by estimates of the effect of today's prices on future sales; and by estimates of the effect of prices upon the entry of potential competitors; and by estimates of the long run effects of the prices of substitutes. The probability of progressive competitive degeneration of a monopoly's position enters importantly into pricing strategy.

D. Interindustry competition

Once maturity has been achieved then competition shifts from the firm in the industry to industries in the economy. Ross M. Robertson contends that especially since 1939, interindustry competition among products and processes has caused oligopoly power to wane. Demand functions have become unstable and much more elastic. 60

For example, television has hurt the motion picture industry, has changed radio production altogether, has raised real problems

in spectator sports, and has even affected book sales and the
custom of restaurants. Frozen foods have affected canned foods,
detergents have gained favor at the expense of soap, etc. 61

To assess the competitive situation of a firm, we must still
resort to counting numbers. Yet counting only those firms
which are "within" the "industry" tells us very little. We must
do our counting by taking categories of uses for the output of
an industry, considering what products of other industries
directly compete within these categories. This is not easy
because of the requirement for understanding so many varied
technologies. 62

Take, for instance, the aluminum industry, a classic example
of oligopoly. Aluminum has sixty-one per cent of the electrical
conductivity of copper but its weight is less than one-third that
of copper — so a steel reinforced aluminum cable is both stronger
and lighter than copper cable and results in longer spans and
fewer supporting structures. As a result copper has almost en-
tirely lost the high voltage transmission line business. Copper
on the other hand is still superior in uses where fine wire sizes

61 Ibid., p. 52.

62 Ibid., p. 54.
are required. In all inbetween sizes four firms in the copper
industry are direct rivals of the three aluminum companies. In
the field of die castings, aluminum competes with almost anything
that can be melted. In construction, aluminum competes with
steel, wood, and magnesium. The higher cost of aluminum may
be offset by savings from its lower weight or maintenance costs.
In other uses plastics, rubber, and fibreglass enter into
the system of alternates.63

In a particular use then the number of competing firms may
be few or many. Even where the number of competing firms is
few, however, the conditions of rivalry are different than in
the case of intra-industry competition. It is less easy to
predict the reactions of other industry rivals. A simple
counting of the number of firms in an industry is a poor way
of coming to an evaluation of a competitive situation.

In consumers' goods the possibilities of substitution do
not seem so apparent as for producer goods. It seems that
attention should be focused on the service-flow which a con-
sumer good yields over time rather than upon the good itself.

Now the nature of competition among buyers and sellers
may be more easily perceived. Household appliances remove the

63Ibid., p. 55.
want to economize activity. Then an electric refrigerator and a vacuum sweeper both provide a service flow which enables the members of a household to avoid expenditure of energy. That the two appliances performed different operations is incidental. One way of conserving energy may be preferrable to another but the fact remains that the individual allocator has a choice of alternatives. A rough count shows nearly 250 manufacturers of household appliances in the labor-saving category - and the appliances themselves may be thought of as competing with the manual labor of domestics. Even functionally unrelated goods may be substituted for one another to satisfy a need for, say, recognition.

We need a taxonomy of product categories before we can evaluate market power. We can discern interindustry competition only through the relationships of the market place.

Arthur H. Cole urges that we not patch old theories but make a fresh effort to develop new basic concepts more fully.

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64 Ibid., p. 60.
in tune with contemporary business procedures and performance. He believes that a socially responsive, technically efficient entrepreneurial system is the best economic constitution that we can evolve in an always imperfect world. The day of the 'robber barons' is gone but in some respects the efforts of leading businessmen to improve operating performance, to live amicably with government, to establish public relations and to win the cooperation of employees may be looked upon as a response to the challenge levelled at the turn of the century. Whatever the causal base, the fact of a transformed American entrepreneurial system cannot easily be denied. We do have foreign "productivity teams" touring our country in search of our keys to success; and we have the equally revealing phenomenon of disappointingly meager results when merely capital and technological information are poured into foreign lands.

The features of change are the increased sophistication of business, the altered time perspectives, and the changed objectives of the business unit.

Management has tended to become professionalized with the consequences that efforts to maximize profits have come to play a subdued role. Labor now bargains not with capital

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67 Ibid., p. 36.
68 Ibid., p. 39.
but with fellow employees. Anticipations have become a major process in business. Sophistication has bred forward planning. The time horizons of large enterprises have lengthened appreciably. Integration, research laboratories, pension plans, executive development, etc. show business concerns to be acting as though they were endowed with perpetual life. Entrepreneurs have vaulted old industrial lines wherever there appeared advantage in doing so. Their activities center around policies to insure permanence: market analysis, advertising, public relations, new product research, and self-derived reserves. "Sustained, effective production through all purpose entrepreneurship has become the economic objective of modern business."

Opportunities for advancement aid the enlargement of the economy and businesses set up a circular flow of ideas consisting of a sequence of setting objectives, constant appraisal of performance, and redefinition of objectives in the light of performance and possibly changed external circumstances. Improvement is "built-in".

There is, of course, the organic character of business growth. Major decisions, like the location of railroad lines, affect all

69 Ibid., p. 42.
70 Ibid., p. 45.
subsequent growth of enterprises. Later decisions are conditioned by previous ones. Thus committed capital and skills further interest in permanence of the firm. The objective is the maximization of the present value of an indefinitely long series of secure and socially permitted profits.

For leading thinkers among businessmen the acceptance of obligations to workers, consumers, and the general public is a condition for the survival of the free enterprise system. Changing social and economic sanctions have altered the parameters within which business decisions must be made. The day of the artisan owner-operator entrepreneur is gone and modern theory must take account of the new social realities.

If one considers each firm competing within the economic market rather than with the industry it seems realistic to think of long-run profits as approaching zero. To a considerable extent what probably awaits one firm in the long run probably awaits other firms similarly situated. Consequently, aggregative predictions can be made with some assurance for groups of firms, even though formal analysis involves a single unreal representative firm.

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71Ibid., p. 50.

72"So far as immediate price policies are governed by long run demand curves, or behave as if they were so governed, they are likely not to differ materially from those of perfect competition." J.M.Clark, "Toward A Concept of Workable Competition", A.E.R. Vol. 30, June 1940, p. 249.
Maximizing profits is simply a desire. The motive does not guarantee the result. Desire is no criterion for policies since they have no unique outcome. There is no rational and unambiguous way to determine the "best" policy, so the economist cannot predict the actions of any real specific firm. The characteristics of survivors may be predicted but not the survival of any actual firm. Marginal analysis which assumes a known most profitable position and that the firm adapts to it is an apparatus of the mind. "It is a pedagogic instrument like the study of the classics."

"The capable actuary can forecast the mortality rate accurately but cannot foretell the length of life of any individual and the marketing economist can calculate more accurately the movement of goods for an industry than he can the results of the interplay of competitive tactics among firms. (It is easier to forecast the demand for tires than the share of this demand for any given rubber company.) Theories of price for an industry explain a great deal of the aggregate movement of goods through markets and the factors setting competitive prices but are much less relevant to the individual firm."

74 Pierre Sraffa in A.E.R. Readings in Price Theory, p. 181 (But in reference to previous value theory.)
This represents at least a "frame of reference" for an industrial case study. Although as Galbraith says,

Apparently our tradition in economic analysis does not allow us to construct partial models of this sort. They must be complete, self-consistent, and harmonious. If the model builder does not make this claim, then his critics will assume that he does anyhow and then isolate the imperfections as proof of weakness.\textsuperscript{75}

Nevertheless, it is agreed with Gabor and Pearce that "It is the marginal theory which is wrong and that, in consequence, any attempt to investigate business behavior entirely within the framework of such a theory can only be misleading."\textsuperscript{76}

In Chapter VIII of Part III the American rubber industry will be analyzed, within the framework of this eclectic theory. Many variables that marginal analysis cannot handle may now be taken into account. For background Chapters VI and VII are devoted to the history and description of the industry.


PART III

CHAPTER VI

ECONOMIC CHARACTERISTICS OF
THE RUBBER INDUSTRY

"The Story of Rubber is the story of the economic development of a nation."

...Hugh Allen: The House of Goodyear,
Cleveland: Corday and Gross, 1949.

In Part I the negative limitations of marginal analysis were developed. In Part II contributions based on empirical evidence were synthesized in an eclectic theory thought to be logically more valid for describing business behavior. There now remains the task of testing this theory by exploring its possibilities for predicting the growth and market structure of some major American industry. Accordingly, Chapters VI and VII will be devoted to the history and economic characteristics of the rubber industry and its chief products. Then, in Chapter VIII, the industry will be analyzed within the framework of the eclectic theory.

A. The raw materials

1. Agricultural rubber.

Until 1914 most commercial rubber came from the Hevea Brasiliensis growing wild in South and Central America. Today wild rubber is of negligible significance since plantation rubber is so superior in quality.¹ Ninety-seven per cent of crude is

cultivated Hevea rubber plus castillea-elastic latex from Central America and Mexico.² Ninety-eight per cent of crude comes from the Middle East; from the British and Dutch and French Countries of Malaya, Ceylon, Netherlands East Indies, and French Indo-China.³

The trees are tapped by natives who make a spiral gouge in the outer bark to bleed the latex or liquid rubber. A peg inserted at the bottom of this cut drips the latex into a cup from which the natives fill their buckets on their collection rounds. Each native tends from 250 to 300 trees and collects daily from twenty to thirty pounds of latex. By careful tapping and resting the best plantations yield about 2,000 pounds per acre.⁴

Today, latex is treated at a plantation factory where acetic or formic acid coagulates the rubber in tanks - the rubber rising to the surface as thick slabs which are put through wringers and then dried; either by hot smoke in forty-eight hours, giving an amber-brown smoked-sheet rubber, or by two weeks of air drying which gives almost white crepe rubber.⁵

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⁵Ibid. cit.
These sheets are then compressed into oblong bales weighing about 250 pounds before shipment. 6

However, as early as 1804 A.F. Fourcroy had suggested latex preservation by alkalies. 7 Today much rubber is transported directly in tanks with ammonia added to prevent curdling. 8

This had become commercially important by about 1922 and since then has been supplemented by dessication, electro-coagulation, centrifugal spinning out of water, and other processes. There is great use today of latex in dipped and molded goods; and the invention by the Dunlop Rubber Company in 1929 of foamed latex has increased the use to over 100,000 tons of latex a year. 9

It was during the decades of the twenties and early thirties that the rubber companies were forced to develop their own plantations. While slashing tire prices, they were losing millions on inventories, making rubber the least profitable division of all big business. United States Rubber opened


7 Schidrowitz and Dawson, op. cit., p. 91.

8 R.J. Tudor, op. cit., p. 9.

plantations in Sumatra; Firestone developed Liberian plantations; Ford went to Brazil; Goodyear has plantations in the Phillipines, Panama, Costa Rica, and Sumatra. The war interfered with the increasing trend by American rubber manufacturers to acquire their own supply sources but possibly Goodrich's announcement indicates a resumption of the trend toward expansion of these facilities. 10

The American rubber industry has always had to contend with "manipulated" prices of its chief raw material - crude rubber. Brazil tried various valorization schemes whereby rubber could be sold only to the Brazilian government, which held it off the market in order to drive up the price. Capital was thereby forced into Asian plantations developing at the rate of 200,000 new acres a year. By 1908 there were 750,000 acres of plantations. 11 Brazil thereby executed its own industry. By this time Asian plantings were beginning to yield and by 1913 plantation rubber had passed wild rubber, which has continued to decline into insignificance.

By the time of the 1920 depression the United States was consuming seventy per cent of the world's rubber and Britain

11 Wolf Bros., op. cit., p. 218, 173.
was producing seventy-five per cent of the world’s supply. Then the British took over with restriction schemes. 12

In 1920 the British Rubber Growers Association tried to curtail the supply by twenty-five per cent but without success. In 1922 the British proposed the Stevenson plan. This imposed an export tax on all rubber shipped in excess of sixty per cent of the 1920 output. Price behaved erratically, finally rising to $1.21 in 1925. Dutch plantings were increased, the use of reclaim was stimulated, and American companies began to look about for their own plantation sites. Consequently, the Stevenson plan was abandoned in 1928 — causing American companies great inventory losses as price dropped to twenty cents in 1929. 13

The business depression of the thirties cut down demand as the supply was increased so that for a few months in 1932-33 rubber was selling for three cents a pound in New York. 14

Under these conditions artificial controls were reestablished. In June 1934 the International Rubber Regulation Agreement went into effect. A commission established quotas for basic producing

12Ibid., p. 219, 177.
areas through export controls. This operated until 1944 while prices fluctuated from ten cents to twenty-four cents a pound.

Rubber is still under some control. The Government General Services Administration has a natural rubber stockpile of 1,200,000 tons worth $866,137,000. Because rubber deteriorates if stored indefinitely the government rotates its stockpile. Manufacturers "buy" rubber and "repay" with new rubber in sixty days or face a penalty. Since starting stockpile operations the government has made a gross profit of $23,712,000.16

2. Compounds.

Probably no other industry uses so many different raw materials. There are now some 1,500 elements in rubber compounding. Goodyear discovered that rubber heated with sulphur and white lead became weather-resistant, strong and elastic. Hancock found that by increasing the sulphur, rubber could be made

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15 Loc. cit. The Rubber Manufacturers Associations participated in discussions but had no vote. Only by U.S. Government protests were the commission's policies moderated when war stockpile objectives became involved. E.L. Allen, op. cit., p. 207.


17 Wolf Bros., op. cit., p. 354. "Pure" rubber turns out to be usually mostly something else. Rubber heels are half clay. One-fourth of a tire is soot. There is sawdust in tile and baking powder in sponges. A few other compounds are asphalt, carbon black, pitch, sheep grease, paraffin, vaseline, waxes, oils, acids, fossil flour, mica, quartz, whiting, charcoal, potato starch, and zinc stearate. Ibid., p. 358.
exceedingly hard. Later it was discovered that rubber could be made tough, without being hard, by adding zinc oxide, lithopone, carbon black, clay and other reinforcing agents. Very soft rubber is obtained by adding stearic acid, resin, and vegetable oils. Pigments can give rubber any color. Antioxidant chemicals prolong the life of products exposed to the weather.\textsuperscript{18}

All rubber products contain sulphur and zinc-oxide to toughen and accelerate vulcanization. The chief reinforcing agent is carbon black.\textsuperscript{19} Asbestos is used as a binder and heat resister, and talc to prevent sticking. There are myriad recipes combining all of the ingredients in different proportions and in different combinations.\textsuperscript{20}

The use of speed-up materials deserves special mention. The industry first used mercuric oxide but although this cut vulcanization time from three hours to five minutes it hastened aging and the goods failed in service. Anilines were then tried but poisoned the workers and produced "blue men."\textsuperscript{21}

\textsuperscript{18}Alderfer and Michl, \textit{op. cit.}, p. 303.
\textsuperscript{20}C.W.Ufford, \textit{op. cit.}, p. 9.
\textsuperscript{21}Wolf Bros., \textit{op. cit.}, pp. 350-354.
experiments, George Oenslager, pioneer research chemist with the Diamond Rubber Company, developed, in 1906, satisfactory organic accelerators. These not only cut the time for vulcanization but improved the quality and tensile strength of the product to an amazing degree. By adding lime, litharge, or magnesium oxide, tire vulcanization time has been cut from three hours to forty minutes. Chemicals in use today are not "cheaper" since many of them are more costly than the rubber itself. Goodyear's discovery was only the beginning of chemical pioneering in rubber - which has become the innovational frontier and one of the chief forms of competition in the industry.

3. Synthetic rubber.

Synthetic rubber is by no means new. Greville Williams, in 1860, polymerized the hydro-carbon substance by latex distillations and named it isoprene. Julius A. Nieuwland of Notre Dame University described in a doctoral dissertation in 1904 the basic process by which he developed synthetic rubber in 1923 from divinyl acetylene. The Hood Rubber Company has claimed to have

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22 C. W. Ufford, op. cit., p. 10.
23 Alderfer and Michl, op. cit., p. 303. Goodyear has now reduced curing time for a passenger tire to twenty minutes and for an earthmover tire to ten hours with its oil extended rubbers. The Story of The Tire, p. 27.
made synthetic rubber in 1911 to test in tires - but there was no contemporaneous documentation. (Goodyear's 1938 tires of chemigum were probably the first commercial synthetic tires in the United States.)

The first commercial production was forced upon Germany by the blockade of World War I. At a cost of nearly thirty dollars a pound, a methyl rubber synthetic process taking nearly six months was developed. Nevertheless, by the end of the war, Germany was producing synthetic at about 150 tons a month. The rubber was not very satisfactory. Heavy vehicles had to be jacked up, when not running, in order to prevent the solid tires from becoming flat-sided from pressure. It is known that the Russians have been producing alcohol and petroleum derived synthetics since 1930.

Synthetic rubber promises to alter the entire future course of the industry. There are now in use five principal types. Buna-S is the most important general purpose synthetic that most nearly resembles natural rubber. Its imperviousness to air has given butyl the second largest production volume - for inner tubes

26 Schidrowitz and Dawson, op. cit., p. 102.
28 Schidrowitz and Dawson, op. cit., p. 102.
29 Ibid., p. 104.
and inflatable articles. Neoprene is a prime insulating material because of its high resistance to oil, chemicals, and flames. Buna-N and Thiokol represent only two per cent of synthetics production. N-type Buna is valuable for its resistance to swelling and low temperatures, and Thiokol for its high resistance to oil.\textsuperscript{30}

Modern synthetic manufacture can be illustrated with GR\textsuperscript{48} technology. Three parts of butadiene are emulsified with one part of styrene into a soapy water solution. A catalyst is added and the temperature raised to 120\textdegree F. After polymerization has taken place, the latex is treated in another tank with sulphuric acid and a salt solution. The reaction of these chemicals causes the latex to coagulate and rise to the surface. The crumbs or "floos" of rubber are then skimmed off, washed, dried, and compressed into blocks for shipment.\textsuperscript{31}

Experiments since the war have developed the "cold rubber" process of polymerization at 41\textdegree F. with new catalysts (cumene hydroperoxide) giving a synthetic with higher tensile strength, resistance to cracking, lower heat build-up, and much improved tire wear of up to thirty per cent. In 1950 over 180,000 tons of capacity had been converted to the cold rubber process.\textsuperscript{32}

\textsuperscript{30}E.L. Allen, op. cit., p. 196.
\textsuperscript{31}Ibid., p. 197.
\textsuperscript{32}Ibid., p. 198.
The cold rubber process has now been adapted in a process by the B.F. Goodrich Company requiring only one-fiftieth of the time of the standard process. Cold rubber which can be made in twelve to fifteen minutes instead of the previous ten to twelve hours is now available at greatly reduced prices. In the early days of synthetics it took thirty-four hours for a batch of man-made rubber. The longer it takes to complete the reaction the less rubber can be produced in a plant. Now, with the new super-fast catalysts, plants can be smaller and cheaper. By requiring far less equipment and time it seems reasonable to expect that costs will be reduced considerably, again lowering the ceiling price for natural rubber. Cheaper rubber may further stimulate the ever increasing use of rubber products and encourage new uses.

After research on the German synthetic, Vulcollan, Goodyear announces a new type synthetic rubber with vastly superior processing advantages and qualities. Laboratory tests indicate that tires made from the new material could easily outwear the automobile itself - and rubber heels or soles would outwear shoes. Costs still make commercial applications a long way off. However, the new synthetic has five times the wear resistance of the best cold rubber, it is equal to butyl in air impermeabil-

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ility, and superior to neoprene in resistance to oil. Its resist-
ance to oxidation exceeds that of any known rubber; and its
tensile strength is twice that of any other rubber-like material,
while vulcanization time is cut in half.34

When the European War endangered our rubber supplies in
1939 the government entered an ambitious stockpiling program.
The RFC established the Rubber Reserve Company to handle the
purchases. Nevertheless, by Pearl Harbor, we had less than a
year's supply at pre-war consumption rates. The Rubber Survey
Committee, under Bernard Baruch, made a study of the situation
and recommended building a synthetic rubber capacity of one
million tons per annum as rapidly as possible — else face
military collapse. The Defense Plant Corporation financed some
fifty-one plants which were leased to private operators (for
one dollar a year) who designed and built the plants. The Rubber
Reserve Company entered cost-plus-fixed-fee operating agreements
with the companies.

The 1948 Rubber Act had as its objective the transfer of
as much of the industry to private ownership as was compatible
with the other objective of maintaining an emergency stand-by

34"Goodyear's Synthetic To Outlast Car?" Akron Beacon
Journal, Jan. 23, 1953.
capacity for defense needs. Use of nearly fifty per cent synthetic in tire and tube production was required by law (to insure the latter objective, above.) The Korean War retarded the transfer to private hands. The Defense Production Act of 1950 cut back non-defense consumption and made the General Services Administration the sole importer of rubber in the U.S.35

On January 25, 1955 Attorney General H.M. Brownell, Jr. approved plans to sell the government's synthetic rubber copolymer plants as best fostering the development of a free competitive synthetic rubber industry. The Rubber Producing Facilities Disposal Commission provided a number of anti-trust protections. Each buyer agreed to make a substantial portion of rubber available at fair prices to small business. Two large plants were sold outside the rubber industry. Goodyear, U.S., Firestone and Goodrich acquired sixty-four per cent of the capacity. (They had been buying between fifty and sixty per cent of the total GR-S sold annually.)

The Commission succeeded in raising the total sales price by $30,000,000 in seven months of negotiating with thirty five companies. This represents ninety-nine and two-tenths per cent of the value put on the plants in a 1952 engineering survey.

35E.L. Allen, op. cit., pp. 188-190.
Total unrecovered cost of the entire synthetic program to the American people was $272,918,800. This includes losses on earlier plant sales plus depreciation. Buyers must keep the plants ready for government directed use in event of war emergency for ten years. 36

The FBI has been instructed to make annual reports to 1965 to insure there is no lessening of competition - and fair sales of the output to small concerns. 37 Both President Eisenhower's and Attorney General Brownell's reports on what has happened in synthetic rubber production have been favorable. There was agreement that the government get full value for its investment, that competition has not been lessened and that national security is fully protected so far as the supply of rubber is concerned. Facilities are being expanded and technical advances are being made in development of new rubbers.

There are ten relatively strong producers and none dominates the market. The price remained at about twenty-three cents while natural rubber went from thirty-one to forty-eight cents, Brownell reported. Small firms report a fair share at a fair price - for improved quality rubbers. 38

In 1954 before denationalization, synthetic production accounted for less than fifty-two per cent of total production. In 1956 this had risen to sixty-one per cent and by 1957 to sixty-four per cent. Projected to 1970 synthetic production may account for seventy per cent of the total.\textsuperscript{39} Production amounted to 1,079,000 tons in 1956 and the U.S. is now a rubber exporter of over 200,000 tons.

Major alterations of a permanent nature resulted from World War II as demonstrated by a few statistics. In 1940 the U.S. consumed approximately 650,000 tons of rubber, one-half the world's production. By the end of 1951 we had a synthetic rubber industry with a capacity of a million tons a year - well above total pre-war consumption. Rubber fabricators need never revert to complete dependence on natural rubber as a raw material.\textsuperscript{40}

The decreased costs now make synthetic competitive with natural rubber but consumption has been regulated by national policy. Under the Rubber Act of 1948 use of 200,000 tons of GR-S per annum was made mandatory.\textsuperscript{41} The U.S. has generous quantities of the raw materials for producing synthetics -

\textsuperscript{39}\textit{"Denationalization"}, \textit{Economic Intelligence}, No. III, Oct. 1957, (U.S. Chamber of Commerce pamphlet)

\textsuperscript{40}E.L. Allen, \textit{op. cit.}, p. 182., R.J. Tudor, \textit{op. cit.}, p. 81.

\textsuperscript{41}Alderfer and Michl, \textit{op. cit.}, pp. 322-323.
petroleum, natural gas, coal, sulphur, limestone and salt. Synthetic will always be able to compete price wise.

World natural rubber production continues to increase in spite of record synthetic production - but only by four per cent in four years. This is one reason why the synthetic plants have proved such excellent investments for the rubber companies.  

Nevertheless, American companies have spent millions to increase natural rubber output through plantations and experimentation with three hormones said to increase yields of old trees twenty-five to forty per cent. Firestone has planted 10,000 more acres in Liberia, and 2,500 acres in the Philippines. Goodyear has developed a large estate in Brazil; Goodrich in Liberia; and U.S.Rubber has planted 9,000 acres in Malaya and 5,500 acres in Sumatra. When the Federation of Malaya was given independence from Great Britain in August, 1957, the new government undertook to increase its already one-third share of the natural rubber markets.

There seems to be general recognition that without synthetic, producers will be unable to meet demand. Even England is now

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striving to establish a synthetic industry in spite of long reliance on dominating natural rubber supplies. Recognition of synthetic's greater price stability, as well as threatened shortages, forces synthetic production.45

Greater use of synthetics should continue as a trend for the next ten years because of increased consumption. Rubber use has increased significantly in the U.S. since the War, but in the rest of the world it has skyrocketed. In 1947 the U.S. used twice as much rubber as the rest of the world. Now more is used outside the U.S. (we use sixty per cent synthetic while abroad rubber use is ninety-two per cent natural rubber.)46

Perhaps the supreme irony in rubber production is Brazil's losing struggle to supply her own needs. She now imports 40,000 tons a year. Discussions have been held regarding building her own synthetic plants. "Carrying coals to Newcastle" may be brought up to date with "making synthetic rubber in Brazil."47

4. The Sorap and Reclain Rubber Industries.

Sorap rubber collection is an industry in its own right with many interesting aspects. Sorap rubber has saved the nation in war emergencies, it has cut costs to the consumer, it has

improved the quality of some rubber goods, and it has been a
defense against raw rubber price squeezes. 48

Many articles are made directly from the scrap: door mats,
blow-out patches, reliners for damaged tires; and there is a
sizeable export business in shoe soles made from old tire treads
in Macedonia, and Spain. 49 Most scrap, however, after processing,
is used as a compounding ingredient with valuable properties of
its own. It is not a cheap and inferior filler used as a rubber
adulterator for the profit of industrialists at the expense of
the public - which seems to be a widespread popular notion. In
emergencies reclaim is used to stretch and conserve rubber stocks,
but normally it is combined with crude in such proportions as the
manufacturer has found best according to the product.

Reclaim is used not only because the product is cheaper,
or because there are economies in operation from the greater
ease of mixing reclaim in the manufacturing process, but chiefly
because it actually improves the products. 50 Crude can be too
good for the use demanded. Mechanical rubber parts on an auto-
mobile need not last any longer than the life of the car. Over-
shoe uppers need last only as long as the soles. It would be

48 Howard Wolf. The Story of Scrap Rubber, Akron: A. Schulman,
Inc., 1943, p. 16.
49 Ibid., p. 51.
uneconomic to make them of material more expensive than necessary. In certain uses reclaim would be retained if it cost more than crude. (Mechanical goods, for instance, where resistance to abrasion is increased by reclaim.)

It is possible that during the ballooning of crude prices the manufacturer changes his components by including more reclaim than is employed when, able to disregard the price factor, he uses the formula he has found best. Statistics would seem to convict him of this. 51

Unquestionably the price and supply of crude and/or synthetic affects the amount reclaimed. For example, between 1922 when crude rubber averaged seventeen cents a pound and 1927 when the price was thirty-eight cents, the ratio of reclaimed to crude rubber consumption in the United States rose from nineteen to fifty-one per cent. In 1932 when the price of rubber fell to three and five-tenths cents a pound, reclaimed rubber consumption was only twenty-three per cent of crude rubber consumption. During the war, 1944-1945, when imports of natural rubber were cut off, the consumption of reclaimed rubber exceeded that of natural rubber. 52

52 Alderfer and Michl, op. cit., p. 308. See also J. H. Ball, op. cit., pp. 197-208.
In 1927-28 the Rubber Reclainer's Association set up scrupulous specifications for grading scrap by type, reclaim process, color, and chemical analysis. Their accumulated experience certainly helped in the rubber shortage emergency of World War II. When the Japanese captured ninety-two per cent of natural rubber producing sources in 1942, we still got driblets of natural rubber from Ceylon and South America, had a small stockpile on hand and synthetic capacity for 32,000 tons a year. But the war effort needed hundreds of thousands of tons!

Reclain suppliers helped meet the need. First they signed a contract as non-profit agents of the Rubber Reserve Company of the government. All of their facilities were placed at the disposal of the government on a cost-of-operation basis. A great victory drive for scrap rubber was launched. Filling stations bought all scrap at one cent a pound. The oil companies in turn were paid twenty-five dollars a ton - pledging all profits to charity. In six months one-half million tons were collected.

The reclain suppliers had previously standardized on tires, tubes, boots and shoes. Now they faced a sorting and grading of multiple miscellany that was an unprecedented task; for heels, hot water bottles, gloves, bathing caps, garters, sink stoppers, 

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53 Howard Wolf, op. cit., pp. 50-60.
The ratio of reclaim to natural rubber rose to 100 per cent in 1943. Throughout the war it was mainly reclaim victory tires that kept civilians travelling to work. In 1899 A.H. Marks of the Diamond Rubber Company, Akron, had patented the process of heating scrap twenty hours at 360° in dilute caustic soda. This simultaneously destroyed fabric, uncombined sulphur, lead, and plasticized the rubber. It was good on all types of scrap. This same process is still used to reclaim eighty to eighty-five per cent of all scrap. It was cheap enough to create a profitable reclaim industry on a large scale.

Four reclaim suppliers supply ninety per cent of all scrap used by the rubber regenerators. One-fourth of this total supply is by A. Schulman, Inc. This firm has eight acres of storage yards in Akron, another plant at Conneaut, Ohio, warehouses and offices at East St. Louis and Boston.

54 Synthetic has posed new problems for the reclaim industry. Buna-A can be reprocessed by the Marks method but with higher pressure and heat. Butyl can be reprocessed by longer milling. But reclaimed natural rubber will not mix with Butyl. The suppliers' sorting and grading problems have been vastly complicated by new mixes. Ibid., pp. 91-103.
56 Howard Wolf, op. cit., p. 34; J.M. Ball, Reclaimed Rubber, pp. 44-126.
57 H. Wolf, op. cit., p. 51, 63.
In turn, of the fifty reclaim plants in the United States, seven companies process eighty-five per cent of the reclaim. The four largest are owned by the big four. Firestone owns the Xylos Rubber Company with plants at Akron, Memphis, and Los Angeles. Goodrich owns the Philadelphia Company with two plants at Akron. Goodyear has plants at Akron and Gadsden; and U.S.Rubber owns the Naugatuck Chemical Division at Naugatuck, Connecticut. The other three are Pequannock Rubber Company at Butler, New Jersey; U.S.Rubber Reclaim Company at Buffalo, N.Y.; and the Midwest Rubber Reclaim Company with plants at East St. Louis, Ill. and Barberton, Ohio (an Akron suburb).  

B. The rubber manufacturing process

Rubber manufacturing may be divided into several different types of plants according to products processed. These are generally tires and tubes, clothing and footwear, sundries, mechanical goods, hard rubber products, rubber reclaim, and synthetic rubber manufacture. The manufacturing process consists of a series of stages handled by different departments or even by different plants.

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58 Ibid., p. 79. See J.M. Ball, Reclaimed Rubber, New York: Rubber Reclaimer's Association, 1947 for history of these firms.

59 C.W.Ufford, op. cit., pp. 11-12.
Describing the manufacturing process for, say, just the 30,000 products produced by B.F. Goodrich is beyond the purview of this study. However, a sample of processes may give a generalized picture helpful in understanding the industry.

Four major steps are generally involved in the fabrication of rubber products. The crude rubber must be plasticized or masticated to soften it, and break it down in a "cracking" mill. Then the rubber is "compounded" with sulphur, carbon black, and other compounds by formula - according to whether the product requires rubber that is hard, flexible or stiff. The mixing is done in a "Banbury mixer" similar to a huge dough mixer. The compound is then shaped. It may be sheeted in calendar rolls and/or rolled on fabric. These may then be rolled onto a tire machine as plies. After shaping, goods must be "cured" - or subjected to heat under pressure which induces chemical changes that "fix" the rubber. Subsequently, the product must

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It is possible now that this whole process of curing may be obsolete. Air Force researchers have discovered that the atom may be used in vulcanizing rubber. A new process using gamma radiation was recently found at the Air Development Center at Dayton, Ohio. Studies of all available rubbers indicate that the new technique produces vulcanization equal to or superior to that of conventional processes. The new process completely eliminates the conventional heat treating plus the usual chemical vulcanizing agents - sulphur and metallic oxides. It has not yet been determined whether atomic curing improves the material. "Finds Rubber Can be Cured by Atom", Akron Beacon Journal, Feb. 11, 1955.
be trimmed, washed, inspected, prepared for shipment. There is much romance in the story of the uses and development in rubber belting, conveyors, electrical cables, insulation, footwear, safety against acids, sparks, shocks, uses in surgery, toys and sporting goods, pavement, hose and tubing, mechanical goods, mats, flooring, thread, dental plates, pipe stems, fountain pens, bonding agents, storage batteries, gloves, prophylactics and war uses. But to tell that story here is impossible. Today the rubber industry manufactures 50,000 separate products. C. The development of tires and tubes and technological competition

After Charles Goodyear's discovery of vulcanization, the search for new uses brought forth the major innovation of solid rubber tires for carriages as early as 1856. Their use was

62The Story of The Tire, p. 6.
not widespread, however, since Harvey Firestone states that in
1896 he had the only rubber-tired buggy in Detroit. 64

In 1845 Robert Thompson had patented a pneumatic tire for
karriages; and though an early set ran 1,200 miles, they won
no general acceptance and the invention was forgotten for
nearly half a century. 65

John Boyd Dunlop rediscovered the principle independently
in 1887 when he made pneumatic tires for his boy's tricycle.
These he patented in 1888 and in 1890 formed the Dunlop Rubber
Company, Ltd., now one of the world's largest tire manufacturers.
This invention was somewhat responsible for the wide vogue of
bicycles during this period, since by 1900 practically all
bicycle tires were pneumatic. 66

64H.Firestone and S.Crowther, Men and Rubber, New York:
Doubleday Page and Co., 1926, p. 29. R.W.Thompson had
patented solid rubber tires in 1867. Schidowitz and
Dawson, op. cit., p. XX. By 1904 Firestone was the world's
largest manufacturer of solid rubber tires. One of his
innovations was to make them on reels so that a dealer could
cut them without carrying some 400 sizes as had previous­
ly been necessary. Pioneer and Pacemaker, p. 8. Alfred
Lief, op. cit., p. 20.

65Schidowitz and Dawson, op. cit., p. XVII; R.J.Tudor,
op. cit., p. 20; W.H.Paull, "Tyre", Encyclopaedia Britannica,

66R.J.Tudor, op. cit., p. 22. Or did the popularity of
bicycles explain the acceptance now of the previously ignored
Thompson invention?
In 1889 W.E. Bartlett had patented the detachable clincher-type tire and in 1892 G.F. Palmer had patented the cord tire. The first automobiles had solid tires. It is not clearly established who first put pneumatics on cars. There are many rival company claims. However, the date seems to be 1895 when a pneumatically-tired automobile was entered in the Paris to Bordeaux race.

Thompson's first pneumatic tire in 1845 was a leather casing of an air container of fabric impregnated with rubber. Dunlop's tire was a single-tube tire of a "square woven" rubberized fabric base. The threads were continually sawing each other in two and generated high temperatures which reduced tire wear and increased the danger from blowouts. The Palmer invention, or the "cord tire", consisted of using just sufficient light cross threads to hold the heavier lengthwise cords together until they were rubberized. Each cord being insulated from adjacent cords by rubber, the elimination of cord chafing greatly reduced the heat generation. Since this approximately doubled tire life, cord tires became standard by 1920, Goodrich having introduced them about 1912.

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67 Schidrowitz and Dawson, op. cit., p. XXI.
70 Schidrowitz and Dawson, op. cit., p. 112.
71 J. D. Gaffey, op. cit., p. 44.
One of the most perplexing problems of the early tire industry concerned the method of fastening the tires securely to the rims. The clincher-type tire involved high air pressures of up to eighty pounds to hold the tires on the rim. In 1896 Art Grant patented a tire look for separable flanges on the rim, which was assigned to the Rubber Tire Wheel Company of Springfield, Ohio. By 1903 this clincher-type tire and rim was standardized by an agreement among a group of manufacturers known as the G. & J. Clincher Tire Association under the control of U.S. Rubber. This group held all the basic patents and exploited their monopoly by standardizing prices and licensing the patents only to members. 72 Goodyear infringed this patent and had all its profits put in escrow until May, 1902, when the courts held the basic patent of the G. & J. Clincher Tire Association was invalid. Firestone, too, had flaunted these patent rights and produced clincher tires for Ford. 73

Who discovered what is obscured by rival claims. Both Goodyear and Firestone developed a beaded straight-side tire about 1904. 74 Goodyear developed the first airplane pneumatic

72 Ibid., p. 28.
74 Alfred Lief, op. cit., p. 8; Hugh Allen, op. cit., p. 311. These were held to the rim by inextensible wire reinforced beads. Combined with the drop center rim, this permitted greatly reduced tire pressures and practically eliminated rim cutting, once the most serious menace to tire life. This type tire and rim construction had become universal by 1927. J.D. Gaffey, op. cit., p. 42.
tire, claims to have made the first solid truck tires of rubber in 1911, and to have put pneumatics on trucks first in 1916.\textsuperscript{75} Goodyear claims the first cord tire although credit generally seems to go to the Diamond Rubber Company of B.F. Goodrich.\textsuperscript{76} Firestone developed the non-skid tread in 1908 (simply by cutting the words "Firestone non-skid" in the tread mold. All previous tires were smooth tread.\textsuperscript{77}

These developments made possible the introduction of the balloon tire in 1924. Tire pressures fell from seventy to ninety pounds per square inch to thirty pounds. This has, with improvements, subsequently been reduced to twenty-four pounds in "air-cushion" tires. Width was increased from three and one-half to six inches. Rims were decreased from twenty-three to sixteen inches. Rims were decreased from twenty-three to sixteen inches.\textsuperscript{78} Recently even smaller rims of fifteen and fourteen inches have been developed.

\textsuperscript{75}Hugh Allen, \textit{op. cit.}, p. 311.
\textsuperscript{76}Loc. \textit{cit.} Cord tires had become standardized by 1920 - but Goodyear had realized that elasticity made for longer wear than did strength alone so in 1922, patented their super-twist cord which permits stretch and recovery to absorb shock. (Cord tires tended to "grow" in use as the cord lost recovery ability. Goodyear stretched the cord prior to weaving into tire fabric.) Goodyear also developed the principle of varying the number of threads per inch in the tire plies. The least number of cords are in the outer layer and increase to the inner ply, thus grading resiliency from road surface to inner tube. Schidrowitz and Dawson, \textit{op. cit.}, p. 115, 114.
\textsuperscript{77}Firestone, \textit{Pioneer and Pacemaker}, p. 10.
\textsuperscript{78}Ibid., p. 219 (i.e. greater comfort, speed, lead and wear.) Most recent developments include even lower pressures, blow-out proof tubes, and the major innovation of tubeless tires now standard equipment.
inches have become popular. This story of development lends credence to the statement that the pneumatic tire was not evolved to meet a demand but that its own characteristics created a demand. 79

Goodyear brought long-staple cotton to the U.S.A. on its Arizona plantation in 1916. The rubber industry uses enormous amounts of high grade "cord" fabrics. Home growth saves transportation costs for Egyptian cotton. Now most tire fabrics are made from domestic fibres and in textile-mills in the East and South, for the most part owned by the rubber companies. 80

In 1928 rayon cord was developed by Goodyear and put on the market for truck tires in 1937. Rayon has much higher heat resistance than cotton cord, so today has about replaced cotton in truck, aircraft, and large off-the-road tires. This shift has now included passenger tires since synthetic rubber generates greater heat.

The demand of aircraft for great strength combined with light weight resulted in substituting nylon for rayon. Nylon has twice the strength of rayon so that today all aircraft and

79 C.W. Ufford, op. cit., p. 10.
80 Schiedrowitz and Dawson, op. cit., p. 116.
and expensive passenger tires employ nylon cord fabric. Goodyear
now claims that it's nylon "Double Eagle" will give 100,000
miles.81

Goodyear led the competition in the development of the safe-
ty tube with its "lifeguard" tube in 1935. This is a tube with
a two-ply tire inside of it. Both inflate simultaneously and
when the outer tube blows out the inner air chamber permits the
car to be brought to a stop without veering even at high speeds.
In 1952 the self-sealing puncture-proof tube was developed still
using two air chambers. These are nearly universal now on fire
trucks, police cars, ambulances, funeral cars, and on some taxi-
cabs.82

Goodyear has been a leader in developing aircraft tires
since 1910. It developed the "Airwheel", a tire with a large
cross-section on a wheel no bigger than a hub. Consequently,
Goodyear also had to develop its own wheels and then disc
brakes.83

The cord truck tire is in many ways responsible for the
truck ing industries' fleet of over 9,300,000 trucks today.

81The Story of The Tire, op. cit., p. 22.
82Ibid., p. 31.
83Ibid., p. 50.
Farmers own twenty-six and three-tenths of all trucks - sufficient evidence of the importance to agriculture. Putting tractors on water-filled tires has an increased traction that farm fuel costs have decreased twenty-five per cent. Today eight per cent of total tire sales are for farm equipment.

The most recent innovation in the tire field is, of course, the tubeless tire. The B. F. Goodrich Company introduced the tubeless tire in 1948. The tubeless tire offers blowout protection from a special butyl liner and a sealant. There is no tube to chafe. It runs much cooler, and has a longer life. Although costlier to produce (greater care being required in manufacturing and additional time for cooling and curing) they cost the same for the traditional casing-plus-tube alternative - and the tubeless tire will give up to twelve per cent more mileage.

Goodrich sued U.S. Rubber for infringement of its tubeless tire patents in 1954 asking for an injunction on use and reasonable royalties on tires U.S. had already sold. A similar suit was filed against Firestone. Goodrich got a patent on Frank Herzegh's invention of a rubber inner liner sealant in 1946. Although others had patents, no tubeless tire was produced in

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84Ibid., pp. 43-45.
85E.L. Allen, op. cit., p. 209.
86Stanley Vance, op. cit., p. 309.
volume prior to Goodrich's. U.S.Rubber claimed Goodrich stole their diffusion sealant idea and that their tire was based on a 1930 British patent.

The court failed to find any infringement of Goodrich patents even though the company spent fifty million dollars on research and development. B.F.Goodrich did not appeal. The suit against Firestone was dropped August 14, 1957, after Goodrich patents were held invalid.

There were, however, compensatory aspects for Goodrich of this patent infringement. During the first five years after the introduction of the tubeless tire, the practice of automobile manufacturers, of adopting optional equipment only when it is available from more than one producer, limited Goodrich's market to replacements. After other companies infringed the patents, the auto manufacturers, led by Packard in 1954, offered tubeless tires as optional new equipment. They are now standard equipment on all new cars.

D. Labor and productivity in the rubber industry

The productivity of labor is merely a technical measure relating the quantity of goods produced to the amount of labor

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time employed. The factors responsible for a productivity increase are complex and cannot be segregated to determine the exact influence of each. When related to labor employed, the tires per man-hour have increased significantly. Much of this may be attributed to the rapid technological changes, the large inflow of capital in the industry, and the increase in scale as numbers were reduced.

However, the actual productivity of the industry cannot be fully appreciated without at the same time considering the fundamental changes in quality and design of the tire itself. If productivity is measured in tire-miles produced, it increased over two-hundred per cent during the period 1910 to 1937.91 The industry productivity index (1935=100) had risen by 1953 to 275.92

Improved design stopped rim-cutting, creeping, and heat blow-outs contributing to earlier tire failures. Improved raw materials contributed to tire quality. Chemical innovations and cord and bead changes have previously been indicated. Tire repair and retreading has substantially increased tire-life and reduced the cost to the consumer.93

91Ibid., p. 41.
92Economic Almanac, op. cit., p. 371.
93J.D. Gaffey, op. cit., pp. 49-51.
Developments in industrial management, too, have contributed to the increased productivity of labor. More precise materials specifications, the careful regulation of inventories of raw materials, goods in process, and finished goods, studies of layout and engineering economies, provision for regular systematic equipment inspection lowering breakdown costs, production control, improved coordination of departments and systematic routing of goods have all increased productivity. Goodyear employs a "flying squadron" of versatile trained men to assist in any department which is behind schedule and provide for alternate routings and emergency crews. Task standardization and incentive wage systems have played an important part since the twenties and are now practically universal in the tire industry.94

Shortening of the work-day and work-week has increased productivity. Average hours per week dropped from forty-nine in 1914 to presently forty hours. In 1914 continuous production on a twenty-four hour basis was adopted with three eight-hour shifts. Workers labored seven days a week until 1923 when a six and one-half day week became general. By 1929 the forty-four hour week became standard. In 1930 Goodyear instituted four

shifts of six hours each. More workers working shorter hours increased both the speed and the quality of work - and absences declined significantly. Most plants outside of Akron, Los Angeles, and Detroit are still on eight-hour shifts and forty to forty-four hour weeks.95

Some changes in the morale, skill and efficiency of the workers themselves have, of course, contributed to increased productivity. Recruiting, training, high wages, and welfare activities96 have attracted superior workers to Akron although skill requirements have declined. Average efficiency can be reached on most jobs in six weeks. The workers have "speeded up" as mechanization, the application of time and motion study, and the incentive wage systems have required it.

The effect of labor relations on productivity is an imponderable. The Akron companies successfully resisted unionization of any considerable number of employees until 1933. Company unions, welfare capitalism, ethnic heterogeneity, civic anti-unionism, and a lack of union organization drive were all reasons for this. The period of remarkably expanding demand for

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the industry from 1913 to 1933 made for satisfactory relations on the whole for both management and labor - contributing to the tremendous increase in productivity during the period. 97

The depression drop in 1929 magnified all problems. Unrest increased as job security waned. In February 1936, the C.I.O. assisted in a Goodyear strike. The United Rubber Workers were one of the ten pioneer unions of the C.I.O. expelled from the A.F. of L. There were ten strikes in rubber in 1936 and 1937, resulting in complete organization and the union shop. The union has grown from 3,000 in 1935 to a present membership of 250,000 URCLFW. About half of these are in the tire industry and half of the tire membership is in Akron. Indications are that the growth of unionism has strengthened the tendency toward decentralization of the industry. 98

The seasonal peak in tires is in May and June and the low in November and December. Production varies between these

98 J.D. Gaffey, op. cit., pp. 109-115. However, the rubber companies tried industry-wide bargaining in 1946 which was abandoned after it resulted in an across-the-board raise of eighteen and one-half cents per hour. Since then, bargains are company-wide with a master contract for all key provisions and supplemental contracts for separate plants to meet local conditions. This has done much to correct inter-plant and geographic inequities and halt the trend toward decentralization. Hugh Allen, op. cit., p. 380.
points by as much as forty per cent.\textsuperscript{99}

Many of the operations involved in tire manufacture require considerable skill as well as unusual physical strength and ability to endure discomfort.\textsuperscript{100} During the period of rapid expansion the industry trained its own workers. Akron plants concentrated on tires and the resultant supply of trained workers has been a factor in the concentration of the tire industry in that city thereafter. Akron's labor supply has been the major part of that of the tire industry. Native labor has predominated and although the proportion of foreign born was once as high as twenty per cent it has since declined to a small figure.\textsuperscript{101}

The earliest workers in the Akron plants were native Americans, some from New England, but mostly from nearby small towns and farms in Ohio. In the expanding years of World War One the industry had to recruit immigrants (mostly of Slavic origins) and large numbers from the deep South, including a sprinkling of Negroes, were brought into the industry.\textsuperscript{102} Child-labor has always been practically non-existent. Today one employee in

\textsuperscript{99}J.D.Gaffey, \textit{op. cit.}, pp. 118-121. This is one reason the URCLPW pushed the Guaranteed Annual Wage. "Car owners buy two-thirds of tires during the five summer months", Hugh Allen, \textit{op. cit.}, p. 368. "Twenty Per Cent of the Annual Output is in the Two Spring Months." L.Reynolds, \textit{op. cit.}, p. 465.

\textsuperscript{100}Mary J. Drucker, \textit{The Rubber Industry in Ohio}, Occupational Study No. 1, \textit{op. cit.}, passim.

\textsuperscript{101}J.D.Gaffey, \textit{op. cit.}, p. 64.

\textsuperscript{102}Wolf bros., \textit{op. cit.}, p. 430 ff.
every three has over twenty years service in a typical big four company.103

A considerable number of women have been employed in tire factories almost since the beginning. The scarcity of labor in WWI led to a large expansion in their number - with another great increase in the second World War. Most female labor is in non-tire products but women work on inner tubes, motorcycle and bicycle tires and the lighter occupations in tire-casing production. They constitute about twenty-five per cent of the wage earners in rubber.104

Large differentials in wages exist, the wages being considerably higher in Ohio and Michigan than in other plants scattered throughout the country. This is probably more closely related to size of establishment than to geographical location. But everywhere tire factories are usually among the highest paying manufacturing industries in communities in which they operate.

Rubber worker earnings are among the best in the world, both in wages and employee benefits. Rubber workers rank seventh in earnings among the twenty industry classifications of the BLS, and well above the average for all manufacturing production workers. Tire and Tube workers would rank second.

104Economic Almanac, op. cit., p. 277.
Average weekly earnings of the rubber industry have increased sixty-five per cent in the past ten years - or three times as much as the cost of living, which has gone up twenty-one per cent. Hourly earnings now average $2.29 an hour with $2.64 an hour for tire and tube workers. Average annual earnings are about $5,000 plus some $1,300 in fringe benefits.  

E. General costs

There have been wide swings in relative costs over time as the industry has matured. For instance, in 1925 labor costs were about thirteen per cent of total costs. By 1935 they were eighteen per cent - although during this time (1914-1935) labor costs per tire were reduced thirty per cent and per tire-mile nearly eighty-eight per cent. By 1939 wages had increased to fifteen per cent of total costs. In 1947 they were about twenty per cent. By 1954 wage bargaining had increased this element to about twenty-five per cent. However, this only represents a wide distribution of the gains.

106 J. D. Gaffey, op. cit., p. 129.
107 L. Reynolds, op. cit., p. 41.
from increased productivity. The great mass of tire consumers have received the greatest gains in lowered prices, and wage earners have gained through higher wages and lowered hours.

Raw materials costs were forty-five per cent of total cost in 1939. By 1947 they were nearly fifty per cent. The 1954 balance sheet continues this proportion. Only twenty-five per cent of total costs then are left for all other operating costs, freight, rent, advertising, insurance, interest on borrowed funds, taxes, depreciation, and dividends seemingly a very favorable proportion for judgments of the industry's performance. In 1954 dividends were one and five-tenths per cent of total earnings and two and nine-tenths per cent were retained for expansion, three and one-tenth per cent for depreciation, and five and two-tenths per cent went for taxes — leaving ten and one-tenth per cent for operating expenses after materials and wages.

The share of fixed costs has been relatively high but is decreasing. In 1935 fixed costs at capacity were twenty-five
per cent. Much of this was from expensive vulcanizing equipment which is the chief limit on capacity.

Dynamic technology has required new machines. Size changes necessitated new molds and equipment had to be discarded because it was depreciated, and new equipment bought even when profits were low. Because of the high materials cost, Goodyear set aside $400,000,000 for working capital in 1954.

Size seems to affect these relative cost shares significantly. The big four have cheaper materials costs from integration than the smaller companies but the higher costs of large distributor organization seems to offset this advantage. Similarly, the large four to six months inventories that the large companies have carried in the past have given the small hand-to-mouth buying companies a cost advantage by lowering working capital requirements. As a consequence the smaller have lower total average costs.

113 L. Reynolds, op. cit., p. 41.
114 In 1954 Goodyear borrowed $50,000,000 from the insurance companies, of which $33,000,000 was spent on conversion to the tubeless tire. J.E. Kuebler, "Goodyear has Second Highest Profit Year," Akron Beacon Journal, April 16, 1955. Of industry total assets in 1952 of $3,140,000,000 - $1,600,000 were in inventories (p. 344). Total capital invested (total assets less investment in governments and securities of other corporations) in 1949 was $1,583,000. (p. 315) This amounted to $9,196 per worker. (p. 316) The Economic Almanac, op. cit.
115 Loc. cit.
116 L. Reynolds, op. cit., p. 459. The large companies higher selling expenditures raise both costs and demand so that big companies get about a ten per cent price differential - but about the same profit margin (as Andrews suggests).
F. Price behavior

Prices have always been highly volatile in the rubber industry in spite of the big four - or because of them. That the price structure has been a competitive one is beyond question. 117

From 1910 to 1920 was a period of boom and room for all in the wild profits of the rubber industry. The big companies invested heavily in capacity to meet the expected ever-growing demand. Prices swung primarily on natural rubber prices. Then came the 1921 depression. Heavy investment in inventories forced large price cuts in order to remain in production. Firestone cut non-skid prices twenty-five per cent at one clip! Within one month all had followed his lead - but not before he had moved eighteen million dollars worth of tires. This enabled him to get into a sufficiently good cash position that he had paid off his forty-three million dollar debt by 1924 while other companies were undergoing financial reorganization. 118 This experience was probably the background for his subsequent price cutting as an adjustment to difficulties. Although severe, the

117 Alderfer and Michl, op. cit., p. 208.
depression was short-lived — but the industry was left with large excess capacity while the life of a tire had been remarkably increased.

To gain sales volume that would utilize this capacity a new price war developed in 1926 precipitated by a series of contracts (between 1926 and 1936) between Goodyear and Sears Roebuck. Under these contracts, Sears received Goodyear tires under private brand names at exceedingly favorable prices. Sears immediately built up a large tire business by underselling both tire dealers of the major companies and its mail order and chain store competitors. Other mail order houses, chain stores and later oil companies, secured similar contracts from tire producers. Firestone assumed the lead of manufacturers whose ire was aroused by their independent dealers being undersold and attempted to meet the new competition by drastic price cuts. The price wars of the decade 1926-1936 forced a large number of both manufacturers and dealers out of business.

Firestone also initiated company-owned stores to defeat the private brand competition. The other large tire companies followed by establishing stores of their own. Nevertheless, Sears' volume of tire sales increased more rapidly than any other distributors' and by 1933 Sears was the largest retailer
of tires in the United States.\textsuperscript{119}

The Sears contract expired in 1928. The pressure for volume production has always given the oligopsonists the advantage. To keep capacity in use Litchfield signed a new ten-year non-cancellable contract. This time Goodyear was to get cost-plus only four per cent and Sears was to get 18,000 shares in Goodyear stock, plus $800,000 to pick up 32,000 more shares in the open market. In addition, Sears forced the building of a new plant at Gadsden, Alabama, to save freight costs for the southern market. From 1926 to 1932 Sears got back rebates of eight million dollars. Independent dealers paid anywhere from thirty-two to fifty-three per cent more for their tires than did Sears. The Sears catalogue became the price leader's list. All others had to follow or cut back.\textsuperscript{120}

\textsuperscript{119}J.D. Gaffey, op. cit., pp. 56-57. Goodyear's Sears contract in 1926 only hastened mass distribution competition in the rubber industry. It is probable that over-capacity, shrinking demand, and the '29 crash would have produced price cutting with or without Harvey Firestone.

\textsuperscript{120}Wolf Bros., op. cit., pp. 471-474. In February 1933 the BFA called a meeting in Cleveland to discuss a price rise. Firestone sat in as a non-member. When his turn came to speak F.A. Seiberling quoted him as saying, "Well, I think I ought to tell you that we just put a ten per cent price cut in the mail...I'm going to hit Sears Roebuck right on the nose!" Next morning Sears cut ten per cent below him. \textit{Ibid.}, p. 475.
Although from 1926-1936 announced cuts averaged two a year, discounts and trade-in allowance increases made price cuts continuous. Dealers were giving thirty-five per cent allowances on old casings, free tubes, and fantastic guarantees (which actually gave two tires for the price of one.) In nine years Goodyear lost ten million dollars on its store operations and Firestone seven million dollars. They took bus, truck and taxi fleet business, supplying tires on a mileage basis, at a loss. Though DuPont controlled both General Motors and U.S. Rubber they let Akron concerns supply part of their needs at a subsidy. When other manufacturers joined a “rubber institute, Inc.” (formed to “correct uneconomic merchandising methods”) Harvey Firestone announced another price cut. The Institute did achieve standardization of the warranty on tires and in 1932 free tube competition was ended. 121

Some stabilization was achieved under NIRA. Hugh Johnson established a mandatory minimum price and ninety-day guarantee but gave the mail order houses a price fifteen per cent below the manufacturers. After the NIRA was found unconstitutional, Firestone engaged in a super price cutting war until prices had

121 Ibid., pp. 476-482.
been reduced forty per cent. It was stopped only when the banks directed a truce—or threatened financial ruin.122

The FTC issued a cease and desist order against the Goodyear-Sears contract in 1933, charging violation of the Clayton Act. Goodyear, following the passage of the Robinson-Patman Act abrogated the contract rather than risk a violation of the new law. The Circuit Court of Appeals held that the cancellation of the contract had rendered the previous case moot.123

The average twelve and five-tenths per cent profits of the 1912-1920 period fell to two and eighty-three hundredths per cent for the twenties and even less during the thirties.124 From 1914 to 1932 the price of the same sized tire went from forty-five dollars to ten dollars.125 By January, 1934, tires were retailing below the manufacturer's cost.126 Firestone's challenge to Sears with his own chain of retail outlets caused him to lose eight million dollars before they started breaking even. Only U.S. Rubber failed to develop dealer stores. 60,000 independent dealers were eliminated.127

During this period the mass distributors firmly established

122Ibid., pp. 482-484.
123J.D. Gaffey, op. cit., p. 56.
124Wolf Bros., op. cit., p. 458.
125Ibid., p. 466.
a position in tire retailing. Independent dealers' share of sales fell from ninety-eight per cent in 1922 to fifty-eight per cent by 1934.

The extension to retail outlets by manufacturers has probably helped stabilize tire prices. The independents were still price warring in the boom postwar period.

In earlier days prices mirrored raw materials prices of natural rubber but with synthetics should stabilize over the long run. However, even in 1950 prices were increased twenty-five to fifty per cent; to some extent from the high level postwar demand, but also from the skyrocketing price of natural rubber. Still tire prices had the lowest increase of any commonly used manufactured product. In 1947 the volume of tire sales was up eighty per cent over 1939. Rubber costs were up twenty-eight per cent, wages one hundred per cent, plant expenditures two hundred and fifty per cent - yet tire prices were increased only sixty per cent. Prices were not increased again - this time five per cent - until 1953.

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128J.D.Gaffey, op. cit., p. 57.

129Alderfer and Michl, op. cit., p. 209.

130Ibid., p. 209.
G. Profits

Profits in the early days were, to say the least, good. Goodyear paid stock dividends of one hundred per cent in 1909, 1910, 1912, and 1916 and one hundred and fifty per cent in 1920. Its earnings on common stocks had averaged fifty per cent from 1908 to 1920. In the decade following 1921 earnings were less than two per cent for Goodyear. For the six largest companies profits on tangible assets had averaged two and eighty-three-hundredths per cent throughout the twenties.

The 1910's constitute the decade of wild boom and huge profits for promoters. The 1920's comprise the era of reorganization and banker control. The 1930's collapsing demand caused many vanishing companies as cut-throat price wars readjusted the industry to half-size.

From '35 to '46 was a generally profitable period, profits running three and eight-tenths per cent of gross income with the big four doing better than four per cent. Since 1946 profits have averaged six per cent of gross income. This may be because of

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132 Wolf Bros., op. cit., p. 458.
133 Ibid., p. 460.
the greater diversification of the industry now in more profitable lines - and the stabilization of raw materials prices.

Goodyear has averaged four per cent profits over its entire history. Contrary to popular belief, during the war years its profits were only two and one-half per cent. One-half of all of its earnings have been plowed back and the firm must keep on hand a $250,000,000 working capital to process the one-sixth of the world's rubber it uses.135

The price wars, inventory troubles, and keen competition in the rubber industry have been reflected in rather low earnings. Throughout the twenty-year period prior to 1940, average earnings were only two per cent on net worth. This in contrast to eight per cent earned during the same period by 200 large corporations in other industries and trade.136

A rubber oligopoly, on theoretical grounds, should favor suppression of ruinous competition. Why have profits then been below average? Primary factors have been the competition in mass distribution and erratic raw materials prices. Raw

135Hugh Allen, op. cit., p. 687.

materials are sixty-five per cent of the value of product. It required five to eight months to bring them to this side of the world. With huge sums tied up in inventory afloat, in warehouses, in goods-in-process and finished goods, the manufacturers were particularly vulnerable to erratic price fluctuations from the inelasticity of supply of crude rubber and price valorization schemes. 137

To recover working capital tied up in necessarily large inventories, the industry was kept in an uproar by price wars from 1926 to 1936. Price competition was so vigorous that financial journals labelled it "chaotic, murderous, and insane." 138

This history of "Boom and Bust" and vigorous competition has led inevitably to concentration as only the best managed or most financially secure firms could survive the grueling contest. 139 Strength, too, was needed to combat the automobile industry's monopsony in original equipment sales.

War time profits depended too much on renegotiation of government contracts to have much significance. New products, defense demand, and easy post-war reconversion have contributed to new peak earnings. New lines have absorbed war time over-capacity, synthetics have relieved the industry of dependence on

137 Ibid., pp. 319-321.
natural rubber and excessive four months inventories of crude and established a ceiling on prices. New products may have a less cyclical demand than tires have had. As a consequence investment analysts foresee better and more stable earnings for rubber for the long-run future.140

Recently the profits picture in rubber has considerably improved. The ratio of profit to invested capital is about nine per cent and the ratio of profit to sales about five per cent. However, this ranks rubber only fifteenth among the twenty-three major industrial groups. Although rubber income has been stable for the last five years, it is still below the average for manufacturing.141

In this Chapter the economics of the raw materials: agricultural rubber, compounds, synthetic rubber, and scrap and reclaim, has been described as well as the manufacturing processes, product and process developments, productivity, and the behavior of costs, prices and profits. In Chapter VII the development of numbers, geographical location, and mechanization and scale, integration, organization and ownership, trade associations, research, advertising, export - import relationships, taxes, market structure and other characteristics of the industry and products necessary for the analysis of Chapter VIII will be outlined.


141 From a five-year study by the Economics Committee of the RMA based on reports to the SEC and the FTC, Dec. 10, 1957.
CHAPTER VII

THE MARKET STRUCTURE OF THE RUBBER INDUSTRY

"Dynamic theories, especially in the field of macroeconomics, have been characterized by a great deal of formal mathematics and relatively little economics."


A. Numerical development in the rubber industry

The first United States factory was established in 1825 by S. G. Smith in Providence, Rhode Island to relast shoes. The Roxbury India Rubber Company was established in Boston in 1833 to manufacture shoes, life preservers, waterproof clothing, wagon covers, hose and mailbags. This company was subsequently re-incorporated as the Goodyear Manufacturing Company (no connection with the present Goodyear) and then the Boston Belting Company.¹ This was followed by the incorporation of a number of other firms located in Boston, Chelsea, Woburn, Framingham, New York and Troy. Except for the Roxbury Company - not one of these firms lasted for more than three years.² The real story of rubber begins after Goodyear's discovery of vulcanization. By 1851 Goodyear had licensed over twenty firms.³

¹ Wolf Bros., op. cit., pp. 295-296. This company expired in 1930. Schidrowitz and Dawson, op. cit., p. 43.
² Ibid., p. 297.
³ Ibid., pp. 401-405.
The 1849 Census of Manufactures is the first official information on the rubber industry. At that time there were thirty-six establishments, hiring 2,000 workers and producing $3,000,000 worth of goods. By 1871 the value of products had increased to $8,000,000.

It was at about this time that the tire industry had its beginnings with solid tires, Dr. B.F. Goodrich having founded the original Akron factory in 1870. After Barlett's invention of the clincher-type detachable tire in 1899 and Palmer's cord-type invention in 1892, the tire industry became significant. It had been heralded in after Dunlop's reinvention of the pneumatic tire when a horse, Nancy Hanks, drew a pneumatic-tired buggy in a record trot. 4 Buggy and bicycle tires became important products although boots and shoes dominated into the twentieth century.

The coming of the automobile caused rubber to experience a great boom. The entire industry in 1895 employed 150,000 workers and produced goods worth $75,000,000. 5 Charles Ranlett Flint had put together nine firms to form U.S. Rubber in 1892 to dominate

4 Wolf Bros., op. cit., p. 408.
5 Ibid., p. 411.
mechanical goods. In 1899 Flint fostered another combine, The Rubber Goods Manufacturing Company. U.S.Rubber took this over in 1905 at which time the trust controlled eighty to eighty-five per cent of the output of all boots and shoes and mechanical goods. Although U.S.Rubber still controls fifty per cent of this business, it never got a majority share of the tire business.6

At this time U.S.Rubber was known as the "rubber trust."

Nevertheless, even though U.S.Rubber set prices, profits were low because they had to set competitive prices. It required no fortune to start a modest shoe plant and there was no control over crude prices. The product was not suited to the needs of would be monopolists.7

But U.S. seemed to overlook developments in Akron. Jacob Pfeiffer had founded the Miller Rubber Company in Akron in 1892. In 1894 O. C. Barber established the Sherbondy Rubber Company - which in 1896 was renamed the Diamond Rubber Company. (This company was absorbed by Goodrich in 1912.)8 The Seiberling

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6Ibid., p. 416.

7Ibid., pp. 409-412.

8C. Jung, op. cit., p. 122.
brothers had launched the India Rubber Company in Akron in 1896 - which Flint's Rubber Goods Manufacturing Company took over in 1898. In the same year the Seiberling brothers founded the present Goodyear Rubber Company. It proceeded to make tires infringing the Tillinghast patent pool of U.S.Rubber's Rubber Goods Manufacturing Company. All Goodyear's profits were placed in escrow until 1902 when the courts found the patent invalid.

Firestone had been founded in 1900 and had also infringed the patents. Tire manufacturers now leaped into open market competition, twenty-five being in the field, led by Goodyear, in 1907. Kelly-Springfield took over Buckeye Rubber (founded in 1900 in Akron.) Swinehart Rubber was formed by a former Firestone vice-president in 1903. (This company failed in 1929.)

By 1912 Akron's companies had about one-third of the tire business, U.S.Rubber another third, and some 250 companies the remainder.

Mohawk Rubber was founded in 1913. It was not until 1916 that the present fifth largest company - General - was founded.

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9Wolf Bros., op. cit., p. 419. This plant was U.S.Rubber's only holding in Akron, then or since. After the plant burned down it was never replaced.

10Ibid., pp. 419-425.
by W.F. O'Neil - who had been a Firestone distributor.\textsuperscript{11}

Goodyear became the largest tire company in 1916 and has never since relinquished the lead. After financial reorganization, F.A. Seiberling founded his own company in 1921 and within five years had driven it past others to tenth place in the industry.\textsuperscript{12}

Goodrich absorbed Hood and Miller in 1929 and 1930. Goodyear took over Kelly-Springfield in 1935. Fisk went bankrupt in 1931, reorganized in 1933 and then was absorbed by U.S. Rubber - which had also bought the first rubber company on the West Coast (Samson) and the Gillette Company in 1920.\textsuperscript{13}

The concentration in the rubber industry over time has been, to some extent, the result of the instability of raw material prices. Periodic huge inventory losses have made large financial resources a condition of survival. Hedging on the New York Rubber Exchange (not founded until 1926) could not be effective without grading uniformity or predictable relationships between future and spot prices.\textsuperscript{14} Although large companies have dominated the industry, competition has never thereby been vitiated. Price

\textsuperscript{12}\textit{Ibid.}, p. 451.
\textsuperscript{13}\textit{Ibid.}, pp. 422-430. In 1935 Fisk was the fifth largest tire producer and the only remaining tire manufacturer of any significance in New England (Chicopee Falls, Mass.) the former center of the industry. Fallen upon evil days, Fisk sold out to U.S. Rubber in Dec. 1939. J.D. Gaffey, \textit{op. cit.}, p. 168.
\textsuperscript{14}\textit{C. Jung, op. cit.}, pp. 112-115.
wars, advertising costs, inventory losses, and depression failures, caused the demise of one in every five companies operating prior to WWI by 1924. The great depression reduced the number of companies from 516 in 1927 to 351 by 1933. As the depression progressed the largest 109 manufacturers became twenty-eight (those producing over 200 tires a day) and 120,000 dealers were reduced to 60,000.

In 1921 employment averaged 400 per plant. In 1947 this had increased to an average of 2,000 per plant, indicating the shift to large scale during this period.

The Census of Manufactures (1947) lists twenty synthetic rubber firms with 7,663 employees and a product value of $235,200,000. There are fifteen reclaim firms with 2,070 employees and a product value of $17,300,000. Fifty-seven tire and tube firms employed 115,657 workers and made a product valued at $1,547,000,000. Twenty-six footwear firms hired 28,125 workers and made $198,700,000 worth of products. The totals were 860 establishments, 257,022 employees, and a value product of $2,699,200,000, including products not elsewhere classified.

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15Rubber Age, Oct. 1924.
16Wolf Bros., op. cit., p. 460.
17Alderfer and Michl, op. cit., p. 314.
The above picture is too neat a classification, however, since now all of these are integrated among the largest firms which produce some 50,000 products and own both synthetic and reclaim plants.

The significant economic fact regarding numbers is that a "big four" dominates the industry. The tire and tube division is the largest segment of the industry and accounts for sixty per cent of the entire value of output. If tires and tubes are regarded as a separate industry there are fifty-seven firms but the "big four" account for seventy-five per cent of the output. The next four largest firms produce fifteen per cent of tires and tubes - or the eight largest firms produce ninety per cent of the output. 18

Thus the organization of the rubber fabrication industry is highly concentrated. The big four own about two-thirds of the total domestic assets of the rubber industry. Domination by the big four was established by the early thirties after a period of cut-throat competition and a high mortality rate among small producers. A key factor in the price wars of the 1930's was excess capacity and it has been estimated that the big four themselves owned enough capacity to meet the entire market demand. 19

19Ibid., p. 191.
The largest rubber company in the world, The Goodyear Tire and Rubber Company, derives seventy per cent of its sales revenue from tires and tubes. The remaining sales are highly diversified among mechanical rubber goods, footwear, aviation equipment, plastics, textiles, military equipment, housing, and chemicals. It has tire plants at Akron, Los Angeles, Gadsden, Cumberland, Jackson, Michigan and Topeka, Kansas as well as in Canada, Australia, England, Argentina, Java, Brazil, Sweden, Mexico, Peru, Colombia, Cuba, and South Africa. It owns cotton plantations, textile mills, rubber plantations, coal mines, aircraft, chemical and synthetic rubber plants and non-tire plants scattered all over the world. It has a chain of over 400 retail stores. It's 1958 sales were $1,367,575,535. This company still concentrates its production in relatively few lines to realize the maximum economies from mass production. It is a large supplier of Chrysler.

The Firestone Tire & Rubber Company is the second largest rubber fabricator and receives over sixty-five per cent of its revenue from tires and tubes. Half of its tire sales are original

\[20^{\text{Cf. Hugh Allen, House of Goodyear, passim.}}\]
\[21^{\text{Ibid., pp. 696-697.}}\]
\[22^{\text{Alderfer and Michl, op. cit., p. 314 and Standard and Poor's Industrial Surveys.}}\]
equipment, Firestone supplying about half of Ford's requirements and some of General Motors. Firestone's Liberian plantations are among the most efficient rubber estates in the world. Firestone has tire plants in Akron (thirty-seven per cent of its capacity) and in Des Moines, Los Angeles, Memphis, Pottstown, Pennsylvania and in Spain, India, England, Argentina, New Zealand, Canada, South Africa, Switzerland, Brazil, and Sweden. Its sales are diversified among non-tire rubber products, batteries, rims, wheels, automotive equipment, military equipment, textiles, plastics, and aircraft. It operates over 700 retail outlets and receives about ten per cent of its revenue from non-rubber items. Firestone's 1958 sales were $1,061,590,801. Firestone is the only one of the big four never to produce private brand tires for the chains.

United States Rubber Company is the third largest rubber fabricator. Less than fifty per cent of its sales are from tires and tubes. Through its affiliation with DuPont, U.S. Rubber enjoys a large share of General Motors original equipment business.


25 Standard and Poor's Industrial Surveys.
particularly Chevrolet's. However, a larger proportion of its tires are sold in the replacement market than either Goodyear's or Firestone's. This in spite of the fact that it has no manufacturer-owned outlets. It is a main supplier of Standard Oil and Montgomery Ward. This company has the largest plantation acreage in Sumatra and Malaya. Its tire plants are located in Michigan, Louisiana, California, and Indiana with its greatest capacity in Detroit. U.S.Rubber's 1958 sales were $870,615,700.

The B.F.Goodrich is the fourth largest rubber company and the most diversified, marketing over 30,000 products. It has over 490 retail stores and has just purchased its first rubber plantation - in Liberia. It depends largely on replacement tire business. Its sales for 1958 were $697,296,556. Its highly diversified line makes this the most profitable company of the big four. Only fifty per cent of its business is in tires.

All of the other companies are much smaller. The fifth is General Tire and Rubber Company of Akron and Waco, Texas which has three plants - two for tires and one for mechanical


goods. Its dollar value of sales and assets are only about twenty-five per cent of those of Goodrich, smallest of the big four. General is highly diversified, manufacturing, in addition to rubber products, plastics, chemicals, metal parts, marine engines, jet propellants, and automotive parts.

General is also in the radio and television business. General's sales for 1958 were $469,782,099. 28

The Gates Rubber Company of Denver and Nashville is now the sixth largest rubber firm. Now in its forty-eighth year the firm is still owned and directed by the same man who founded it. Not being a publicly owned corporation, its sales or profits are not disclosed. However, the Denver Post estimated 1956 sales in excess of $100 million. Gates employs 5,500 with an annual payroll of over $25 million. The company has doubled in size every decade since 1911. Over ninety per cent of its profits have annually been "plowed-back". (This compares in 1956 with sixty-five per cent for Firestone, sixty-two per cent for General, sixty-one per cent for Goodyear, and fifty-five per cent for Goodrich.

Gates started out as a leather company producing a steel studded band of leather which could be fastened over the short-lived auto tires of the day to get extra mileage. This evolved

28Standard and Poor's Industrial Surveys.
into a rubber "half-sole" which could be cemented to the tire
carcass. Now it has a full line of tires and tubes. Its major
products, however, are V-belts and mechanical goods. In
addition to distributing tires through independent dealers,
Gates manufactures casings for Montgomery Ward and Western Auto
Stores.

Dayton Rubber Company was number seven in industry sales
in 1958 and one of the most diversified of the smaller concerns.
Its '58 sales were $85,609,634. Its three major divisions are
tires, mechanical goods, and foam rubber. Dayton Rubber owns
the American Latex Products Corporation at Los Angeles - the
largest foam rubber plant on the West Coast.

Armstrong Rubber was number eight in 1958 with sales of
$81,317,403. Its tire business is mostly replacement. It is
a large supplier of Sears Roebuck and Company.

Number nine is Lee Rubber and Tire Corporation of Conshoh-
ocksken, Pennsylvania. Lee's '58 sales were $46,558,852. It
operates a foreign factory and forty-two retail stores and
emphasizes quality line replacement tires.

Tenth place goes to Seiberling Rubber Company. '58 sales
were $45,134,084. Ninety per cent of Seiberling's business is

29 "Business Today", Akron Beacon Journal, April 21, 1957,
April 3, 1959.
30 Standard and Poor's Industrial Surveys.
in tires. It employs 1,700 workers in Barberton and Gary, Ohio plants. Seiberling recently entered a contract to supply Standard Oil with Atlas tires - the company's first private label contract.

These firms rank in the same order in total assets from Goodyear's $666,300,000 down to Seiberling's $21,800,000. Most brand names represent firms owned by the big four. For example, Goodyear owns Kelly-Springfield; Goodrich owns Miller, Diamond, and Hood; U.S.Rubber owns Fisk, Gillette, and Sampson.

B. Geographical location of the rubber manufacturing industry

There has been much speculative accounting for the various rubber manufacturing centers. The industry first developed in New England. This seems only natural since New England was then the manufacturing center for the United States with developed power, skilled labor, and in the center of the market area of greatest population.

The movement to the middle west originated about 1870 with Dr. B.F.Goodrich founding his rubber plant at Akron. It is a bit difficult to account for the Akron locale of the rubber industry. Akron is on no major body of water and is far from the crude supply sources. Labor originally had to be recruited from, primarily, West Virginia and Kentucky.  

\[31\text{Standard and Poor's Industrial Surveys.}\]
\[32\text{Jung, op. cit., p. 123.}\]
Historical accident played a major role. In 1860 Dr. B.F. Goodrich had abandoned his medical practice at Jamestown, New York and started a real estate business with J.P. Morris - an attorney. As a result of their real estate deals they acquired a small rubber manufacturing plant at Hastings-on-the-Hudson, New York and took over its operations. This plant soon failed but being new in the rubber business, Goodrich and Morris bought another plant at Melrose, New York. This plant, too, was about to fail when the partners happened to see an Akron Chamber of Commerce booster pamphlet offering advantages to new industries.

Handicapped by lack of capital, Goodrich became convinced that his opportunity lay across the Alleghenies in the rapidly developing midwest. Consequently, in 1870 he met with a group of civic leaders in Akron who put up $18,000 for the founding of Goodrich, Tew and Company. Aided by another $5,000 put up by Morris, Goodrich together with his brother-in-law, Harvey Tew, established the first Akron rubber company which has operated continuously since 1870, although having gone through several reorganizations. Since 1879 it has been known as The B. F. Goodrich Company. 33

Goodrich made a fortunate choice, the deciding influence probably being the proximity of the carriage making trade in Ohio to which solid tires were supplied. When these carriage manufacturers metamorphosed into automobile makers, the Akron, Ohio suppliers were already adjacently located.

Other businessmen took advantage of the supply of skill and knowledge developed there and Akron expanded industrially to become the "Rubber Capitol of the World." With the coming of the automobile, rubber experienced a great boom. Besides Akron's big three, scores of smaller companies were established in the vicinity. Workers by the thousands flocked to Akron from neighboring states and from the European Slavic countries. The influence of these groups is still strong in the Akron labor supply. Between 1910 and 1919, Akron was the fastest growing city in the world. During this period its population tripled — without annexation — from 69,067 to 208,435. This was a result of the high wages and company advertising for help all over the world. Firestone established barracks and fed its employees for $14 a month.

At the turn of the century, New England's U.S. Rubber had dominated the industry, but its concentration on footwear and

34W. Ufford, op. cit., p. 8. Goodyear was launched in 1898, Firestone in 1905, General in 1916.
36See Wolf Bros., op. cit., pp. 434-444 for interesting details on bed rentals by the shift, etc.
mechanical goods had forced the Akron companies into the tire line. This gave Akron a tremendous advantage when the automobile began its spectacular growth after 1908. By 1912 the Akron companies already accounted for more than one-third of the sales of the rubber industry. Goodrich, Goodyear and Firestone, in that order, accounted for seventy-five per cent of the Akron total. By 1929 Akron was producing sixty-five per cent of the value of tire products of the tire industry.\(^{37}\)

Akron's growth at the expense of other rubber manufacturing centers may be attributed then to several factors. The close booming automobile industry gave the Akron companies a large transportation cost advantage. The rate of expansion in the automobile industry gave Akron firms no chance to consider the economies of decentralization in this growth period.\(^{38}\)

Very important factors were the favorable city environment and attitudes of the citizenry that encouraged and promoted rubber's industrial growth and the aggressive and efficient management of the Akron firms. Their leadership in technological progress has already been indicated. Akron firms' productivity differential was so great that from 1920 to 1929 practically the entire net increase in employment in the industry occurred in Ohio.


\(^{38}\)There was a 350 per cent increase in the capitalization of existing firms with a 500 per cent increase for the six largest producers.
The number of firms dropped from 178 in 1921 to ninety-one in 1929 and, while Ohio's share increased only slightly, the thirty-two Ohio firms accounted for two-thirds of the employment and value of products by 1929.\(^{39}\)

In 1928 when DuPont purchased the controlling interest in U.S. Rubber it was decided that its decentralization in forty plants scattered about the country was an element in its high cost operations and low profitability. Accordingly, tire manufacture was concentrated in Detroit. Together with the installation of the most modern machinery, this has brought U.S. Rubber profits back to a competitive level.\(^{40}\)

The only large Akron company to relocate entirely was Kelly-Springfield Company. In 1920, attracted by tax subsidies, it moved from Akron to Cumberland, Maryland. It rapidly went from sixth place in the industry to near bankruptcy, Goodyear buying the company in 1935.\(^{41}\)

It was in the decades of the twenties that the first successful branch factories were established by Akron firms. These were in California - located nearer to the Pacific Coast market and able to get rubber more cheaply from Oriental

\(^{39}\)Ibid., pp. 153-157.

\(^{40}\)Ibid., pp. 157-158.

\(^{41}\)J. D. Gaffey, op. cit., p. 160.
supply sources. Goodyear established both a textile and a tire plant in Los Angeles in 1920. Firestone and Goodrich soon followed and U.S.Rubber bought the Samson Rubber Company of Los Angeles. The other small independent companies were driven out by the large company competition but California's share of the tire production increased from one per cent in 1919 to six per cent by 1929 and ten per cent by 1938.42

The Sears contract forced Goodyear to build a plant at Gadsden, Alabama in 1928 to save transportation costs. The plant is near southern markets, textile mills, had lower taxes and lower wages - and yet from 1929 to 1935 was unprofitable.43

During the years 1929 to 1935 the number of plants in the industry shrank from ninety-one to forty-two. Productivity increased because the least efficient firms were frozen out. Akron firms had the lowest labor costs in the industry even though they were paying the highest wages.

Decentralization of rubber began in earnest in 1935 when firms outside Ohio did not follow the wage increases of Akron's firms.44 Sears, after the abrogation of its contract with Goodyear, gave a contract to the Armstrong Rubber Company of New Haven, Connecticut which then built a new plant in Natchez,
Mississippi. Contracts with Sears have aided many other small plants outside of Akron. In 1938 Ford built a modern plant in Dearborn, Michigan with an initial capacity of 4,000 tires per day.

In 1937 Goodyear opened a new plant at Jackson, Michigan; Goodrich at Oaks, Pennsylvania; and Firestone one at Memphis, Tennessee. These had a combined capacity of 21,500 tires a day. In 1930 Goodrich took over the Hood Rubber Company of Watertown, Connecticut, shifting its footwear there and tires to Akron. Other non-tire plants built were Goodrich's at Cadillac, Michigan and Clarksville, Kentucky; Goodyear's at Windsor, Vermont; General's at Wabash, Indiana; and Firestone's at Fall River, Massachusetts and Noblesville, Indiana. In 1938 only Goodrich was producing a considerable part of its non-tire products in Akron. This decentralization has occurred because technological developments were in the direction of more individualized units of equipment and the standardization of tire sizes has permitted specialization by plants. Decentralization by market areas secures transportation savings but these are almost offset by materials transportation costs. The major reason for decentralization appears to have been labor costs and labor relations. The Akron companies were
the most vigorous opponents of unionism.\textsuperscript{45}

Only two foreign firms have attempted operations in the United States. Michelin et Cie of France operated a small plant at Milltown, New Jersey from 1907 to 1930 at which time it was abandoned. The Dunlop Tyre and Rubber Company of England established a small plant at Buffalo, New York in 1919.\textsuperscript{46}

On the other hand, American companies had established twenty plants in thirteen countries by 1937. Today the big four are world-wide organizations with both manufacturing plants and plantations scattered around the world. Tariff barriers have forced American manufacturing concerns to build factories in foreign countries to protect their export business. Without such tariff barriers it is logical to suppose there would have been further expansion in the United States.\textsuperscript{47}

C. Mechanization and scale

The Rubber industry is now a large-scale industry. A primary factor in the growth of scale has been mechanization. A rapid shift from manual to mechanical operations has involved the

\begin{footnotes}
\item[45]\textsuperscript{45} D. Gaffey, op. cit., pp. 166-171. The companies also offer Akron's water supply limits as a reason for not expanding further in Akron - and since the war, catastrophe fears account for some decentralization for military reasons. \textit{The House of Goodyear}, p. 347.
\item[46]\textsuperscript{46} Wolf Bros., op. cit., p. 496.
\item[47]\textsuperscript{47} D. Gaffey, op. cit., pp. 149-150.
\end{footnotes}
cumulative effect of a vast number of improvements all along the technological process rather than any revolutionary change in the process itself—such as occurred in glass-making and steel-milling. The installation of power-driven conveyors, automatic machine-feeding devices, and improved bias-cutting and bead-building machines has in itself increased the capital outlay necessary for building a minimum sized plant for competitive efficiency. In addition, mass production has necessitated larger and larger sized plasticizing and mixing units and calendars.48

The substitution of the drum-process for the older core-process in building a tire has been probably the most important technological innovation49—and has made possible the adoption by U.S.Rubber of a merry-go-round with nineteen tire-building machines mounted on it. As the merry-go-round revolves each

48 Today's machinery represents a huge investment. For instance, the recently installed 2 calendar at plant one of the Goodyear cost $1,000,000. It processes one hundred yards of fabric a minute, coating both sides in one operation. Wingfoot Clan, Vol. 42, June 24, 1953, p. 1.

49 The drum-process was introduced in 1919 and was in general use by 1927. J.D. Gaffey, op. cit., p. 90. Again we have an example of the rubber industry's disregard of patents. Goodyear claims to have invented the tire machinery for the drum-building process but in litigation with U.S.Rubber and Firestone the patent was held invalid in 1920. Hugh Allen, op. cit., p. 29.
of nineteen operators performs at his station only one of the nineteen operations involved in building a tire. By such specialization a man can be trained to perform his one operation in ten days—whereas to learn all of the operations in building a complete tire takes six weeks—and years to acquire the requisite skill.

Increased mechanization has contributed to increased productivity, high wages, and improved quality of the product. It has always been true of rubber machinery that it is highly specialized and seriously limits lateral transfer into or out of the industry as profits differentials occur. The new material, rubber, was so unlike any other material that little adaptation of machinery in use in other industries was possible. "In the main machinery and processes established were due to the ingenuity, skill and perseverance of the rubber workers themselves."  

50 Alderfer and Michl, op. cit., pp. 310-312.

51 Schidrowitz and Dawson, op. cit., p. 195. See this work for the story of the progress from Thomas Hancock's masticator to today's eighty-four inch two-roll calendars, Banbury mixers, and Gordon plasticators. pp. 195-212. "All over the world tire industries, regardless or not of whether they are American owned, have been developed with American technical aid, including those in Canada and England, which indicates the superiority of United States rubber fabricating technology." E.L. Allen, op. cit., p. 203.
Nevertheless, although the most efficient machinery is very expensive, most units do come in different sizes and the efficiency differential has not been sufficient to preclude entry by smaller firms whose profitability prospects rival those of the big four. 52

Increasing productivity has been due to both substitutions of capital for labor and true improvements in technology reflecting the progress in mechanical ingenuity and invention. The increased use of machinery and changes in size, type, and design have made tire production more rapid and automatic. This process has reduced labor requirements and eliminated some operations entirely. A constant interchange of ideas and information among research men and engineers has contributed to the tendency toward a standardization of equipment and methods. Workers themselves have contributed many valuable suggestions. All large companies pay bonuses for those suggestions used. 53

52 See Standard and Poor's Industrial Surveys, 1954. Stock purchases in Armstrong and Dayton Rubber - two of the smaller firms - are recommended. In 1958 only General Tire of the big five had a sales increase - and this was from its rocket and missile subsidiary. Nearly all of the smaller companies in the largest ten firms not only had sales increases but have reported record profits - in spite of the fact that they have no original equipment sales. "Rubber Comparisons", Akron Beacon Journal, March 29, 1959.

Possibly larger plants have reaped some advantage from the ability to use large banbury mixers, merry-go-rounds, and other machines which require an output of 5,000 to 10,000 tires a day. Financially weak firms unable to introduce the expensive newer equipment may have thereby lost out in competitive efficiency. Such an assertion, however, could not be demonstrated since concentration is both a cause and an effect of technological changes.

Nevertheless, concentration is not demanded by the technological process. It has occurred possibly because in the past the fluctuating prices of raw rubber and the concomitant inventory losses have made bigness in terms of cash reserve an instrument of survival rather than productive economy. Raw rubber has been on the side of the big four. Some tendency to concentrate emanates possibly simply as a product of the cultural inheritance of modern industry.

There is no agreement that the large unit is more efficient. Sears Roebuck and Company, whose tires were made by a large Akron firm and a small Iowa factory, claimed before the FTC that the cost was greater in the Akron plant. The optimum scale cannot be ascertained. Economies begin to be realized at relatively

small scale. "Granting an identical material, labor costs per unit and the same management a plant which at capacity produces 1,000 tires a day in two six-hour shifts is about as economical to operate as a plant which produces 10,000 to 20,000." E.G. Holt, the rubber expert of the Bureau of Foreign and Domestic Commerce claims that the size of the plant per se has practically no influence on costs of production given a basic volume of say 4,000 tires daily.56

D. Integration

A typical company owns far eastern plantations. Cord requirements dictated the entry of rubber companies into textiles - first cotton and now chemical. With the development of synthetic a chemical phase has been added to rubber. Technical innovations have put rubber into insulation, drug sundries, plastics, building materials, insecticides, and many other fields.

Large companies have expanded horizontally across industry and are heavily involved in chemicals, petroleum, and textiles. They have vertically integrated from plantation to scrap rubber

56Talton Hamilton, op. cit., p. 95.
to synthetic; through manufacture to retail distribution.

Previously the rubber industry could not be said to be a completely integrated industry since American owned plantations could supply only a fraction of domestic requirements. However, with the disposal of government owned synthetic plants, full integration both horizontal and vertical, has been achieved.

Rubber has become big rubber because of the difficulty and complexity of securing raw materials and the technical obstacles of supply. The necessity of quick expansion into onemicals and textiles has added to the casualties among smaller firms and increased limitations on entry of new ones. The new freedom from the tyranny of supply markets should make rubber a much more stable industry in the future.

E. Organization and ownership

The corporate form of organization has been practically universal in the rubber industry since its origin. Since the first producers were all small companies with limited financial resources the principal investors were, in most cases, the managers of their plants. This situation is still true in small concerns.

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57 For example the United Rim Company monopoly forced Firestone into steel products manufacture in 1909. Alfred Liep, op. cit., p. 41. This company is now the largest manufacturer of rims for trucks, busses, and tractors. Goodyear similarly makes one-half of all the wheels and brakes for the country’s airplanes. Hugh Allen, op. cit., p. 531.


59 J. D. Gaffey, op. cit., pp. 136-137.
At Firestone the original founders' heirs still retain the major share of ownership. In 1939 the Firestones owned twelve per cent of the common stock directly, another sixteen per cent through the Harbel Corporation (a family trust) and the company itself held sixteen per cent of the shares. 60

The other major firms are managed by executives who are not large stockholders. Their incomes depend more on salaries than dividends but bonus systems are widely used in the industry. 61

In 1907 B.C.Work assumed the presidency of Goodrich and moved its executive offices to New York. When Diamond Rubber was absorbed Goodrich reorganized for $90,000,000 capital and since then Goldman Sachs has had important financial control. 62

U.S.Rubber control passed to the DuPonds in 1928 with the purchase of $16,000,000 worth of stock in the company giving twenty per cent of the votes directing the firm. In a year this was increased to thirty per cent. DuPonds sent in F.B.Davis as president and practically refinanced the company with family funds. 63

60 Wolf Bros., op. cit., p. 464.
63 Ibid., p. 463.
Goodyear had to undergo complete reorganization in 1921. A Goldman Sachs loan of $25,000,000 put the company on the verge of receivership when Clarence Dillon came into control. The Seiberling management was forced to abdicate and 60,000 stockholders were disenfranchised. Dillon, Read and Company was sued for fraud in a stockholders litigation and control passed to Cyrus Eaton and then to the Cleveland Trust and Chase National Bank of New York.  

Management is now in the hands of production men and except for Firestone these have only nominal stock holdings. According to a report of the FTC in 1948 the world-wide investment in American Rubber Manufacturing was $1,572,400,000 as of January 1, 1948. Of this $1,225,100,000 represents capital stock, surplus and reserves, and $347,300,000 represents long term debt. The growth in the last decade has been primarily through retained earnings with little increase in capital stock outstanding.  

F. Trade associations  
The Rubber Manufacturers Association was formed May 10, 1929 as a merger of the former Rubber Institute Incorporated

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64 Ibid., p. 461. Stock ownership is not widely disseminated. There are 45,000 stockholders. Hugh Allen, op.cit., p. 689. There are 9,106,608 common shares. In 1953 all preferred shares were retired. "Goodyear has Second Highest Profit Year", Akron Beacon Journal, April 16, 1955.  
and the Rubber Association of America, Inc. It is the corporate organization of a number of trade associations which function as independent institutions under their own division chairman. There is a trade association for tires, mechanical goods, footwear, heels and soles, hard rubber, sundries, coated materials, and flooring.66

Firestone resigned from the Rubber Association in 1923, over Stevenson plan opposition.67 After thirty-three years Firestone returned to membership in the RMA November 28, 1956. Firestone, however, has financially supported the organization on the same basis as members and cooperated and participated in its policies.68

In 1946 the Rubber Manufacturers excluded reclaimers from their organization and these incorporated in that year the Rubber Reclaimers Association.69

Some standardization is furthered by the Committee for Rubber of the American Society for testing materials formed in 1912 and the Division of Rubber Chemistry of the American Chemical Society, formed in 1919.70

66Schidrowitz and Dawson, op. cit., p. 369.
67Alfred Lief, op. cit., p. 150.
69J.M. Ball, op. cit., p. 13.
70Schidrowitz and Dawson, op. cit., p. 369.
The Tire and Rim Association of Akron standardizes dimensions and valve holes.\textsuperscript{71}

Other past agencies influencing cooperation that should be mentioned are the NIRA Industrial Code Agreements, The 1928 Industry Institute formed to stop price cutting,\textsuperscript{72} information exchange through the Goodyear Clan, Goodrich Circle, Firestone Non-Skid publications and the industry journals -- India Rubber Journal, India Rubber World, Rubber Age, and Tire Review.

During the thirties the financiers threatened financial ruin unless the price wars were stopped.\textsuperscript{73} During the last war all patents, processes, specifications, and research were pooled and made available to the government. Firestone's synthetic plant, first in operation in 1942, furnished the construction plans for others.\textsuperscript{74}

The record indicates the impotency of these factors in promoting collusive control in the past. Their present and

\begin{itemize}
  \item[\textsuperscript{72}]Hugh Allen, op. cit., p. 343.
  \item[\textsuperscript{73}]Wolf Bros., op. cit., pp. 482-484.
  \item[\textsuperscript{74}]Firestone, Pioneer and Pacemaker, p. 31.
\end{itemize}
future influence of course cannot be ascertained from the
literature.

G. Research.

The U.S.A. might also be regarded as the home of the big
industrial research laboratory -- in no other country has the
laboratory of the individual rubber manufacturing concern been
developed on so lavish a scale. Laboritories were established
by B.F. Goodrich in 1895. Hood in 1896, Firestone in 1908,
Goodyear in 1912, and U.S.Rubber in 1913. These have grown
in size and significance ever since. From 1928 to 1938 over
$55,000,000 was spent on tire research alone. These sums
have become cosmic ones since the start of serious synthetic
research. The Akron research laboratory alone (erected by
Goodyear in 1943) employs 200 scientists and 1,000 developmen-
tal workers.

The U.S. Government's research program had reached $18,000,000
per annum by 1948 in developing synthetics. No cooperative
research center for the entire industry has been developed
along the model of the cooperative research association in rubber
in the United Kingdom.

75 Schidrowitz and Dawson, op. cit., p. 186.
76 Ibid., p. 187.
77 The Story of the Tire, p. 55.
78 Schidrowitz and Dawson, op. cit., p. 185. Becoming avail-
able, of course, to the private firm operators of government
plants.
The old methods of biting and pulling rubber to test its properties are long gone. In today's modern laboratory electron microscopes enlarge a bit of rubber 100,000 times; an ultra-violet spectroscope can detect the presence of one millionth of one percent impurity. Instruments test the effects of temperature, oxygen, and abrasion. Miniature machinery duplicates the actions of huge machines in the factories and their products are tested under exact controlled conditions. Chemists, physicists, engineers develop new uses, designs, and compounds every day in a modern rubber laboratory. The huge sums spent on chemical analysis, physical tests, technical control and basic research are concrete evidence that big companies think in terms of tomorrow's customers' demands.

Research expenditures are increasing at the rate of ten percent per year. This emphasis on technology is rubber's great competitive force. Research deliberately causes obsolescence and there is no defense against a new idea but a better one.

It might be mentioned that whereas Goodyear controls subsidiary plants through its interplant relations department,

80Firestone, Pioneer and Pacemaker, pp. 18-19.
Firestone permits its plants independence in competing in development and research ideas. 82

H. Advertising

Large advertising expenditures have been a feature of the rubber industry from its very beginnings. Goodyear, for instance, after winning the patent litigation of 1906, brought in C.C. Hopkins of Chicago's Lord and Thomas Agency at a salary of $50,000 a year - in 1908 - and launched a quarter-million dollar advertising campaign that doubled output within the year. In 1910 Goodyear bought the first double-page spread in industry in the *Saturday Evening Post.* 83

In radio, WTM, Cleveland, NBC outlet was started by Goodyear as station WEAR in the early twenties. In 1947 Goodyear budgeted three-quarters of a million annually for its program of biblical stories - "The Greatest Story Ever Told." Today Goodyear advertises in 150 magazines and besides newspapers, direct mail, documentary movies, visual merchandising sets, radio and television programs, and such stunts as flying numerous blimps about the country with advertising messages in electric

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82Hugh Allen, op. cit., p. 124. This is the interplant competitive aspect that Heflebower stresses.
signs along their sides, the firm has a gigantic public relations program issuing books, pamphlets and circulars, and movies to clubs, churches, granges, and schools. It publishes the Wingfoot Clan for employees, the Goodyear News for dealers, and The Triangle for the sales field.

Firestone similarly, early became one of the country's larger advertisers. Old timers will remember his sponsoring of the famous "Glidden Tours", the "Better Roads" and "Ship by Truck" campaigns, the supplying of racing tires for cars in the Indianapolis 500 mile Memorial Day Race, and the continued manufacture of obsolete tires for antique autos. The Firestone Company also carries on a national advertising service for dealers, public relations programs, and extensive magazine, newspaper, radio, and television advertising. The "Voice of Firestone" radio program was inaugurated in 1928. The opening signature was a wistful song "In My Garden" written by Idabelle Firestone. In 1941 another of Mrs. Firestone's songs "If I Could Tell You" became the opening number and "In My Garden" the closing of this famous program of memorable music now on television.

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84Ibid., pp. 649-652.
85Firestone, Pioneer and Pacemaker, p. 50.
These are only examples. Similar advertising is carried on by all of the larger rubber firms with the result perhaps that the advertising war becomes a stalemate and a fixed cost that tire prices must cover. However, in the past it has been a necessary concomitant of rapid innovations to inform the public and penetrate the market. In 1938 some thirty per cent of the price of a tire was from selling costs. It was these greater selling expenses that gave the large firms greater total average costs than the small producers - but also greater survival ability. Today distribution costs average fifty per cent of the price. Dynamic merchandising is a chief form of non-price competition.

Tire advertising has caused the FTC to publish a tire ad guide to eliminate deceptive advertising. Since there are no recognized quality standards for tires, the FTC objects to phrases like first-line and one-hundred level implying that standards do exist. The National Tire Dealers Association favors the guide to restore integrity in tire advertising. Recently, tires have been labelled "Six-ply rating" that do not have six plies, retreads are called "new treads" etc.89

87L. Reynolds, op. cit., p. 462.
88S. Vance, op. cit., p. 315.
In 1949 the advertising expenditures of all industrial groups were one per cent of gross receipts. All manufacturing was one and one-tenth per cent and for rubber products advertising expenditures were one and two-tenths per cent of gross receipts. This does not seem excessively high when compared to three and four-tenths per cent for motion pictures, three and one-tenth per cent for chemicals, three per cent for beverages, and two and nine-tenths per cent for tobacco. However, this proportion has been rising for rubber products at the rate of about one-tenth of one per cent every year since the war.

It is argued here (along with Andrews) that continued sales come only from satisfaction in experience. There are no separable markets on the basis of irrational buyer preferences extended by advertising as in traditional theory.

I. Export - import relationships

In spite of synthetic rubber production domestically the United States has continued importing natural rubber at a very high level. 800,000 long tons of natural crude was imported in 1950 compared to 474,000 long tons in the 1935-1939

89Econmic Almanac, p. 232.

90It could be argued that advertising might reduce rather than raise costs - by routinizing selling effort, etc.
average year. Part of these imports have gone into the government's strategic stockpile - but most has been used by industry.91 Probabilities are that imports of natural crude will continue at a high rate despite the development of the synthetic rubber industry. The high levels of consumption and the substantial stockpile objectives assure this. Crude rubber has been on the free list since 1930, and synthetic rubber for re-manufacture was added to the free list by Public Law 415, Eightieth Congress, February 25, 1948.92

Quantitatively postwar imports of raw rubber have become quite stabilized although dollar value figures, influenced by price changes obscure this.

Traditionally, the United States has been an importer of natural rubber and an exporter of rubber products, chiefly tires and tubes. Postwar exports have been far above prewar figures. In 1947 exports exceed $211 million compared to the 1935 - 39 average of less than $29 million. Even making a generous allowance for price increases, exports were still five to six times higher than prewar. The most insistent foreign demand has

92 E.L. Allen, op. cit., pp. 186-188.
been satisfied and exports are now declining from the 1947 high. The most important foreign customers are, in order: Canada, Philippines, United Kingdom, Cuba, Brazil, Sweden, Mexico, Netherlands, Union of South Africa, and Colombia.

However, exports of rubber products are of relatively small importance to domestic manufacturers. Exports of tires in 1950 amounted to less than two per cent of the domestic production. Tire imports have always been of negligible significance, in the prewar period averaging no more than 12,000 tires a year. Although the United States has in the past sold as high as thirty per cent of total world exports of tires, the volume of such sales has never been large as compared with domestic sales. In the late twenties exports accounted for about five or six per cent of total sales, but in the interwar period of economic nationalism exports of tires amounted to no more than two per cent of total sales. These are confined mostly to the large companies since they are the only ones able to maintain the extensive organization necessary for export sales.

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93 E.L. Allen, op. cit., pp. 187-188. It must be remembered that American companies had established twenty plants in thirteen countries by 1937.
94 J.D. Gaffey, op. cit., p. 159.
95 J.D. Gaffey, op. cit., p. 53.
Nevertheless, export for Goodyear by 1939 was a larger business than the total for any non-big four company. At that time it organized a subsidiary Goodyear Foreign Operations, Inc., which handles all non-domestic operations. Export has been a major division since 1913. Additionally Goodyear operates factories on five continents and has distributors in every country but Russia and Abyssinia. It advertises in many languages.

An interesting arrangement is Goodyear's agreement with Dunlop Tyre of England to build Dunlop tires to Dunlop's specifications in Dunlop's molds - but in Goodyear plants in Argentina, Java, Sweden, Brazil, and Peru; while reciprocally Dunlop builds tires for Goodyear in Dunlop factories in South Africa, India, Eire, and New Zealand.

Foreign operations were hard hit by the war; plantations and distributors' organizations being seriously disrupted. But the war-created hunger for tires permitted rapid reorganization and by 1948 Goodyear, for example, was doing the largest export business in its history. Of its 1954 earnings of $1,090,094,050 foreign income represented $20,190,989.

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96Hugh Allen, op. cit., p. 411.
97Ibid., p. 383.
98Ibid., p. 407.
99Ibid., p. 675.
100"Goodyear has Second Highest Profit Year", Akron Beacon Journal, April 16, 1955.
A federal excise tax was placed on tires in 1935. This tax is collected by the manufacturer from the dealer or distributor on wholesale sales and amounts to, on the average, six and three-tenths per cent of the value of the tire or five cents a pound.

The house public works committee has recently proposed (to help finance the vast national highway program for the next twelve years) to boost this excise tax a fantastic 900 per cent on tires and 400 per cent on tubes! It was also proposed to put a new twenty cent a pound tax on camelback - the material used to retread tires (now costing thirty-four cents a pound).

The new tax would increase the current tax on a 9.20 truck tire from four dollars and fifty cents to forty-three dollars - on a tire costing about ninety dollars. 101

Naturally the tire and truck lobbies argued that truckers would use tires until long past a safe condition and set back highway safety. That increased costs would be passed on to the consumer affecting especially the availability and costs of food.

That it would increase working capital needs of dealers sixty-three per cent and put some out of business.  

Of course the regressivity of an excise tax was emphasized. The tax would put truck operators out of business, and increase bus fares. All rubber company presidents vehemently protested.

The uproar had results. Tax proposals have now been scaled down to ten cents a pound instead of forty-five on heavy truck tires, six cents a pound on tubes instead of forty-one cents, and seven and one-half cents a pound on camelback instead of twenty cents.

A subsequent modification now has the backing of the RMA. The Boggs Bill would increase passenger tire taxes eighty-four cents - shifting the burden from truckers appreciably. Apparently tire manufacturers are convinced that growth depends on better highways and are reconciled to helping finance their own benefit.

Tires are quite bulky relatively to their value and hence costs of transportation are a significant element in their prices. Transport costs have been an important factor in the trend toward decentralization in the industry.

K. Market structure

Since there is no acceptable substitute for a rubber tire, what prevents control of the market at a stable price when seventy-five per cent of the tire output is handled by a big four? The answer lies in the structure of the market.

The marketing and distribution of rubber products is a large-scale complex undertaking. No one form of distribution is applicable to all commodities, inasmuch as rubber products are related to other industries. The distribution of tires, for example, conforms closely to the distribution system for the automobile industry. Automobile manufacturers are supplied by direct sale from the tire manufacturers.

Distribution of replacement tires is made: through direct sales to large consumers, such as taxi-cab companies, bus lines, and truck fleets; through branch warehouses and sales agencies to retail dealers; through jobbers to ordinary merchants; and to oil companies with their own retail outlets; to mail order houses; to chain stores; to department stores; to company-owned retail stores; and to export sales organizations. 104

The domestic tire market consists in effect of two markets - the original equipment market and the replacement market. The proportion of total sales as between these two markets has varied

104Glover and Cornell, op. cit., pp. 563-570.
considerably over the years. As the number of automobiles in use has increased, the replacement market has steadily become the more important of the two. Presently the replacement market accounts for seventy-one and nine-tenths per cent of total sales and original equipment twenty-eight and one-tenth per cent. However, the replacement market has not been growing as fast as the rate of increase in new cars registered because of the improvement in tire quality and in the art of retreading and repairing used tires - both of which make for less frequent replacement.

So again the replacement market divides into two - that for new tires and that for recapped or retreaded used ones. In 1951 replacement demand was satisfied fifty-three and eight-tenths per cent by new tires and eighteen and one-tenth per cent by recaps and retreads.

Finally, the replacement market for new tires divides into those sold under the manufacturers' own brand names (Goodyear, Firestone, Lee for example) and those sold under private brand names of large retailing organizations (Sears "All-State", Schio's "Atlas", etc.).

106Alderfer and Michl, op. cit., p. 316.
Manufacturers' brands account for thirty-eight and eight-tenths per cent and private brands fifteen per cent of the domestic replacement market. Although the private brand tires are made by the tire manufacturers they compete with the manufacturer's own brands just as though they were made by a rival firm. Manufacturers rely on their own retail outlets and independent dealers for distribution and these compete with mail order houses, filling stations and auto-equipment chains.

Now what competition do the big four face in these markets? They have practically all of the original equipment market (ninety-seven and seven-tenths per cent). The fifteen independent tire manufacturers share a three-tenths per cent. Yet big four competition for this market is keenly competitive and percentages of each producer's output sold in the original equipment market is far from being static over time.\[108\] In 1952 Goodyear and Firestone sold more than fifty-four per cent of their output to car manufacturers, Goodrich hardly thirty per cent. In 1954 Goodyear sold seventy per cent and Firestone sixty-five per cent of output as original equipment and

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108 These orders are secured in large blocks, serve as order backlogs, and are regarded as effective advertising. In addition, they mean future replacement sales to the extent that the consumer wants "matched sets" of tires and will buy a single tire to match the brand on his car. As a consequence, competition for these orders is very keen in spite of the small profit margin - or the profit margin is small because of keen competition.
Goodrich nearly fifty per cent.\textsuperscript{109}

The big four's share of the total replacement market is only sixty-five per cent - about one-third going to the smaller manufacturers. Similarly the smaller companies get thirty-eight per cent of the mail order houses', and retail chain private brand orders.\textsuperscript{110}

Although less than ten per cent of recaps and retreads are turned out by the big four, they supply fifty per cent of the camelback which recappers and retreaders use to restore old tires for service.\textsuperscript{111} General Tire and Rubber has recently established a nation-wide network of retread plants to meet the servicing needs of the vast federal highway building program. Some of the plants will produce their own camelback.\textsuperscript{112}

Today eighteen million passenger tires and nine and one-half million truck tires are recapped annually for a 400 million dollar business shared by 3,000 plants. Truck tires are usually recapped two or three times for less than half the cost of a replacement.

\textsuperscript{109}Standard and Poor's, Industrial Surveys.
\textsuperscript{110}A.D.H. Kaplan, \textit{op. cit.}, p. 99.
\textsuperscript{111}Retreading has been a significant conservator of our supplies. A retread for an average-sized tire requires eight and five-tenths lbs. of camelback, only five lbs. of which is rubber while a new tire requires fourteen lbs. of rubber. A retread will give eighty per cent of the mileage of a new tire. It is estimated that about 115,000 long tons of crude rubber can be saved annually by retreading. Alderfer and Michl, \textit{op. cit.}, Old Edition, p. 281.
\textsuperscript{112}General Tire Builds Retread Plant Chain", \textit{Akron Beacon Journal}, March 21, 1956.
After wartime disgust with helter-skelter retreading, the National Tire Dealers and Retreaders Association worked out standards for retreading that have been reflected in continuing growth of retreading. With stronger carcasses for tubeless tires even greater increases are expected for the future.

The shifting relative importance of the three market sectors of replacement demand, well illustrates the competitive cross currents. In 1926 nearly all replacement sales were manufacturer's brands - there was only negligible recapping. Although retreading started in WWI only heavy truck tires had the rugged carcasses to withstand the heat and pressure of early processing methods. Only 800,000 retreads were processed in 1931. Recapping really took hold during the depression jumping to 5,750,000 in 1939. As use increased, the process improved so that the new tread did not peel off the carcass as was common earlier. Proved in service, retread demand gradually increased reaching 6,750,000 in 1941. When tires were shifted to military use during the war the civilians had no recourse but to recap the tires as long as carcasses would last.

In 1944, 34,000,000 tires were recapped. Besides selling camel-back, the manufacturers also retread some of the tires. The volume of retreading varies directly with the prices of new tires.¹¹⁴

Manufacturers lose only their lowest margin market from retreading since in prosperity it is mainly the lower income group that constitutes the chief demand source. Heavy truck and bus tires are regularly retreaded, but passenger retreads are mostly new tire trade-ins that are retreaded and resold in the used tire market. However, retreaded tires and those with vulcanized section repairs carry nearly as good a guarantee as a new tire and give comparable service for the life of the tread.

A recent development that has stimulated this sector has been the growing custom of using "snow-tread" recaps during the winter months in the Northern States. They have virtually eliminated tire chains. Certainly retreading, recapping, and tire repair developments have been of great significance in reducing the inelasticity of demand that would otherwise characterize the rubber tire. Now potential buyers can always do without or postpone new tire purchases.

Another factor that has caused significant shifts in the relative importance of the replacement market sectors was the

¹¹⁴Standard and Poor's Industrial Surveys.
rapid development of the private brand sector. The increased concentration of control of automobile manufacturing in the hands of a big three provided oligopsonistic downward pressures on tire prices and left very low profit margins in the original equipment sector for the tire manufacturers. To operate at capacity and to avoid the cyclical fluctuations from dependence on a rather erratic automobile market, the tire manufacturers sought more adequate profits by turning to new distribution channels. In 1926 Goodyear entered into a contract with Sears and Roebuck to supply the mail order house with sixty per cent of its requirements at whatever price would yield the company six and five-tenths per cent profit.

Previously the mail order houses and chains had sold only the tires of small producers. Goodyear could well add this business on a cost-plus basis at six per cent profit. Original

115 While demand ran from twenty-two million tires in 1921 to seventy million tires in 1928 the rubber industry had expanded its capacity to 106 million tires (big four fifty million - smaller companies sixty-eight million). There was forty per cent excess capacity. Wolf Bros., op. cit., p. 464.

116 Alderfer and Michl, op. cit., p. 315. In the decade ending with 1939 the volume of original equipment sales ranged from seven to twenty-six million tires.

117 Ibid., p. 316.
equipment sales were very nearly down to costs. President Litchfield of Goodyear saw not only more profit on the Sears sales, but by spreading the overhead by using excess capacity, a profit could be squeezed on original equipment sales. It was agreed to make a rebate to Sears whenever the market price of rubber fell and reduced costs below those actually figured in the contract. Sears was able to put a Goodyear tire on the market under the "All-State" name at two dollars less than the same tire under the "Wingfoot" name. Subsequently, there was a mad stampede. Ward's signed with U.B. Rubber; Western Auto with U.S. Rubber and Goodyear; Standard Oil with U.S. Rubber and B.F. Goodrich. By 1929 Ward's and Sears had fifteen and three-tenths per cent of the replacement sales.

In angry reaction to this Firestone signed no contracts with the chains but instead started his own chain of retail stores in 1927. By 1929 he had built 500 of them. Dunlop of Buffalo had 450 by 1933. In 1931 Goodyear had 275 and Goodrich 387.

This was the real era of price cutting as the mail order houses, manufacturers, chains, and auto supply companies fought

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118 Wolf Bros., op. cit., pp. 467-471. Only Seiberling had no stores - no mail order or auto company contracts. His policy was "business with a profit or to hell with it". This has been adhered to until in Jan. 1955 Seiberling contracted to supply Atlas tires for Standard Oil.
it out. From 1927 to 1934 there were seventeen price cuts. The 120,000 independent dealers in 1927 were halved. Their share of the replacement market shrunk from ninety per cent to fifty-four per cent. Mail order houses increased their share from nine per cent to eighteen per cent and the oil company and manufacturers' stores increased their share from two per cent to twenty-seven per cent. By 1947 the independents' share had further shrunk to fifty-two per cent, mail order houses' share declined to sixteen per cent and the company stores and oil companies' share had increased to twenty-four per cent. 119 Both mail order houses and oil companies together represent an increasing share of the replacement market and in 1952 private brands and recaps accounted for half of the replacement market. 120 There is no evidence here of any trend toward monopolization of both production and distribution.

Competition can again be demonstrated by geographic differences in market sectors. A given company's market position varies greatly in different sales districts. The consumer is still king and free consumer choice leads to area preferences that give each locality peculiar competitive

119 Alderfer and Michl, op. cit., p. 317.
characteristics. In one, one of the small tire producers, say Lee Rubber, may be strongest. In another private brands may dominate, or a manufacturer's dealer. These deviations from a producer's national average belie any assumption of maintaining fixed shares in any part of the market. If there is collusion to divide the market the big four are doing a poor job. 121

Of course, the greatest evidence of competition in the rubber industry lies in the creation of new products and the invasion of new markets. Tires and tubes account for diminishing portions of the big four's business as they expand into more remunerative lines as competition diminishes profits margins. 122 The rubber industry offers much evidence of this element in the theory of pure competition in the continual innovation and diversification of lines.

The result of this range of markets and of competitive pressures has redounded to the benefit of the consumer in both prices and quality. Tires can be bought at a price range of from seven dollars to forty-five dollars for the most popular sizes and the competition for the large-scale buyers' purchases

122 Sixty per cent of the sales dollar still comes from tires and tubes. Alderfer and Michl, op. cit., p. 209.
has vastly improved the quality manufacturers offer the individual consumer. The trend of tire prices has been well below the average for other manufactured products ever since 1921 and particularly in the post-war period. In the face of big four concentration of output, the consumer has had the protection of competitively differentiated products even though he is unable to substitute anything else for a rubber tire.* * * 123

L. Other attributes of the industry and product influencing price

The tire industry is a mass production industry producing large quantities of standardized articles, using large amounts of capital, highly mechanized processes, and minute divisions of labor into repetitive tasks, and dominated by a big four.

The product is a necessity - since automobile ownership has become so widespread in the United States and the private automobile has become such an integral part of our transportation system that cars and, therefore, tires can no longer be regarded as luxuries but are necessary conveniences for the vast majority.

There are no adequate substitutes for natural or synthetic tires or rubber. Quantities can be reduced in emergency but the bulk of transportation rubber is essential. No nation can

survive in war without rubber tires. There are no competing industries supplying the same essential demand although the auto competes with other forms of transportation.

Tires are usually regarded as consumers' goods inasmuch as tires for passenger cars represent the major share of the industry's output.

Until 1930 tires were generally regarded as being non-durable but the improvement in quality has been so great that they must now be considered at least semi-durable (with a 50,000 mile life.)

Tires are jointly demanded with cars. Tires represent only a relatively small part of the cost of automobile transportation. These circumstances tend to make automobile tires a product of relatively inelastic demand.

Prior to 1929 the inelastic demand together with the rapid growth in demand made the tire industry relatively unsusceptible to general business fluctuations. Since that time improvements in wearing qualities, retreading and repairing, have made tires a postponable type of purchase and contributed greatly to the industry's susceptibility to the cycle.

The rubber industry now again appears to have become cyclically stabilized. Although automobile sales were below normal
in 1957 tire sales volume increased due to a ten per cent increase in replacement demand. When people do not buy new cars (and original equipment tires) they buy replacements for the cars continued in use. 124

Now only twenty-five per cent of the industry’s business is tied to automobile manufacture. With more cars and a substantial increase in driving, the replacement market is the backbone of the industry.

Tires are storable for great lengths of time - but not indefinitely. Rubber does oxidize, lose its "life", and is subject to "set" in storage while temperatures change.

Every improvement in tire life cuts replacement demand as the number of units needed are reduced. After 1928 the rising quality more than offset the increasing number of cars. 125 It is also important in increasing the elasticity of demand - an unstabilizing influence. In 1928 consumers bought 51,700,000 tires while in 1939 they purchased 38,000,000 only in spite of the great increase in cars and the price cuts. The 43,466,000 tires bought in 1949 increased to 56,800,000 in 1950.126 It must be concluded that income elasticity is greater than price elasticity for tires.

125E.L. Reynolds, op. cit., p. 460.
126E.L. Allen, op. cit., p. 209.
As a manufactured product, tires had their processing and design features protected. Most of these basic patents have expired. However, they have made little difference as far as limiting competition. On the contrary, they were a great stimulus to innovations in technology, machines, processes, product design, and materials. Throughout their history the big rubber companies have been in constant litigation with each other over deliberate patent infringements - usually rationalized by some new departure from the patented feature. Patents have been a negligible factor as a limitation on entry.

The industry has been characterized by rapid technological change. Materials, manufacturing processes, and product design, had become fairly well standardized but now synthetics, electronics, and atomic energy promise new upsets.

Although a tire is bought primarily for its functional value, still style cannot be completely disregarded. The shift between Tillinghast single-tube and Dunlop double-tube clinchers, between clinchers and straight sides, between smooth and grooved treads, between narrow and wide cross-sections, between high-pressure and low-pressure balloons, and between tubed and tubeless tires, has undoubtedly been motivated mostly by utilitarian considerations of the superior engineering principles. Yet it
cannot be denied that the rapidity of the change-overs was influenced by style-consciousness, desire for novelty, or to be different.

When low pressure balloons were introduced, for example, some can remember the craze of youngsters to put tires with larger and larger cross-sections on older cars until it was no longer surprising to see Model A's equipped with 7:50 or 8:00 x 16 "doughnuts". For the size and weight (and speeds) of these cars there is no question that this tendency to large tires on small cars was carried far past the functional advantages relative to the expense of the change over.

An interesting example of the element of style in product differentiation, even for tires, takes us back to 1910. At this time U.S.Rubber had most of the business in motorcycle tires. Goodyear decided to penetrate this market. Their tire was brought out with white side walls and a narrow streak of blue rubber around the center of the tire. How this tire caught on is still evidenced by the popularity of the expression "to go like a blue streak". In two years Goodyear had built up a million dollar business in this line with a production of nearly 1,500 tires a day - as compared to 5,000 automobile tires.127 The white side walls and blue streak contributed nothing to the functioning of the tire - but they

127Hugh Allen, op. cit., p. 323.
undoubtedly contributed a great deal to the insistent demand for blue streak racing tires.

Interest in automobile "styling" similarly has had important repercussions on the rubber industry. The "low-slung" look resulted in smaller tires with larger cross-sections and lower pressures. Now automobile stylists, wanting greater freedom in designing the rear end of cars, are clamoring for the elimination of the "spare" tire. Because of increasing dependability, and self-sealing punctures, the time is not far off when the "spare-tire" will be gone.

How to explain the price differential that white side walls on an automobile tire commands? It does cost more to pigment to white, a rubber mostly made of soot. But why does the consumer pay the higher price? No claim is made that a white sidewall tire is qualitatively any better than a black side wall tire. This can only be explained by fashion and style consciousness.

Now United States Rubber offers on the market two-tone sidewalls - available since April 1955. They come in three combinations - blue and white, green and white, and brown and

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128 In 1955 one-half of all tires being produced were white side-walled. "Shipments Reflect Banner Tire Year", Akron Beacon Journal, June 10, 1955.

129 Particularly since white side walls demand extra care to the point of being a nuisance - in avoiding rubbing the curbs when parking the car. Also it is usual to charge more for a car-wash if the car has white side walls.
white - to match popular color combinations of new automobiles.

U.S. Rubber frankly admits this is an appeal to style - consciousness, particularly women buyers. The expert buyer stresses technical specifications and tested characteristics of performance. The nature of a tire is such that the ordinary consumer cannot judge its quality by examining it. Consequently, aside from taste and style appeals he must rely, as Andrews argues, on experience with satisfactory performance. Among the big four elements of quality have become so standardized that strong preferences for a particular brand - in the presence of a price differential - are probably rare. "Buyers choice has become one of the best values at a given price, rather than one between different prices for a similar product." 131

The fact that big four tires all sell at about the same price within the same quality brackets does not necessarily indicate collusion. This is an expected result with cost-plus pricing and a standardized product resulting from the intense product competition of the industry. Firms then engage in

130 "Blue - green Tires?", Akron Beacon Journal, March 16, 1955. Goodrich introduced colored sidewalls in 1932. They did not meet with popular favor. At present no Akron firms are making the new two-tones, although they announce that if a demand develops they will meet it.

131 Jules Bachman, op. cit., p. 101. Consumers' criteria (for a tire) are: will it wear? is it non-skid? is it cheap? Walton Hamilton, op. cit., p. 84.
effective non-price competition in service, guarantees, and advertising. Andrews' contention that firms must protect their goodwill and custom built-up through consumer experience is exemplified in the stress that large firms put on quality control. Goodyear's motto is "Protect Our Good Name", Firestone's is "Service". Both state a policy of building the best tire technological knowledge permits and competing through efficiency cost reductions.

It is this satisfaction through experience that gives a brand name its value - and takes it away when quality is sacrificed. From 1927 to 1933 Goodyear was able to keep a price differential for its "All weather" tire of twenty-nine to forty per cent over Sears "All State".132 This was the same tire. Goodyear made Sears' tires to its own specifications. But this not being common knowledge, the public relied on its experience with Goodyear tires since the turn of the century. This is the value of a brand. It is not built over the long run by advertising but by product service. Consequently, prices of advertised brand names tend to be more rigid than unadvertised unknown brands because of the quality association - not the advertising.133

132Ibid., p. 107.
There has been a continuous improvement in tire quality and design. Certainly better roads, retreading and repair and the greater care of tires since the war in proper inflating pressures, wheel rotation, alignment, and balance have added to tire mileage\textsuperscript{134} - but this has probably been offset by higher speeds, weight of vehicles, and increased braking necessities.\textsuperscript{135} Increasing service is shown by Walton Hamilton.\textsuperscript{136} Whereas in 1910 the average tire lasted nine months for 3,500 miles, by 1954 the average tire lasted four years for 35,000 miles. Even if tire prices had remained unchanged, the increased durability of tires would have given the consumer the equivalent of price cuts in value received.\textsuperscript{137}

This increase becomes meaningful, however, only after a look at prices. 1908 tires, fifty pounds hard pressure, smooth tread, giving 2,500 miles of service cost $500 a set for a Packard.\textsuperscript{138} A 1914-tire, good for 3,000 miles, cost $43.60.

\textsuperscript{134}J.D. Gaffey, \textit{op. cit.}, p. 38; Hugh Allen, \textit{op. cit.}, p. 641.
\textsuperscript{135}Not to mention the driving practices of the younger Kamikazi drivers! "Sunday drivers wear but 5,000 tons of rubber every weekend" - hence tires consume seven out of every ten pounds of rubber used. Alfred Lief, \textit{The Firestone Story}, p. 271.
\textsuperscript{136}\textit{op. cit.}, pp. 86-88. S. Vance, \textit{op. cit.}, p. 306.
\textsuperscript{137}Cf. L. Reynolds, \textit{op. cit.}, p. 463.
\textsuperscript{138}Hugh Allen, \textit{op. cit.}, p. 35.
A 1935 tire giving 20,000 miles, cost ten dollars. Today the motorist pays less than one dollar per 1,000 miles of service compared to four dollars per 1,000 miles in 1915. This in itself tells much of the story of the increase in the life of a tire from 3,500 to possibly 100,000 miles in the near future.

The outlook for the future is a tire good for ten years and around 100,000 miles on the average. Today's tire gives the motorist six times as much mileage at twice the speed as the tire of thirty-five years ago - and costs less than half as much. Larger cross-sections and smaller rim diameters distributes the weight over a larger amount of flattened tread.

Certainly this suffices to show that product competition has been intense in the rubber tire business. The chemical processes, the cord and other materials, the design of the tire itself, manufacturing methods, all have contributed to longer tire life and safety at lower costs. Tires now contain

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139 Wolf Bros., op. cit., p. 466.


141 "Tires Good for 100,000 Miles Seen", Akron Beacon Journal, June 28, 1953.
fifty per cent more material, \textsuperscript{142} give 135 per cent greater mileage and cost thirty-five per cent less than they did twenty-five years ago.\textsuperscript{143}

The modern tire is a marvelous product when one considers the beating that a tire takes. At fifty miles per hour a twenty-eight inch tire flexes 36,000 times an hour or ten times per second which is faster than you can tap a finger.\textsuperscript{144} Consider the heat generation potential and the rarity of a modern tire blow-out!

One of the principal expressions of competition in the industry has been the effort of each manufacturer to put out a superior product. This rivalry has been a primary force in the remarkable improvement in tire durability. The expanding market for the new industry with unstandardized products was a powerful stimulant. Following 1929 the unfavorable business conditions, cheap raw materials, and low tire prices .

\textsuperscript{142}The average weight of a tire is a factor in its durability but by no means the only factor in quality. Changes in size, physical construction and chemical composition are all elements in the revolutionary development of the tire. The average life of a tire in years is a factor of limited applicability in the measurement of tire durability because of the obvious fact that the mileage the average car is driven per year has increased considerably. \textsuperscript{143}\textsuperscript{R. J. Tudor, op. cit., p. 82.} \textsuperscript{144}\textsuperscript{Ibid., p. 29.}
with excess productive capacity increased the competitive struggle. 145

With this background knowledge of the rubber industry, we are now in a position to compare in Chapter VIII the eclectic theory and marginal analysis alternates as explanations of developments in the industry.

145 J. D. Gaffey, op. cit., p. 41.
CHAPTER VIII

COMPARATIVE ANALYSIS OF THE RUBBER INDUSTRY
WITH IMPLICATIONS FOR THEORY AND POLICY.

"This business is conducted on the basis of sound
common sense, and is free from idiotic word spinning
theorists whose intervention invariably leads to Carey
Street. (going broke.) There is no need to treat
the above information as strictly confidential."

...Oxford Economic Papers, Feb. 1940,
p. 48 (A businessman's reply to
the Hall and Hitch questionnaire.)

It is now possible to proceed to an economic analysis of
the rubber industry, comparing marginal analysis and the
clectic theory as explanations - or predictions - of what
has occurred.

There are many characteristics of the rubber industry
that are similar to other large-scale American industries.
Composed, at first, of many small firms the industry went through
a vigorously competitive period during which a few firms, by
making more successful adjustments, outstripped the others and
oligopoly now results. "Thus rubber follows an industrial
pattern that is familiar."

Detailed descriptive and analytical treatment may provide
then not only some understanding of the rubber industry's facts
and problems, but perhaps some feeling for the functioning of
manufacturing as an aggregate and provide some insights into
what competitive enterprise means in America today. The step-

1C.R.Hall, op. cit., p. 250.
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by-step analytical methodology for particular industries is a necessary prerequisite to generalizations concerning the significance of competition in the macro-economic summation.

A. Growth pattern

Marginal analysis, however useful it might be as a static tool, has little to offer in explaining the growth pattern in the rubber industry. On the other hand, the industry "fits" the pattern of development to maturity of the eclectic theory, as outlined in Chapter V.

The period of testing with fluid product designs is exemplified in the shifts from solid to pneumatic, from Tailinghost single-tube to clincher double-tubes, from clinchers to straight sides, and from high pressures to balloons. As sales rapidly expanded with the automobile boom, the large demand and easy profits resulted in mass entry and a period of severe competition during which the less efficient were driven out.

Finally the tire tended to be relatively standardized in design and production methods and consumers differentiated very little between the brands of the remaining oligopolists. Firms, of course, tried to control the rate of loss of their markets by both price and non-price strategies. The patent litigations and price wars have been described, as well as the rapid rate of
product development. As tire mileage increased, prices rapidly fell as the larger firms followed a policy of stay-out pricing to restrict entry and extend their share of the market.

After consumer acceptance of leading standardized brands, progress toward competitive maturity was indicated by increasing stability of market shares and the price structure. Brand preferences weakened as product design was standardized. Costs tended to approach equality and high cross-elasticity permitted little in the way of price differentials. Further price reductions had to come primarily from savings in distribution costs and this resulted in the mass entry of private label competitors and the manufacturers' extension of retail outlets began in the middle twenties.

These tactics forced price into such a relationship with costs that would-be entrants found profits prospects more inviting in fields where the opportunities for rapidly lowering costs by innovations were better, and market shares for accepted brands were not so stabilized. With a saturated market, demand becomes regarded as inelastic. Price competition can then gain volume only by rival's expense, so price warring faded and competition became primarily qualitative.

As large firms achieved sizeable market shares they began to think of their firm as permanent and the horizon for decision-making became long run. Reduced prices permitted economies of
scale and the increased volume of sales called for expansion of production facilities till oligopoly resulted.

As the market ceased to expand the threat of entry lessened as would-be entrants became less confident that they could get their costs down to a competitive level by building large volume. When the long-run rate of change became slowed firms arrived at similar estimates of costs and normal cost price ensued and kink theory became relevant.

With a few sellers of a relatively homogeneous product in a saturated market price slashing ended. Not being able to anticipate the effect of price changes that might result adversely competitive efforts became focused on product improvement and sales rather than price. Price is changed only as factor costs change, since these affect all similarly, and do not disturb market shares. If demand increases, goods are rationed while capacity is expanded. Only small-time operators follow the practices marginalism would indicate in price-output adjustments in the short run.

It is maturity of the industry then that causes the shift from price to product competition. The change of emphasis does not necessarily indicate monopoly control.

Quality competition alone may erode excessive profits. A uniform price is not necessarily evidence of a lack of competition, only that it is restricted to the quality dimension. Only if
quality is uniform and invariant, as well as price, may
competition be suspect. In marginal analysis it is assumed
that the product remains unchanged. The theory simply cannot
handle the dynamic changes in technology and product design that
have characterized the rubber industry as outlined in Chapters
VI and VII.

B. Price behavior.

Marginal analysis would lead one to expect oligopolistic
quietude in the rubber industry. From the traditional theoretical
point of view nearly all of the characteristics of the
industry and the chief product, tires, would seem to entice
avoidance of any real price or quality competition.

Tires are a relative necessity with no adequate substitutes.
They are jointly demanded goods with a highly inelastic price
elasticity of demand. While there are about twenty large tire
and tube manufacturers the big four account for about three-
fourths of the output, with three of the big four with general
offices in the same city (Akron), awareness of interdependence,
and altogether amicable relations between executives. These
factors, together with heavy fixed costs and a decreasing suscept-
ibility to the business cycle, would indicate to the marginal
analyst oligopolistic stagnation and collusive agreements, yet
competition does not seem to have been vitiated. On the contrary,
the industry exemplifies the complexity and dynamism of the competitive process under conditions of few sellers.

The list prices are virtually identical but this may only mean that the lowest cost producers set the price for all—as Andrews argues. There is no consistent price leader because of the unwillingness of individual producers to accept the status quo.

The price concessions to the big buyers were too large to be explained by theoretical economies in scale and selling costs. Since the manufacturers' dealers were in competition with private label distributors, the price discrimination was not imposed to maximize profits. Sears could take the output of a smaller manufacturer—or produce its own tires. It was the utilization of idle capacity and the bargaining power of buyers that forced the prices. The big four had to meet the pressure of big buyers, automobile and farm equipment manufacturers, mail order houses, and oil companies in both original equipment and replacement markets.

Concentration does not appear to be demanded by the technical processes. It has come about from other reasons than would be adduced from traditional theory. Firms had to keep attuned to dynamic changes from inventions, processes, and chemical discoveries. Satisfactory profits demanded eternal adaptation. It was the investment of the bankrupts that subsidized the campaign for markets.
In the past the large companies were in a worse position in a period of declining demand than were the small ones. This followed from a natural rubber raw material grown in the tropics, controlled in Europe, and used in the United States. The story of the wild price fluctuations from an inelastic supply from trees taking eight years to mature has been told. Consequently, the four to six months inventories the large companies had to carry posed grave hazards. The small companies' hand-to-mouth buying, on the other hand, caused many of them to fail on a rising market - when the large companies were using inventories costing less than spot prices.\(^2\)

These price wars cannot be explained by usual theory. The demand for tires is exclusively derived from transport demand. Apart from the vehicle, the tire has no utility. By and large the automobile establishes the market and fixes the demand. The car is the major investment and the cost of the tires to use it is relatively a dribble expenditure. The stimulus to purchase comes from the car operation. Therefore, demand is most sensitive to auto sales, car mileage, and national income - not price.\(^3\) Accordingly, it is long run shifts in demand -

\(^3\) Ibid., p. 85, 89, S. Vance, op. cit., p. 314.
which marginal theory does not explain—that are apropos for understanding. 4

With the growing market, during the history of the industry, certain prices could have been increased without significantly lowering demand. Instead market rivalry in tire improvements accompanied price cuts. Why? Perhaps business saw largeness as industrial security. Attention shifted from profits to output. If low prices brought volume and spread the overhead—that justified them. The battle for larger market shares included long-term contracts with the auto producers. As these expired, the market was searched for better values. If a rubber company lost one of these contracts it incurred higher per unit costs from the lower volume as well as losing prestige in the industry. It has previously been documented that these contracts were sought even at prices below manufacturer's costs. How does the short run profit maximization concept of marginal analysis explain this? Or the large losses by Firestone and Goodyear

4According to theory, the inelastic demand for a complement would provide every incentive to raise price—yet price cuts are characteristic. According to conventional theory the demand and price for substitutes will move together and that of complements in the opposite direction. When auto prices are cut do tire prices rise? Tires and tubes are complements. When tire prices fell, tube prices did not rise—instead during the price wars they were given away free.
in the development of company stores from 1928 to 1933. This was an era of "stay-out" and "get-out" pricing for future security. Quoted prices had little meaning. Series discounts, trade-in allowances, free tubes - made prices only a point of departure. Manufacturers gave dealers cut-back discounts to "meet competition", bonuses for volume, and reimbursement for losses in price wars. Financial strength, was the key to survival - for long run profits.

Although subject to short run fluctuations the rubber industry now maintains price for long intervals. This suggests that producers place a higher premium on short run stability than on short run profit maximization. Since tires are sold primarily through exclusive dealerships, producers set prices and arbitrarily reduce dealer's margins, making manufacturers' prices the important ones for study. Consequently, this explains the failure for resale price maintenance to develop in the tire industry.

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5 Walton Hamilton, op. cit., p. 103. These must be regarded as developmental costs for future profits.
6 Ibid., p. 107.
8 The five per cent increase in tire prices in 1953 was the first in three years in spite of a growing secular demand. United States Rubber, the first to raise indicated that it was necessary because of higher labor, transportation, and materials costs. This reinforces Andrews' and Heblebower's contentions that price is raised only as factor cost changes, believed to be permanent, are incurred - and suggests cost mark-up pricing.
There is no evidence that firms have limited output to secure a maximum profit price that conventional theory suggests is typical of oligopoly. On the contrary, the price wars were basically for volume. Profits have been well below the average for manufacturing for the last thirty years. The wholesale price index for tires in 1951 was fifteen per cent below the 1926 level while other manufactured goods cost 175 per cent of 1926 levels.

There are no standards of measurement of price flexibility that would give adequate validity to inferences derived from traditional theory. A tire may be a relatively homogeneous product at a given time, but the evolutionary character of the commodity and secular changes in prices and consumption, makes it impossible to separate the price effect on volume from the qualitative effect, or income effect. The resultant demand curve approximates neither the long nor short run demand curve as ordinarily conceived.

In the face of uncertainty, a maximum profit price is unascertainable. As an industry matures, a stable price is

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arrived at by evolutionary development and then kink theory
and cost-plus pricing adequately explain subsequent changes.
The consonance of price movements then, is explained by
competition - not the lack of it. Mutual dependence is recog-
nized, and simultaneous price changes, when all are similarly
affected by costs changes, are not necessarily to be construed
as ipse facto collusion. Available information will not support
too ready generalizations about the degree to which prices are
raised by agreements. Accounts of identical government bids for
rubber heels, and erasers may be explained by concepts of a
"fair" margin, over average industry costs. 11

R. F. Lanzillotti, in reporting the results of a study of
pricing by big business in a Brookings Institution Study, lists
the most typical pricing objectives as determined from inter-
views with corporate executives. The most common was pricing
to achieve a target return on investment. Under this system
both costs and profit goals are based on standard volume at the
long-run average rate of plant utilization. The expectation
is that the averaging of fluctuations in cost and demand over
the cycle will produce a given rate of return on investment
without unduly affecting price. This assumes a rate of produc-
tion of about eighty per cent of capacity and a given product-mix.

11TNEC monograph No. 21, p. 132.
This is a long-run, satisfactory, secure profits concept and not "maximization" of profits on a year-to-year basis. The target return objective is determined by competition.

A second goal was stabilization of price and margin. This was accomplished by cost-plus pricing as modified by competition. 12

A third was market-share target. The attempt was to preserve a given percentage of the market for a product line, limiting this usually to about twenty-five per cent.

A fourth goal was meeting or preventing competition. This is influenced by market-share concepts and definitely involves stay-out pricing to potential competitors. 13 The market is regarded as an equilibrium relationship and the large corporation feels responsible for preserving it in order to perpetuate its own position. Price is not varied to adjust supply to demand. Unneeded capacity might be brought into the industry and upset equilibrium.

It is clear that the objective is planned profits. It would be more appropriate then to speak of administered profits

12 American Can Company automatically (via contracts) adjusts price to customers whenever labor or steel costs change.
rather than administered prices. Capital investment is planned with built-in excess capacity (illustrated by the fact that eighty per cent utilization is assumed as long run normal).

This study supports the hypotheses that large companies' goals are long-run, secure profits sought by simultaneous decision with respect to price cost and product. Profit-maximization cannot give unambiguous guidance for action for the firm in any given situation; nor can it provide a satisfactory basis for valid predictions of price behavior. Individual products, markets, and pricing are not considered in isolation; the unit of decision-making is the enterprise. A further implication for the theory of the firm is the fact that the investment decision presupposes a price. Thus investment decisions in effect are themselves a form of pricing decision. This study tends to corroborate the hypotheses of the eclectic theory.

C. Excess capacity

The tire industry affords an excellent opportunity to test the usefulness of the theory of monopolistic competition. The theory as it now stands fails, because of its very simple assumptions, to explain the excess capacity which existed in tire production. Only in pure competition are resources used most

\[14\] L. Reynolds, op. cit., p. 459.
efficiently. It follows that excess capacity in itself cannot suggest government intervention.

Chamberlin ascribes excess capacity to the wastes of monopoly (p. 109). With free entry under monopolistic competition, price would be driven to the level of average cost and there would be no unused capacity, but each firm would be less than optimum size (p. 116). This has not been borne out in the rubber industry. Reynolds thinks Akron plants may have gone beyond optimum size. Rubber has had excess capacity since 1927. More investment took place (not disinvestment according to theory) in spite of below average earnings. Excess capacity came from too large plants. This type of excess capacity is for flexibility in anticipation of expansion.

The period 1926-1936 was one of diversification, manufacturers hoping to take up the slack of original equipment sales below cost (which also decreased the replacement market) by new products. Throughout this period, plant expansion continued from new technological developments. Although earnings were below average, the industry did not disinvest according to conventional theory. Investment went ahead in spite of low profits. Reynolds suggests this was to maintain the corporation as a petty state. It implies a long run view looking ahead.

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15 Ibid., p. 464-466.
16 J.W. Markham, Competition in the Rayon Industry, p. 44.
18 Ibid., p. 465.
to markets when demand recovered. Investment was not related to current but secular demand expectations and technical necessities (according to the eclectic theory).

The manufacturers are still plagued with excess capacity—seventy per cent in 1940, eighty per cent in 1950-1951. This idle plant has lessened resistance to the pressure for favorable prices by the big buyers. Only Firestone among the big four has refused to provide private label tires, choosing instead to compete through its own outlets.

The high mortality of small firms may have resulted, in part, from a negatively sloping average cost curve over a wide range of output. Numbers are limited by economies of scale and the prevalence of the growth pattern developed in the eclectic theory indicates the significance of economies of scale in explaining oligopoly. Traditional theory's increasing costs beyond an optimum size leaves something lacking in an explanation of America's giant oligopolies.

Economies of scale cannot be measured. Technological change and temporal differences make cost comparison of different plants at different times valueless. However, an a priori case for economies of scale in the rubber industry can be inferred from the history of the industry. The established

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firms have expanded faster than the new ones could construct capacity. The large companies have a superior position in the capital market and hence lower interest rates on their bonded indebtedness. The effects of earning power cannot be isolated from the effects of size. The large firms experience economies from more effective utilization of reserve capacity in power plant, laboratories, and staff - facilities not varying proportionately with size.

Inferences from the relative profitability of large and small firms are often inadequately founded. The large companies are more organized and the unions always lead a pattern bargain for higher wages in a larger firm. The large companies pay higher than average wages. The large firms, too, spend more on research and development while the small companies copy. The smaller companies also spend little on training, depending on hiring personnel trained by the big companies.

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20 In asking how important are personal connections in obtaining capital; or how important is the prestige value of growth and size; or how important is the fear of public opinions; political and government pressures; or Napoleonic complexes, etc., forces are revealed that are more sociological and psychological than economic. K. Boulding, "Discussion", A.E.R. Proceedings, May 1948, Vol. 38, p. 155.

Large firms spend on institutional advertising, employee welfare plans, recreation, and the like, much more than the small firms. The large corporations do better in depression and the small ones in prosperity, but the large companies have a more stable income. This suggests that the endeavor is not to maximize profits or seek least cost but the try is instead for satisfactory secure profits over the long run. This requires expenditures that the small companies do not incur, and investment in flexibility for cyclical change, technological change, peak demands, and transfer between products for long run profits. Comparison of the present relative profitability of large and small concerns can have little validity for ascertainment of optimum size.

As for relative costs, it is impossible to eliminate all factors affecting costs but output variations and then to relate those to levels of utilization. Such costs are simply not determinable for multi-products, while techniques and prices change at different rates over time. Observations can only be over the actual range of output. Logically U-shaped curves exist because of diminishing returns, but they are not empirically ascertainable, and break-even charts indicate that the decision makers assume linear relationships.
Accordingly, only general comments on costs have been previously recorded and no elaborate investigation of statistical costs is felt to be apropos. It is necessary for the eclectic theory to discover the executives premises regarding the cost and demand behavior. Policies can then be explained by the structure of the market. Theory is adapted to the executives data - not vice-versa. Executives start with known costs and modify by expectations and judgement.

D. Advertising

Most advertising, including that in the rubber industry is partly an unnecessary expense where goods are relatively homogeneous, the consumer is familiar with the product, and would buy it whether advertised or not because of the inelastic demand. Advertising does not increase the total demand for tires. If demand is increased for one firm, economies of scale are not sufficient to be reflected in lower costs to the consumer. Advertising has primarily resulted only in the big four being able to maintain a price differential over unknown brands. However, advertising competition has not removed price and quality competition in the rubber industry. It has been a factor in exploiting innovations before rivals could copy them and it has hastened consumer acceptance.
Advertising expenditures are increasing in the rubber industry. Goodyear and Firestone are among the top 100 national advertisers. With newspapers alone Goodyear, in 1954, spent $2,267,630 and ranked thirty-third. Firestone spent $949,585 and was ninety-sixth. 22 These expenditures are still small relative to G.M's $37,391,000 and Ford's $18,000,000 for newspaper advertising in 1954. Sears Roebuck spent $36,831,400. 23

Certainly entrepreneurs appreciate the fact that advertising is subject to diminishing returns. Then why not vary the volume to maximize short run profits according to marginal theory? In this banner year of sales with unprecedented demand and capacity output it seems improbable that a diminution of any one of the big four's advertising efforts would result in a loss in earnings greater than the savings on advertising. It can be inferred that the interest is not in immediate short run profit maximization but that it is thought that boosts in advertising budgets will preclude a reduced share of the expanding market and contribute to long run profits.

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E. Entry

Obstacles to entry are difficult to find. There has been no exclusive ownership of scarce factors, unfair practices, legal restrictions aside from patents (which were ignored), no complete vertical integration, no collusive agreements or market-sharing, as far as can be ascertained. Contracts with large buyers have not been excessively long-term, as in the can industry. Products are not significantly differentiated. Dealer organization and advertising do not seem sufficient to bar entry. Tires are on the free list without tariff. It can be inferred that competitive price, quality, and profits do not invite entry.

The 178 firms in 1921 became thirty-two by 1933 and twenty by 1940, while the share of the big four increased from sixty to seventy-five per cent. Meanwhile auto registrations increased from two million in 1920 to five million in 1929, and to a present approximate sixty million. The big four expanded to add this new market and priced new entrants out of the market. In 1938 there had been no entry of new firms in fifteen years. 24

The Ford Motor Company's tire plant, built in 1938, did not produce for the market. It had a small capacity of only 4,000 tires a day. 25 It supplied only Ford and was probably built as a "yard stick" plant on costs and as a club to get

lower prices from the tire manufacturers. The threat of potential entry has always been a factor in keeping tire prices in line with costs and leaving low profit margins in the rubber tire industry. 26

F. Product

A flagrant example of the inadequacy of traditional theory is the assumption of a homogeneous product over time. The eclectic theory takes account of the dynamic adaptation that is typical - in product, technology and organization. Marshallian theory concentrated adjustment on what to buy - substituting factors as their costs changed to achieve a least-cost production point for an unchanged commodity. Chamberlin emphasized what to sell - assuming factor prices, adjustment being by product differentiation, and selling effort. A probable model must assume both product and factor cost changes. Great voids would be left in attempting to explain occurrences in the rubber industry with a theory that left out of account the changes in rubber itself - from wild to plantation to synthetic; the constant adaptation to myriad new uses; the developments in chemistry; attempts to control prices

26 If there are vertically adjacent businesses which would be able in terms of size, organization, and financial resources to enter an industry and do not--this is prima facie evidence that this industry is performing competitively. Heflebower, op. cit., p. 132.
of the raw materials; the obstacles of supply with associated inventory and financial problems; dynamic technological developments, and the rapid rate of innovational change in product design and quality.

G. Executive statements

The following conclusions inevitably suffer from defects inherent in considerable dependence on inferences and implications read into personal opinions expressed by rubber company executives. Representatives of Goodyear, Firestone, and Goodrich, though differing in detail and emphasis, expressed views betraying a surprising unanimity when interviewed.

Open-end questions, asked in an informal discussion, were relied on - rather than a formal list of questions, the answers to which could be tallied, etc. It was felt that the open-end question would avoid the suggesting of possible answers and the placing of subconscious limits on the respondents' answers that a formal, multiple-choice questionnaire tends to do. However, the open-end question has the defect of providing the opportunity for irrelevant lengthy speeches about company policies that may be only ready-made cliches or rationalizations. Nevertheless, certain consistencies permit limited inferences concerning executive behavior, attitudes, and reactions to changes in the data.
The men interviewed constituted a cross-section of those participating in price-output-profit decisions. Vice-presidents in charge of sales, of international plants, of personnel relations, and of marketing research were generous with their time. Lesser officials were a treasurer of a foreign subsidiary, a comptroller, an industrial engineer, and men in the production-planning and product-development departments.

Most of them revealed a surprising illiteracy with respect to the economists' tools. One cannot discuss traditional marginal analysis with them because they have neither heard of nor use the concepts. Consequently, considerable difficulty was experienced in conveying the rational for the kinds of questions asked. Let it suffice here simply to indicate what generalizations seem fair from the questions and answers significant for the eclectic theory.

Executives have little interest in the quantities that could be sold at different prices. Price derives from costs and concern then is with a changing volume of sales at that price - or shifts in demand. Changes in demand are detected mainly through changes in inventories. Sales forecasting is not by blindly extrapolating curves on the basis of the usual *ceteris paribus* assumptions. Price is the given, and the fixed factors of marginal theory are the variables given most attention,
such as income changes, population growth, and product changes. The start is a total industry demand and then the firm's historical share is computed and some percentage over that is set as a goal.

Total demand is regarded as quite inelastic. It was felt that total sales would be little affected by either an increase or a decrease in industry price. It was not thought that a cut in price by one firm would increase its sales because, "You could not get away with it". With costs virtually the same for all companies and technology practically standardized, the price cutter would only reduce his profit margin - or have to cheapen his product qualitatively (which the customers would infer even if he didn't) and that would jeopardize the market share. Peculiarly enough there was almost consensus that if they all raised prices, say ten per cent, that total sales would be very little affected. This could not be done by a price leader since other firms would not follow unless the increase was forced by a cost rise. By standing pat they could increase market share, secure more volume and thereby improve profits. Apparently, the kinked-demand curve is revealed in their notions.

It was believed that costs decreased until you were "pushing capacity". Direct costs were regarded as a relative constant and "volume spread the overhead". The chief factors
affecting changes in costs were technology and product changes—
not labor costs or variations in output. The idea of a higher
price (and profits) from reduced output struck them as ridic-
ulous. Costs would so increase that profits would disappear.
They were adamant that profits were from volume.

Fixed costs were allocated by various formulae but seemed
to depend mostly on the item's burden-bearing ability, as deter-
mined by competition. An industry normal cost concept does
seem to be entertained and margin sheets for innumerable
products were exhibited. Antipathy for the phrase "mark-up"
was expressed by one executive. He seemed to think that it
connotated profit padding. Anyway, he preferred "Costing
Margin" which gave a "full-cost" price. This was influenced
by the industries' cost and did not depend exclusively on the
given firm's cost. In fact, some items were produced at a
loss for the sake of a "full-line". This was offset by mark-ups
on other items (particularly where the firm had an item not
subject to significant competition— as Goodyear's flotation
tire). It is obvious that the emphasis is on total, firm profit
and not that for individual items.

Rather complicated break-even charts were generally used
with an assumed price and a saw tooth rather than a smooth linear
cost function. They apparently combined utilization rates and
capacity expansion revealing the concept of planned flexibility for long run profit.

They did not maximize profits - but most thought that they were doing about as well as, under the circumstances, they could. The view was definitely long run and took cognizance of potential entry and anti-trust limitations. Emphasis was on product and technological improvement and selling effort. Increasing profits by price and output variation was not even mentioned. Some concern was expressed about "some of these little outfits cutting in on 'our' market if we do not keep on our toes". This reveals that long run, secure profits are the goal and not short run maximization.

At least one executive alleged that the idea of a probe to ascertain maximum profits by either holding price and increasing output, or holding output and increasing price till inventories rose, was a new one to him. One had to keep down costs and this was done by maximizing output. Expansion was accomplished by increasing what the market would take - by selling effort and product improvement. This emphasis on volume and market share is an unmistakable characteristic of this industry. Price would be increased only because of factor cost increases, and any increase in long run demand would be met by expanding output - as rapidly as practicable, to increase market share. The idea of cutting price seems not to have been
given much thought of late. Liquidity considerations might force a price cut but that was considered unlikely in a period of secular growth. Savings from technological advance would probably be spent on sales effort and capacity. Nothing was learned that was inconsistent with the eclectic theory. 27

H. Implications for policy

Businessmen must act against a background of legislation designed to preserve competition, prevent unfair practices, and outlaw collusive actions.

Suffice it to say that recent decisions have held conscious parallelism of action to be under a fog of legal uncertainty. One critic has pointed out: "In the old days, to violate the law, you had to have power, use it, and use it wrongly (unreasonable restraint of trade). With the first step of change, you only had to have it and use it (restraint of trade). Today you need only have it (monopoly power)." 28

Trust has become distrust. The constitutional power to regulate almost any business practice now exists, but the question remains what should be regulated?

27 See Jules Bachman, Price Practices and Price Policies, pp. 78, 135-137, 142., for similar conclusions from executive statements.

Over a half century of discussion of the effects of big business on the character of the competitive processes in the American economy leaves us as far from a consensus as when the debate began.29

It is conceded that criticism is a necessary prelude to correction and cure. All criticism is not to be rejected and business permitted to profit from abuses. It is argued here that social policy can improve the economic situation if it is based on business performance and not a priori conclusions.

Big business does not mean the death of competition. Firms may compete to achieve a monopoly, but changing consumer wants always provide leaks. Integration may be a guard against being the victim of monopoly and preserve a buyers' market. Still competition must be the life of the trade and not the death of tradesmen. Policy must prevent anything tending to drive out competition. We need rules of the game - but no fixed fights. Profits must come from increased efficiency and lower costs.

Managements may seek and take pride in the approval of others. In seeking security and growth, a low price and large volume may be the way of realization. A large investment certainly does not indicate short-run exploitation. Profit

from random factors is not a factor in policy making. Businesses plan a permanent harvest. Large-scale enterprise has no intentions of killing the goose that lays the golden eggs.  

Monopolistic competition theory presupposes firms' maximization of profits from demand considerations that penalize increasing output, and cost considerations that may also penalize increasing output. "This view of business behavior is that it goes positively against the social interest."  

The view that all profits are suspect as the result of a monopolistic racket has left the businessman under the force of a theoretical attack which he cannot understand. It does not explicitly fit the facts of business life as he finds them but if he queries the assumptions the economists say the rationale of the economic doctrine is so soundly established that he must behave in the theoretically determined manner, and that he must do so unconsciously if he is not honestly aware of so doing, and has not the explicit data in terms of which theory assumes him to behave. If it is true that private enterprise does work broadly to the benefit of society, we might at least acknowledge this, pending the construction of a better system.  

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According to traditional theory the consequences of monopoly are widespread monopoly profits, idle facilities, and technological stagnation - but we find the opposite. ³³ Andreas Papandreau states that "it is commonly agreed that our economy is predominantly oligopolistic. According to the precepts of our orthodox price and allocation theory, the performance of our economy should be highly disappointing. Instead it is possible to assert that it is rather satisfactory. Something must have gone wrong with our theoretical constructs."³⁴

Traditional theory ignores potential competition. Would-be entrants detect abnormal profits, but the established firms blindly equate marginal revenue and marginal costs, attracting new firms until the demand curve is tangent to the average cost curve. It is manifest nonsense to suppose that firms exploit the immediate inelasticity of demand, and pay no regard to more ultimate effects. Short run excess capacity might not be as important as has been inferred from traditional theory. There has been an under-estimation of the strength of potential competition, and when it is given adequate consideration it goes a long way in justifying the assumption of competition

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as a satisfactory approximation over a very wide field.35

Ross M. Robertson disagrees with the view that competition in the American economy has persistently declined. He argues that it is not hard to show that the rapid technological change of the past century makes the large firm inevitable, and that in many manufacturing processes a few large firms can achieve greater output and sell at lower prices than could many small ones in an atomized industry. "How does it come about", Robertson asks, "that despite the omnipresence of oligopoly, by any measure we choose to take, the American consumer has been progressively better off over the past half-century?" 36

It appears that anti-trust policy, as far as legislation, has been based on one kind of economic theory, and anti-trust action on another kind of theory. We do not seem to be able to resolve the question of whether competition is an effective instrument of order - or whether it is a great myth by which we reconcile ourselves as best we can to a business system


that goes its own way. 37

Although anti-trust action cannot produce important structural changes in the economy, or even much retard trends toward corporate concentration, it still may serve to "improve" the ruling equilibrium. The danger of anti-trust prosecution, or adverse public opinion, is without doubt an important consideration in corporate price policy. It is fair to assume that there is a lesser degree of monopoly in the economy than would have been the case without anti-trust action. 38

37 Walton Hamilton, The Pattern of Competition, p. 5.

"Our dissatisfaction with our world is less the result of having known any other than of having constructed a model of another economic society, the rationale of which we know and which is more companionable to our sense of elegance and order. We shall never find anything so agreeable in the world we have. But perhaps there will be compensation, once we have exchanged elegance for actuality, in a greater rate of progress in understanding what we have." J.K. Galbraith, "Monopoly and Concentration of Economic Power", Survey of Contemporary Economics, Vol. I, pp. 127-138.

Anti-trust policy has been born of a philosophy and enthusiasm for small local-owned business and the fear of the social and political consequences of concentration—not from economic criteria. Policy needs to tell us how to handle big business as big business. Not reverse historical trends. We can neither demolish big business nor big government. What is needed is more intelligent organization and administration of continuing mammoths. R.C. Osborn, "Efficiency and Profitability in Relation To Size", Harvard Business Review, Vol. 29, March 1951, p. 94.

No one should underestimate the importance of anti-trust laws in bringing business practice into accord with basic concepts of decency and equity, or in preventing those with economic power from using it to combat innovation. This is not an argument for laissez-faire.\(^{39}\)

Unfortunately our anti-trust philosophy has tended to judge the consequences of competition as emanating from the conditions of competition. The justification of anti-trust action is determined from the objective characteristics of the market. Competition is a matter of results, not conditions, and there are no objective criteria for measuring the degree of departure. Theory emphasizes price competition, but actual competition is among heterogeneous substitutes. Competition is not ideal but nevertheless very real. "Views that effective competition can be judged by mere statistics of firm size, and numbers of sellers...show either naiveté or intellectual laziness. To find the real substance of competition requires grubbing work."\(^{40}\)

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In a world of wars, rapid technological change, economies of large scale, shifting consumer tastes, desire for diversity, and consumer ignorance and indolence, the standard of competition may be an impediment to understanding rather than an aid. The efficient utilization of resources is the meaningful standard. Do market arrangements serve the nation satisfactorily? Policy should be determined by consequences and not classifications.

As J. M. Clark has argued, it is performance alone that can be a satisfactory guide. The competitive ideal "does not afford reliable guidance to the factors which are favorable to the closest available working approximation to that ideal under actual conditions." Markets are satisfactory or unsatisfactory only according to how well they serve the public interest. The existing performance can be compared only with the best attainable in practice. Efficiency means as efficient as possible, considering the political realities. Performance means all aspects—not just price alone.

This kind of standard cannot be made concrete but Oxenfeldt suggests several notions of different importance, some

43Ibid., p. 243.
in conflict, all controversial, and none of which can be applied mechanically. Goods should be what consumers would prefer if informed. Production should use as little in resources as knowledge permits — considering the cost of scrapping existing equipment and altering present methods. A minimum of resources should be devoted to advertising. Arrangements should facilitate full employment without inflation. There should be strong incentive for producers to seek improved methods. Income should be distributed according to prevailing ethical standards. Consumers and producers should be free to act as they wish as long as they do not injure others. Decision makers should be responsive to all affected by their decisions. Minority groups should have no disproportionate influence over public policy and policy should not reduce the viability of the firm.  

J.W. Markham is essentially in agreement with such a composite criteria. The criteria of workable competition is that achieved when public policy can produce no changes making society better off. Corwin Edwards would insure no collusion, possible entry, access to the market on both sides, the profit motive dominant over politics, and no preferential status by law, politics, or commercial alliances. All such criteria are,

45 J.W. Markham, Competition in the Rayon Industry, p. VII, 204.
of course, based on the premises that the public prefers regulation by market forces, the dynamics of competition must be preserved since there is no pure competition, the benefits of increased competition will be greater than the social costs, and size can not be restricted per se.

According to the eclectic theory it is entirely conceivable that there may be elimination of unnecessary price fluidity on competitive markets (that may only be responses to short run changes that tend to cancel out) without interfering with the basic competitive structure of industry.

I. Performance of the rubber industry

In spite of a high degree of concentration in the rubber industry it has long been one of the most competitive industries in the country. Price wars have been frequent and the trend of prices has been downward.

For a number of years prior to 1920 rubber was an exceedingly profitable industry, but since that time its earnings have been below the average for American manufacturing generally. It is and has been for many years one of the highest wage industries in the country. It is characterized by a relatively large capital investment per worker and per dollar of sales.

It is difficult to name a single product not improved since the war. Even with price increases less than average, the quality increases would mean that the real cost to the consumer has been lowered.
The gains from increased labor productivity have been widely distributed. Tire prices have fallen, wages increased, and hours decreased.

There has been little evidence of deliberate practices of derogation and harassment of rivals. Product comparisons have emphasized superiority. Allegations that rivals are going broke, or have violated FTC regulations, fixed prices, or misrepresented materials, are not characteristic of the rubber industry.

Advertising has not been excessive relative to comparable industries and certainly has not removed price and quality competition.

The lack of entry may in itself be evidence that the industry is performing competitively. It can be inferred that price, quality, and profits do not invite entry.

Productivity has increased, technological progress has been continuous, (and rapid) and the quantity and quality of products provides a variety of choices.

Innovations have given no continuous advantage to any one firm. With regard to the patent infringements and litigation, it might be argued that patent protection preserves monopoly, not competition. Since patents were generally infringed, possibly some wasteful advertising was thereby eliminated, and
less attention directed to preservation of a patent monopoly meant more attention to competitive production.

The market structure is such that the consumer is protected by "countervailing power" positions of retailers, auto firms, and mail order chains. The consumer is further protected by a division of the market into original equipment and replacement sectors and the replacement market offers the alternates of new, used, or retread tires. On the basis of "performance" the tire industry must be rated as highly effective.

This Chapter has analyzed the rubber industry, comparing marginal analysis and the eclectic theory as explanations, or predictions of what has occurred. Specific applications of the two theories were made to the growth pattern, price behavior, excess capacity, advertising, entry, and product development aspects of the industry. It was suggested that only a dynamic interpretation, employing institutional materials, can adequately explain what has happened. A summary of conclusions derived from interviews with rubber company executives indicates that the decision makers premises are not inconsistent with the basic hypotheses of the eclectic theory.

Since our economy performs rather satisfactorily, in spite of the prevalence of oligopoly, it may be that considerations of
potential competition, and product and technological innovations are sufficient to approximate the competitive result. The consequences of competition do not necessarily emanate from the theoretical conditions of competition. Performance alone may be a satisfactory guide to policy. It was indicated that in terms of "performance" the rubber industry must be rated as highly effective. Detailed analytical and descriptive studies of other industries may provide new hypotheses for a theory of effective competition that may involve significant revision of public policy concepts. Chapter IX offers a summary and statement of conclusions.
CHAPTER IX
SUMMARY AND CONCLUSIONS

A. Outline summary

This section is a summary restatement of the findings of the preceding chapters. In Chapter I the thesis was advanced that it is time to introduce greater realism into economic discussion with a theory of the firm consistent with recent results of factual research, and recognizing that though competition is not perfect, it is nevertheless a powerful force in determining industrial development. It was suggested that static determinate solutions are of limited use in a dynamic business world.

Chapter II traced the evolution of price and production theory. Marshall adequately synthesized the Austrian utility theory and classical cost theory, with proper emphasis on the principle of evolutionary continuity. Value was the equilibrium result of the dual forces of supply and demand over the long run. The long run supply-price for an industry tended to equal the normal costs of a representative firm. Marshall thought in terms of a stable industry output, and not in terms of equilibrium for the individual firm.

In 1926 Piero Sraffa argued that diminishing unit costs, with a negatively inclined price-determined demand curve, led to monopoly.
In 1933 Robinson and Chamberlin offered an organized approach to the middle ground between monopoly and competition. Essentially they argued that most situations are composites combining elements of both monopoly and competition. Usually, the product is differentiated, or, if homogeneous, the number of sellers is sufficiently small that each has some influence on the price. Competition is in terms of substitutes, and is only partial. The theory is exclusively concerned with static equilibrium. The analysis is based on self-interest motivation working through single firms' attempts to maximize profits both short and long run.

Robert Triffin sought to integrate imperfect competition theories with general equilibrium analysis. When all independent decisions were made compatible through interactions in the market, equilibrium was achieved. Thus resulted a theory of the economic unit and a theory of external interdependence.

The eclectic theory synthesizes the Chamberlin firm approach, the Marshallian industrial equilibrium, and the Triffin general equilibrium concepts.

To indicate the need for a new conceptual framework, Chapter III explored the limitations of conventional theory. These reside in the \textit{ceteris paribus} assumptions and the maximum profits concept. The businessman cannot empirically discover
the position or slope of objective demand curves. He does not
test utilization of capacity. Marginal costs and marginal
revenue cannot be ascertained, nor equated.

Asset values are changed by demand shifts, technical
changes, and interest rate changes. A pricing decision
involves a complex time distribution of allocable fixed costs.
Practically all decisions include elements of futurity that
static theory cannot handle.

It is assumed that a firm sells but one product. Almost
all firms conceive the product as a matrix of many products,
making the precise calculation of the marginal costs, for any
one item, impossible. Cost and revenue functions are not in-
dependent. The demand curve is influenced by, and therefore
partly depends upon, selling costs.

If profits are maximized are these realized profits,
expected profits, gross, net, distributed, or undistributed
profits? Over what period? Whose Profits? Owners or managers?
If a firm knew its output was not the most profitable, leaving
aside the question of how it would discover this, how would it
backtrack, changing its price and output, along an average
revenue curve the location and slope of which are unknown at
any moment, and which shifts over time?
It seems fair to assert that the static theory of the firm cannot be used for the prediction of business behavior because of defects in the cost and revenue functions; extreme instability, lack of continuity, lack of independence; and inapplicability of static methods to changing conditions. Much business behavior is non-rational, traditional, or motivated by extra-economic considerations. The number of variables is large, subjective, and non-measurable. The range of output variation is small, and the range of anticipations is long. There can be no numerical definiteness of estimates to equate marginal revenue and marginal cost. The static theory of the firm then has limited applicability for policy.

There is needed a conceptual framework which will show the actions of a normal businessman under the specific conditions of an oligopolistic environment.

Accordingly, Chapter IV presented abstracts of more recent contributions to price and output theory that have appeared to carry forward the development of theory based on factual observations. The kinked oligopoly demand curve of Sweezy, and Hall and Hitch, takes cognizance of the businessman's consideration of rival's reactions; and points to the imagined, or subjective demand curve, as the only meaningful one. This analysis starts with the existing price and does not explain it.
Hall and Hitch derive the price from a full-cost principle. Direct costs were marked-up to cover fixed costs and a "fair" profit. This margin was modified by competition so that approximately the same prices for similar products would prevail for the competing group. However, full-cost pricing justifies any existing price.

P.W.S. Andrews tries to show why the kink occurs at the normal-cost level of price. In planning scale, a plant is built larger than necessary for expected average output in order to provide flexibility for product and technological innovation. Granted this reserve capacity, the fixed plant then is, in fact, substantially variable about the basic output, giving constant average direct costs through the range of variation.

In the long run, falling technical costs offset rising managerial costs, giving constant long run average costs. Goods become technically standardized so that firms have about the same average direct costs. Price is determined by adding a gross profit margin the size of which is determined by competition. Profits are maximized only over the long run. In the long run a manager sees that orders will go to a competitor if he can supply a good of equal quality at a lower price. The typical customer of an oligopolist is another business which must sell competitively. There are no irrational
preferences. Short run goodwill from a continuing supply of a satisfactory article cannot be exploited or it will be lost in the long run. Buyers are always alert for better quality or lower prices, so an individual firm cannot maintain an independent price policy over time. Therefore, the firm sees its long run demand curve as horizontal, and its price changes are limited by long run competition.

Here is the essence of the equilibrium tendency. Price is stable in established conditions, and the firm will supply what the market will take, cutting price only as costs permit to extend its market. If a firm exceeds normal cost price, it will expect its demand to shrink as others move into its market. Raising prices by agreement will motivate lateral transfer entry because of inviting gross profit margins. Businesses are limited on the demand side by goodwill, and on the supply side by entry and long run falling technical costs. Firms meet normal increased demand at an unchanged price, price changing only from long run shifts in factor costs. Mark-ups are adjusted by experience to give the normal cost price that gives a gross profit that maintains market share, and prevents entry.

Hence, normal cost theory offers a rationale of price determination which is consistent with business practice. It helps to explain how firms arrive at the stable price with a kinked
convex demand curve. Firms would like to charge what they could get, but in the long run standardized products must command the same prices. A firm's market share depends on the "right" price. It must meet and keep out competition. Goodwill will not support long run price differentials. Once again the industry emerges as a natural extension of the theory of the firm.

But how does a firm know when its price is "right"?

W.J. Eiteman contends that because operations involve turning working capital and the danger of inventory losses, businessmen use inventory changes and turnover rates as the basis for their managerial decisions on matters relating to price and output. Declining turnover rates, or mounting inventories, indicate prices, or the scale of operations, have advanced beyond the limits set by demand. This theory is reconcilable with Andrews' normal cost price. Price is stable in the short run, inventory variations compensating for demand fluctuations. Rising inventories would indicate the firm price exceeded the normal cost price. Since a manager wishes to maximize production and turnover, he will reduce price when demand persistently declines, or when costs permit. When demand increases, the manager first increases output to extend his share of the market. If it is a long run general increase in demand, output can be increased
only with increased factor costs, which may then result in all firms raising price to protect the industry margin.

Joe S. Bain's theory of limit pricing suggests that an oligopolist sets price below where marginal revenue equals marginal cost so long as the decrement to profit in period one is more than offset by the increment to profit in period two. The upper-limit price is that price which will discourage all entrants. This is a long run profits maximization concept and price determination decisions take into consideration potential competition.

In William Fellner's "bargaining theory", the thesis is that in the case of fewness, decision-making units shape their policies in view of how they mutually react to each others moves. Under oligopoly conditions objective supply and demand curves are not determinable because of mutual interdependence. All theory can do is set up long run limits for pricing. Cost and utility functions set the limits for a firm, but since they can not be uniquely defined, then, for the range between such limits, the outcome will be indeterminate, depending on assumptions about rivalrous reactions, or "conjectural interdependence." Thus the difference between collusion and spontaneous coordination becomes theoretically indistinguishable.

Richard Heflebower conceives a "balance", or equilibrium, arrived at through an evolutionary process whereby firms come to
acquire a workable relationship with one another. This environment then limits short run decisions. Market position becomes a means of long-term profit maximization under conditions of uncertainty, and governs the feasibility and effectiveness of various forms of rivalry. Oligopolists are reluctant to disturb this balance, and hence compete through other devices than price changes. Heflebower agrees with J.M. Clark that some insulation from price competition is a necessary condition for the assumption of risks and uncertainties associated with innovation in product and processes, and investment in the most efficient equipment. Innovation and entry may be sufficient to erode non-competitive levels of price and profits. Factors held constant in a simple cost-price-output model have, potentially, a major effect on economic results and tend to undermine price when that price fails to reflect on optimal combination of product quality, process and cost, and output rate.

Kenneth Boulding borrows from ecology, populations act and react upon each other, and the equilibrium size is a function of the size of all others. The organism, the firm, has a law of internal growth pressing against a complex external environment. His theory of the firm is a "homeostasis of the balance sheet" comparable to the physiochemical equilibrium of the body. Inventories are the homeostasis thermostat. They "feed back" an output error as an input correction. It is not true
that the movement towards equilibrium must be through the price structure. Sellers regard price policy as a long run matter not to be disturbed for temporary changes. Excess demand may be met by increased production. Excess supply may be met by production cuts, or increased selling effort, at the fixed price. The thermostat is set at a fixed price and inventory changes trip the mechanism.

In Alchian's "viability" analysis uncertainty is emphasized, with a survival of the fittest concept. Where there is uncertainty, a firm cannot know the results of its actions in advance. Only positive profits, however, are necessary for survival. Innovations are analogous to mutations, and their copying determines the evolutionary trend of industry.

Firms cannot adapt, once and for all, to a given environment. They must consider probabilities and retain flexibility for readaptation to a changing environment. This environment is the result of all firms' actions and hence, cannot be known in advance to any one firm. Each tries his own methods and there is a natural selection through competition.

In Chapter V the foregoing contributions were synthesized in an eclectic theory. A culling of the literature confirms the existence of an impressive body of factual material sufficient to afford a basis for formulation of hypotheses thought to be congruent with observed business behavior. Cost and revenue
functions can only be subjective estimates, hence, businessmen must use methods that fit their information. Managements will emphasize the stability of operations at a level of output, costs, price, and market share to insure a satisfactory rate of return on capital, at a level expected to be maintained in successive periods. The effort will be to reduce uncertainty rather than to maximize increments to income. The target is a reasonable, long run profit conditioned by competition, antitrusters, labor unions, customers, and ethics. A price is quoted that is not so low that it provokes retaliations, nor so high that it encourages new entrants, or loses consumers' goodwill. Within these limits the oligopolist will quote that price which will cover his expected costs and a fair profit. Homeostasis permits a range of variation and viability analysis requires only positive profits.

It seems acceptable that consumer rationality is sufficient to insure equal price for like quality in the long run. The businessman changes a competitive price and then meets the demand at that price, up to his productive capacity. Over the long run, consumers guide production by selecting for survival those firms whose production decisions most nearly conform to changing consumer preferences.

Cost functions are not determinable nor known. Businessmen seem to think that average costs decline until output is at
capacity, and that long run expansion takes place at decreasing costs. Hence they are motivated to maximize output.

In American manufacturing multi-product, and multi-plant, and vertically and horizontally integrated firms are typical. But within large financial empires there is specialization by firms. Since different brands of the same commodity compete more closely than do different commodities, there appears to be justification for retaining the concept of the industry as a tool aiding progress toward a general equilibrium approach. Each firm must be analyzed within its industrial environment and then each industry within the total economic environment.

The firm is the unit maximizing satisfactoriness, with an identifiable product-line involving specific technological processes. Costs of multi-product production processes not being separably determinable, the product is regarded as the output of the firm consisting of all the items of the product-line. The industry then, consists of those firms engaging in similar production processes. It is defined in terms of these processes rather than products. The market includes all buyers and sellers of any product whose actions influence a firm's volume of sales. The market conditions a firm's reactions in a mature industry.

The firm seeks a profit on its product-matrix not necessarily on each item. The object is to recover costs in the aggregate
plus a satisfactory return for the use of capital. This is facilitated the larger the firm's share of the market. The firm operates within industries carrying on sufficiently similar technological processes that any firm could laterally transfer its resources to the production of an item in another firm's product-line, if abnormal profits existed. Primary competition is between firms in an industry, until the market for that good has achieved maturity, and then shifts to competition between industries in the economy as effort is expanded to persuade the consumer to substitute unlike goods in the satisfaction of the same general want. A child is conditioned by its family but that family in turn is conditioned by its society's changing culture. A firm reacts within an industry, but the industry adapts to the economy.

After production processes, and product design, have become stabilized, production costs tend to become similar for firms producing similar items. Competition limits the mark-up over similar average variable costs so that equal price tends to prevail for like items. Since average costs are thought to decline up to capacity, the firm wishes to maximize the output of all items. Eiteman's turnover theory reflects the emphasis on producing all the market will take at a fixed price. Inventories provide the flexibility that a stable short run price necessitates.
Each firm is motivated to reduce price to gain volume as long as the market is expanding until price tends to approach the level of average costs. After maturity price cuts would lower the profit margin, and gain sales only at rivals' expense. Firms will not permit this. Price becomes stabilized at the full cost level, and thereafter competition is through non-price parameters of action.

When maturity arrives, each firm has achieved a share of the market which it cannot expand, and inroads upon which it cannot permit. Kink theory then becomes relevant. Price is changed only as it becomes necessary to protect profit margins but not to affect market shares. Price is changed only when a factor has the same impact on all firms alike. All firms will raise price together when there is a general cost increase. However, a general increase in demand will not have a uniform impact, since different individuals will experience different income increases, so firms will hold price while expanding capacity. Thus Heflebower's "balance" is preserved. The insulation from price disturbances is conducive to the assumption of risks of innovation in product quality and process cost reductions.

Competition now seems to shift to interindustry competition. The changing environment to which firms must adapt comes from
this competition between industries. Innovation, and the substitution of unlike goods in the satisfaction of the same general want, becomes the essence of competition in American manufacturing industry.

To assess the competitive situation of a firm, we must take categories of uses for the output of an industry and consider what products of other industries directly compete within these categories. Aluminum, for instance, competes with copper wire. In die castings, aluminum competes with almost anything that can be melted. In construction, aluminum competes with steel, wood, magnesium; and many other materials enter into the system of alternates.

In consumer goods attention should be focused on the service flow which a good yields over time, rather than upon the good itself. Household appliances remove the want to economize activity. Then an electric refrigerator and a vacuum sweeper both provide a service flow which enables the members of a household to avoid expenditure of energy. One way of conserving energy may be preferable to another, but the fact remains that the individual allocator has a choice of alternatives. Even functionally unrelated goods may be substituted for one another to satisfy a need for, say, recognition. Interindustry competition can be discerned only through the relationships of the market place.
This represents at least a "frame-of-reference" for an industrial case study. In Chapters VI and VII the history of the American rubber industry was outlined, and the economic attributes of the chief products, tires and tubes, were described. In Chapter VI a factual background was supplied the reader on agricultural rubber and its price manipulations, compounds, and chemistry. Relationships with the synthetic rubber and scrap and reclaim industries were indicated. Industry technology was described, as well as innovational competition, productivity, labor relations, and cost, price and profits behavior.

In Chapter VII numerical development in the industry, characteristics of the big four firms, geographical location, mechanization and scale, integration, organization and ownership, trade associations, research, advertising, export-import relationships, taxes, and market structure were described.

In Chapter VIII, with this factual background, the industry was analyzed, comparing marginal analysis and the eclectic theory as explanations of what has occurred. The industry growth pattern, price behavior, excess capacity, advertising, entry, and product development, were specifically analyzed. The results of interviews with executives of Akron rubber firms were reported. Occurrences in the industry seemed capable of being interpreted with the eclectic theory, and executive
statements of policies and practices were not inconsistent with the basic hypotheses.

The rubber industry was quite unstable in earlier years, because it had to contend with manipulated prices of its chief raw material, crude rubber. Periodic huge inventory losses made large financial resources a condition of survival, and forced concentration. Now, a big four dominates the industry. Tires and tubes account for sixty per cent of the output. There are fifty-seven tire producing firms, but the big four account for seventy-five per cent of the output. The eight largest produce ninety per cent of the output.

The tire market consists in effect of two markets, the original equipment market and the replacement market. The replacement market accounts for about seventy-two per cent of total sales, and original equipment twenty-eight per cent. The replacement market divides into two, that for new tires and that for used or recapped or retreaded tires. The new tire market divides into those sold under the manufacturer's brand names and those sold under private brand names of oil companies, mail order houses, auto parts companies, and chain stores. The big four have ninety-seven and seven-tenths per cent of the original equipment market, and sixty-five per cent of the replacement market.

Yet competition is demonstrated in the price wars, separate production and distribution, area preferences, creation of
new products and processes, and technological innovations.

The trend of tire prices has been well below that of other manufactured products as quality has improved, and rubber industry profits have been below that of manufacturing generally. Although there is no substitute for a rubber tire, and the industry has been dominated by a completely integrated big four, it is manifest that there is workable competition.

Unfortunately anti-trust policy has tended to judge the consequences of competition as emanating from the conditions of competition. Competition is a matter of results.

B. Conclusions

As more is learned about the dynamics of modern markets, prices, competition, innovation, and business behavior, the more apparent is the need for a theory of competition that takes account of growth and innovation. Existing theoretical models have been insufficient to explain the competitive process under present conditions. These models have been even less reliable as guides to public policy.

Policy orientation needs to be integrated with the evolving understanding of business behavior, with new concepts of effective competition not related to static marginal analysis.

The endeavor here has been to point up this need, and at least to suggest the foundations for a theory of effective
competition that takes into account dynamic factors.

This study of the rubber industry has gone behind supply and demand curves, and described the basic institutional, technological, and related conditions, which shape and shift these functions. It, perhaps, has helped to reveal the essential complexity of competitive behavior.

The description of rivalrous reactions and results recorded for this single industry permit no generalizations. It was intended only as an exemplary case study in which the eclectic theory could be used to interpret behavior in the industry. But a large number of such case studies should clarify what is typical for the purposes of assumptions.

If other cases of fewness can be as adequately analyzed with the eclectic theory as a frame of reference, then this theory has important implications for revisions of concepts of public policy.

C. Recommendations for future research

Progress in the formulation of a general theory of effective competition necessitates the multiplication of detailed industrial studies and the attempt to relate discoveries to theory.

Much more needs to be done in the generalization and interpretation of the results of empirical research that has already been contributed. Future model building needs to be non-static,
and take into account functional relationships among economic variables over time, and the transitional processes of adjustment. Specifically, each of the sixteen basic hypotheses outlined in Chapter V needs elaborate testing and verification. Techniques to accommodate formal apparatus to the treatment of numerous variables, simultaneously and over time, need to be developed.
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D. INDUSTRIAL PUBLICATIONS

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Rubber Age
Tire Review
Goodyear Triangle (Sales field)
Goodyear Wingfoot Clan (employees)
AUTOBIOGRAPHY

I, James Marion McLain, was born in Atlanta, Georgia, May 16, 1913. I received my secondary school education in the public schools of the city of Akron, Ohio. My undergraduate training was obtained at the University of Akron, from which I received the degree Bachelor of Arts in 1940. From Western Reserve University, I received the degree Master of Arts in 1942. During the academic year 1939-1940, I was under-graduate assistant to Dr. H. O. DeGraff (in Sociology) at the University of Akron. While in residence at Western Reserve University, I acted in the capacity of graduate assistant to Dr. N. N. Fackett (in Sociology) during 1940 - 1941. In February 1942, I was called into the military service and spent four years in the Southwest Pacific in the 158th Infantry Regimental Combat Team. I was wounded in the Philippines and discharged in February, 1946, as a Captain. After a brief industrial experience at the Firestone Tire & Rubber Company, Akron, Ohio, I taught Social Psychology at the University of Akron for one semester, and in the fall of 1946, I received an appointment as an instructor in Economics. In 1950, while on leave from the University of Akron, I taught as an assistant in Economics at the Ohio State University until June, 1952. In the fall of 1952 I returned to the University of Akron as an Assistant Professor of Economics, where I have continued to teach while completing the requirements for the degree Doctor of Philosophy.