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CHAPTER III

THE MEASUREMENT OF PRICE INSTABILITY PRICE RELATIVES IN COMBINATION

I Price Relations and Economic Processes Price Instability

In the interpretation of measures descriptive of the behavior of prices of individual commodities, one naturally compares them with similar figures relating to other commodities. This tendency to compare arises from inherent relations between commodity prices. An individual price has significance only in its relations to other prices. These relations, and changes in these relations, play a vital part in economic processes.

1. THE PRICE SYSTEM

The broadening of the approach to the study of prices which has characterized work in this field in recent years is due in large part to the introduction of the conception that prices constitute a unified, coherent system.¹ This conception emphasizes the fact that no one price is an isolated, independent phenomenon. From each price lines of relationship run out to all other prices coeval with it in time and back to previous prices, while similar lines run forward to affect future price quotations. Every price is connected by immediate or remote bonds to every other price.

Within the broad system of prices which is formed by this infinity of ties there are numerous elements. Each of these may, perhaps, be viewed as a minor price system, with characteristic features and modes of behavior. For an understanding of the price system as a whole it is necessary to isolate these separate elements, studying them individually and in relation to the whole system. The elements entering into the complex net which is the price system are not, of course, restricted to commodity prices. The prices of human services, of land, of capital and credit, the prices of business enterprises themselves, constitute elements of the price system,

¹In the form in which it is here presented this conception is due to Wesley C. Mitchell. The role of prices in economic life and the numerous bonds which tie into a well-articulated system the multitude of prices of individual commodities and services are described by Dr. Mitchell in *Business Cycles: The Problem and Its Setting* (National Bureau of Economic Research, 1927), pp. 108-116. Léon Walras, in describing the conditions of general economic equilibrium, defined in mathematical terms certain characteristics of a system of related prices. In the Walrasian system prices are one element in general economic equilibrium.

and each of these has unique features. The present study is confined, with minor exceptions, to the system of commodity prices.

This system is never at rest. It is a changing organism, with its parts constantly altering their relations to each other. An account of the working of the price system must, therefore, be a dynamic one. Change is of the essence of the relations which are here studied.

The remainder of the present volume and all of the volume which will conclude the present study deal with the system of prices. For a study of the behavior of prices in combination is a study of the price system. Interest attaches to the behavior of prices in combination because of the immediate economic significance of changes in the net-work of relations which tie prices together. Such changed relations disturb (or reflect changes in) that equilibrium between prices which prevails when there is an uninterrupted functioning of economic processes. These disturbances are discussed in the next section.

2. THE NATURE OF PRICE STABILITY AND INSTABILITY

The analysis of price relatives in combination may be looked upon, in one of its most important aspects, as a study in price instability. This term and its companion, price stabilization, are used in a somewhat loose fashion in current discussion. Some precision may be gained by distinguishing between three fairly distinct, though related, meanings which may be attached to price instability. The first relates to what is commonly called the general level of prices, the second to relations between individual commodity prices and groups of prices, the third to the characteristics of frequency distributions of price relatives.

a. *Instability of the Price Level.* In so far as the term price stability has a definite and generally accepted meaning in current usage, it refers to the general level of prices. A fairly uniform price level, such as that which prevailed in the United States between 1909 and 1915, is considered to be stable, while a fluctuating price level, similar to that prevailing between 1916 and 1921, is said to be unstable. Price instability of this kind is measured by index numbers of the usual type.

The economic and social effects of such fluctuations in general prices have been discussed elsewhere in considerable detail, and extensive programs looking toward the stabilization of the price level

have been formulated. Later detailed discussion will bear in part upon the measurement of such instability, and upon the relations between instability of this type and other forms of price instability.

b. *Internal Instability: Alterations in the Relations among Prices.* The changes in prices which are matters of immediate concern to producers and consumers of goods and to recipients of money incomes are those which affect the relations between different elements in the price system. By internal instability is meant that form of price instability which develops when a set of established price relations is disturbed. When buying and selling relations at any point in the market are altered, economic equilibrium is disturbed and some element of instability is introduced. Such instability is obviously not unrelated to the changes in the price level which were mentioned in the preceding paragraph. In fact, the practical effects of an unstable price level upon the economic system appear through changes in established price relations. The force, or combination of forces, which raises or lowers the general price level does not affect all elements in the price system at the same time nor in the same degree. Internal instability is in part, at least, a result of an unstable price level. The two types of instability are sufficiently independent of each other, however, to require separate treatment.

Alterations in price relations may be due to changes in the quantity of money in circulation, to changes in manufacturing and marketing methods, to a temporary shortage or surplus of goods, to any of the thousand factors that affect economic processes. The causes of internal instability are not, of course, found exclusively in the price system itself. Perhaps the chief causes are external to that system. To the extent that external causes are responsible, prices constitute merely the medium in which changes in market relations are reflected. Back of changing price margins and shifting price ties are alterations in economic relationships, alterations which may be slight or profound. These are the ultimate objects of interest.

It may not be altogether accurate to describe by the term price instability the condition which develops when established price relations are altered, for such price relations are always changing. What constitutes a "normal" rate of change is something to be determined. In the meantime the measures of internal instability should be thought of as measures of the degree of change in price relations. The rate of change may be such as to indicate

marked instability at certain times, while at other times the measures of instability may approach the values which indicate a perfectly static condition, with unchanging economic relations. The proper interpretation of the measures to be secured is, of course, one of the matters with which we shall be concerned.

The problem of defining and measuring all the shifts in price relationships which contribute to, or which reflect, internal instability is probably not capable of definitive solution. Three types of internal movements which are capable of measurement have a bearing on such dislocations. These are:

- (a). The dispersion of prices, due to the varying degrees of change in individual commodity prices between given dates.
- (b). The shifting of relative position, or displacement of prices. (The difference between dispersion and displacement is discussed in a later section.)
- (c). Long-term shifts in relationship, due to differences in the secular trends of individual commodity prices. The significance of such changes in relationship was briefly discussed in Chapter I, in connection with the measurement of average annual rates of price change.

c. *The Population of Prices and the Problem of Group Stability.* The types of instability dealt with above relate to changes in the general price level and to changes in the relations among individual prices. The third form of instability to be investigated is a group attribute, as is the first, but an attribute of a different order. In defining it we deal with the entire population of prices as an organic entity. We may study the characteristics of this group just as we would study the characteristics of any population. As we might inquire concerning a biological group, so we may ask of the population of prices: Is this population homogeneous? Is it subject to the play of balanced forces, with the tendency toward individual variation held in check by stabilizing factors? Or is it heterogeneous, marked by wide and sporadic variation, subject to the play of forces which are limited in number or unbalanced in their incidence? These questions bear directly upon the stability of the price system itself, and upon its utility and reliability as an economic instrument. The fuller development of this theme, and the attempt to answer some of these questions, may be postponed until more detailed attention has been given to the measurement of changes in

the price level, to the study of price dispersion and to the analysis of price displacement.

There is, of course, a close relation between the problem of price stability and that central problem of economic theory which is concerned with general economic equilibrium. In studying price instability we are dealing with the monetary aspects of this classical problem. The relationship between the movements of prices and the equilibrium of economic forces has been suggested by many writers, although there is a sharp difference of opinion as to the direction in which the chain of cause and effect runs. There are those who look upon the price system as the source of major disturbances, there is an opposing view that price instability is merely a reflection of more fundamental disturbances of economic equilibrium, while a third group would stress the mutual dependence of price and non-price factors. This particular problem is not one which concerns us at present.

3. PROBLEMS RELATING TO COMMODITY PRICES IN COMBINATION

Certain of the problems connected with prices in combination have been indicated above. A brief summary, in more specific form, of the matters which will be considered in the present and the following chapters will indicate the scope of this treatment.

The first measures to be studied in combination will be those relating to price changes between specific dates—link and fixed base relatives of the usual type. This study will be confined largely to the behavior of prices in wholesale commodity markets.

The analysis of such measures is not a new procedure in economic research. An extensive literature has been built up about this subject, and there have been warm discussions concerning the problems to be solved and the methods to be employed in such studies. The questions which have engaged the attention of students in this field have been set for them, as in all studies, by contemporary interests and contemporary economic problems. Although interests and problems have changed somewhat since serious study of prices was begun, a single issue has been dominant. This issue is clearly set forth in the titles to certain of the fundamental memoirs. Jevons' pioneer study (1863) was called *A Serious Fall in the Value of Gold Ascertained*. Edgeworth's *Memoranda to the British Association for the Advancement of Science* in 1887-8-9 dealt with "variations

in the value of the monetary standard." In 1901 C. M. Walsh published his comprehensive book, *The Measurement of General Exchange Value*, and in 1911 Irving Fisher's work *The Purchasing Power of Money* was issued. The same central problem appears in works primarily concerned with the methodology of the subject, such as Mitchell's *Making and Using of Index Numbers* and Fisher's *Making of Index Numbers*. The earliest important studies in this field were undertaken to measure the effect upon general prices of changes in the volume of gold production. This interest has persisted, and the major purpose in constructing index numbers of prices has remained to this day the measurement of changes in the price level, or changes in the purchasing power of money. The object, that is, has been the study of the first type of price instability described above.

Though this interest in the "general level of prices" has been dominant, other aspects of the behavior of price relatives have received attention from students in this field. The widening of the sphere of interest is, in part, the outgrowth of technical studies relating to methods of index number construction. Jevons, Edgeworth and all their successors found it necessary, in deciding upon appropriate methods of measurement, to study frequency distributions of price relatives, and this study has drawn attention to aspects of such distributions other than their central tendencies. Again, the recognition that an index number must of necessity be based upon a sample set of price quotations raised questions concerning the procedure to be followed in securing a representative sample. The tendency toward a broader approach to the study of price behavior which is attributable to these studies in method has been reinforced by other considerations. Specific information concerning particular groups of commodities has been desired. There has been, besides, a growing appreciation of the economic importance of the price relations between different commodities and services. The conception of prices as a system has been introduced, and the internal structure of this system has become an object of scientific inquiry. Once the significance of this conception is appreciated, it is clear that no single index number of commodity prices can yield the information concerning the behavior of prices and the shifts in price relations which economists and business men require. For many important aspects of price behavior quite elude measurement by such an index.

Among the objects of study in a survey of the price system are

those other types of price instability described above—instability of internal relations, and group instability. Measures of the dispersion and displacement of price relatives must be constructed, and account must be taken of those long-term shifts which are due to differences in trend. In the study of group stability and homogeneity we shall be concerned with the attributes of frequency distributions of price relatives. In approaching this problem we lose sight of individual commodities and our sole interest attaches to the attributes of the entire population, considered as an entity.

Somewhat similar problems present themselves when we pass from price relatives to other measures of price behavior. We shall study cyclical measures and measures of variability and trend in combination, again seeking information concerning the group attributes of prices. It would be desirable to analyze in the same way collections of measures of price flexibility and of regional price differences, but the available figures are too limited in number to permit of generalizations concerning group behavior. The study of such measures in combination must wait upon the assembling of the necessary data.

The final stage of the study, and the most important from the point of view of one interested in the elements and internal structure of the price system, is the isolation and analysis of price groups and the testing of various grouping principles. The data described in the present volume furnish some of the basic materials for such an analysis. The detailed account of this part of the study is deferred to a second volume.

II The Description of Price Relatives in Combination

The present chapter deals with the first of the measurable characteristics of commodity prices which were discussed at an earlier point—degree of change in price between specific dates. The first step in the study, in combination, of the relatives which measure these changes is their organization in the form of frequency distributions.

1. FREQUENCY DISTRIBUTIONS OF PRICE RELATIVES

Distributions of price relatives may be constructed in a number of different forms, representing various combinations among measures of the following types:

- (a). Fixed base and link relatives
- (b). Unweighted and weighted relatives
- (c). Relatives in natural and in logarithmic form