

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Price-Quantity Interactions in Business Cycles

Volume Author/Editor: Frederick C. Mills

Volume Publisher: NBER

Volume ISBN: 0-87014-114-7

Volume URL: <http://www.nber.org/books/mill46-1>

Publication Date: 1946

Chapter Title: Introduction: Physical Volume, Unit Prices, and Monetary Values in Business Cycles

Chapter Author: Frederick C. Mills

Chapter URL: <http://www.nber.org/chapters/c5525>

Chapter pages in book: (p. 1 - 7)

〈CHAPTER I〉

INTRODUCTION: PHYSICAL VOLUME, UNIT PRICES, AND MONETARY VALUES IN BUSINESS CYCLES

THERE is a familiar distinction in economics between the physical or 'real' level of activities and the monetary level. At the one, we are concerned with the expenditure of physical energy and the use of physical materials in the production and distribution of goods. At the other, attention is given to the money values of commodities and services—values of individual goods, groups of commodities, or large aggregates. The continuing activities of economic life center on the stream of physical goods and services and on the flow of payments that is its monetary counterpart.

In the expansions and contractions of business cycles the flow of both goods and values are affected.¹ There are changes in the quantity of goods produced, of goods consumed, and of productive services rendered. There are, similarly, fluctuations in the aggregate values of goods and services—in the value of the national product, of consumers' outlay, of capital goods produced, and of commodities and services in various other categories. But the movements of the stream of goods and of the stream of values are not identical. Changing unit prices intervene, causing the two streams to fluctuate with different amplitudes and with different timings in their accelerations, their retardations, and their major changes of direction.

Thus, the cyclical movements of three related elements are of immediate interest to students of business cycles. Fluctuations in the number of physical units of goods produced and of services rendered interact with variations in unit prices to yield the expansions and contractions in value that are observable at the monetary level. Our purpose in this study is to obtain a better understanding of the relations among the cyclical fluctuations in values, prices, and quantities.

¹ Throughout this book the term 'value' is used to mean the monetary value of a commodity or group of commodities. In this sense value is the product of price per unit and number of physical units.

PRICE-QUANTITY INTERACTIONS

Such an understanding may be sought in two directions. One leads to study of the larger aggregates of values (aggregates built up from the monetary payments for individual commodities) and their price and quantity components. The most comprehensive form of such an aggregate would include total payments of all sorts in the economy—payments for goods at the raw materials stage, in semi-finished form, in finished form in wholesale and retail markets; wages and salaries; dividends, interest, and rent; taxes; payments of debts; payments for the transfer of title to real estate, securities, or other forms of property. In this form, of course, aggregate payments are many times² greater than the aggregate value of goods produced and services rendered. For total payments include much double counting of commodities, and are affected, also, by transfers of title that represent no change in physical form or properties. We deal in this report with a less inclusive aggregate, the value of goods currently produced and of services currently rendered. In the study of this aggregate (and its major components) one would ask: To what extent do expansions and contractions of business represent changes in the money value of spending and income, merely, and to what extent changes in the underlying stream of physical goods and services? How do the unit price and physical quantity factors interact? How do their amplitudes of change compare, their rates of expansion and contraction at different stages of cycles, their timing in cyclical movements?

The other direction leads to study of the relations between the prices and quantities of individual commodities, under the impact of cyclical forces. The essence of an enterprise economy lies in the interplay of prices and quantities, and in their mutual adaptation. Economists have pictured these adjustments as effected through shifting supply and demand relations, and have thought of these relations as definable in a tissue of supply and demand functions. Such functions, static in conception yet

² Some 10 or 11 times at least. Bank debits, as estimated by the Board of Governors of the Federal Reserve System, are approximately 10 times the gross national product, as estimated by Simon Kuznets. Cash payments would increase this ratio. A study of the flow of payments is now being conducted for the National Bureau of Economic Research by Morris Copeland.

INTRODUCTION

subject to change over time in both shape and position, are inadequate instruments for the study of the price-quantity adjustments that occur as business cycles run their course. Only in imagination can dynamic changes be separated from static relations. For present purposes dynamic aspects are the central objects of investigation. We must do what we can to define and understand correlative cyclical changes in the prices and quantities of individual commodities and corresponding changes in the outlays of buyers.

In tracing these movements two problems concern us. We shall in the first place examine the interrelated movements of commodity prices and quantities during business cycles. Quantities produced, consumed, or traded constitute the physical bases of economic accomplishment, and of existence. Prices are the bases of exchange, the measures of relative worth, the keys to the allocation and utilization of resources. In some sectors of the economy individual producers and, indeed, whole industries effect adjustment to the forces of business cycles by modifying the physical quantities produced and marketed. In other sectors producers adjust to cyclical changes by altering unit prices.³ In other words, business cycles, as they are manifest in certain sectors of the economy, are primarily quantity phenomena; in other sectors they are primarily price phenomena; in still other sectors the quantity and price factors dispute the primacy. The economic and social consequences of these two modes of accommodation are, of course, widely different. In seeking light on how prices and quantities interact in various markets during business cycles we shall be exploring these two modes of adaptation.

³ It is convenient to speak of the 'adjustments' effected in business cycles through the price-quantity mechanism. The term doubtless implies that through related changes in the prices and quantities of individual commodities adaptation is effected, in commodity markets and in producing units, to external forces associated with cycles in the economy at large. This is not, I think, an inadmissible assumption. It is true, of course, that the price-quantity movements of each commodity influence, in their turn, other economic series, and that business cycles at large are composed of congeries of such interacting changes. The initiatory role of any one pair of price and quantity series in a business cycle is not great, however, so it is justifiable to think of cyclical movements in one pair of series as primarily 'adjustment effecting'.

PRICE-QUANTITY INTERACTIONS

The second problem has to do with outlay patterns for individual commodities. The total value of the output of a given commodity in a given period is computed by multiplying the number of units produced by the average unit price. This gives the required measure of the monetary outlays of buyers of that commodity (or of the revenues of sellers).⁴ Having such measures for a substantial sample of commodities we may study, in detail, the ebbs and flows of buyers' outlays, for various classes of goods, and determine the relative roles of price and quantity changes in the cyclical fluctuations of monetary payments.

The present investigation is concerned primarily with the mechanism of price-quantity adjustments, for individual com-

⁴ In deriving our measures of monetary outlay, or value, from unit price and quantity records it is assumed that goods changing hands in any given month have been sold at the prices quoted in that month. If the value measures are taken to represent a current flow of monetary payments, it is further assumed that payments are made at the time of the transfer of the physical goods. Obviously, neither assumption is strictly accurate. For some commodities contracts may be made well in advance of delivery, at prices that are constant for the season, regardless of the course of current quotations. Even without such contracts delivery may be made with a lag, i.e., current prices may relate to deliveries to be made weeks later.

The transfer of funds in settlement of a sale may, in turn, lag behind the transfer of the goods. Since we do not have the information concerning market practices that would be necessary to correct for such lags, we assume that price quotations, physical deliveries, and monetary payments are synchronous, within the time period set by the use of monthly data and by the process of averaging by cyclical stages (see App. Table 1). This averaging process irons out many of the time differences. The assumption that changes are synchronous, within the limits indicated, probably accords with the facts for many of the commodities here studied; for some it is clearly in error. In particular, for some commodities actual monetary flows doubtless lag behind the movements recorded for the present value series. These value series, in fact, may be regarded as indexes of the volume of financial commitments, on the part of buyers, rather than as measures of actual cash payments. It will be convenient, however, to use the term 'outlays of buyers', but the reservations here suggested should be borne in mind in the interpretation of results.

Similar reservations apply to the term 'revenues of sellers'. When freight charges, commissions, and other transfer payments are to be met by buyer or seller, sellers' receipts and buyers' outlays are not identical. However, since the broad cyclical swings of these two aggregates are closely parallel, I have used the terms interchangeably.

The present measures of monetary outlays are presented as first approximations to the cyclical fluctuations in the volume of monetary payments that parallel the transfer of physical goods. In a more accurate set of records account would be taken of the leads and lags that grow out of varying trade practices in the exchange of economic goods.

INTRODUCTION

modities, and with outlay and revenue patterns for these commodities, separately and in various aggregative forms. We do not attempt to deal with total monetary payments in the economy at large. However, it will be helpful to introduce the discussion by a brief survey indicative of the character and dimensions of the value, price, and physical volume changes that have occurred in the United States during a recent period. In this, we utilize estimates of gross national product made by Simon Kuznets.⁵

Gross National Product, United States, 1919-1938

Av. annual value, millions of dollars	75.653
Av. change in 5 cyclical expansions	
Absolute, millions of dollars	+14.464
As percentage of av. annual value	+19.1
Av. change in 5 cyclical contractions	
Absolute, millions of dollars	-14.079
As percentage of av. annual value	-18.6

The fluctuations in gross national product, as averaged for these five cycles in general business, were substantial. In both expansions and contractions the average movement exceeded \$14 billion. In relative terms, the annual accretions to gross national product during business expansions averaged 19.1 percent of the mean annual gross product; losses during contractions averaged 18.6 percent.⁶ Losses have on the average almost equaled the gains of expansion. (Declines were exceptionally severe on the whole in the sample of recent cycles here included. Long-run American experience would show relatively greater gains in expansion.)

Do these cyclical fluctuations in the money value of gross national product represent equally large movements in the aggregate of goods and services that make up the *real* national product? What part do price changes play in the cyclical swings

⁵ *National Product since 1869* (National Bureau of Economic Research, in press).

⁶ The base is the average of the annual values. Measured against average values in years when cyclical lows were reached, the cyclical increments to gross national product average 20.0 percent. Declines during contraction average 16.2 percent of average values in peak years.

The observations on which these measures are based are annual aggregates. The cyclical fluctuations would be substantially larger if monthly figures were available.

PRICE-QUANTITY INTERACTIONS

of total value? Kuznets' materials help to answer these questions. His reports provide estimates of gross national product in 'constant' dollars. By the use of deflating indexes the effects of changing unit prices have been eliminated, so far as possible. From estimates expressed in 1929 dollars we derive measures of relative changes in gross national product during cyclical expansions and contractions. These we may take to define, with reasonable precision, changes in the physical quantities that underlie the value aggregate. These measures, with corresponding estimates of average changes in unit prices, are given in Table 1.

TABLE 1

Cyclical Changes in Estimated Annual Value and Aggregate Physical Volume of Gross National Product, and in the Average Unit Price of its Components, 1919-1938

	AV. CHANGES IN 5 BUSINESS CYCLES, AS PERCENTAGES OF AV. ANNUAL FIGURES		
	Expansion	Contraction	Full Cycle Amplitude ^a
Aggregate value	+19.1	-18.6	+37.7
Aggregate physical volume	+15.2	-9.1	+24.3
Average unit price	+3.4	-10.5	+13.9

^a Algebraic difference between the change in expansion and the change in contraction.

During the five business cycles between 1919 and 1938 swelling physical volume was the major factor in the expansions of the value of gross national product. The contribution of rising unit prices (which advanced, on the average, some 3 percent of their mean value) was not negligible, but it was distinctly less important than the increase in the number of physical units entering into the national product. In contractions the story is different. An average decline of 9.1 percent in the quantity factor was paralleled by a decline of 10.5 percent in unit prices. During this period cyclical fluctuations in the value of gross national product were dominated in expansions by increases in physical quantities; in contractions they were dominated, but by a much narrower margin, by declining unit prices. In the aggregate of movements in expansions and contractions the fluctuations of values exceeded those of the two components.

INTRODUCTION

Quantity variations stood next, with a range of fluctuation substantially wider than that of prices.⁷

This general record deals with a short period. We cannot be sure that study of a longer period would yield the same results. (In a time of rising price trends, for example, relative price behavior in expansion and contraction phases would be different.) Moreover, there are cross-currents and differences that are not revealed by an aggregate as comprehensive as gross national product. For a more detailed picture of the interaction of prices and quantities and of the behavior of buyers' outlays during business cycles we turn to price quotations and corresponding quantity records for a selected sample of individual commodities. Building on basic measures derived by the business cycles staff of the National Bureau in its description of cyclical behavior,⁸ we employ various methods that help to bring out the characteristics of outlay patterns and of related price and quantity movements. A brief account of the essential points needed for an understanding of our argument follows.

⁷ The entries in the last column are not accurate measurements of cyclical amplitude, being derived from annual series fitted into the framework of general business cycles. See *Measuring Business Cycles*, Arthur F. Burns and Wesley C. Mitchell (National Bureau of Economic Research, 1946), Ch. 6, for a discussion of this point.

⁸ For a detailed account of these methods of measurement see Burns and Mitchell, *op. cit.*