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STUDY PAPER NO. 1

RECENT INFLATION IN THE UNITED STATES

BY

Charles L. Schultze

MATERIALS PREPARED IN CONNECTION WITH THE
STUDY OF EMPLOYMENT, GROWTH, AND
PRICE LEVELS

FOR CONSIDERATION BY THE

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STUDY OF EMPLOYMENT, GROWTH, AND PRICE LEVELS

(Pursuant to S. Con. Res. 13, 86th Cong., 1st sess.)

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This is one of a series of papers being prepared for consideration by the Joint Economic Committee in connection with their Study of Employment, Growth, and Price Levels. The committee and the committee staff neither approve nor disapprove of the findings of the individual authors. The findings are being presented in this form to obtain the widest possible comment before the committee prepares its report.

LETTERS OF TRANSMITTAL

SEPTEMBER 21, 1959.

To Members of the Joint Economic Committee:

Submitted herewith for the consideration of the members of the Joint Economic Committee and others is a paper on "Recent Inflation in the United States."

This is one of a number of subjects which the Joint Economic Committee has requested individual scholars to examine and report on to provide factual and analytic materials for consideration in the preparation of the staff and committee reports for the study of "Employment, Growth, and Price Levels."

The papers are being printed and distributed not only for the use of the committee members but also to obtain the review and comment of other experts during the committee's consideration of the materials. The findings are entirely those of the author, and the committee and the committee staff indicate neither approval nor disapproval by this publication.

PAUL H. DOUGLAS,
Chairman, Joint Economic Committee.

SEPTEMBER 17, 1959.

HON. PAUL H. DOUGLAS,
*Chairman, Joint Economic Committee,
U.S. Senate, Washington, D.C.*

DEAR SENATOR DOUGLAS: Transmitted herewith is the first of the series of Papers being prepared for the "Study of Employment, Growth, and Price Levels" by outside consultants and members of the staff. The author of this paper is Prof. Charles L. Schultze, of Indiana University, Bloomington, Ind.

Additional papers in the series will be submitted during the fall. They will contain further studies of price changes, as well as studies of potential policies designed to reduce instability in the price level. Other volumes will deal with the objectives of employment and economic growth. All papers are presented as prepared by the authors, for consideration and comment by the committee and staff.

OTTO ECKSTEIN,
*Technical Director,
Study of Employment, Growth, and Price Levels.*

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EMPLOYMENT, GROWTH, AND PRICE LEVELS*

INTRODUCTION—STATEMENT OF FINDINGS

This study is concerned with the nature of inflation, and in particular with the rise in the general level of prices between 1955 and 1957. While there is little controversy over the nature and causes of inflation during periods of war or postwar reconversion, there is substantial disagreement over the causes of the relatively mild inflation of recent years. Those who believe that inflation stems, now as always, from "too much money chasing too few goods" are ranged against those who attribute postwar inflation to the upward pressure of wage costs on prices. This study concludes that creeping inflation can be explained by neither of these two lines of analysis. In particular its conclusions are:

1. The basic point at issue between the "demand-pull" and "cost-push" theorists relates to the sensitivity of prices and wages to changes in the demand for goods and services. If prices and wages are very sensitive, general monetary and fiscal policy can be designed to achieve full employment and price stability. The elimination of aggregate excess demand will choke off inflation without necessarily involving substantial unemployment. If prices and wages are relatively insensitive to moderate changes in demand, the converse holds true.

2. In the modern American economy prices and wages are much more sensitive to increases in demand than to decreases. As a consequence, a rapid shift in the composition of demand will lead to a general rise in prices, even without an excessive growth in the overall level of demand or an autonomous upward push of wages. Prices rise in those sectors of the economy where demands are growing rapidly, and decline by smaller amounts, or not at all, in sectors where demands are falling.

3. When the composition of demand changes rapidly, prices of semi-fabricated materials and components tend to rise, on the average, since price advances among materials in heavy demand are not balanced by price decreases for materials in excess supply. Wage rate gains in most industries tend to equal or almost equal those granted in the rapidly expanding industries. As a consequence, even those industries faced by sagging demand for their products experience a rise in costs. This intensifies the general price rise, since at least some of the higher costs are passed on in prices.

*Those who have aided the author in the preparation of this study are indeed legion. In the course of innumerable conversations, they provided much needed light through some of the murkier conceptual depths into which the study continually threatened to disappear. Messrs. David Lusher and Henry Briefs, of the staff of the Council of Economic Advisers; Jack Alterman, of the Bureau of Labor Statistics; Norman Ture, of the Joint Economic Committee staff; Prof. Daniel Hamberg, of the University of Maryland, and Profs. George Stolnitz, Samuel Loescher, and David Martin, of Indiana University, were particularly imposed upon as critics and advisers. Mrs. Alice Mehling and Mr. Arne Hylin completed most of the statistical calculations.—CHARLES L. SCHULTZE.

4. The resulting inflation can be explained neither in terms of an overall excess of money demand nor an autonomous upward push of wages. Rather it originates in excess demands in particular sectors and is spread to the rest of the economy by the cost mechanism. It is a characteristic of the resource allocation process in an economy with rigidities in its price structure. It is impossible to analyze such an inflation by looking only at aggregate data.

5. During the 1955-57 period the overall growth of monetary demand was not excessive. But there was a strong investment boom, offset by declining sales of automobiles and houses. This rapid shift in the composition of demand led to a general price rise, in which the capital goods industries played the major role.

6. If the rise in prices was not a result of an overall excess of monetary demand, neither was it primarily caused by an autonomous upward push of wage rates. There are many indications of this. For example, the capital goods and associated industries accounted for two-thirds of the rise in industrial prices during the period, but in these same industries prices rose substantially more than wage costs. Profits per unit of output rose in the capital goods industries, although for the economy as a whole they declined.

7. The largest part of the rise in total costs between 1955 and 1957 was accounted for not by the increase in wage costs but by the increase in salary and other overhead costs. This increase in turn was associated with the investment boom. Business firms purchased large amounts of new equipment, hired extensive professional, technical, sales, and clerical staffs, and speeded up research and development projects. When output did not rise producers attempted to recapture at least some of these increased costs in higher prices. This "premature" recapture of fixed costs further accentuated the magnitude of the general price rise.

8. Overhead costs have been increasing as a proportion of total costs throughout the postwar period. This has intensified the downward rigidities in the cost structure of most industries.

9. These downward rigidities in prices and costs put a new floor under each successively higher price level and thus help create a long-term upward bias in prices.

10. While there is a secular upward drift to the price level, its magnitude is not to be judged by the size of the price increases during the 1955-57 period. These years were characterized by an abnormally large shift in the composition of demand and a particular combination of events which led to an abrupt rise in overhead costs.

11. Since it does not stem primarily from aggregate excess demand, but largely from excess demand in particular sectors of the economy, a slow increase in prices cannot be controlled by general monetary and fiscal policy if full employment is to be maintained. When, as in recent years, prices are rising during a period of growing excess capacity, a further restriction of aggregate demand is more likely to raise costs by reducing productivity than it is to lower costs by reducing wages and profit margins.

12. Monetary and fiscal policies which are directed specifically toward the sectors where demand is excessive, may, however, limit the inflationary effect of a rapid shift in the composition of demand. Between 1955 and 1957 a slower growth in investment demand, coupled with a more even rise in purchases of autos and housing would have resulted in a smaller price increase and a larger output gain.

13. The whole subject of selective tax and credit controls is beyond the scope of this study. Their application involves economic and social problems of substantial magnitude. This study does indicate that counter inflationary policy must be designed to take into account the composition as well as the magnitude of excess demand. By using monetary and fiscal policy to prevent excess aggregate demand from emerging, one type of inflation—and that, the most harmful type—can be controlled. Even should aggregate demand rise no more rapidly than the supply potential of the economy, however, inflation can still take place if the composition of demand changes sharply. Faced with this situation we can attempt to alter the composition of demand by using selective controls or we can accept the moderate price increases which will otherwise occur. In either event, the problem cannot be solved by a further repression of demand through general monetary and fiscal policy.

Public policy statements in recent years have emphasized that wage-rate gains must stay within the bounds of productivity advances if inflation is to be avoided. This study on the other hand stresses the importance for price stability of the responsiveness of wages and prices to changes in demand. There is no single formula which can specify the appropriate relationship between changes in productivity, prices, and costs in particular industries. In a flexible economy individual wage-price-productivity relationships should reflect the strength of demands in each industry. If businessmen and labor leaders would become more demand conscious and less cost conscious, the overall wage-productivity relationship would take care of itself, so long as intelligent monetary and fiscal policies were pursued. Hence, if one must preach to business and labor about their obligations to the "public interest," the emphasis should lie on the need to orient price and wage decisions more closely to market conditions. The continual invocation of the phrase "wage rate gains on the average should not exceed productivity gains on the average" is not sufficient to enable management and labor in an individual business to determine the kind of price and wage behaviour on their part needed to achieve a greater stability of the price level in a full employment economy.

CHAPTER 1

GENERAL SUMMARY

THE CURRENT CONTROVERSY: DEMAND-PULL versus COST-PUSH

The purpose of this study is to examine the nature of the gradual inflation to which the American economy has been subject in recent years. There is relatively little controversy over the basic features of a wartime or reconversion inflation; rising prices are attributed to an increase in the effective demand for goods and services over and above the capacity of the economy to furnish them. There is wide disagreement, however, about the nature of and remedies for the more gradual rise in prices which has occurred during the postwar period. Most of the discussion has centered on the merits of the "cost-push" versus the "demand-pull" theories of inflation. Proponents of the cost-push thesis attribute the major blame for the price increases, particularly those of the 1955-57 period, to autonomous upward movements in either wage rates or administered prices, or both. The demand-pull theorists on the other hand, assert that price increases currently, as always, are the reflection of aggregate excess demand for goods and services, including the services of the factors of production.

We have been and shall be using the concept of excess demand throughout this study in a dynamic sense. In an economy characterized by steadily improving technology and substantial net investment, the supply of goods and services forthcoming at full employment is continually growing. Hence an absolutely stable demand could only be consistent with full employment if prices declined. Excess aggregate demand, in a dynamic context, only exists, therefore, when monetary demands for goods and services are rising *faster* than the constant dollar value of supplies of goods and services at full employment. The degree of excess demand will, of course, be influenced by the composition of the aggregate: an increased output in some industries can more easily be supplied than in others. Moreover, as chapter 4 points out, we can have a situation in which output is below its potential even though the labor force is fully employed. If, for example, there is large-scale hiring of salaried employees, those employees may be retained even when output does not rise as expected—we have underemployment. But these refinements aside, the essential point to remember is that the term "excess aggregate demand" is used throughout in the context of a growing full employment supply.

In analyzing the process by which price increases are generated there are two major sets of factors to be considered:

1. The impact of rising prices and wages on aggregate demand for goods and services.
2. The impact of changes in the demand for goods and for factors of production on prices and wage rates. Put more simply, how does the growth of excess capacity and unemployment affect prices and wages?

Prices and wages have a dual nature when considered in the aggregate: they are costs to buyers and incomes to sellers. Thus an increase in the general level of prices does not automatically mean a reduction in the quantity of goods and services demanded as it normally would in the case of a single commodity. The increased cost of purchasing any article or any factor of production is matched by the higher incomes received by the seller. So long as the increase in prices is accompanied by an equal increase in money expenditures, real purchases of goods and services will not be affected and employment will not be reduced. There are, however, indirect influences on the level of real demand exerted by a rising price level. If the tax system is progressive, the higher money incomes lead to a higher proportion of income taken in taxes. With a constant money supply, higher prices normally lead to a tighter money market, which in turn has some depressing influence on investment demand. If these and other indirect effects are important, their depressing influence on demand must continually be offset by demand increases from other sources, if the rising price level is not to result in rapidly growing unemployment. If, on the other hand, these indirect effects are relatively unimportant, then a rising price level will not bring about excess capacity and unemployment, or at least will do so only very slowly.

If prices and wages are sensitive to changes in demand, then no inflation can continue unless aggregate excess demand is constantly being renewed. The appearance of unemployment and excess capacity would quickly halt any price rise. Consequently the strength of the indirect influences discussed above determines how large an inflation will result from a given initial excess demand. There can be no inflation without the excess demand, however. Hence monetary and fiscal policy, appropriately handled, can achieve full employment and price stability; all that needs to be done is to prevent the excess demand, without which wages and prices would cease to rise. If, on the other hand wages and prices are relatively insensitive to changes in demand, then the indirect influences of the price level on aggregate demand will determine not how large the price rise will be but how much unemployment it will generate. For if prices and wages do not respond to growing excess capacity and unemployment, then the limitation of aggregate demand will not halt the inflation—it will only lead to unemployment.

The responsiveness of prices and wages to changes in demand is thus the central issue. Let us call prices and wages which are sensitive to changes in demand "flexible" and those which do not respond to demand, "cost-determined." The latter category includes both those cases in which prices and wages adjust solely to changes in costs¹ and those in which there occur autonomous increases in prices and wages. We can distinguish four types of situations, depending on the nature of price and wage behaviour and the impact of rising prices and wages on demand.

I. Rising prices and wages tend to reduce demand and employment:

1. Prices and wages *flexible*.
2. Prices and wages *cost-determined*.

¹ Changes in consumer prices are equivalent to changes in costs for the purpose of wage determination.

II. Rising prices and wages do not tend to reduce demand and employment:

1. Prices and wages *flexible*.
2. Prices and wages *cost-determined*.

So long as prices and wages are cost-determined, then a cost-push inflation is possible, regardless of whether case I or case II holds. If the indirect effects of a cost-push inflation are relatively weak, so that real aggregate demand is not reduced (case II), then the inflation is self-validating—a cost-push inflation will not, of itself, lead to unemployment. If the indirect effects of rising prices and wages on aggregate demand are significant (case I), then unemployment and excess capacity will result. But since prices and wages are not flexible, the inflation will continue. In this situation, the maintenance of full employment requires a positive Government monetary and fiscal policy to provide the validating demand. In either situation the failure of aggregate demand to keep pace with a growing full employment output would not eliminate the inflation, so long as price and wage decision making does not respond to demand conditions.

If, on the other hand, prices and wages vary in response to changes in demand as well as costs, then the failure of demand to match full employment supply will quickly bring an inflation to a halt. The effect of rising prices and wages on aggregate demand determines how much of an inflation will result from a given initial excess demand. If a general price and wage rise leads to a large reduction in demand, then the economic system has a built-in self-correction factor. The Government need only exercise self-restraint; so long as excessive deficits and money supply increases are avoided, inflation is not a serious problem. If, on the other hand, the self-corrective influence of a rising price level is weak, then positive government counterinflationary policy may be a recurrent necessity. In either event, the flexibility of prices and wages implies that full employment can be maintained without price inflation. If prices and wages start to rise, a restriction of aggregate demand will lead to a cessation of price and wage gains rather than a growth in unemployment.

The controversy between the demand-pull and cost-push theorists is in reality, therefore, a debate about the consistency of full employment and price stability.

Given an appropriate monetary-fiscal policy, the answer to the question whether we can continue to enjoy a large, growing, and reasonably stable volume of production and employment * * * lies in the relations of prices, costs, and profits.²

Do labor unions and monopolistic firms largely disregard the state of the market in setting prices and wages? Are prices marked up as costs rise with little regard for demand conditions? Does a rise in the cost of living lead to an equivalent wage increase even in periods of unemployment? Few would take an extreme position on these questions. There is rather a spectrum of opinion. Toward the one end of the spectrum are those who feel that prices and wages do respond rather quickly to changes in demand. The possibility that strongly organized groups can push up their cost prices in the absence of ex ante excess aggregate demand is not "an empirically important possibility,"³ according to these demand-pull theorists. Further,

² Edward Mason, "Essays in Honor of John H. Williams," p. 189.

³ Milton Friedman, in "The Impact of the Union," edited by D. M. Wright, p. 244.

according to this theoretical approach, the existence of inflation implies that the excess demand must be an *aggregate* excess. If prices and wages are responsive to demand conditions, excess demands in particular areas of the economy, balanced by deficient demands in other sectors, will merely lead to a realignment of relative prices. Only if demands in the aggregate are too high will the general level of prices rise.

Toward the other end of the spectrum are those who feel that prices and wages are, within a substantial range, set independently of demand conditions. No one would deny that there is some level of unemployment and excess capacity which would halt a price-wage spiral. But the cost-push theorists feel that the degree of unemployment and excess capacity required to break through the cost-determined nature of wages and prices is quite large. The power of big business and big labor to determine prices and wages is so great, that under conditions of relatively full employment, even without excess demand, a secular rise in the price level is unavoidable.

The validity of either approach in this controversy cannot be discovered from the historical relationship of a few large aggregates. The fact that in recent years wages have risen faster than productivity, for example, is often cited as evidence that we have been experiencing a cost-push inflation. But this relationship tells us absolutely nothing about the nature of inflation. In the purest sort of demand-pull inflation, wages would also rise more rapidly than productivity. By the same sort of "reasoning" we could cite the fact that money expenditures rose more rapidly than output as a proof of demand-pull inflation. An equally strong condemnation applies to demonstrations which point to the rise in the money supply or its velocity as proof of the demand-pull nature of inflation.

Even the timing of wage and price increases cannot be offered, by itself, as evidence of the nature of the inflationary process. Suppose, for example, that prices are marked up mainly in response to rising wages. Then an excess demand inflation will first lead to a rise in wage rates through its impact on the labor market, and only thereafter in a price rise. The historical data would indicate that the increase in wages preceded the rise in prices, yet the inflation would be one which was initiated by excess demands.

A cost-push inflation need not arise solely from an *autonomous* upward push of administered wages or prices. If prices are set by applying a constant margin to costs, and if wages are determined by movements in the level of consumer prices, then an initial general price rise, stemming from any source, can perpetuate itself, as wages and prices successively adjust upward to each other. The greater the insensitivity of the price and wage "markups" over cost to unemployment or excess capacity, the greater the inflationary possibilities. The shorter the lag between the mutual adjustment of prices to wages and wages to prices, the faster the inflation will proceed.

The response of prices and wages to changes in demand cannot, in reality, be forced into the simple categories of "flexible" and "cost-determined." The most important fact about their behavior, for the purpose of analyzing creeping inflation, is its asymmetry. Prices and wages tend to be more flexible upward in response to increases in demand than they are in a downward direction in response to decreases in demand. As a consequence, the composition of demand as well as

its aggregate magnitude, takes on a central role in the generation of inflation. The further development of this point is one of the major features of the present study.

THE NATURE OF THE RECENT INFLATION

An examination of recent economic history suggests that creeping inflation is not a phenomenon which can be dealt with in aggregate terms. In particular the price increases from 1955 to 1957 stemmed, in the main, neither from autonomous upward "pushes" of administered prices or wages nor from the existence of an aggregate excess demand. Neither of these explanations can satisfactorily account for a number of apparent paradoxes during this period: The dissipation of a relatively modest 5 percent per annum rise in money expenditures in a 3½ percent price rise and only 1½ percent output gain; the apparent correlation of price increases with demand increases industry by industry, but with an upward bias, so that the overall level of prices rose while the overall level of demand was not excessive; the fact that prices rose more rapidly than unit wage costs, while at the same time net profit margins were shrinking; and finally the high level of investment activity followed by disappointing gains in productivity and consequent increases in unit costs.

The theoretical and empirical analysis of the economic processes which lead to creeping inflation is not easily summarized. It is not a relatively simple matter which can be condensed into a short formula, like the popular "too much money chasing too few goods." Nor is it a "devil" theory in which abound the villains of most cost-push theories—the union boss and the greedy monopolist. We shall attempt in the remainder of this chapter however, to sketch the characteristics of economic behavior which lead to creeping inflation and indicate briefly the application of the analysis to the 1955–57 period.

The importance of the composition of demands

Prices and wages in the modern American economy are generally flexible upward in response to excess demand, but they tend to be rigid downward. There is, as we noted earlier, an asymmetry in their behavior. Even if demands in the aggregate are not excessive, a situation of excess demand in some sectors of the economy balanced by deficient demand in other sectors will still lead to a rise in the general level of prices. The rise in prices in markets characterized by excess demand will not be balanced by falling prices in other markets.

Excess demand in particular industries transmits its impact to the rest of the economy through its influence on the prices of materials and the wages of labor. Crude materials prices are normally quite sensitive to changes in demand, and are unlikely to rise significantly unless demands for them in the aggregate are excessive. Prices of intermediate materials supplies and components, on the other hand, are more likely to be rigid downward, but flexible upward in response to an increase in demand or costs. Prices of those materials chiefly consumed by industries with excess demand rise, since excess demand for the final goods usually implies excess demand for specialized materials. Materials used mainly in industries with deficient demand will not fall in price, unless the demand deficiency is quite large. Thus excess demand in particular sectors of the economy will result

in a general rise in the prices of intermediate materials, supplies, and components; industries which are not experiencing excess demands will find themselves confronted with rising materials costs.

Wages will also be bid up in excess demand industries. Wages in other industries will tend to follow. Even though demand for labor is not excessive, firms cannot allow the wage differential between themselves and other firms to get too large; this is not because they fear the wholesale desertion of their work force, but because they do not wish to experience the inefficiencies and lowered productivity which result from dissatisfaction over widening differentials. Rising wage rates, originating in the excess demand sectors thus spread throughout the economy. Because productivity gains in the short run are greatest where demand and output are increasing, firms in those sectors where demand is rising slower than capacity will often be faced with even larger increases in unit wage costs than firms in the areas of excess demand. In some cases the size of wage increases will be determined by long-term contracts concluded in earlier periods. Except as such increases are modified by changes in the cost of living (through escalator clauses) they will have little relationship to the current state of the market.

The spread of wage increases from excess demand sectors to other parts of the economy accentuates the rise in the price of semifabricated materials and components. Thus the influence of rising costs and the resistance of prices to declining demands will be larger at the later stages of the production process, other things being equal. The opportunities for rigidities to build up and for rising costs, particularly labor costs, to affect prices are multiplied as products approach the finished state.

Producers of finished goods will be confronted with a general rise in the level of costs, even when the demand for their products and their own demands for materials and labor are not excessive. The more cost determined are the pricing policies of the industries involved, the greater will be the price rise. In competitive sectors of the economy the rising costs will be at least partly absorbed. But in very many industries they will be more fully passed on in higher prices. Markups will of course be shaded when excess capacity begins to rise. As inflationary pressures spread out from excess demand sectors, their force will be somewhat damped in the absence of excess aggregate demand. Similarly the tendency of wages to follow the pattern set in the rapidly expanding industries will be modified as unemployment rises. But so long as markups and wages are more sensitive in an upward than in a downward direction, a rise in the general level of prices can be initiated by excess demand in particular industries.

This kind of inflationary process cannot be neatly labeled. It arises initially out of excess demand in particular industries. But it results in a general price rise only because of the downward rigidities and cost oriented nature of prices and wages. It is not characterized by an autonomous upward push of costs nor by an aggregate excess demand. Indeed its basic nature is that it cannot be understood in terms of aggregates alone. Such inflation is the necessary result of sharp changes in the composition of demand, given the structure of prices and wages in our economy.

The downward rigidities and cost-oriented nature of prices and wages act like a ratchet on the price level. Most maladjustments of prices relative to each other and of prices relative to wages tend to be corrected by upward movements in the out-of-line prices or wages rather than by a mutual adjustment to a common center. The short-run inflationary mechanism which we have been describing thus imparts a longrun secular bias to the price level. A floor is placed under each higher level, from which later increases take off. During earlier periods in our history, the recurrence of substantial and lengthy depressions broke through these rigidities and forced large declines in the levels of prices and wages. The widespread bankruptcies and reorganizations of depression periods also led to massive writedowns in the value of fixed assets. This removed an additional feature of the ratchet mechanism. Moreover, a much larger proportion of total value produced originated in the demand sensitive raw materials industries—particularly agriculture. Even if rigidities in the industrial sector were as great then as now, they played a smaller role in the overall economy.

Overhead costs

A second major factor influencing the determination of prices and the movement in the general price level in recent years has been the rapid growth in the proportion of overhead or fixed costs in total costs. This development played a particularly important role in the 1955-57 period.

Between 1947 and 1955 a very large part of the rise in total costs was accounted for by the rise in relatively fixed costs. Of the total increase in employment during those years, 65 percent represented employment of professional, managerial, clerical, sales, and similar personnel. Only 20 percent of the increase was accounted for by operatives, laborers, and craftsmen. In manufacturing, nonproduction worker employment rose 40 percent and production worker employment only 2 percent. During this same period fixed capital costs per unit increased very rapidly. Prices of capital goods rose relative to other prices, and the proportion of short-lived equipment to long-lived plant rose sharply. Depreciation charges thus expanded very substantially. Depreciation and salary costs per unit, taken together accounted for more than 40 percent of the increase in total unit costs in manufacturing between 1947 and 1955. Adding profits per unit we account for two-thirds of the cost increase.

TABLE 1-1.—*Changes in manufacturing costs and prices*

[In percent points]

	1947-55	1955-57
"Price" of value added in manufacturing.....	29.8	9.6
Unit wage cost.....	9.0	3.9
Unit salary cost.....	7.7	5.6
Depreciation per unit.....	4.2	1.0
Profits per unit.....	7.2	-2.2
Indirect taxes per unit.....	1.6	1.3

Source: App. A. (The derivation of all tables and charts will be found in this appendix.)

The period between 1955 and 1957 was characterized by a very sharp rise in investment outlays accompanied by a quite modest growth in aggregate demand and output. Not only was capacity expanded rapidly but there was a continuation, indeed an acceleration, of the postwar growth in the number of overhead employees. Unlike earlier postwar booms however, the expansion in these relatively fixed inputs was not matched by a corresponding rise in output (table 1-2). Fixed costs per unit of output therefore rose sharply, not because output was falling but because it did not rise rapidly enough. Prices were raised almost, but not quite enough to cover these higher costs. Of the total rise in unit costs (including profit margins) some 55 percent was accounted for by higher salary costs per unit as compared to 40 percent by higher wage costs. Book depreciation charges are unreliable for most purposes; nevertheless, in combination with other costs, they put pressure on profit margins and to some extent on prices.

TABLE 1-2.—Indexes of capacity, employment, and output in manufacturing industries

[1947=100]

	1955	1957
Capacity:		
A ¹	156	175
B ²	146	163
Nonproduction worker employment.....	140	155
Production worker man-hours.....	103	100
Output.....	140	145

¹ A—McGraw-Hill Department of Economics estimates.

² B—Fortune magazine estimates. (See app. A.)

The fact that a large part of the increased employment during the period was in the nature of overhead employment helps explain why the general price rise, during a period in which monetary demands were not excessive, did not lead to significant unemployment. By the same token the lack of rise in output relative to fixed inputs accounts for the disappointing gain in productivity. The rise in prices was accompanied by a relatively moderate increase in money expenditures. Real expenditures and output rose by substantially less than the "normal" postwar rise to be expected from growth in the labor force and productivity gain. Yes instead of a rise in unemployment, there occurred a shortfall of productivity below its potential. Output per production worker man-hour continued to increase fairly sharply throughout the period—indeed production worker employment declined. But the failure of output to match the rise in overhead labor input substantially moderated the overall gain in productivity. In general, the more important fixed costs become, the more sensitive productivity will be to changes in output.

The failure of output to rise toward the levels implicit in the expansion of fixed inputs was partly due to the fact that declining demand in particular sectors of the economy—housing and automobiles—largely offset the rising demands for investment goods. But in addition the attempt to recapture in prices a substantial expansion in fixed costs at existing levels of output tended to raise the level of prices relative to any given money income; the gross saving rate at

any given level of output was increased. This in itself damped the rise in output, so that the process tended to be self-defeating. Had output risen along with capacity, overhead costs would have been spread over a larger volume of output. But, by restricting the growth in real demand, the very pricing policies which attempted to recover fixed costs at low levels of output, led to a rise in fixed costs per unit. To some extent a kind of "vicious circle" occurred. The failure of aggregate output to increase raised fixed costs per unit. Insofar as prices were marked up relative to wage and salary rates in order to recover these higher unit costs, the forces impeding the growth in output were strengthened. This kept fixed unit costs high, and so on around the circle again.

The major part of the general rise in prices during recent years may thus be attributed to two sets of factors:

1. The downward rigidity and cost oriented nature of prices and wages in most of industry. During a period in which dynamically stable *aggregate* demand veils a fairly violent shift in the composition of demands, such market characteristics will result in a general rise in the level of prices. This rise cannot be said to result either from excess *aggregate* demand or from autonomous upward adjustments of administered prices and union wages. Rather it stems from excess demand in particular markets, and is propagated throughout the rest of the economy by a cost mechanism.

2. The attempt to recapture in prices at least some of the increase in fixed unit costs which occurred when a vigorous investment boom and a rapid substitution of fixed for variable labor input impinged on a situation of sluggish growth in output. Further, the fact that most of the employment rise was in overhead labor helps explain why the subnormal growth in output did not involve a rise in unemployment. It did however lead to the growth of excess capacity.

None of the foregoing is designed to indicate that all inflations are mainly the result of these processes. Excess aggregate demand has been the basic cause of all of our *major* inflations, including the post-war reconversion inflation. And for a short while in late 1955 there seemed to be some excess aggregate demand. But the major thesis of this study is that the creeping inflation of 1955-57 is different in kind from such classical inflations, and that mild inflation may be expected in a dynamic economy whenever there occur rapid shifts in the mix of final demands. It is, in effect, a feature of the dynamics of resource adjustment where prices and wages tend to be rigid downward. Moreover, it gives a secular upward bias to the price level so long as the major depressions which "broke" the ratchet in the past are avoided in the future.

Similarly there is no attempt here to prove that *autonomous* upward pressures of wage rates have had no impact on the price structure. Such pressures may have played a role in recent inflation. But the role was not a major one. The mere showing that wage rate increases exceeded productivity gains proves anything at all with respect to the magnitude of this role. (It is interesting to note, however, that the substitution of overhead for direct labor implies that wage rates cannot rise as fast as the statistical number called output per production worker if total unit costs are to be stable.)

A DETAILED ANALYSIS OF THE 1955-57 PERIOD

The reader is referred to chapter 5 for the detailed examination of the 1955-57 period. In this summary it is impossible to do more than list some of the more important characteristics of the general rise in prices which occurred during those years.

Demands and prices

1. As the economy recovered from the 1954 recession it reached a situation of aggregate excess demand in late 1955. Demands in all sectors of the economy were high and rising. The three major volatile sectors—capital goods, automobiles, and housing—were expanding particularly sharply. Production rose even more rapidly than sales, as inventory accumulation speeded up. Raw materials prices, which are especially sensitive to the state of existing and expected demand, rose steeply during the last half of the year. This aggregate excess lasted only briefly however. After the end of the year purchases of automobiles and houses fell rapidly, and remained at reduced levels in 1956 and 1957. Business demand for capital goods, on the other hand, continued to boom throughout the period.

2. On balance aggregate money outlays, after mid-1955, rose at a rate of about 5 percent per year. Prices rose at a 3½ percent annual rate and output by only 1½ percent. The normal postwar rate of growth in output during prosperity periods has been about 4 percent per year.

3. The slow rate of growth in output and productivity cannot be explained by the "indigestion" hypothesis—(i.e., the very size of the investment boom itself caused such dislocations that normal productivity gains were temporarily impossible). Output per man-hour of production workers *did* rise significantly; producers *were* able to substitute overhead for fixed labor; most importantly there was a strong interindustry correlation between output and output per man-hour. Those industries whose output rose also achieved substantial productivity gains.

4. Thus the difference between the rise in aggregate money expenditures and output did not represent aggregate excess demand. The output rise was clearly less than the economy's potential. The growth of widespread excess capacity is a good commonsense indicator of this.

5. The magnitude of price rises among different sectors of the economy and among different industries was associated with the magnitude of the rise in demand in each sector or industry. On the average, however, prices rose, even though demand, in the aggregate, was not excessive. There was, in other words, a substantial upward bias in the relationship of price changes to demand changes.

6. The magnitude of price rises among industrial commodities was related to two major factors: In general, commodities which experienced the largest price rises were those which had the largest increases in demand. With some important exceptions, most commodities with large price rises were those associated with the boom in capital goods. The frequency of price declines and the magnitude of average price increases among different groups of commodities differed also according to the stage of fabrication. Very few finished commodities were reduced in price; price increases were, on the average, somewhat smaller and the evidence of price flexibility slightly greater for semi-

manufactured materials; the smallest average price rise, after late 1955, and the most flexibility occurred among crude materials.

7. Steel and automobiles were the major exceptions to the pattern described in the preceding paragraph. Relative to the change in demand and output price increases were much larger than those associated with similar changes in demand and output in other industries.

Wages

1. Wage rate increases were fairly uniform among different industries. Wages in industries with stable or declining output rose by the same amount as they did in rapidly expanding industries. A United Nations study has found this uniformity of behavior to exist among industrial countries generally.

2. Productivity gains were closely associated with the degree of rise in output. Industries with rising output tended to have larger productivity gains than other industries, and vice versa.

3. As a consequence of these characteristics of wage and productivity behavior, wage costs per unit of output rose less in expanding than in contracting industries.

4. Price increases in the capital goods and associated industries accounted for two-thirds of the rise in the industrial wholesale price index between 1955 and 1957. Their prices rose 15 percent compared with an average increase of 4 percent for all other industries. Yet wage rate increases in the two groups were almost identical. Because of the relationship between productivity and output mentioned above, unit wage costs in the industries with large price increases averaged less than in other industries. Prices in industries which accounted for the bulk of the overall inflation also rose substantially more than wage costs. In other industries unit wage costs rose proportionately (but not absolutely) more than prices.

Overhead costs

1. All of the employment rise during the period was in overhead type employment. In fact the employment of direct labor fell substantially.

2. More than 50 percent of the rise in total units costs in manufacturing was accounted for by rising unit salary costs, and an additional 20 percent by rising depreciation. Net profit margins declined from the high levels reached in late 1955.

3. The rise in salary costs per unit was not only due to an increase in salary rates—which rose by about the same amount as wage rates—but also by the rising ratio of salaried employment to output. The increase in this ratio stemmed chiefly from the failure of output to rise along with capacity. Had it done so, evidence from other postwar years indicates that the salaried employment-output ratio would not have increased.

4. Since productivity of both direct and overhead labor is output sensitive, it is clear that, within moderate limits, a further rise in output could have resulted in lower unit costs. The data suggest an elasticity of minus one-half; i.e., a 1 percent further rise in output in industries operating below capacity could have yielded a one-half-percent decline in total unit costs.⁴

⁴ This assumes that the additional demand for production labor would not have led to even more rapid wage increases. Considering the reductions in production worker employment during the period, this is a most reasonable assumption.

Consumer prices

1. In the Consumer Price Index, food, nonfood commodities, and services each account for approximately one-third of the total weight. Even among nonfood commodities manufacturers' prices make up not much more than half of the total price, the rest being transportation, wholesaling, and retailing costs. The service component of the CPI is made up of a long list of heterogeneous items, including such things as auto, real estate, and medical insurance, public utility rates, haircuts, postage, and interest rates. Thus it would seem that the direct impact of changes in industrial prices and wages on the Consumer Price Index is relatively limited. Yet an increase in the prices of manufactured products diffuses itself throughout the economy by many indirect routes. Steel prices rise, school construction costs go up, and property tax rates are adjusted upwards; an initial rise in the CPI on account of an increase in industrial prices leads, with some time lag, to rising wages in the service industries and e.g., auto-repair charges rise; and the examples could be multiplied ad infinitum.

2. About one-third of the rise in the Consumer Price Index was contributed by increasing food prices. In turn, half of the rise in food prices was attributable to rising farm prices for livestock and half to increased marketing costs. The livestock rise chiefly reflected changing supply conditions. But an examination of the details of the increase in marketing costs shows that the same factors were operative as in the industrial sector generally.

3. The heterogeneity and institutional character of service prices make any simple characterization suspect. The rise in consumer prices generated in other sectors of the economy, and the general rise in wage rates, however, did lead after some time lag to a significant speedup in the rate of increase in service prices after mid-1956. And the rise in service prices in turn had repercussions on the increase in wages and prices in the industrial sector of the economy.

SOME IMPLICATIONS

Although it may not be obvious at first, this analysis is fairly optimistic with respect to its implications for the magnitude of the potential secular upward drift in the price level. In particular the size of the price increases between 1955 and 1957 are not a good indicator of the kind of problem which may be confronting us (assuming, of course, we do not allow classical excess aggregate demand inflation to get started).

The magnitude of the shifts in demands between mid-1955 and mid-1957 were unusually great, even for a dynamic economy. We should not be continually subject, for example, to a 2-year increase in expenditures for fixed business investment of some 25 percent (and a much larger rise in order backlogs) accompanied by 20 percent decline in residential construction and automobile sales.

The upward price pressure arising out of attempts to recapture fixed costs at reduced "standard volume" is not a continuing phenomena. It is unlikely, indeed impossible, for the average operating rate at which entrepreneurs attempt to recapture fixed costs to fall indefinitely. Indeed the very size of the current ex ante profit margin, at full utilization of capacity, which resulted from this reduction in standard volume should become a moderating factor, offsetting price

pressures from other sources as output rises toward full utilization of capacity.

This study does not attempt to evaluate the policy aspects of creeping inflation. It does, however, lead to certain general conclusions which are relevant in the formulation of antiinflationary policy.

In the first place it is quite obvious that monetary and fiscal policies designed to combat an inflation arising out of excess *aggregate* demand are not suitable to a situation in which demand in the aggregate is not excessive. When, as in recent years, a rise in the general level of prices accompanies a growth in excess capacity, further restriction of the general level of demand may be positively harmful. Since productivity is sensitive to changes in output when output is running below capacity, a general reduction in demand is more likely to raise unit costs by its effects on productivity than to lower them by its effects on wage rates. This will be particularly true if the restriction of aggregate demand continues to leave the booming sectors of the economy relatively unaffected.

Monetary and fiscal policies which do not restrain aggregate demand, but impinge only on the sectors where demand is excessive may indeed limit the inflationary forces during a period of creeping inflation. Had investment demand risen more slowly between 1955 and 1957, and automobile and housing demand more evenly, we would have experienced a larger rise in aggregate output and a smaller rise in prices. The question of selective tax and credit controls is far too broad to be discussed here; their application involves a host of economic and social questions which cannot be casually answered. At the same time however, our analysis does indicate that counterinflationary monetary and fiscal policies must take into account the composition as well as the magnitude of demand. The use of monetary and fiscal policy to prevent the emergence of aggregate excess demand can prevent one type of inflation—indeed the most harmful type. But inflation can still arise in a situation of dynamically stable aggregate demand. Under these circumstances we can either attempt to alter the composition of demand by using *selective* monetary and fiscal policy or we can accept the moderate price increases which take place. This is our choice. We cannot solve the problem, indeed we shall do positive harm, by a further restriction of aggregate demand through *general* monetary and fiscal restraint.

There is one final implication of this analysis. The moderate inflation of recent years was part of the process of resource allocation. Simply because it is called inflation, one cannot attribute to it the dire consequences associated with classical hyperinflation. It does indeed benefit some individuals and harm others—like many other aspects of the resource allocation process. In fact it is, in part, a reflection of the attempt by individuals and groups in society to ease the adjustments in relative incomes which result from a shift in the composition of demand. Such an inflation probably disturbs the social structure less than do the rapid changes in technology, the shift of income between industries, and the movement of industries from one region to the other, which we take to be the marks of a dynamic economy.

CHAPTER 2

PREVAILING THEORIES OF THE INFLATIONARY PROCESS

INTRODUCTORY REMARKS

In some senses the present chapter represents a lengthy detour from the main stream of analysis. A characteristic feature of almost all current discussion about inflation is its tendency to deal in aggregates, whereas one of the main features of this study is its insistence that creeping inflation can only be understood when one goes beneath the aggregates. Yet it is necessary to lay this aspect aside for the moment and examine closely the differences and similarities between the two prevailing approaches to inflation—"demand-pull" and "cost-push." Because demand influences costs while conversely, changes in costs are a determinant of the state of monetary demand, and because these cross effects are simultaneous in their operation, the disentangling of the basic factors in the inflationary process is most complicated. Historical data do not allow the easy separation of these mutually determining factors. As a result much faulty analysis has been constructed, using simple historical time series to demonstrate the overriding importance of costs or of demands, whereas, in fact, such data in themselves disclose the primacy neither of the one nor of the other. In order to evaluate the factual evidence, we shall have to lay the groundwork by carefully distinguishing the basic meaning of the concepts, cost-push and demand-pull. Indeed, we must ask whether, in the light of the mutual interaction of costs and demands, such a distinction has merit. Granted that the difference between the two is meaningful, in what does that difference really consist; what assumptions with respect to economic behavior characterize each of the two approaches to the analysis of inflation? What kind of data is, and what kind is not, relevant to the support of either hypothesis? Certain aspects of *both* hypotheses, considered in a framework which stresses the *composition* as well as the magnitude of aggregate demand, will prove valuable in analyzing the recent inflation. As a consequence—this lengthy, and to some readers I fear tedious, digression.

The current debate

The controversy over the nature and origin of rising prices in recent years finds the protagonists generally divided into two groups: those who stress the importance of aggregate excess demand for goods and services as the casual factor, and those who attribute the price rise to an independent increase in wage rates or administered prices. The terms "demand-pull" and "cost-push" have generally been applied to the respective theories. In actuality, however, those contributors to the controversy who recognize the complexity and interrelationships which characterize all economic processes bridle at being so neatly assigned to one of two categories, particularly when the categories are

considered as mutually exclusive. In fact, of course, they are not. Various theories of the inflationary process may preliminarily be thought of as constituting a spectrum. The place of any particular theory in that spectrum depends on what it postulates about the likelihood of significant and sustained increases in prices without the prior and continuing stimulus of rising demands for commodities and factors of production. The greater the degree of "independence" one assigns to price and wage decisions, the closer one is to the "cost-push" end of the spectrum; and, of course, vice versa.

Few, except pamphleteers turned economists and economists trying their hand at pamphleteering, belong at either extreme of the spectrum. But without trying to slice the spectrum precisely in half, it is clear that there are sharp enough differences in the emphasis placed by the different protagonists on demand and on independently determined costs to allow of useful distinction. Until quite recently most explanations of inflation emphasized the role of excess demand. There has, indeed, been a cleavage between those who stress the importance of the money supply as a final and fundamental limitation on demand and the followers of Lord Keynes who emphasize the primary role of changes in spending decisions relatively independent of the money supply. Nevertheless both groups give primacy in the inflationary process to the existence of excessive monetary demands.

The "new inflation" school, whose major prophet has been Professor Slichter, is of more recent vintage. The attribution of price increases to autonomous upward advances in wages, mainly in union organized industries, has been put forward as an explanation of the relatively modest creeping inflation of recent years. This particular variant of the cost-push thesis was quickly adopted by many business organizations and by individual businessmen in their speeches and other public pronouncements.¹ The concept of cost-push inflation not only fits in with the overall philosophy of most business organizations but it confirms the experience of many a businessman, who first sees inflation when it confronts him in the form of higher costs. Even if those higher costs result from excess demands for factors of production, the time sequence of his own experience makes a cost-push theory seem eminently reasonable. Not surprisingly another branch of the new inflation thesis has been adopted by most union leaders—the inflation of recent years is blamed mainly on advances in administered prices not justified by either increased wage costs or increased demand.

Finally, in recent months, two new books by well-known economists have appeared which purport to show that wage inflation is not something new—it has been the basic cause of all inflations.² As we shall note later on, however, the mere fact that wage increases are often the primary *mechanism* in the process of inflation, tells us nothing about the basic causes operating to produce the inflation. An excess demand inflation can, and often does operate by causing the prices of factors of production to be bid up, with commodity prices being marked up in response thereto.

Unfortunately it is in the very nature of ex post economic data that on superficial examination they can be called upon to support either

¹ Although Professor Slichter's policy conclusion—accept creeping inflation as inevitable and learn to live with it—has not won an equally hearty response from the same groups.

² Harold G. Moulton, "Can Inflation Be Controlled?," Anderson Kramer Associates, 1959. Sidney Weintraub, "A General Theory of the Price Level, Output, Income Distribution, and Economic Growth," Chilton, 1959 (Weintraub's book had not been published at the time this was written. A summary of its contents had been released by the publishers however).

of the two camps. Professor Slichter, for example, has utilized a table showing, for recent years, the excess of the increase in average hourly employee compensation over the increase in output per man-hour in support of his contention that wage increases, in some independent sense, are the major cause of inflation.³ Indeed he labels this excess the "inflationary gap." But in *any* sustained general price rise, regardless of its basic causes, wage rates will rise more rapidly than productivity. In the purest sort of excess demand inflation, taking place in an economy with perfectly competitive labor markets, the demand for factors of production will become excess—in the sense of demand exceeding supply at current prices. There is no doubt that had we but records of the inflation which scourged ancient Rome, we would find a sharp rise in unit labor costs. One might just as easily "prove" the case for excess demand inflation by constructing a similar table showing that expenditures in money terms rose more rapidly than real output; whenever the general level of prices rises such a discrepancy in rates of increase will show up in the data.

Precisely because any inflation is normally characterized by rising prices, increasing unit labor costs, and a rise in money expenditures, the mere demonstration that, ex post, money demands have been "excessive," that either the supply of money or the velocity of its circulation has risen,⁴ or that wage increases have outstripped productivity gains, proves nothing whatsoever about the basic forces which generated the inflation. Economic processes are, by their very nature, complicated interactions of many variables. Simple answers are usually deceptive answers. The principle of Occam's razor is often of immense value in excising unnecessarily complicated explanations. But like any razor, it can severely wound the user who indiscriminately hacks about with it.

One final introductory remark. Most of the cost-push versus demand-pull debate is carried on in terms of aggregate measures of economic activity. In particular, those who attribute the recent inflation to demand phenomena think solely in terms of excess *aggregate* demand. Indeed, as a general rule, excess demands in specific sectors of the economy, so long as they are balanced by deficient demand in other sectors will not give rise to general inflationary pressures according to current excess demand theories. And for the cost-push theorists, so long as wage increases, on the average, do not exceed average productivity gains, general price increases should not take place. It is one of the major theses of this discussion that creeping inflation—and in particular the 1955-57 rise in the general price level—can only be analyzed by delving beneath the aggregates. More specifically, a rise in the price level can occur without either a prior excess aggregate demand or an autonomous upward push of wages and administered prices. This makes the use of simple ex post comparisons of aggregate economic data doubly dangerous: because they are after-the-fact they may simply illustrate tautological identities; and because they are aggregate, they may hide the basic forces operating during the period. But of this, more anon.

³ Sumner Slichter, "Reconciling Expansion with a Stable Price Level," in "Problems of United States Economic Development," vol. I, Committee for Economic Development, New York, 1958, p. 237.

⁴ See for example, Richard T. Selden, "Demand-Pull versus Cost-Push Inflation," *Journal of Political Economy*, February 1959.

CLASSIFICATION AND DISCUSSION OF VARIOUS INFLATIONARY
MECHANISMS

Differences between existing theories of the inflationary process hinge, as we noted above, on the postulated behavior of wages and prices with respect to the influence of changes in demand. Are prices flexible in the face of changes in demand or are they set mainly by applying a constant markup to costs; further, are there significant areas of the economy where the market structure is such as to allow producers to raise prices without either an increase in cost or an increase in demand? The same questions may be posed with respect to changes in wages; in this case, of course, the relevant changes in "costs" are changes in the level of consumer prices. The particular behavior of prices and wages will, of course, differ from industry to industry. But we may classify the various types of inflationary processes by what they assume to be the most characteristic description of price and wage behavior for the economy as a whole.

Ralph Turvey has classified four types of inflation on this basis.⁵

Classification of inflations

Type	Prices	Wages
A.....	Cost determined.....	Cost determined.
B.....	Flexible.....	Cost determined.
C.....	Cost determined.....	Flexible.
D.....	Flexible.....	Flexible.

The distinction between cost-determined and flexible wages and prices is not a clear-cut one. In general, flexible wages and prices are those which behave as the orthodox theory of pricing says they should behave. They consequently respond to changes in both costs and demands. If both prices and wages are flexible, however, then any increase in costs—to which wages and prices do indeed respond—stems fundamentally from excess demands. Excess demand in turn may be defined as the excess of the sum which would be spent on commodities, services, or factors of production if they were in unlimited supply at their current prices over the value of the commodities, services, or factors which would be forthcoming at those prices.⁶ Usually, but not always, a flexible price will decline in the face of falling demand, despite constant costs. Similarly flexible wages will fall in periods of unemployment, even if the cost of living remains unchanged.

For the sake of avoiding too many possible permutations of categories we include under cost-determined prices and wages, two kinds of behavior. Wage movements can be either "compensatory"—i.e. responding to changes in the cost of living, or "autonomous," i.e., resulting neither from excess demand for labor nor from changes in the cost of living, but arising out of union bargaining power.⁷ The same terminology can be used to classify changes in prices. Both of these types we shall call "cost determined." The key distinction

⁵ "Some Aspects of the Theory of Inflation in a Closed Economy," *Economic Journal*, September 1951.

⁶ A. J. Brown, "The Great Inflation, 1939-1951," Oxford University Press, 1955, pp. 15-16.

⁷ These terms are employed in the discussion of European wage movements in the "Economic Survey of Europe, 1956," U.N. Economic Commission for Europe, Geneva, 1957.

between "flexible" and "cost determined," therefore, is that the latter excludes the influence of demand, the former does not.

Strange as it may appear at first, we can use one basic model to examine certain aspects of all four types of inflation. Assume, for example, that prices and wages are generally "cost determined"—type A—and that an inflationary process is started, e.g., by an increase in the Consumer Price Index following upon a rise in farm prices. If the subsequent increase in prices and wages is not to lead to unemployment, money expenditures must rise along with the rising prices. Without such an increase in expenditures the rise in the aggregate supply price would exceed the rise in aggregate demand, and unemployment and excess capacity would begin to grow.⁸ In the case of an excess demand inflation, e.g., type D, the rising unemployment of factors of production would halt the inflation. Thus the forces controlling the rise in money expenditures determine the employment effects of a cost-push inflation, but do not halt it so long as prices and wages remain "cost determined." Conversely the behavior of money expenditures will determine the degree of price rise in demand-induced inflation; growing unemployment and rising prices are incompatible when prices and wages are flexible. We can express this point yet another way; if rising wages or administered prices themselves continue to generate monetary demand sufficient to clear the market, despite the rising aggregate supply price of full employment output, cost-push inflation and full employment can coexist. The possibility of attaining this result depends on the impact of rising prices and wages on aggregate demand. An inflation originating in the prior existence of excess demand will continue so long as the rising prices and wages do not wipe out the initial excess demand—i.e., so long as aggregate demand continues to rise in step with the aggregate supply price of full-employment output. An initial inflationary gap will, therefore, continue to generate inflation so long as the rising prices and wages do not reduce real aggregate demand. Thus we need to examine the impact of rising prices and wages on aggregate demand—in the cost-push case in order to determine the employment effects, in the demand-pull case, in order to determine the extent of the inflation.

In the basic Keynesian model an initial increase in aggregate demand beyond the full employment point will generate an indefinitely large wage and price increase unless something intervenes to reduce the level of real aggregate demand; i.e., limit the rise in money demand to something less than the rise in aggregate supply price. Similarly an initial attempt by wage earners to increase their real wages beyond the advance in productivity⁹ will give rise to a price increase which will wipe out the original gains. But so long as the wage and price increases do not lead to reductions in real demands for goods and services, money expenditures will rise in step with prices, and full employment will be maintained.

Prices, wages, and the level of real demands

Only the briefest kind of attention can be given to the various ways in which overall wage and price increases might be expected to influence

⁸ For a diagrammatic presentation, see Sidney Weintraub, "A Macro-economic Approach to the Theory of Wages," *American Economic Review*, December 1956.

⁹ Which may arise either autonomously or from a compensatory increase in wages in response to an exogenously introduced rise in the consumer price index.

the level of real demands. The following is more in the nature of a catalog (and a partial one at that) than an exhaustive discussion:

1. Demand for consumption goods: (a) As a first approximation, at any given level of output, equiproportionate increases in wages and prices might be expected to leave *real* demand for consumption goods unchanged. Both wage earners and property income recipients, taken all together, would find their money income changed in the same proportion to prices.¹⁰

(b) A progressive tax system would tend to damp real consumption demand, for obvious reasons. The entire system, including sales, property, excise taxes, etc., must, however, be on the average progressive.

(c) Given a constant supply of money in the hands of consumers, rising prices will lower the real value of consumer liquid assets. This in turn will tend to reduce *real* consumption demand.¹¹ However it is most likely that money balances in the hands of consumers would rise along with the price level, as an automatic accompaniment of higher money incomes, except in a period such as the end of World War II when liquid assets are unusually high and widely distributed. With a constant overall money supply, this implies that if the "real balance" effect is to be significant it must show up mainly in reduced liquidity among firms and financial institutions. (See below p. 23.) The influence of rising prices on the purchasing power of liquid assets will depend on the elasticity of consumer demands with respect to real liquid assets. For moderate changes in prices the elasticity is probably quoted low.

(d) Expectations: Here one is in a morass of possibilities. Let it suffice to say that the role of expectations in a creeping inflation—as opposed to more violent inflationary movements—is often exaggerated. A glance at the history of price movements in the United States does not appear to confirm the impression that a creeping inflation must necessarily become a galloping one through the influence of expectations.

(e) If wages are cost-determined and prices flexible [type B] any tendency of real demands to fall will lead to a rise in wages greater than the rise in prices. But this in turn redistributes income from profits to wages. Even if the marginal propensity to consume out of dividends is no lower than the marginal propensity to consume out of wage income, such a redistribution should increase real consumption. The largest part of before-tax profits are siphoned off in profits taxes and retained earnings. Hence, despite a constant marginal propensity to consume out of disposable income at different income levels, the marginal propensity to consume out of wage income is larger than the marginal propensity to consume out of profit income. The net impact of this is to weaken the damping influence on real consumption which might be exerted by other factors during a general price-wage rise.

2. Investment demand: (a) In the first place, we should begin with the caveat that we are discussing only the impact of general

¹⁰ Although there would be a shift in income between fixed income recipients and owners of equities.

¹¹ The Pigo-Friedman-Patinkin "real balance" effect.

wage and price increases on real investment demand. Quite obviously shifts in investment demand arising from innumerable other factors can bring the rise in overall monetary expenditures to a halt, or reduce it below the rate of increase in prices—and hence lead to unemployment.

(b) If we consider only an equiproportionate rise in wages and prices, there is no a priori reason why money outlays on investment should fail to rise in proportion to the supply price of investment goods. Expectations of continuing rises in wages and prices may indeed stimulate *increased* real investment, but, as in the case of consumption, there is little warrant in past history to conclude that creeping inflation will necessarily lead to such a result.

(c) With a constant money supply, however, rising prices should have a twofold depressing effect on investment: First, the declining real value of firms' liquid balances combined with greater working capital requirements and a higher money outlay per unit of real investment will increase the need for outside financing. As Duesenberry has convincingly shown, this fact alone is likely to have an unfavorable impact on real investment, even if the nominal cost of outside funds does not increase.¹² But, of course, with a higher level of money incomes and expenditures to be financed the nominal cost of outside financing will rise. And even when the nominal rate of interest does not fully reflect the increasing demand for funds, credit rationing will do the trick just as effectively. This is particularly evident in the case of residential housing.

In the postwar economy, however, with a substantial volume of near-moneys available,¹³ the interest rate elasticity of the demand for cash balances has been quite high. It has been possible to finance a fairly substantial increase in money expenditures with a constant money supply, by mobilizing idle cash balances, offering in return riskless securities of only slightly less liquidity than cash. It was by this route that the large increase in bank loans during 1955-57 took place in the face of a small increase in bank reserves. The higher the interest elasticity of the demand for cash, the smaller the damping influence on investment demand of any given rise in prices and wages.¹⁴ And the larger the volume of near-moneys available the higher is the interest elasticity likely to be.

(d) If prices are flexible and wages cost determined, any damping influence of prices and wages on real demands is likely to be strengthened by the consequent impact of declining margins on investment. Unlike its impact on consumption, (1(e)) a rise in wages not matched by an equivalent rise in prices is most likely,

¹² James Duesenberry, "Business Cycles and Economic Growth," McGraw-Hill, 1958, ch. 5. Duesenberry argues persuasively that the cost of outside funds, from management's viewpoint, is substantially higher than the opportunity cost of internal funds.

¹³ Especially Government securities. But in addition the "cash-saving" aspects of shares in savings and loan institutions, mutual savings banks, etc. must be included.

¹⁴ Selden, *op. cit.* p. 18, argues that an increase in the velocity of circulation was the "cause" of the 1955-57 inflation. He points out, quite correctly, that the rise in the demand for funds to finance the rising money expenditures, by bidding up the interest rate increased the velocity of circulation, i.e., made possible the mobilization of otherwise idle balances to finance the increase in working capital needed to support the higher price level. But this merely indicates that the relation between money supply and expenditures is quite flexible. Whether prices rose "because" velocity increased, or velocity increased "because" higher prices raised the demand for funds we cannot determine from the *aggregate ex post* data on money supply, interest rates and velocity.

on balance, to have adverse effects on real investment demand, particularly in the later stages of a boom. There are three major ways in which declining profit margins should affect investment. First, internal sources of funds for investment would be reduced, leading, as we have noted previously, to an increase both in the cost of financing a given volume of investment and in the effectiveness of "credit-rationing." Secondly, the marginal profitability of "scale" investment would be reduced; by scale investment is meant an expansion of capacity with given capital intensity. The third effect of lower margins, i.e., higher real wages, works in the opposite direction, for it encourages the substitution of capital for labor. In the context of a short-run cycle, I would judge that the first two effects would normally outweigh the third.

3. Government expenditures, taxes, and monetary policy:

(a) Quite obviously, if we confine ourselves to *aggregate* demand, a pattern of fiscal and monetary policies could be chosen such as to offset any adverse effects on real demand induced by rising prices and wages. But, at the moment we are interested in the *automatic* response of the economic system to an inflationary situation. Hence we shall leave, for later mention, the implications of such policies.

(b) We noted previously the automatic damping effect on real consumption exercised by a progressive tax structure.¹⁵ A progressive tax on corporate profits (e.g., an excess profits tax) would similarly tend to reduce real investment insofar as it reduced the level of retained earnings. And insofar as a progressive profits tax was shifted forward or backward (an unlikely possibility in the short run) it would simply add to the restraining force of progressive personal income taxes.

(c) Any tendency for Government expenditures to be fixed in money terms would result in a decline in real Government outlays during a period of general price increases. A mere lag in the adjustment of Government money outlays to the inflationary situation would not eliminate the original inflationary pressure of demand, although it would reduce the rate at which prices rose. We shall need to discuss at length, later on, the effect of various types of lags on the inflationary process.

4. Exports, imports, and balance of payments: (a) In an "open" economy, a rise in prices and wages can operate to reduce aggregate real expenditures by its effect on the real volume of imports and exports and through a drain of gold not compensated by central bank monetary action. However, if prices abroad are rising at a similar or faster rate, the restraining effect of higher domestic prices is canceled out. During the postwar period the rise in U.S. prices and wages has, in general, been somewhat less than abroad. Even in recent years, despite increasingly vociferous warnings that we are "pricing ourselves out of the market," U.S. price movements have compared quite favorably with most other countries if we look at aggregate measures only. On the other hand, U.S. prices of durable goods for industrial use have risen significantly more

¹⁵ For an analysis of progressive taxes as an automatic inflationary dampener, cf. E. Cary Brown, "The Static Theory of Automatic Fiscal Stabilization" *Journal of Political Economy*, October 1956. Brown shows rigorously, as we have not done here, that a proportional tax system does not of itself restrain inflation.

than in most other industrialized nations. The damping effect of wage and price increases in reducing real expenditures via the foreign trade sector has thus been only partly offset.

TABLE 2-1.—*Price changes in the United States and selected other industrial nations, 1953 to 1957*

	[Percent change]					
	United States	United Kingdom	France	Germany Federal Republic	Italy	Norway
Gross national product deflators, total.....	9	16	11	9	8	21
Consumption.....	6	14	11	7	8	14
Producers durable equipment.....	17	14	7	5	6	n.a.
Consumer Price Index:						
All items.....	5	16	6	6	10	12
Food.....	2	5	3	9	11	13
Average hourly earnings in manufacturing.....	17	30	33	32	21	28

The reader will recall that our purpose in investigating the effects of price and wage increases on real aggregate demand differs, depending on whether we are considering a flexible price or a cost-determined price situation. In the former case the degree of inflation resulting from any given initial inflationary pressure would be indefinitely large, except as real demands are moderated by rising prices and wages. In the latter, cost-determined, case the volume of real demand does not affect price and wage decisions,¹⁶ but rather determines the degree of unemployment resulting from such an inflation.

In summary the effects of wage and price increases on real aggregate demand will depend principally on:

1. The elasticity of consumption and investment with respect to changes in the real value of money balances; there is reason to believe investment would be more affected than consumption, insofar as firms are reluctant to finance increasingly larger proportions of their needs from outside sources. The greater the elasticity, the more limited the demand inflation, and the greater the unemployment accompanying a cost-push inflation.

2. The interest elasticity of the real demand for idle balances: The higher the elasticity the greater the possibility of mobilizing "idle" funds for financing the increase in money expenditures needed to maintain real expenditures.

3. The interest elasticity of investment demand: The higher the elasticity the greater will be the impact of a rise in prices on aggregate real demand, given in turn, the elasticity of the demand for funds in 2, above.

4. The progressivity of the tax system.

5. The elasticity of Government outlays with respect to a rise in prices. The more Government outlays tend to be fixed in money terms, the greater the impact on real demands of a rise in the price-wage level.

¹⁶ We are taking an extreme situation for purposes of exposition. No one would deny that there is some level of unemployment and excess capacity at which price and wage increases would cease.

6. The response of consumption and investment to changes in the price-wage ratio. Changes in the price-wage ratio—and even the direction of change will depend on the type and degree of inflation—will tend to have offsetting effects: a rise in the ratio will dampen consumption and raise investment, and vice versa for a fall in the ratio.

For ease of exposition we have been discussing the rise in prices and wages in terms of whether or not it reduces real aggregate demand. But the avoidance of unemployment and excess capacity in a dynamic setting requires that real expenditures rise, at a rate sufficient to clear the market of a growing output.

1. If prices and wages are “flexible” with respect to changes in demand, then to achieve full employment, aggregate money demand must increase even when prices are stable. For any given full employment output will be supplied at declining prices, so long as overall factor productivity continues to rise. Hence the demand for output must increase at a faster rate than the increase in labor force in order to bid up wage rates to the point where prices will not decline. The “required” increase in money expenditures during an inflation must be measured from this rising base.

2. In a situation of cost-push inflation, where wages are determined by costs or autonomous factors and prices are marked up to reflect cost increases, the avoidance of unemployment requires that money demand rise faster than the growth in the labor force to a degree roughly¹⁷ determined by the relationship of wage increases to productivity gains.

These considerations simply mean that the requirements for bringing a demand-pull inflation to an end, or for generating unemployment in a cost-push inflation, must be reinterpreted. Price and wage increases must now reduce real demand below the rate of growth given by the increase in the labor force and in productivity.

The prior discussion may otherwise be left intact.

Type A inflation: Prices and wages both cost determined

Inflation theories of the cost-push variety assume that both wages and prices are cost-determined. The current controversy over the nature of inflation generally centers on the possibility of an independent cost-push exerted by union pressure to increase wages faster than productivity. But in actuality there are many additional possibilities, granted this type of wage-price structure. A wage-price spiral may be initiated not only by a rise in wages greater than the rise in productivity, but by rising import prices, an increase in margins in administered price industries, or a bad agricultural harvest. In addition, if we relax our strict assumption that all wages and prices are purely cost-determined and admit the possibility that a large enough excess demand can initiate a price rise,¹⁸ then price increases “inherited” from a period of excess demands can lead to a continuing price-wage spiral even when the initial excess demand is removed.¹⁹ Even though the initial inflationary pressure stems from an excess

¹⁷ We use the term “roughly” because changes in the capital-output ratio change the wage-productivity relationship consistent with stable unit costs.

¹⁸ In other words, prices and wages can increase because of excess demands, but regardless of the state of demand they will rise if costs rise.

¹⁹ J. C. R. Dow, “The Analysis of the Generation of Price Inflation,” “Oxford Economic Papers,” vol. 8, 1956.

aggregate demand, the insensitivity of prices and wages to downward movements in demand results in a continuation of the spiral after the original excess demand has disappeared. Thus a sharp rise in demand, occasioned perhaps by a leap forward in expectations, can generate an inflation which continues for some time, even should it become clear after a short period that the expectations were unjustified. As we shall discuss later, this was one element in the 1955-57 inflation.

A number of analyses have been constructed to show the general nature of a wage-price spiral, in an environment in which demand conditions are not the major factors determining prices and wages.²⁰ The rate of inflation resulting from an initial cost-push²¹ it is shown, will depend on numerous factors, but perhaps none so important as the lags between a rise in costs, the subsequent rise in prices, and the further rise in wages and other costs. If there were no lags, then any continuing attempt by labor or management to raise their share of income would result in an indefinitely large increase in prices. On the other hand, with no lags in the system, as soon as each party gave up its attempt to increase its share of income at the expense of the other, the inflation would cease. With lagged responses of wages to prices and prices to wages a definite rate of price and wage increases will be determinable. However, the mere cessation of the initial cause of the spiral will not necessarily bring about a cessation of the inflation.

With the use of a simple model, adapted from one constructed by J. C. R. Dow²² we can investigate the various inflationary possibilities, given cost-determined prices and wages. First let us assume some lag between increases in costs and increases in prices. The relevant costs are labor and raw materials costs; we shall assume that we can make assumptions about the behaviour of raw material prices, independent of the behaviour of costs, principally because raw materials prices are likely to be demand and supply oriented (even in an economy of administered prices and union monopolies). We shall also assume that there is a further lag between a rise in prices and a rise in wages, and that the two lags are approximately equal. All of our variables are expressed in terms of chain indexes, i.e. 1 plus the percent change from the prior period. Thus if prices rise 5 percent from period $t-1$ to period t , then price, equals 1.05.

Let:

P = index of change in price,

M = index of change in raw material prices,

W = index of change in average hourly compensation of labor,

X = index of change in output per man-hour,

λ = ratio of labor costs to the sum of labor costs and raw material costs,

π = ratio of profits to the value of output,

ϕ = percent change in π , from period (t) to $(t-1)$.

Then,

$$P_{t+1} = \left(\lambda \frac{W_t}{X_t} + [1 - \lambda] M_t \right) (1 + \pi \phi) \quad (1)$$

²⁰ The most outstanding are the models of Duesenberry ("The Mechanics of Inflation," Review of Economics and Statistics, May 1950); Brown ("The Great Inflation 1939-1951") and Dow (op. cit., footnote 19).

²¹ Remembering that a rise in the cost of living is a cost increase from the standpoint of wage determination.

²² Op. cit., footnote 19 above.

This equation indicates that prices will rise by the same percent as the weighted rise in raw material and labor costs per unit, adjusted for any change in the markup of prices over prime costs.

$$\frac{W_t}{X_t} = (1+Z)P_{t-1} \quad (2)$$

$$M_t = (1+g)P_t \quad (3)$$

The second equation states that wages rise in excess of productivity by the amount of the price increase in the prior period, or alternatively, that real wages adjust to productivity after a one period lag. Z is a coefficient to allow us to assume that unions attempt to push up real wages faster than productivity ($Z > 0$), or conversely that real wages lag behind productivity gains ($Z < 0$). For simplicity we have assumed that the cost-of-living index, which is presumably the one which influences wage bargaining, moves with our general level of prices, P_t . The third equation simply states that raw material prices move proportionately with the current movement in the general level of prices. g allows us to modify this assumption for a more or less rapid expansion in raw materials costs. If, for simplicity, we assume X_t to be constant in all periods, i.e., that productivity grows at a constant rate, equation (1) now becomes:

$$P_t = \left(\lambda \frac{1+Z}{X} P_{t-2} + [1-\lambda][1+g]P_{t-1} \right) (1+\pi\phi) \quad (1')$$

This second order difference equation can be solved for different values of the coefficients, and different lengths of the time lags, to allow us to see the implications of assuming certain conditions.

An examination of price-wage data for the United States shows the impossibility of selecting any specific lag which holds good under all conditions.²³ Professor Brown has found the average time in the United States for a turn of the spiral to be about 6 months: Some 3 months between wage changes and price changes and a further 2 or 3 months between price changes and induced wage changes.²⁴ For purposes of illustration we adopt this 3-month lag between each half of the spiral.

One of the immediate conclusions which emerges when we substitute specific values into the equation, is that a cost-push model of this sort generates a substantial inflation for a fairly small initial disturbance. If we use values for λ and π which seem to characterize U.S. manufacturing industry as a whole,²⁵ we can calculate the rates of price increase for manufactured goods which result from making specific assumptions about the behavior of real wages, raw material costs, and profit markups.

I. Consider the situation in 1946 when price-income relations, mainly on account of World War II price controls, yielded profit markups which by historical standards were quite low for a period of very high demand.²⁶ Between 1946 and 1947 the percentage of net profits

²³ See Bert Hickman, "An Interpretation of Price Movements Since World War II," in "The Relationship of Prices to Economic Stability and Growth," Joint Economic Committee Compendium, 1953, or a discussion of the varying lengths of price-wage lags during the postwar period.

²⁴ Brown, *op. cit.* p. 127.

²⁵ Taken from table 4-6.

²⁶ Strictly speaking, this departs from a rigid cost-determined system. In reality, however, what we have done is construct a model in which we can modify cost-oriented behavior in the face of demand changes by varying Z , g , and ϕ .

in total value produced (in manufacturing) rose from c. 15 percent to c. 18 percent. Our ϕ is 20 percent per year, or 5 percent per quarter. We have introduced this into the model and assumed that real wages are adjusted to productivity gains and that raw materials prices follow the course of finished goods prices.²⁷ During the first year after such an increase in markups prices will rise about 3 percent, and by the end of the year they are rising at a 5½ percent per annum rate. Even if we now assume no further increase in markups, prices will continue to rise at a rate of about 5 percent per year. If the lag is reduced to 2 months, the steady rate of increase will be some 7 percent per year.

II. Assume that labor unions attempt to raise real wages by 3 percent per year *faster* than the growth in productivity. Further, assume there is no change in markups, and that raw material prices advance in step with finished goods prices. Since prices adjust up with a 3-month lag, labor will not of course be successful in achieving its goal. But so long as labor continues to strive for this objective prices will not only rise but the increase will accelerate. At the end of the first year prices will be rising at an annual rate of about 8 percent, at the end of the second year by 17 percent, and at the end of the third year by 26 percent. Even if, after 1 year of trying, the unions give up their attempt to raise real wages faster than productivity, prices will continue to increase at a steady pace, somewhat in excess of 7 percent per year.

III. If we simply assume an "inherited" price increase, resulting, for example, from a once and for all rise in agricultural prices, then prices will continue to rise at the "inherited" rate, so long as real wages rise with productivity, raw materials prices move with the general price level and markups remain unchanged. However any tendency for wage rate increases to lag behind price and productivity gains, for markups to decrease, or for raw material prices to level off will bring the spiral to a halt. Using our simplified model we find, for example, that an initial price increase of 5 percent during a 6-month period will be damped down to a zero increase as follows:

1. In seven additional calendar quarters if wage rates succeed only in keeping up with prices, but not with productivity, assuming in turn that productivity grows at 2½ percent per annum.

2. In only 6 calendar quarters if, in addition to the failure of wage rates to rise with productivity, we assume that over a period of a year margins are squeezed such as to reduce profits from 15 percent of the value of output to 12 percent.

3. In only 2 calendar quarters if, in addition to the wage rate lag and the decline in ex ante margins we assume that raw material prices remain stable. And since we are discussing a situation in which ex ante aggregate demand is not excessive, this rates quite high as a possibility.

The purpose of this exercise in running a wage-price spiral through our mechanistic model is not to forge a claim that the model is a realistic interpretation of any particular inflationary process. But two striking conclusions do stand out. First, any continuing inflationary force would lead to an accelerating price increase, while even a once-

²⁷ There is also the implicit assumption that the Consumer Price Index moves with manufacturing prices

and-for-all inflationary impetus would result in a steady price rise, *if* decision making processes with respect to prices and wages were not influenced by demand conditions. If efficiency wages continue to rise as rapidly as prices, if raw materials prices advance in line with prices in general, and if profit margins are maintained, there is no end to the inflation. On the other hand, the second major conclusion of the model is that relatively modest damping of the three basic cost factors can bring price stability in a relatively short period of time.

Experience in the United States strongly indicates that the damping factors do come into operation when the initial excess demands are exhausted. We do not get cumulative and accelerating movements in prices resulting from a *continuing* attempt by labor or business to increase its share of the product. Nor do we even seem to get the steady inflation which would result from an initial inflationary impulse, were the damping factors completely absent. In all three of the major upsurges in prices during the postwar period, for example, raw materials prices reached an early peak and either declined or at worst remained relatively stable in the face of further rises in finished goods prices. Profit margins, after rising rapidly in 1947, 1950-51, and 1955, declined thereafter, even though prices and total aggregate expenditures continued to rise for some time.

A pure "cost determined" price spiral, in the absence of continuing "validating" aggregate demand increases would, it seems, gradually taper off. We discussed above the factors which tend to reduce real expenditures below full employment requirements when prices and wages rose in the face of a constant money supply and a fixed fiscal policy. Other influences on demand will of course also occur, tending either to offset these depressing factors or to reinforce their effect. We noted that in a *pure* cost-push spiral, any shortfall of aggregate demand below the aggregate supply price of full employment output would tend to produce unemployment and excess capacity rather than to halt the spiral. We must now modify this. Even if one believes wages and prices to be mainly cost-determined, it is clear that they are so only within a certain range. Falling demand for commodities does tend to reduce margins and to moderate or reverse the rise in materials prices. Lower demands for labor, during a period in which prices are continuing to adjust upward to prior cost increases, will often prevent real wages from rising as rapidly as productivity. The difference between the cost-push and demand-pull explanations of inflation thus devolves into a debate about the *degree* of unemployment and excess capacity required to break through the strict cost-determined nature of price and wage decisionmaking. This in turn is really a debate about the compatibility of full employment growth with price stability.

In essence type A inflation theories, or at least the meaningful ones, incorporate the following propositions:

1. Wages and prices are not sufficiently sensitive to moderate changes in the level of demand. Hence initial inflationary impulses are not quickly damped, as they would be if demand sensitivity were greater. The price increase resulting from any given inflationary stimulus is thus magnified, but is nevertheless limited.

2. Since wages (or in some cases administered prices) are often raised not merely to compensate for prior changes in costs, but

also autonomously, we can have an inflation in which excess demand is not the initial generating force.

3. Even when price and wage increases are brought to a halt by weakening demand, downward rigidities prevent any significant decline. Hence, secularly there is a "ratchet" operating to lift the economy in discrete steps, to higher and higher price levels.

4. The demand insensitivity of price and wage decisions is so great, that while not complete, it would require a substantial volume of unemployment and excess capacity to damp the secondary effects of initial inflationary pressures (whether due to autonomous wage-push or excess demand) and reduce prices to their original levels.

To make sure the preceding discussion is quite clear, it may be worth taking the risk of inducing boredom by recasting some of the implications. *First*, the existence of a cost-price spiral is not a sign that we have an inflation of type A. A purely excess demand inflation will induce a continuing cost-price rise if, once the initial excess demand has been injected into the system, real demands do not fall. The fact that prices are flexible does not mean that they are unresponsive to cost increases; and the same with wages. However, since flexible prices and wages also respond to demand changes, an increase in aggregate demand influences their levels; since prices are "costs" to labor, and wages are costs to management the effect of demand is then reinforced by a rise in costs. *Second*, the mere fact that wages rise more rapidly than productivity does not signify a cost-push inflation—such a phenomenon is also the essential mechanism by which an initial "inflationary gap" is perpetuated. *Third*, ex post data on the labor or profits share of output is not a conclusive proof of the nature of the inflation. Assume, for example, that the inflation is initiated by an attempt on the part of labor to raise real wages faster than productivity. If ex ante markups are unchanged and raw material prices follow other prices up, labor will not achieve its objective, except insofar as the existence of a lag will cause some slight redistribution to labor.²⁸ The same reasoning applies to an autonomous rise in ex ante markups in administered price industries. The dangers of attempting to trace the basic "cause" of inflation by the use of ex post aggregate data should be sufficiently clear. We shall discover additional problems in the interpretation of inflationary phenomena as we discuss other types of inflation theories.

Type B inflation: Prices flexible, wages cost determined

Inflation of type B arises when wages are cost determined and prices are flexible. Many of the typical Keynesian inflationary gap models operate with such a mechanism. Aggregate demand affects prices while wages tend to rise with the resulting increase in the cost of living. In such a case, efficiency wages are assumed to be mechanically adjusted upward in line with the cost of living. An initial rise in prices, due to the appearance of an inflationary gap, can perpetuate itself so long as real aggregate demand is not reduced, either by the rise in prices and wages or by factors exogenous to the inflationary process as such. Conversely once the inflationary gap in the commodity markets has been eliminated, the spiral will come to an end; for stability in prices also means stability in efficiency wages.

²⁸ There will, of course, be some redistribution of income between receivers of fixed and variable property incomes. But this is a phenomenon common to all types of inflation.

This particular analysis of the inflationary process has recently been attacked, for its lack of attention to the effects of excess demand in the labor market.²⁹ Even if the excess demand for commodities is wiped out, it is possible to have continuing inflation in prices, if excess demand continues to exist in the labor market. If, for example, a vigorous inflation has substantially raised profit margins, producers will wish to increase the level of output, even though some reduction in the margin is necessary to clear the market of the additional production; i.e., there is no aggregate excess demand for commodities, but, at the high margins that now exist, producers are eager to sell additional output. Should employment already be at a maximum wage rates will be bid up. Even though margins may fall, the price level can increase—all, it should be remembered, in the absence of excess demand for commodities.

An examination of price and cost data seems to indicate that this kind of situation prevailed in the United States from 1951 to 1953. In tables 2-2 and 2-3 we note that gross profit margins rose substantially in 1951. They reached levels well above the postwar average. The Korean war and the expectations it engendered gave a significant fillip to the price level while labor costs lagged behind. After mid-1951 the growth in aggregate demand slowed to a moderate rate. Inventories of consumer goods were huge, and despite a continuing buildup of military production the overall rate of inventory accumulation fell from an annual rate of \$14.5 billion in the second quarter of 1951 to \$2.5 billion in 1952.³⁰ During this period, however, the unemployment ratio ranged between 1½ and 2½ percent of the labor force, a very low level by any historical standard. Wage rates rose more rapidly than productivity, not merely as an adjustment to earlier rises in the Consumer Price Index, but also as a direct result of excess aggregate demand for labor. The Consumer Price Index ceased rising rapidly in the latter months of 1951, and rose very gradually thereafter.

During this 2-year period (mid-1951 to mid-1953) profit margins declined. But the upward movement in costs was sufficient to raise the overall price level moderately. In the face of substantial increases in labor costs, average prices of manufactured goods fell, but only because of a sharp decline in raw material prices.

TABLE 2-2.—Changes in prices and costs—private nonfarm business¹

[Percent change]

	1947-51	1951-53
Price ²	18	3
Labor cost per unit.....	13	7
Gross margins per unit.....	28	-6
Indirect taxes.....	11	8

¹ Total gross business product less farm and real estate.

² Price deflator for gross business product less the sectors noted in footnote 1.

NOTE. See ch. 4, pp. 82, 83, for a discussion of derivation of unit cost and price measures.

²⁹ Cf. Bent Hansen's brilliant discussion in "The Theory of Inflation" (chs. 1, 2, and 7). This is a work upon which we shall rely heavily at a later point. Also, Turvey, *op. cit.*, p. 531.

³⁰ For an analysis of the economic developments of this period, cf. John Lewis, "The Lull That Came To Stay," *Journal of Political Economy*, February 1955; Bert Hickman, *op. cit.*, pp. 178-191; also by the same author, "The Korean War and U.S. Economic Activity," NBER Occasional Paper No. 49; and the present author's "The Construction of Consistent Price, Output, and Unit Cost Estimates," in the forthcoming *Studies in Income and Wealth*, vol. 25, National Bureau of Economic Research, Conference on Research in Income and Wealth.

TABLE 2-3.—*Changes in prices and costs—manufacturing industries*

[Percent change]

	1947-51	1951-53
Price of manufactured products.....	20	-2
Raw materials prices.....	15	-10
Deflator for manufacturing value added.....	24	0
Labor cost per unit.....	16	6
Gross margins per unit.....	51	-14
Indirect taxes.....	6	4

During these 2 years the level of wage costs did advance despite the lack of significant excess demand for finished goods. Yet, the rise in wage costs which occurred was, quite probably, the result of excess demands in the labor market. In a sense, the basic inflationary pressure had subsided, and demand factors were operating to reduce margins. But the initial upsurge of profit margins in 1950 and 1951 created a situation in which inflationary pressures of a moderate nature continued in the labor market.

Thus, an inflationary gap model of type B cannot be used to explain the complicated effects of excess demands in the labor market. In a classic monetary inflation, models of type B are sufficiently descriptive of actual results to be workable; wage rates do tend to move up with prices, although possibly at a retarded rate. Whether the wage rise is to be mainly explained by the rise in the cost of living or by the excess demand for factors of production is relatively unimportant. Once the inflationary gap in the commodity market has been eliminated however, the possibility of continuing excess demand for factors of production still exists. Most particularly it will exist if abnormally high profit margins are one of the legacies of the prior excess demand for commodities. The resultant further rise in the price level will have a determinate limit, so long as aggregate demand conditions are such as to continue the squeeze on margins. At some reduced margin the excess demand for labor will disappear, and with flexible prices the spiral will be brought to a halt.

Type B inflation ignores the impact of changes in aggregate demand on the factor market. However, it is entirely possible to postulate asymmetrical behavior in the labor market; wages being responsive in an upward direction to excess demands, while at the same time relatively unresponsive to declines in aggregate demand. Hence, a type B model could generate a cost-push inflation via two distinct routes;

1. An initial upsurge in aggregate demand could set off a spiral which would continue even after the excess demand had been eliminated. The spiral would eventually cease however; with prices flexible, margins would decline, and as we saw in the Dow model used previously, this would bring the spiral to a halt. Since wages do not respond to unemployment, the degree of price rise would be greater than if wages were flexible. And, for any given level of real aggregate demand the resulting unemployment would be larger. As a consequence price stability and full employment would be incompatible, even though prices were flexible. The degree of incompatibility would depend on the amount of unemployment required to "break" the cost-determined nature of

wages. Further, the damping effect of flexible prices would be relatively slight if we wished to maintain conditions favorable to full employment. Relying on price flexibility alone to halt the spiral would probably be inconsistent with sustaining the level and rate of increase in investment required for full employment. Hence, if the economy were actually characterized by flexible prices and cost-determined wages many of the same results would emerge as if type A behavior were characteristic. And of course the "ratchet" problem of downward rigidities in costs would still be with us. The problem of price stability and full employment would be the same in the long run, even though in the short run, price flexibility would damp the inflationary process.

2. Inflation could also originate in a type B economy through an autonomous increase in wages or other costs. Generally speaking the course of the inflation and the implications for price stability and full employment would be of the same nature as those discussed in the prior paragraph, except that the problem would be somewhat greater. In the former case some excess demand is required to start the inflationary engine. In the latter case, even if monetary and fiscal policy were so phenomenally successful as to prevent any such excess demand, a limited spiral could still occur.

Type C inflation: Prices cost determined, wages flexible

With prices cost-determined and wages flexible, the inflationary process raises prices through the mechanism of excess demand in the commodity market leading to excess demand in the factor market. Wage rates are bid up and prices are raised as constant markups are applied to increasing costs. Insofar as prices are strictly cost determined, the inflationary process is damped not by the growth of excess capacity, but only by the elimination of excess demand in the labor market. There has appeared a growing body of evidence, both theoretical and empirical, that some form of *modified* full-cost pricing provides the best explanation for prevailing pricing practices in a large segment of industry. We shall have occasion to discuss this at some length in the next chapter.³¹ At the moment we are only interested in discovering the impact of full-cost pricing on the inflationary process.³² By full-cost pricing is meant the setting of prices by the addition to prime costs of a markup, designed to cover fixed costs and return some desired rate of return on investment. The markup is most usually calculated to recover costs and earn the desired profit at some standard or average volume of operations. The use of this technique, while it violates the economist's criteria for short-run profit maximization, does not necessarily preclude its being a tool for longrun profit maximization, particularly in a world of uncertainty.³³ Nor does the acceptance of full-cost pricing as the basic method of price-setting deny the existence of deviations from the basic pattern when demand changes drastically. In terminology we have used before, prices are cost determined only within some moderate range of changes in demand.

³¹ See below pp. 55-59.

³² Actually our aim is even more limited than this. We are confining ourselves in this chapter to aggregate analysis. Full-cost pricing takes on a more significant meaning for inflation analysis when we consider the problem of relative shifts in demand.

³³ William Fellner, "Average Cost Pricing and the Theory of Uncertainty," *Journal of Political Economy*, June 1948.

Granted such a pricing mechanism, inflation of the excess demand variety first appears as a rise in costs. A situation of this sort is particularly likely to mislead those who attempt to determine the causality of an inflation by examining the timing of price and wage changes. For inflation operates, in a type C situation, by causing wages to rise first, with prices following on behind. Yet it can be a purely excess demand inflation. Indeed possibilities of a cost-push inflation in this kind of environment are minimal.

1. Assume an "inherited" price increase. As soon as excess demand in the factor market is eliminated, wage rate increases begin to lag behind price increases and, as we have shown, the inflation tapers off rather quickly. In type A or B inflation where wages are cost determined, the same inflationary impulse would result in a much larger inflation.

2. Even if we begin a sort of cost-push inflation via an increase in administered prices, labor costs will not continue to rise in the face of any decline in real aggregate demand. And since unit labor costs account for a much larger proportion of total price than do unit profit margins, any factors tending to limit the rise in aggregate money demands will quickly bring an incipient spiral to a halt. Flexibility in the prices of the most important factor of production will normally be sufficient to prohibit any extensive inflation not characterized by a continuing excess demand.

Thus, an inflationary development in a situation where wages are flexible and prices cost determined is unlikely to take place unless there be excess demand. At the same time the mechanism of inflation will operate primarily by raising wages, and indeed raising wages ahead of prices.

We referred previously to two recent books by distinguished authors which describe the inflationary process exclusively in terms of wage inflation.³⁴ In both cases the authors have in mind a price system which fully passes on the rising unit wage costs. Even should this description of the process be correct—and there is reason to believe that full cost pricing is widespread enough to make it approximately so—we gain very little by knowing that wages are the prime agent of inflation. The response of wages to changes in the aggregate demand for labor remains the key problem. The more strictly cost-determined wages are, the greater the unemployment necessary to damp the spiral, and the greater the potential incompatibility between full employment and price stability. The more responsive wages are to the demand for labor, the easier it is to eliminate a wage-price (or price-wage) spiral without a significant degree of unemployment.

Consequently the argument that all inflations are wage inflations reduces to the statement that prices are generally cost-determined. Such a position is quite compatible with either a demand-pull or a cost-push theory of inflation.

The possibility of an excess demand for factors coexisting with the absence of excess demand for commodities is present in a type C inflation. We discussed this situation in connection with type B inflation, where, strictly speaking, it could not exist (i.e. wages are cost-determined) in order to indicate the shortcomings of the type B inflationary gap model. The discussion developed there is applicable

³⁴ P. 18 footnote 2.

to a type C inflation with appropriate modifications to take account of a full cost pricing system.

In brief, a type C inflation is not substantially different from the pure excess demand inflation which we shall discuss below. The economic response mechanism is somewhat more rigid, on account of the cost-determined nature of prices.³⁵ The aggregate demand "dampers" must be somewhat stronger to halt a given inflationary impetus than if prices were flexible.³⁶ But unit profit margins are a much smaller proportion of price than are unit wage costs. Hence, the insensitivity of wages to demand is a more important requirement for generating a cost-push inflation than is the insensitivity of prices. A type B environment (prices flexible, wages cost-determined) is much more likely to permit a cost-push inflationary situation than is a type C environment (prices cost-determined, wages flexible).

Type D inflation

While demand-pull inflation theory has usually concentrated on the impact of excess demand in final goods markets, assuming wages to adjust upward mechanically with rising prices,³⁷ pure demand theories of inflation usually postulate the flexibility of both wages and prices. The reader will recall that the definition of flexible prices and wages does not exclude the influence of costs. Prices in particular markets are influenced by changes in marginal costs and marginal revenues. The wages of the various grades and skills of labor in different markets are set both by the demand for labor and by the supply of labor forthcoming at different wage rates; in turn this schedule of the amounts forthcoming will be influenced by the cost of living. Reasonable flexibility of prices and wages does not require that we have a completely competitive system, nor that workers be unorganized. The essence of flexibility, however, is that the markets for both goods and factors be so structured that excess demand tends to increase and deficient demand to decrease prices of both goods and factors, at any given level of costs.

* * * it is not true that demand theories rest on the assumption of market-clearing prices. All that is necessary is that, given stable cost conditions, an increase in demand will soon result in higher prices, whether administered or not, for a large segment of the economy.³⁸

The existence of flexible prices and wages does not mean that general price and wage increases will wipe out the initial excess aggregate demand. An equiproportionate rise in wages and prices will, in itself, eliminate an inflationary gap only through the indirect effects on real demand which were discussed at some length above. There are, however, two distinctly different approaches to the problem of demand inflation. Those who employ the monetary approach concentrate on the demand creating aspects of increases in the quantity of money. By the very nature of their theory, they tend to stress the limitation imposed by a constant quantity of money on the

³⁵ One qualification should be added. J. C. R. Dow and Dicks-Mireaux have noted that a chronic labor shortage may in itself reduce excess demand for labor. Employers, who themselves are often pricing on a conventional markup less than that which would clear the market, finally resign themselves to the situation, and no longer even attempt to find the work force they might like to have. Effectively, demand for labor is reduced. The economy exists in a perpetual state of disequilibrium in both labor and commodity markets. But the disequilibrium does not lead to the kinds of price and wage increases which would normally be expected with a labor market in which wages are flexible upward with respect to excess demand.

³⁶ Cost-determined prices are not rigid: if costs decline, so also will prices.

³⁷ I.e., type B inflation.

³⁸ Richard T. Selden, "Comment" on a paper by Gardner Ackley, *American Economic Review*, May 1959, p. 455. It is also crucial that a decrease in demand "soon result" in lower prices.

degree to which money expenditures can rise. The Keynesian approach, on the other hand, operates with income and expenditure categories. While formally the two approaches may be reconciled,³⁹ in actual practice they tend to lead to different conclusions with respect to the conditions necessary for an inflationary movement to exist. Further, the Keynesian theory, because it emphasizes the demand creating aspects of cost increases, lends itself much more easily than does the "quantity" theory to an acceptance of cost-push inflation.

We discussed at some length the conditions under which aggregate demand would support a wage-price spiral; we noted that the spiral could continue so long as real aggregate demand was not reduced by rising prices and wages. Further it was pointed out that in the case of flexible wages and prices the reduction of real aggregate demand would stop the spiral, while in the case of strictly cost-determined wages and prices a reduction in real demand would lead to unemployment and excess capacity. The "quantity" theorists generally hold that the reduction of the real value of money balances which will occur when the money supply is constant, will act very quickly to reduce real expenditures. In other words the velocity of circulation of money is alleged to have a relatively limited range of fluctuation. In the terminology used earlier in this chapter, such an economic structure implies that the interest elasticity of the demand for idle cash balances is quite low, and that the interest elasticity of investment demand is high.⁴⁰ Often, these implicit assumptions are not spelled out. Professor Bailey for example, in his comment on the possibilities of a cost inflation raised by Prof. Gardner Ackley states flatly—

Given that aggregate (money) demand is unchanged, *as it will be if there is no monetary expansion*, the fall in prices in the competitive sector will offset the rise in the noncompetitive sector, and the general price level will stay where it is.⁴¹

According to Professor Selden the velocity of circulation may indeed rise as excess demand develops, but will not increase in response to inflationary pressures created by autonomously rising costs.⁴² We, on the contrary, have argued that the cause of the initial inflationary pressure is, to a large extent, irrelevant. Given a constant money supply, the increase in aggregate demand (and, consequently, the rise in the velocity of circulation) will be determined, inter alia, by the elasticities discussed above.

Those who employ Keynesian income and expenditure categories in discussing the inflationary process are prone to emphasize the wide range within which aggregate demand can fluctuate, given a constant quantity of money. Velocity is treated as a determined residual, not a fixed parameter of the economic system. Implicitly this involves assumptions about the interest elasticities of the demand for cash balances and the demand for investment just the converse of those generally ascribed to the quantity theorists.

³⁹ Through the interrelationship between real money balances and spending decisions, see for example, Don Patinkin, "Money, Interest, and Prices," Row, Peterson, New York, 1956.

⁴⁰ *Supra*, pp. 23-25. The technically minded reader will note that we have ignored the "real balance effect" in the consumer goods market. The reasons for doing so were given above on p. 22.

⁴¹ Martin Bailey, "Comment" on Ackley's paper, *American Economic Review*, May 1959, p. 461. (Emphasis supplied.)

⁴² Richard T. Selden, *op. cit.*, p. 456; also, the same author, "Cost Push vs. Demand Pull Inflation," *Journal of Political Economy*, February 1959.

There is no need, for the purposes of this chapter, to delve further into the controversy between the two schools. Their *conclusions* differ with respect to the limit placed on aggregate demand by the money supply. Both are in agreement, however, that the state of aggregate demand is the major determinant of the movement of prices and wages. Or, to put this another way, if one conceives the major characteristic of prices and wages to be their flexibility, he is driven to the conclusion that price flexibility and full employment are compatible goals. It does not require a substantial amount of unemployment to break an inflationary spiral. While arguments may persist as to how effective monetary management is in regulating aggregate demand, there is agreement that control of aggregate demand can control inflation.⁴³

In actuality, of course, an analysis of inflation in type D terms does not preclude the possibility of some autonomous upward movement of costs and prices not related to changes in aggregate demand. In the early postwar years, for example, the leading "quantity" theorist, Professor Friedman, voiced grave doubts that the economy could simultaneously achieve economic growth, full employment, and price stability, so long as powerful organized labor and oligopolistic industries could influence prices and wages.⁴⁴ In later years, however, he has stated on numerous occasions that a wage-push inflation is quite unlikely; in the face of monetary restrictions on aggregate demand, growing unemployment and excess capacity would soon both reduce union demands and "stiffen the backs" of management.⁴⁵ He holds that wages and prices are relatively flexible in the face of deficient aggregate demand, despite the apparent monopoly power of organized labor and business. And, even if prices are fairly inflexible in some sectors of the economy, downward price flexibility in competitive sectors will not only offset the price rises in administered price sectors, but increase the tendency for cost-induced price increases in those sectors to run up against the barrier of declining demands.⁴⁶ Professor Morton has taken a similar view, in two strongly worded articles condemning the adoption of a governmental policy guaranteeing full employment.⁴⁷ Prices and wages are not inflexible in the face of actual or even potential unemployment and excess capacity—trade unions will not butt their heads against a stone wall, nor will prices be set independently of demand conditions.

The attitude upon which the pure demand-pull analysis rests is well summed up as follows:

Certainly union leaders * * * confronted with falling labor demand will hardly be encouraged to adopt an inflationary wage policy, however tempting the prospect might be.⁴⁸

To Morton, Friedman, Selden, Bailey, et al., the flexibility of prices

⁴³ It is of interest, however, that the emphasis on the demand-creating aspects of wage rate changes which characterizes Keynesian economics has led a very large number of Keynesian or neo-Keynesian writers to adopt a cost-push theory of inflation. In other words, the possibility that autonomous cost increases will provide their own "validating" demand, and hence not lead to unemployment, is conducive to the possibility of a self-perpetuating, cost-induced inflation. Because of the limits on aggregate demand implied in the "quantity" theory model, such a self-induced spiral is unlikely.

⁴⁴ Friedman, "A Monetary and Fiscal Framework for Economic Stability," *American Economic Review*, June 1948.

⁴⁵ Friedman, "Some Comments on the Significance of Labor Unions for Economic Policy," in "The Impact of the Union," edited by Wright, pp. 204-234; also, "Rejoinder" to Professor Neff's criticism of "Monetary Framework, etc.," *American Economic Review*, September 1949, pp. 949-956.

⁴⁶ Friedman, "Some Comments, etc.," pp. 226-227. Also cf. the quote from Bailey, *supra*, pp. 2-48.

⁴⁷ Walter Morton, "Trade Unionism, Full Employment, and Inflation," *American Economic Review*, March 1950; and "Keynesianism and Inflation," *Journal of Political Economy*, June 1951.

⁴⁸ Gorter and Hildebrand, "Is Price Control Really Necessary," *American Economic Review*, March 1951. (The article deals with price controls during the Korean war.)

and wages implies that inflation stems almost exclusively from excess aggregate demand for factors and commodities. In turn this excess demand is only possible if the quantity of money supplied by the banking authorities rises at an excessive rate. Hence the traditional analysis and the traditional policy implications are vindicated.

It has, in fact, been argued that the existence of inflexible wages and prices is a restraint on the inflationary process. Insofar as some wages and prices do respond sluggishly to increases in demand, the wage-price spiral will be slowed, not only because of the time lag itself, but, possibly, because of the expectational and income-redistribution effects of such a lag.⁴⁹ But, as Samuelson notes, such a finding still does not exclude the possibility of a cost-push inflation, in situations where, *ex ante*, aggregate demand is not excessive.⁵⁰

SUMMARY OF THE DEMAND VERSUS COST INFLATION THEORIES

The analysis in this chapter of the various types of inflation theories has attempted to isolate the fundamental conditions for the existence of a cost-push as opposed to a demand-pull inflationary process. We have seen that the distinction between the two does not lie in the relationship of wage increases to productivity gains, nor in the relative timing of cost increases and price increases, nor even in whether or not cost-push inflation can fully provide its own validating demand. Rather the sensitivity of wages and prices to the state of demand proves to be the crucial factor. Those who maintain that prices and wages are characterized chiefly by their flexibility stand near one end of the spectrum, believing with Friedman that while it is logically conceivable for strong organized groups to push up their cost prices, it is not "an empirically important possibility."⁵¹ There are those who like Bach, take a middle position; a sustained rise in wages and prices in the face of limited demand is not likely, but the degree of demand restriction required to break the cost-determined nature of prices, given the current market structure, is probably larger than consistent with a policy of sustained full-employment growth.⁵² Finally, at the other end of the spectrum, are those who believe that price, and particularly wage, determination has been so far divorced from the state of aggregate demand that it would take really substantial unemployment and excess capacity to achieve price stability. Professors Slichter, Reder, and the late Henry Simons, although differing in many other respects, are characteristic of those who hold this view.

Ralph Turvey, whose classification of inflationary processes we have used in this chapter, summarizes the possibilities as follows:

1. Excess demand for commodities: Inflation arises from the attempt on the part of the economy to increase its aggregate real expenditures faster than it can increase its real output, at constant prices. Inflation stems primarily from excess demand in the commodity markets.

⁴⁹ Friedman, *op. cit.* p. 226; Boulding, "The Impact of the Union," p. 244. Rees cautiously suggests the same conclusions in his "Postwar Wage Determinations in the Basic Iron and Steel Industry," *American Economic Review*, June 1951.

⁵⁰ Paul A. Samuelson, "The Impact of the Union," p. 245.

⁵¹ Friedman, "The Impact of the Union," p. 244.

⁵² George L. Bach, "Economic Requisites for Economic Stability," *American Economic Review*, May 1950; also, "Monetary and Fiscal Policy Reconsidered," *Journal of Political Economy*, June 1951.

2. Excess demand for factors: Inflation arises primarily from the attempt by producers to raise output at a faster rate than the existing supply of resources and the current state of technology make possible. Inflation stems from the excess demand for factors of production.

3. Income share inflation: Inflation arises out of the competition of various groups to maintain their real incomes at a higher level than the real output of the economy can accommodate.

The first and the second kinds of inflation generally, but not always, exist together. They represent the two aspects of demand-pull inflation. Income-share inflation is simply another, and perhaps better, name for cost-push inflation.

The mechanics of inflation

It is important to make a careful distinction between the mechanics of the inflationary process and its basic nature. An examination of the mechanics of inflation has led Gardner Ackley to deny the validity of the distinction between demand-pull and cost-push.⁵³

In our model of demand inflation * * * buyers of final output are attempting to procure a larger total supply than can be produced. As a result prices are bid up. To be sure, wages and other cost-prices may promptly rise too; but it is important that the causal sequence is this; prices are bid up, costs follow. If the causal sequence is reversed—if costs rise and therefore prices rise—we have the case of cost inflation.⁵⁴

Ackley proceeds to argue that neither prices nor wages are set in the instantaneous market clearing manner described by orthodox pricing theory. Prices are determined by applying a markup to costs; wages are generally set with reference to some "markup" over the cost of living. The demand and supply oriented pricing of the textbook variety does not exist in the real world outside of markets for agricultural products and some other raw materials. Hence inflations generally proceed by a cost mechanism, both prices and wages being set with reference to costs. Ackley points out, however, that the markups applied to costs will vary with the state of the market, excess capacity and unemployment generally tending to reduce markups. Demand and cost phenomena are thus inextricably intermingled. He proposes the term "markup" inflation to describe the process, and suggests discarding the concepts of demand-pull and cost-push inflation.

As a first approximation it is eminently reasonable to describe the inflationary process in terms of costs and markups. The fact that markups are not instantaneously adjusted in response to excess or deficient demand is a major feature determining the timing and speed of inflation. But this provides no warrant for denying the validity of the distinction between demand and cost inflation. If the only difference between demand and cost inflation were the one suggested by Ackley—i.e. whether prices or costs rise first—the distinction would indeed be useless. But, as we have repeatedly emphasized, the essential difference is to be found not in the timing of price and wage increases, but in their sensitivity to changes in demand conditions. Using Ackley's terminology, the crucial problem is the response of markups to excess or deficient demand. We noted earlier

⁵³ Gardner Ackley, "Administered Prices and the Inflationary Process," *American Economic Review*, May 1959; "A Third Approach to the Analysis and Control of Inflation," "The Relationship of Prices to Economic Stability and Growth," Joint Economic Committee, 1958.

⁵⁴ Ackley, "Administered Prices, etc.," op. cit., p. 419.

how an inflation can quickly be brought to a halt when markups are reduced, particularly when wage rates are "marked up" by less than the combined rise in prices and productivity. If markups are quite sensitive to growing excess capacity and unemployment, then only a continuation of excess demand will keep inflationary pressure alive. If markups are fairly rigid on the downward side, then inflations of both the excess demand and cost-push varieties are possible; substantial unemployment and excess capacity may be required from time to time if the price rise is to be halted.

POLICY IMPLICATIONS OF EXISTING THEORIES

Since those who analyze recent developments in terms of cost-push inflation believe that it would require substantial unemployment to make cost-determined wages and prices flexible, they normally conclude that the cost of restraining price increases through the traditional methods of limiting aggregate money demand is too great. Here two variants branch off. There are those, whom we may call the "pulverizers" who would attempt to solve the problem by strengthening the various antitrust laws, applying them, in modified form perhaps, to labor as well as to business.⁵⁵ This view implies that by sufficiently vigorous action we can create an economy in which prices and wages behave with the flexibility now ascribed to them by the demand-pull theorists. Indeed, many of the latter would also emphasize the necessity of achieving an even greater demand sensitivity of prices and wages by "pulverizing" existing power structures.

On the other hand there are the Slichterians who feel that the possibility of attaining the requisite price and wage sensitivity is quite small in view of the economic and political facts of life. As a consequence they recommend that we no longer make obeisances in the direction of secular price stability, but face the inevitable and accept creeping inflation. Indeed such inflation is not only necessary, if we are to maintain full employment in the face of rising costs, but perhaps desirable, as a lubricant on the wheels of progress.

Similarly there are two policy variants among the demand-pull theories. There are some who feel that cost-determined wages and prices are not a problem. Our inflations have always stemmed from excess aggregate demand, which in turn usually arises from overexpansionary monetary and fiscal policies. Control the latter, and you can control inflation, without sacrificing reasonably full employment. There are some, however, who believe that cost-determined wages and prices have been, in a proximate sense responsible for recent inflation. But the insensitivity of business and union wage-price policies to demand conditions ultimately stems from the knowledge that the Government will intervene to assure full employment. A firm policy of maintaining only such a growth in monetary aggregate demand as is necessary to clear the market of full employment output at stable prices would soon teach union and business leaders that any attempt to push up prices and wages will cost them dearly in terms of excess capacity and unemployment. Put more succinctly, the cost of enforcing wage and price flexibility would be only a few sharp recessions.

⁵⁵ Needless to say, of course, the unions, who attribute cost-push inflation to rising administered prices have a different view of the required antitrust action than do most business organizations, to whom the villains in the piece are the unions.

"Admittedly deflationary unemployment is unattractive in itself, but it will serve as a convincing proof of unsound wage policies."⁶⁶ One is tempted to call this the "Pavlov technique;" rap the child over the head whenever he eats sweets excessively, and he will soon achieve a positive distaste for candy. How business and labor leaders are to distinguish between price and wage increases which are desirable (and presumably rewardable) for resource allocation purposes, and those which are antisocial (and presumably punishable) one cannot discover.

THE AGGREGATE NATURE OF EXISTING THEORIES

A common characteristic of all of the various types of inflationary processes discussed to date is their aggregate nature. Cost-push inflation is normally discussed in terms of *average* wage and productivity relationships. Demand-pull inflation is also analyzed as an aggregate phenomenon. Since wages and prices are considered to be flexible with respect to changes in demand, only an aggregate excess demand can lead to inflation.

In the traditional body of economic literature * * * it seems universally to have been concluded that inflation is necessarily the result of a *general* excess of demand. This conclusion follows understandably from the classical assumption of a perfectly competitive market in which prices and wages are continuously adjusted so as to eliminate any excess demand or excess supply. In such a market, if there is no excess demand (or supply), prices will come to rest; if, therefore, prices are rising cumulatively it can only be because excess demand is constantly tending to reemerge.⁶⁷

A theory of inflation which is based primarily on the flexible nature of prices and wages is not only a demand-oriented theory, it is necessarily an aggregate-oriented theory. Excess demand in some sectors of the economy, balanced by deficient demand in other sectors will indeed result in changes in relative prices and wages, the degree of relative price change depending on the mobility of resources. But an increase in the general price level will not occur in such a situation. Price decreases in the declining demand sectors will offset price increases in excess demand sectors. Further, in such a situation there is no overall excessive demand for factors of production, although the relative demands for, and hence relative prices of different factors may indeed change. Shifts in the composition of demands, within a stable aggregate, thus lead to a change in resource allocation, but not to any movement (except perhaps a temporary one) in the general price level. Prices and wages always move so as to eliminate excess or deficient demands in particular commodity and factor markets.

In the real world, however, prices and wages are not so flexible. *In particular wages and prices are much less likely to be flexible in a downward than in an upward direction.* This is not to deny any downward flexibility; rather it simply maintains that the the degree of excess demand needed to raise prices is significantly less than the degree of deficient demand required to reduce them. There is an upward bias in the general level of prices such that a large change in the composition of demand, even when aggregate demand is not excessive, will lead to a general price rise. The rise in prices will be aggravated by the impact of excess demand in particular sectors of the economy on the prices of

⁶⁶ Gorter and Hildebrand, op. cit., p. 80.

⁶⁷ United Nations, "World Economic Survey, 1957," p. 5. (Emphasis supplied.)

raw materials and wage rates. For there is a similar asymmetry in the response of material costs and wages—particularly the latter—to changes in demand. Hence, the absence of excess aggregate demand for factors of production provides no guarantee against an induced rise in the average level of their prices.

~~*Under such circumstances inflation can take place without either an excess aggregate demand or an autonomous cost push.*~~ Inflation of this kind originates in excess demand in particular sectors of the economy and spreads, via cost increases, to other sectors in which demands are not excessive, and indeed to those in which there is unused capacity and unemployment. The difference between this type of inflationary movement and the aggregate demand-pull and cost-push processes of most existing inflation analysis is not merely an interesting academic refinement. It has important implications for anti-inflationary policy. Chapter 3 is devoted to a more rigorous examination of this type of inflation and the process by which it tends to spread throughout the entire economy. In chapter 5 the theoretical analysis developed here and in chapter 3 is applied to the economic events of 1955-57.

THE CHANGING NATURE OF COSTS

In most analyses of inflation discussions, of costs center on prime costs; i.e., raw materials and wages. In recent years, however, the very rapid growth of overhead costs—particularly overhead labor—has substantially increased the share of such costs in the total. Chapter 4 discusses the significance of overhead costs in the generation of price increases. Part of chapter 5 will investigate the influence of changing overhead costs on prices and productivity during the 1955-57 period.

CHAPTER 3

THE INFLATIONARY IMPLICATIONS OF SHIFTS IN THE COMPOSITION OF DEMAND

THE IMPORTANCE OF THE COMPOSITION OF AGGREGATE SPENDING

In a dynamic economy the process of change involves not only movements in aggregate output and income but also shifts in their composition. During periods of substantial inflationary pressure induced by war or its aftermath demand presses hard upon supply availabilities in all sectors of the economy. The overall pressure of excess demand, while not uniform, is usually so large and pervasive as to minimize the need for attention to the components of demand. Aggregate excess demand is the driving force behind the rise in prices, and efforts to eliminate the excess quite rightly concentrate on reducing total purchasing power.

Inflations of the peacetime variety are usually quieter and more selective. Very often they are characterized by the rapid expansion of demand in only certain sectors of the economy; in other sectors demands may be relatively stable, and in still others may be declining. If prices and wages were flexible, in the face of both positive and negative excess demand, then we might still concentrate our analysis on aggregate demand aspects only. It is implicit in the existing demand-pull theories of inflation that the composition of demand is not of major significance in the analysis. The use of the term "implicit" is deliberate. A search of recent economic literature for an extensive discussion of this point reveals only scattered references. Nor is this surprising. Universal price flexibility has long been considered the mechanism for allocating resources in the economy. To use the economist's jargon, this is the province of the microtheorist. To be sure, a major part of the work of the microtheorist is precisely the analysis of deviations from that price flexibility characteristic of a competitive market structure, and an evaluation of the impact of such deviations on the allocation of resources. Inflation, on the other hand, has been the domain of the macrotheorist—who up until 1936 was usually also a "money" theorist. He normally assumed relative price flexibility—his colleague in the next office could worry about the anti-social implications of rigid prices—and concentrated on the movement of overall price levels, employment, and output. Except to students in the economic principles course, it was unnecessary to repeat the assumptions with respect to relative price flexibility, upon which the aggregate demand analysis rested.¹ There are a few exceptions. Some have spelled out, briefly, the assumption upon which they were proceeding. Gorter and Hildebrand, in an article questioning the

¹ "Invalid dichotomies" are not confined to the field of monetary theory, but, in this case, apply to the whole division of labor between micro and macro price theory.

need for price and wage controls during the Korean inflation state the case in the baldest terms: if aggregate demand is only held in check, the rapid shift from civilian to military production cannot cause any inflation.² A policy of "no monetary expansion with free prices" is the one which "alone can lead to an economy untouched by the ravages of inflation."³ Further, "With prices free to move up or down, the reactions of entrepreneurs will lead them to do precisely what the preparedness program requires."⁴

Professor Friedman makes essentially the same point when he notes:

If fiscal and monetary policy prevent *total* demand from falling or rising sharply, they will thereby prevent any general decline or rise in wages and prices from developing into a rapid spiral and becoming cumulative. Declines or rises in particular prices and wage rates can then serve the useful and indispensable function of facilitating adjustments among different sections of the economy.⁵

In general, the demand-pull theorists have a picture of a self-adjusting price and wage system, which will channel resources in the appropriate directions through relative price changes, all within the framework of overall price stability so long as aggregate demand is appropriately restrained. Messrs. Friedman, Selden, and Bailey have in fact suggested at various places that universal price flexibility is not necessary; the existence of cost determined prices in some sectors of the economy would not be inconsistent with price stability. Given stable aggregate demand, rising prices and wages in "administered" price sectors of the economy would simply force greater price and wage adjustments in the flexible sectors. (This would be fine, granted the premise, if the rising and falling sectors of demand were evenly distributed between flexible and administered price industries.) The basic agent for guaranteeing aggregate price stability remains, however, the flexibility of prices and wages. More precisely, wages and prices must be roughly as flexible in a downward direction as in an upward direction. Otherwise the prevention of excess aggregate demand will not guarantee price stability if the *composition* of demand is shifting rapidly.

In the contemporary American economy prices and wages generally tend to be substantially more flexible in an upward than in a downward direction. Prices of many commodities do, of course, decline under the impact of falling demand or rising supply. We need only glance at a chart of agricultural prices to confirm this. In the industrial sector of the economy, and even more so in the service and related industries, prices tend to be rigid against declining demands. This does not mean that such prices never fall. Nor does it deny that there is substantial variation from commodity to commodity, depending on the structure of the particular industry involved. But, as a general proposition it takes a fairly sizable decrease in demand, lasting over a significant period, to induce price cuts. The magnitude of the excess demand needed to raise prices, is almost universally smaller; and the speed of reaction is generally larger in an upward than in a downward direction.

The same characteristics are even more applicable with respect to wages. The downward rigidity is far greater than any sluggishness in wage response to an increase in demand for labor. Moreover, as

² Gorter and Hildebrand, "Is Price Control Really Necessary," *American Economic Review*, March 1951.

³ *Ibid.*, p. 78.

⁴ *Ibid.*, p. 78.

⁵ Dissenting comment by Friedman in the American Economic Association Committee Report, "The Problem of Economic Instability" *American Economic Review*, September 1950, p. 534.

we shall discuss at some length later on,⁶ the tendency of wage increases in one sector of the economy to induce similar wage increases elsewhere, makes the rigidities even greater.

Formally, in order that the absence of excess aggregate demand be a sufficient condition for the stability of the general price level, it is necessary that the "price reaction coefficients" of all goods and factors of production be equal; further the coefficients must be the same (though of opposite sign) for deficient or for excess demand.⁷ The "price reaction coefficient" of a good or factor specifies the time rate of change in its price for a given amount of excess or deficient demand. It therefore incorporates not only the magnitude of the price change in response to changes in demand, but also the speed of the change. The statement that price reaction coefficients are larger for positive excess demand than for negative, is another way of stating that prices (and wages) are more rigid downward than upward. The consequence of this is to impart an upward bias to the general price level whenever the composition of demand is changing rapidly, even though aggregate demand is not excessive. Further, since the prices of one industry are often the costs of another, while consumer prices are a "cost" in the determination of wage rates, a further upward pressure on the price level is exerted. Prices rise in sectors with excess demands; offsetting price declines do not occur where demands are deficient. The rising costs in excess demand sectors tend to "feed out" into other sectors, so that prices there often rise even in the face of falling demands. While a very rapid and sustained increase in the general price level is unlikely to occur from these factors alone, a substantial part of the creeping inflation of recent years may be attributed to such "asymmetries" in price and wage behavior.

In the next section we shall attempt to incorporate the argument of the preceding few pages into a general model of the economy, in order to show rigorously the implications of the argument. (Those who are quite satisfied with the "literary" demonstration presented in the prior discussion, and who have no taste for mathematical manipulations may omit the section without losing the thread of the analysis.)

THE DEMAND AND PRICE FLEXIBILITY REQUIREMENTS OF A STABLE PRICE LEVEL

The presentation which follows is basically derived from Bent Hansen's "Theory of Inflation," and the later work of Alain Enthoven.⁸ Both of these authors utilize a modified Walrasian general equilibrium model as their basic tool, but introduce certain dynamic elements. We shall do the same, adding some additional modifications to bring out more clearly the implications of introducing downward price and wage rigidities.

Assume a typical Walrasian system with " n " demand and supply functions for commodities, claims, and factors of production.

⁶ See below 65-70.

⁷ Bent Hansen, "The Theory of Inflation," ch. VIII. Alain Enthoven, "Monetary Disequilibria and the Dynamics of Inflation," *Economic Journal*, June 1956.

⁸ Enthoven, *op. cit.*, *passim*.

Let:

- P_i = price of the i th commodity, claim, or factor
- D_i = quantity demanded of the commodity, claim, or factor
- S_i = quantity supplied of the commodity, claim, or factor
- X_i = excess demand for the commodity, claim, or factor (in terms of quantity)

$M = \bar{M}$ = the quantity of money: assumed given exogenously.

r = "the" interest rate.

The n th "commodity" is money, and $P_n = 1$;

By Walras' law:⁹

$$\sum_{i=1}^{n-1} P_i D_i - \sum_{i=1}^{n-1} P_i S_i \equiv \sum_{i=1}^{n-1} P_i X_i \equiv -X_n \equiv S_n - D_n \tag{1}$$

In other words if we know the demand and supply of all but one of the commodities, claims, and factors, we also know the demand and supply of the remaining commodity, claim, or factor. We have chosen money as that remaining good. As Lange points out, the demand and supply of money are used in an unusual sense: the demand for money is equal to the supply of commodities;¹⁰ in other words sellers offer commodities in exchange for money. Conversely the act of demanding a commodity is equivalent to an act of offering money. The difference, *during a specified time period*, between the total demand for money (supply of commodities) and the supply of money (demand for commodities) represents the demand for additional cash balances over and above those held at the beginning of the period. If D_c represents the total demand for cash balances and S_c the supply of cash balances, then, since the excess of aggregate supply over aggregate demand is the demand for additional cash balances,

$$\sum_{i=1}^{n-1} P_i S_i - \sum_{i=1}^{n-1} P_i D_i \equiv D_c - S_c \tag{2}$$

$$\sum_{i=1}^{n-1} P_i D_i - \sum_{i=1}^{n-1} P_i S_i \equiv S_c - D_c \tag{2}'$$

From equation (1)

$$S_c - D_c \equiv S_n - D_n \equiv -X_n \tag{3}$$

In other words the excess demand for money, in the rather unusual sense originally employed turns out to be identical to the excess demand for cash balances. We shall continue to use the symbols S_n , D_n , and X_n , but now signifying the demand and supply of cash balances. With a given money supply $S_n = \bar{M}$. The demand for cash balances has an independent existence in its own right:

$$D_n = k \sum_{i=1}^{n-1} P_i S_i + L(r) \tag{4}$$

⁹ Cf. Oscar Lange: "Say's Law: A restatement and criticism," "Studies in Mathematical Economics and Econometrics," ed. by O. Lange etc., the University of Chicago Press, Chicago, Ill.

¹⁰ To save the repetition of writing "commodities, claims, and factors" each time, we shall use "commodities" to cover all three. Where some distinction needs to be made, the text will so indicate.

The first term tells us that the demand for cash will depend on the total value of transactions—the familiar transactions demand for money. The second term represents “speculative” demand for cash, or, if you will, the demand for “idle” balances. The second term may also be considered as incorporating the diversification or portfolio demand for cash.¹¹

If we assume, *preliminarily*, that an equiproportionate change in all prices (including factor prices) would leave the real demand and supply of individual commodities unchanged, the individual demand and supply functions would have the following form:

$$D_i = f_i(\pi_i, r) \quad (5)$$

$$S_i = \varphi_i(\pi_i, r) \quad (6)$$

and, consequently the excess demand equation have the general form,

$$X_i = \psi_i(\pi_i, r) \quad (7)$$

where the π_i represent relative prices, i.e.,

$$\pi_i = \frac{P_i}{\bar{P}_{n-1}} \quad (8)$$

But this leaves us with only the interest rate as a link between the money market and the commodity markets. Aggregate excess demand in the commodity market is unaffected by the general price level. Any level of aggregate demand can exist with any price level, except as the interest rate is affected. Yet by Walras' law the aggregate excess demand for commodities is equal to the excess supply of cash balances [equations (1) and (3)], while equation (4) tells us that the excess supply (or demand) for cash balances will be affected by the general price level. A determinate price level is only made possible by effects of excess demand on the interest rate. Excess demands in the commodity markets lead to higher prices, thus increasing the transactions demand for cash, which in turn requires a higher interest rate, if the money market is to be in equilibrium. A higher interest rate in turn restricts investment spending, thus damping the excess demand.¹²

Following Patinkin, let us directly introduce the absolute price level into the excess demand functions,

$$X_i = x_i\left(\pi_i, r, \frac{\bar{M}}{\bar{P}_I}\right); \frac{\partial x_i}{\partial \bar{P}_I} < 0 \quad (9)$$

where \bar{P}_I represents some appropriately weighted general price index.¹³ Rising absolute prices now affect excess demands not only through the medium of higher interest rates but also through the reduction

¹¹ Although strictly speaking to represent the portfolio demand the current flow of saving should enter as a variable. Also the demand schedule would shift as the volume and degree of liquidity of near-moneys changed.

¹² The so-called “Keynes effect” applied to inflation analysis.

¹³ The problem of the “appropriate” weights is not really important for our purposes. The shape of the x_i functions would depend on the appropriate index chosen, but so long as $\frac{x_i}{\bar{P}_I}$ has the right sign, some equilibrium general price level is possible.

in the real purchasing power of money balances thereby achieved. Apart from periods in which cash balances are abnormally high and quite widely distributed, it is likely that the major impact of the real balance effect is on the demand for investment goods.¹⁴

There is consequently only one absolute price level at which the system is in aggregate monetary equilibrium. For, in equilibrium,

$$D_n = S_n = k \sum_{i=1}^{n-1} P_i S_i + L(r); X_n = 0 \quad (10)$$

while, at the same time, by (1), and (3)

$$\sum_{i=1}^{n-1} P_i D_i - \sum_{i=1}^{n-1} P_i S_i = \sum_{i=1}^{n-1} P_i X_i = X_n = 0 \quad (11)$$

The implications of the model for cost-push inflation

In type A inflation theories, in which prices and wages are cost-determined, the following assumptions are made (implicitly):

1. $\frac{\partial X_i}{\partial r} = 0$; in other words *only* relative prices are im-

portant in determining the state of excess demand. As a consequence any level of prices is consistent with equilibrium in the goods and factor markets. Put another way, the disequilibrium in the money market caused by a rising price level does not affect real quantities demanded or supplied. The real balance effect doesn't operate and investment is interest inelastic.

An alternative possibility is that $\frac{\partial X_i}{\partial r} < 0$, but that $\frac{\partial L}{\partial r} \cdot \frac{r}{L} = \infty$.

The demand for idle balances is infinitely elastic with respect to the interest rate. Hence changes in the transactions demand for money (because of higher prices) can be financed out of idle balances without a rise in the interest rate.¹⁵

2. Even if $\frac{\partial X_i}{\partial r}, \frac{\partial X_i}{\partial M/P_i} \neq 0$ and/or $\frac{\partial L}{\partial r} \cdot \frac{r}{L} \neq \infty$, so that excess

demand falls with a rise in the general price level, the rate of change in prices (and wages) is not affected. Rather excess capacity and unemployment show up—recession cum inflation.

The first set of assumptions is necessary if the cost-determined inflation is not to result in unemployment. Or, if the shapes of the functions are such that unemployment would result from a cost-price spiral, monetary and fiscal policy are necessary to "validate" the inflation, thus preserving full employment. The second set of assumptions is inherent in the definition of cost-determined. In actuality, of course, few people adhere to the extreme limit of these implications. This we stressed at length (some would say, ad nauseam) in chapter 2. But the cost-push theorists generally believe the shape of the functions to be about as depicted in 1. above for moderate ranges of price variation. And, more importantly, they believe that

¹⁴ This was discussed more fully on p. 22, above.

¹⁵ For practical purposes we confine the effect of interest rate changes to the investment goods sector.

¹⁶ The liquidity trap has a "top" as well as a "bottom."

it takes substantially excess, and most particularly, substantially deficient demand to swerve wages and prices from their fixed course.

Aggregate demand inflation

We are particularly interested at this point in the specific implications of price and wage behaviour for aggregate demand inflation. Demand-pull theories hold that inflation stems from a situation in

which $\sum_{i=1}^{n-1} P_i X_i > 0$ and will not continue when the sum total of excess

demands is zero. Those associated with the quantity theory of

money hold, in addition, that the shapes of $\frac{\partial L}{\partial r}$, $\frac{\partial X_i}{\partial r}$ and $\frac{\partial X_i}{\partial M/P_i}$ are

such, that without an increase in the quantity of money, relatively small increases in the price level would be sufficient to eliminate any excess demands which might arise.

Within a stable aggregate demand, individual demands may indeed be excess, counterbalanced by deficient demand in other sectors. In order that price stability be maintained it is not necessary to have

perfect equilibrium, i.e. $X_1 = X_2 = \dots = X_{n-1} = 0$, only that $\sum_{i=1}^{n-1} X_i P_i = 0$.

Prices will rise to wipe out the excess demand in the areas of rising demand and decline sufficiently to clear the market in the areas of falling demand. If marginal cost curves are relatively flat and resources are highly mobile, only small changes in relative prices will be forthcoming. If, on the other hand marginal cost curves are steep—if costs rise rapidly in the neighborhood of plant capacity—and if resources are immobile, a much larger shift in relative prices will be forthcoming; but these price shifts will always take place within the framework of a stable general price level, so long as the economy is not afflicted with aggregate excess demand. Further, it is possible to achieve this result, say the demand-pull theorists, even if some prices or wages are autonomously “pushed” upward—the resultant deficient demand will force price reductions in the flexible price sectors of the economy; this in turn will lead to even larger unemployment and excess capacity in the administered price sectors, tending to “break” the cost-determined nature of such prices.

The process by which excess demand leads to increases in price is not an instantaneous one. Were prices and wages immediately to adjust to any tendency for demand to be excessive, the economy would instantly “explode” to the new equilibrium price level, however much of an increase that might require. Indeed, if reactions were so quick, excess demand as an actual phenomenon would never exist.¹⁷ It would only be a potential *ex ante* force, never an actually existing situation. In reality, of course, the economy moves through a series of disequilibrium positions toward a neighborhood of “equilibrium”—a position which it seldom reaches, the equilibrium having changed in the interim. Not only are we faced with lags in the spending and production processes, but with lags in the adjustment of wages and prices to demands and costs. In the Chicago wheat pit there may indeed be

¹⁷ Cf. Duesenberry, “Mechanics of Inflation,” *op. cit.*, p. 145.

instantaneous adjustment, but in few other markets. The firmest believers in the applicability of traditional pricing theory conceive it to explain the basic level and movement of prices; it need not hold true at every moment of time. Wage rates in the most competitive of labor markets are fixed for some minimum period. Prices of almost all commodities, apart from raw agricultural products, cannot be changed from day to day. Contracts, convenience, public relations, and not least, the sheer cost of making price decisions, combine to insure some lag between the emergence of changes in demand and costs and the resultant change in prices.

What really interests us in any event is not the theoretical level of prices implicit in various degrees of excess demand, but rather the rate of increase in prices to which the excess demand will give rise. There is a world of difference between the statement that a given excess demand will lead to a price rise of 10 percent in 6 months, and that it will lead to a 2 percent per year price increase, for the next 5 years. While most analyses of demand inflation have concentrated on the "equilibrium" increase in prices stemming from excess demand, some recent works have concentrated almost exclusively on the *rate* of increase aspect—determinate systems stressing continuous disequilibrium have been the major feature of these works.¹⁸ We shall follow their example.

We define the price reaction coefficient k_i , to be the relationship between the magnitude of excess demand for commodity i and the time rate of price increase to which the excess demand gives rise. More precisely,

$$\frac{\Delta p_i}{\Delta t} = p_i k_i \frac{x_i}{q_i} \quad (12)$$

or

$$\frac{\Delta p_i}{p_i} = k_i \frac{x_i}{q_i} \Delta t \quad (13)$$

where p_i , x_i , and q_i represent the initial price, the excess demand, and the equilibrium quantity respectively. In other words the rate of increase in prices during a given time interval is proportional to the magnitude of excess demand relative to the equilibrium quantity. Given a three sector economy, whose aggregate variables are denoted as follows:

Y = gross national product

C = consumption, planned

S = savings, planned

I = investment, planned

G = Government expenditures (planned and actual)

R = Government revenues,

then *at the beginning of any time period*, the aggregate excess demand in the economy will be equal to:

$$I + G - S - R \quad (14)$$

or, what is the same, to:

$$I + D - S; (D = G - R) \quad (14)'$$

¹⁸ In particular, Bent Hansen, Duesenberry, and Enthoven, all op. cit. The derivations which follow are those of Hansen and Enthoven. Most of the later implications are not.

In turn,

$$I + D - S = \sum_{i=1}^{n-1} P_i x_i \quad (15)$$

If the existence of excess aggregate demand is the necessary and sufficient condition for a rise in the general price index, that index

must rise or fall as $I + D - S = \sum_{i=1}^{n-1} P_i x_i \gtrless 0$.¹⁹ The standard general

price indexes now in use for both consumer and wholesale price measurement are Laspeyres, i.e.,

$$\frac{\sum q_i p_i^2}{\sum q_i p_i^1} = P_I \quad (16)$$

or

$$\frac{\sum q_i (p_i^1 + \Delta p_i)}{\sum q_i p_i^1} = 1 + \frac{\sum q_i \Delta p_i}{\sum q_i p_i^1} = P_I \quad (17)$$

This index will rise, remain unchanged or fall as

$$\sum q_i \Delta p_i \gtrless 0 \quad (18)$$

From (12) we see that,

$$\sum q_i \Delta p_i = \sum q_i p_i k_i \frac{x_i}{q_i} \Delta t \quad (19)$$

If the k_i are all equal, then,

$$\sum q_i \Delta p_i = k \Delta t \sum p_i x_i \quad (20)$$

Since in the usual case $k \Delta t$ will not be negative, a Laspeyres index will

rise or fall as $\sum p_i x_i \gtrless 0$, the time rate of change being given by the

size of k . Without excess aggregate demand (an excess of planned investment plus Government deficit over planned saving)—there will be no inflation. If, however, the k_i are not equal, then the only type of index whose stability will depend on the absence of excess aggregate

demand $\left(\sum_{n=1}^{n-1} P_i x_i = 0 \right)$ will be an index of the form;

¹⁹ Enthoven, op. cit., p. 262.

$$\frac{\sum \left(\frac{q_i}{k_i}\right) p_i^2}{\sum \left(\frac{q_i}{k_i}\right) p_i^1} = P_I^{20} \tag{21}$$

But this is a nonsense index. It weights prices by the reciprocal of their reaction coefficients. The more volatile the price the less its weight. Rigid prices on the other hand receive very heavy weights. Even apart from the question of zero coefficients, the resulting index is useless.²¹ Thus, so long as price reaction coefficients differ, the only price index whose movements will depend solely on the degree of aggregate excess demand is a nonsense index, one which achieves stability by weighting stable prices heavily relative to volatile prices.

Staying with the standard Laspeyres index, and assuming the k_i to differ we find that equation (19) now reduces to

$$\sum q_i \Delta p_i = \sum p_i k_i x_i \tag{22}$$

Our Laspeyres index will therefore rise, remain unchanged, or fall as

$$\sum p_i k_i x_i \gtrless 0, \text{ not as } k \sum p_i x_i \gtrless 0. \tag{23}$$

Now if there were only minor variations in timing or in reaction speed among different commodities this would be an interesting but trivial result. Within a stable aggregate demand, changes in composition could lead to a price rise, or a price fall depending, fortuitously, on the relative magnitude of reaction coefficients in expanding versus declining sectors. *However, once we recognize that prices, and particularly wages, are much more rigid downward than upward, a substantial shift in the composition of demand necessarily tends to increase the price level, even if aggregate demand is stable.* If the k_i are positive for increases in aggregate demand and zero for decreases in aggregate demand, then a mere shift in relative demands can lead to a rise in the price level. Moderate changes in demand mix, of course, need not lead to such a result. But shifts in demand larger than can be taken care of by resource mobility at constant prices, will be inflationary. We need not assume that deficient demand has no impact on price. All that is required is that the k_i be systematically larger for positive than for negative excess demand. In that case an index, the change in which depends on $\sum p_i k_i x_i$, can rise even if $\sum p_i x_i = 0$. Let us designate *positive* excess demand as x_j , and the k associated therewith as k_j , ($j=1 \dots m$), and *negative* excess demand and its associated k as x_r and k_r , respectively ($r=n \dots z$). If all of the k_j are larger than the k_r with no overlapping (i.e. the smallest k_j exceeds the largest k_r), then whenever

$$\sum p_i x_i = \sum p_j x_j + \sum p_r x_r = 0,$$

²⁰ Derived as follows:

$$P_I = 1 + \frac{\sum \left(\frac{q_i}{k_i}\right) \Delta p_i}{\sum \left(\frac{q_i}{k_i}\right) p_i^1}; \text{ from equation (12) we have } \sum \left(\frac{q_i}{k_i}\right) \Delta p_i = \sum \frac{q_i}{k_i} p_i k_i \frac{x_i}{q_i} = \sum p_i x_i. \text{ Hence, a rise in } P_I \text{ oc}$$

curs only when $\sum p_i x_i > 0$

²¹ Cf. Enthoven, op. cit., p. 269.

it will always occur that,

$$\Sigma p_i k_i x_i = \Sigma p_i k_i x_i + \Sigma p_i k_i x_i > 0.$$

It is of course possible that there could be some overlapping. Even if, for any given commodity, the k associated with positive excess demand is larger than the k associated with negative excess demand, it could happen that a particular shift in demand would be so structured that the decreases in demand would be concentrated among industries with particularly sensitive prices. In general, however, if the k_i are significantly and systematically larger for increases in demand than for decreases, a large shift in the composition of demand will lead to a rise in the general level of prices. The greater the variation in the x_i around a zero mean, the larger the price rise is likely to be.

In a growing economy a mere rise in demand need not be equated with excess demand. Supply functions are constantly shifting to the right, in response to the increase in the labor force and rising productivity. Hence our condition for excess demand,

$$I + D - S > 0,$$

must be modified to take account of this fact. Thus we have:

$$\Sigma p_i x_i \geq 0 \text{ as } (I + D - S) - \Delta(\Sigma p_i S_i) \geq 0, \text{ for } p_i^2 = p_i^1 \quad (24)$$

The conditions for a stable price level are unchanged, insofar as they involve excess demands. The only difference is that demand can grow by a certain amount before becoming excess. With a systematic bias in the k_i , the more uneven is the pace of expansion the greater is the rate of price increase likely to be. If demand and supply grow at approximately the same rate in all sectors of the economy, then a demand-induced inflation will not occur so long as the growth in aggregate demand is no more rapid than the growth in aggregate supply. If on the other hand there are very diverse rates of demand growth relative to supply in different sectors, then a demand-induced rise in the general price level may occur, despite the fact that aggregate demand and supply are growing at the same rate. An overall price increase may thus take place which stems neither from an excess aggregate demand nor from an autonomous upward "push" of administered prices and wages. *Given downward rigidity of commodity and factor prices, the dynamics of shifting resource allocation involve a general price increase, even in the absence of excess aggregate demand.*

THE SPREAD OF INFLATION THROUGHOUT THE ECONOMY

So far, the kind of general price increase which results from downward price rigidities, has been ascribed to a kind of "averaging process." Prices rise where excess demand occurs and do not fall where deficient demand is present. Hence the average price level rises. But the inflationary pressure generated by a rapidly changing composition of demand is not confined to this averaging process. The prices of one industry are the costs of another. Excess demands for certain materials, components, and parts lead to a rise in their price. Declining demands for other materials do not result in offsetting de-

clines in their prices. Hence industries in which demands are not excessive are faced with rising materials costs; so also, though to a lesser degree, are some industries with declining demands. Similarly wage rates in particular occupations, and in particular industries are bid up. Declining demand for other types of labor does not result in falling wage rates. Increases in the cost of living also tend to raise wage rates generally. Insofar as prices and wages are relatively insensitive to downward shifts in demand, but responsive to increases in costs, inflationary pressures originating in particular industries will gradually "feed out" into the economy as a whole. The weaker the demand, however, the less complete will be the pass-through of cost increases into price increases, and the greater the pressure on profit margins.

The relationship of prices and costs

Both theoretical and empirical investigations have led a growing number of economists to believe that prices in a large part of American industry do behave in the manner described above. Prices tend to be set at a level sufficient to cover average unit costs plus some margin designed to realize a "satisfactory" rate of return on invested capital. The rigid version of full-cost pricing, is clearly not an accurate description of price behavior. Margins are not immutable, and are varied in the light of market conditions. The variance, however, is not so great as would be suggested by orthodox marginal price theory. As a consequence prices are less sensitive to shifts in demand (particularly in a downward direction) and more sensitive to changes in costs than would be the case were they set in accordance with orthodox theory. The list of those who have accepted this "modified full-cost" explanation of the pricing process is impressive.²² The literature on the subject is already so extensive that a survey of it would itself be a major work. At this point we can only indicate a few of the reasons why some form of full-cost pricing is likely to characterize pricing decisions in a large segment of industry.

The major objection to full-cost pricing as a description of business behavior has been that it appears to be inconsistent with the attainment of maximum profits. The business firm which inhabits the world of economic textbooks has known or certainly expected demand and cost curves; profits are maximized by producing that output at which expected marginal revenue and expected marginal cost are equal.²³ There are indeed problems where demand curves are recognized to be mutually interdependent—the "mutual dependence recognized" situation in an oligopolistic industry; but even here the marginal concepts are usually retained with a discontinuity in the revenue schedules, and the *formal* solution of profit maximization is basically unchanged.

Perhaps the most persuasive and realistic alternative description of business price behavior has been formulated by Richard Heflebower.²⁴ In any industry characterized by large firms a sort of balance is achieved through a process of evolution. Each firm in the industry

²² In addition to the original work of Hall and Hitch and their successor, P. S. Andrews, others who have, in whole or in part, accepted this view of the pricing mechanism include: Mason, Chamberlin, Harrod, Fellner, Robertson, Ackley, Duesenberry, Bain, Heflebower, Gordon, Lanzhotti, and Rothschild.

²³ If one wants to be quite precise, it is expected *discounted* marginal revenue and costs which are relevant.

²⁴ "Toward a Theory of Industrial Markets and Prices," *American Economic Review*, May 1954, and, "Full Costs, Cost Changes, and Prices," "Business Concentration and Price Policy," National Bureau of Economic Research, Princeton University Press, 1955.

acquires a market position, which depends on a host of variables in addition to price; the network of relationships with particular suppliers, dealers, and customers built up over the years, the reputation of the firm with respect to particular product specialties, the services furnished in connection with its products, its selling organization and advertising, and its own internal organization. Market position, in other words, is "that composite of attributes which governs the ability of the firm to compete."²⁵ It is an asset which must be preserved, for it is a means of profit maximization under conditions of uncertainty. The firm's response to unanticipated developments must be made within the framework of these attributes. As one firm put it, in answer to a survey of pricing policies.

Our objective is to build for the long term a solid market that will stick to our ribs through periods of adversity as well as prosperity.²⁶

The balance achieved in an industry, with each firm possessing its own—partly unique—market position, is not something to be lightly disrupted. In particular, long run profit maximization requires the maintenance of market position. Customers once lost to other firms are not easily regained, for supplier-customer relationships are not the ephemeral connections implicit in orthodox price theory. During a period of declining demand firms are faced with excess capacity, and price cuts by rivals are viewed as threatening not only current but future market positions. Retaliation must be swift, and all firms know this. Changing a firm's relative price position is appropriate only when a radical change in market position is contemplated. This in turn usually involves changes in many of the variables which make up the market position, price being only one among many other factors. It is a substantial step, not to be taken lightly, and in particular not in response to relatively moderate changes in demand.

Nonprice competition is a much more satisfactory weapon for the maintenance or gradual improvement of market position. Because of their history, existing market positions, and internal structures, individual firms have differential advantages in particular directions. An improvement in market position is most likely to be sought in those areas where the firm has a unique advantage, or in strengthening other aspects of its operations where it is disadvantaged with respect to competition. Moreover, an initial gain from nonprice competition is likely to be maintained for a longer time than is the gain from a price cut, which will almost certainly prove temporary. As demand declines, marginal price concessions—kept as secret as possible—will begin to be made. But an overt price cut is likely to be made only when such adjustments on the part of all firms have undermined the existing structure of prices.

Unlike changes in price made to improve market positions, price changes in response to changes in factor costs are not likely to upset the industry balance. A general wage increase affects firms in the industry in more or less the same way. Corresponding changes in price are likely to be recognized for what they are, and are not interpreted by other firms as a challenge to the existing structure of the industry. Moreover public pronouncements, speeches, and press interviews by

²⁵ Heflebower, *op. cit.*, p. 125.

²⁶ Robert Lanzilotti, "Some Characteristics and Economic Effects of Pricing Objectives in Large Corporations," "The Relationship of Prices to Economic Stability and Growth," Joint Economic Committee, 1958.

industry leaders are a workable²⁷ method of agreeing in advance what sort of price change is called for by the change in factor prices.

The necessity of maintaining long run profit opportunities, therefore, tends to discourage attempts to maximize short run profits via competitive price cuts. But price changes in response to changes in factor costs, since they do not threaten to disturb relative market positions in the industry, are not so inhibited. "Forseeable profits are not maximized, in order to 'maximize' those conditions which are a *sine qua non* for any profits at all over the long run."²⁸ It might, of course, be said, that such behavior will, *in the long run*, correspond to orthodox pricing theory—i.e. long run marginal costs will be equated to long run marginal revenue. Aside from reducing the description of entrepreneurial behavior to an *ex post* tautology (whatever the entrepreneur does, it can be rationalized into marginal terms, *ex post*) this is irrelevant from our point of view. The basic fact is that short run decreases in demand are less likely to induce price changes than are changes in factor costs.

Price and output decisions are made in an environment of uncertainty. Not only are demand and cost curves imperfectly known, but the likelihood of unforeseen changes in demands and costs is quite great. William Fellner has pointed out that under these circumstances if maximum safety margins are to be maintained, prices will be set on the basis of average costs.²⁹ There will always be some uncertainty with respect to the outcome of decisions taken in accordance with some "best guess" as to demands and costs. Maximum safety margins are the highest available margin by which the outcome may be worse than the best guess without causing losses. By producing at that output where the gap between prices and average cost is the greatest, the effect on profits of "guessing wrong" will be minimized.³⁰ Normally this will not be the same price or output which, in the short run, would yield maximum profits if expectations were held with certainty. If the rate of output for which the difference between price and average cost is at a maximum also yields what are considered to be a satisfactory rate of profits, firms will be reluctant to sacrifice safety margins for the sake of increasing short-run profits. In reality, of course, there will be some compromise between maximum profits and maximum safety margins. But, to moderate downward shifts in demand, firms are likely to be unresponsive. Prices will normally be set on the basis of average total costs plus an uncertainty premium, and—

* * * the output policy actually adopted will be described as a policy of producing whatever output the market will take. The implication is: at a price which the firm can afford to sell, i.e. given the policy just described.³¹

The fact that most large firms also produce a variety of products is another reason to expect that prices will be set on the basis of average unit costs. Many costs will be common to the production of a variety of products. In theory the incremental costs of adding to the output of any particular product should be separable. In practice however

²⁷ "Workable," i.e. not subject to antitrust action.

²⁸ R. A. Gordon, "Short Period Price Determination in Theory and in Practice," *American Economic Review*, June 1948, p. 271.

²⁹ William Fellner, "Average Cost Pricing and the Theory of Uncertainty," *Journal of Political Economy*, June 1948.

³⁰ Unless deviations of actual from expected normally take the form of lump-sum losses not influenced by the size of output—an unlikely possibility. Cf. Fellner, *op. cit.*, p. 250.

³¹ Fellner, *op. cit.*, p. 252.

the existence of numerous products with common costs makes imperative the use of shortcut approximations. In the first place the distinction between what is a fixed and what is a variable cost becomes blurred. At full capacity all costs are variable. But even at less than full capacity the existence of many different processes within one firm lends importance to fixed-cost allocation. Some departments will reach capacity well before others; the decision to concentrate on the production of one item will, of necessity, preclude capacity operations in others. Decisions cannot be made and unmade at every shift of wind in the marketplace. Hence the "absorption" of overhead at a normal volume of operations must be taken into account, even when operations are below normal. The full opportunity costs of producing one item instead of another must include at least some portion of overhead and "target" profits as they would be at normal operations. In the second place, the mere complexity of defining, much less allocating correctly true marginal costs in a constantly changing environment forces the use of an average cost system, usually incorporating a full allocation of overhead. Indeed the choice between the production of different products in one firm is somewhat equivalent to a choice between several industries, so long as decisions cannot profitably be reversed quickly. As a consequence the total unit costs must be considered in the short run, just as they are in the long run.³² Unless prices are set to yield full costs plus a margin (all calculated at some standard volume) an intelligent choice between various products cannot be made.

For both the long and the short period, the existence of common costs—particularly if numerous products are involved—creates an almost irresistible tendency to price on an average cost basis.³³

A world of uncertainty is a world in which longrun price strategy and shortrun price tactics take on far more meaning than in the simple two variable world of certainly known marginal cost and marginal revenue schedules. Quite often the achievement of maximum profits is most nearly approximated by a policy which aims at maintaining "satisfactory" profits over the long haul. Considerations of entry, of public relations, of potential antitrust action, of union power, and the maintenance of the complex of attributes which Heflebower has called "market position," all play a role in defining the level of "satisfactory." A recent Brookings Institute study, and several articles by one of its authors, have emphasized the prevalence of this "target rate-of-return" pricing among large firms.³⁴ No simple rule of thumb is ever pursued single mindedly in business pricing decisions. Yet the establishment of a price designed to yield some target rate of return at a normal level of operations seems, from these studies, to be a common practice.

The principal type of target return pricing is building prices directly from standard costs plus a margin sufficient to provide the desired profit target; but in many cases firms select a price first (via consumer surveys, comparisons with prices of substitute products, or determinations of economic value to user), and then tailor engineering design and costs to fit the product requirements. In the second method; the profit margin added may be the customary margin on direct

³² D. H. Robertson makes this point in "Some Recent Studies in the Theory of Pricing," *Economic Commentaries*, Staples Press, London, 1956.

³³ Gordon, *op. cit.*, p. 274.

³⁴ Kaplan, Lanzilotti, and Dirlam, "Pricing Policies of Large Corporations," Brookings Institute, 1958; Robert Lanzilotti, "Some Characteristics and Economic effects of Pricing Objectives in Large Corporations," "The Relationship of Prices to Economic Stability and Growth," Joint Economic Committee, 1958; and the same author, "Pricing Objectives in Large Corporations," *American Economic Review*, December 1958.

or full costs, or a flexible margin on direct or full costs, which are expected to yield the prescribed return at anticipated volume of sales.³⁵

Such a price policy is, of course, the base from which many deviations are made. And the particular mechanisms used to arrive at the price are quite different among different firms. Some firms, indeed, start with a price and work back to costs, deciding then if the item in question can be produced at that cost. But the concept of attaining some longrun profit objective seems to dominate the basic decision making process, according to the Brookings study.

Now of course the mere fact that businessmen say they operate in this fashion does not deny the possibility that they are rationalizing processes actually carried out in a much different fashion. Nevertheless, the fact that they do describe their own behavior in a manner quite consistent with the theoretical considerations adduced in support of the full-cost pricing hypothesis is not to be lightly dismissed.

The downward rigidity and cost-determined nature of prices do not imply aberrations from rational behavior, nor can they be explained by such simple concepts as "kinked" demand curves. We have seen that these characteristics of price behavior derive from the complex nature of modern big business, and reflect the desire to maintain long-run profit opportunities at a maximum level. That deviations from full-cost pricing are plentiful there is no doubt. In particular, the typical business firm will not be at all adverse to making a little hay while the sun shines. Nor to a lesser degree will it be able to resist the temptation of margin shaving when excess capacity rears its ugly head. Most prices will eventually fall if demand slackens enough, and the degree to which increased costs will be reflected in higher prices will be conditioned by the state of the market. But the bias is there; to elicit a price cut requires a substantial decrease in demand, while a price advance, not surprisingly, is more easily forthcoming when demand rises, and almost sure to occur when costs increases.

Wage determination

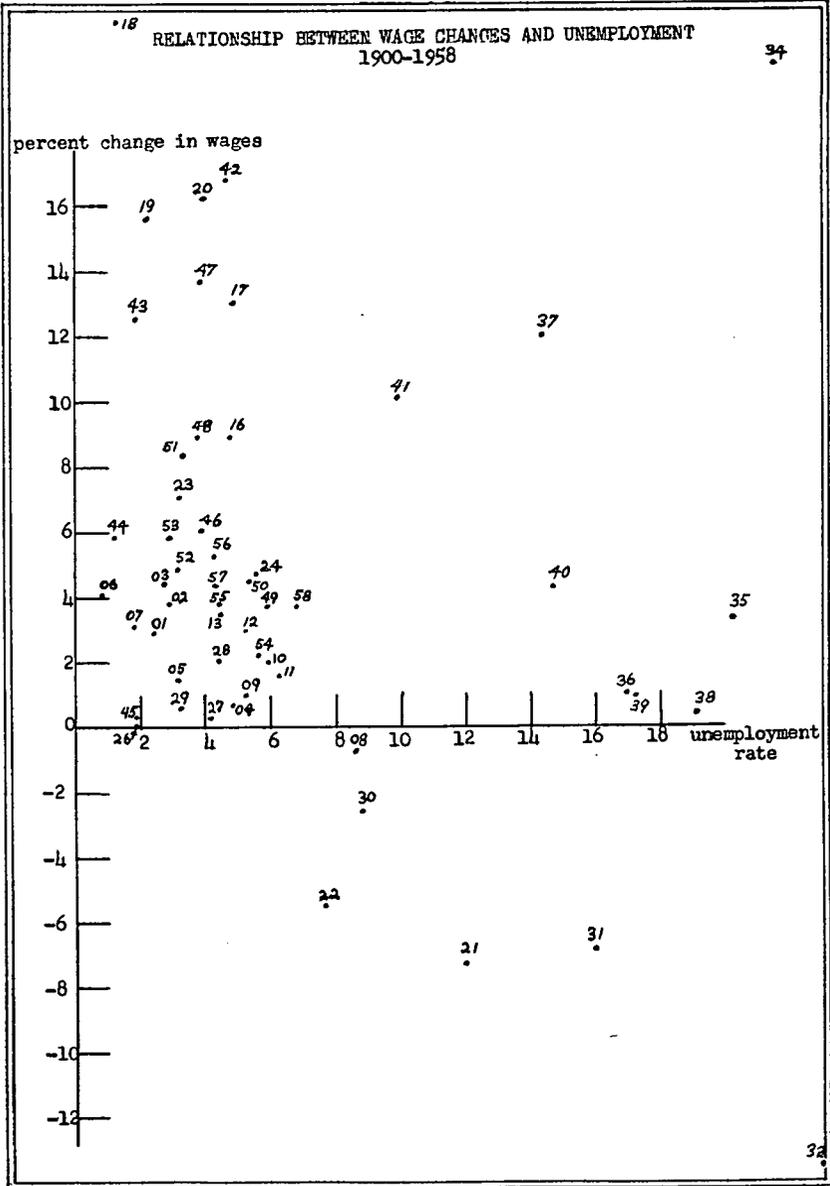
Three characteristics of wage behavior are of particular importance for our analysis of inflation: First, their insensitivity to declining demand; second, their tendency to be influenced strongly by changes in the cost of living; and third, the imitative pattern in wage agreements, which tends to force up wages in industries with declining demand for labor as much as wages in industries where excess labor demand exists.

Charts 3-1 and 3-2 depict the relationship between wage rate changes and unemployment since 1900. The overall relationship shown in chart 3-1 is very loose. If we use 4 percent unemployment as a rough, but convenient division, with higher unemployment ratios denoting deficient demand and lower ratios excess demand, and specify 2½ percent as the annual wage increase consistent with stable unit labor costs (i.e., we assume 2½ percent annual growth in average productivity) then we find that of the 34 years in which wage increases were in excess of 2½ percent, 17 were years of excess demand, and 17 were years of deficient demand. It is true that of the years in which wage increases were less than 2½ percent, more were years of deficient than of excess demand. But most of these years, and all of the ones in which wage rate changes were negative, were years of declining consumer prices. An examination of the mild recessions during the last

³⁵Robert Lanzilotti, "Some Characteristics, etc.," op. cit., p. 446.

100 years, reveals that in the recessions of 1861, 1867, 1870, 1885, 1888, 1891, and 1904, the annual average of hourly earnings did not decline, while in the recessions of 1854, 1900, 1911, 1924, 1927, 1938, 1949, 1954, and 1958, they rose moderately. All but one of the wage increase cum recession situations were in the latter half of the period.³⁶

CHART 3-1



³⁶ Sumner Slichter, "Do Wage Fixing Arrangements in the American Labor Market Have an Inflationary Bias," American Economic Review, May 1954, p. 324.

CHART 3-2

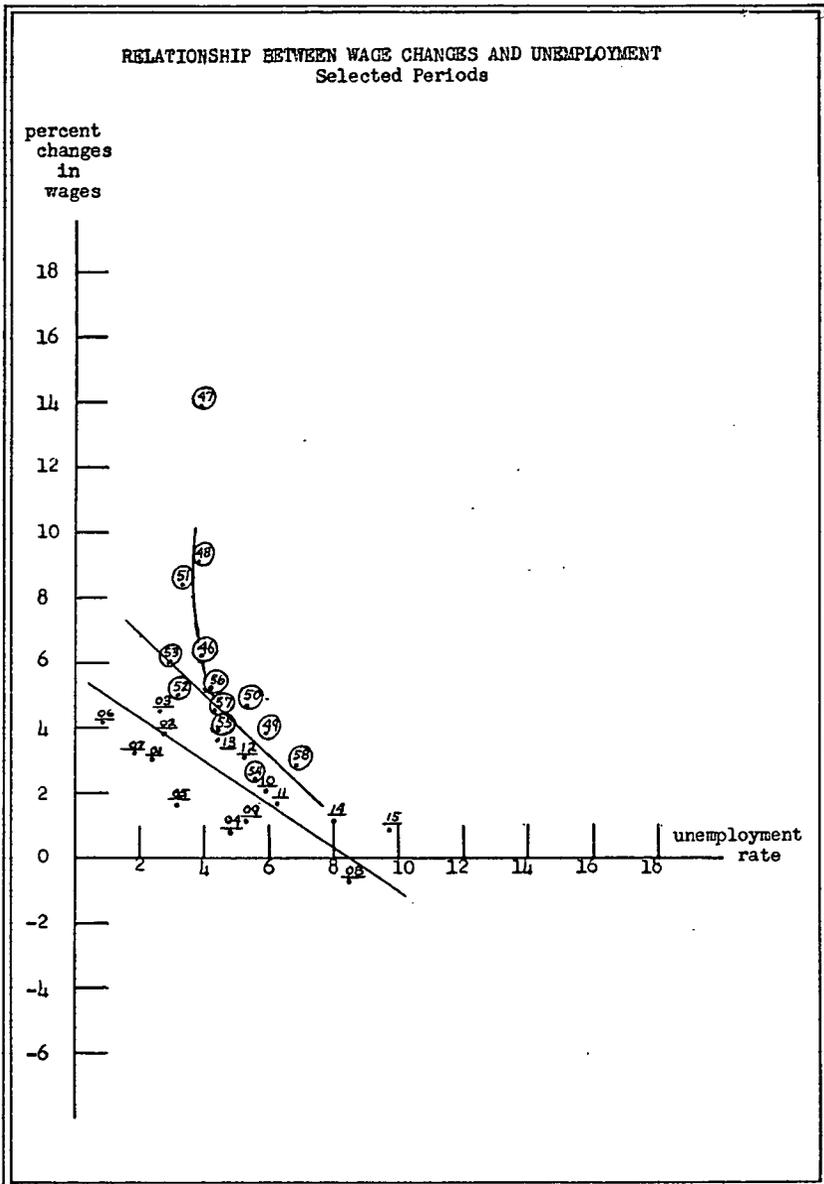


Chart 3-2 presents the same data for two sets of years; the first, 1900-1915, the second, 1947-58. The line describing the post-World War II relationships is much higher than that characterizing the early part of the century. If we ignore 1947-48 as influenced by the peculiar nature of the postwar reconversion, the slopes of the two lines are about the same. But a 4 percent unemployment rate roughly im-

plied a 3 percent wage increase in the earlier period, whereas it seems to imply an annual increase of some 5 percent in the postwar period. In general, however, the relationships after the First World War are so poor as to warrant drawing few conclusions—except that the level of unemployment required to keep wage increases below 2½ to 3 percent appears to be quite substantial.

If one is willing to stretch the data a bit further than they perhaps warrant, the postwar relationships shown in chart 2 suggest one additional hypothesis. Fairly sizable levels of unemployment do affect the magnitude of the annual increases in average hourly earnings. However, the relationship between wage rates and unemployment breaks down once unemployment falls below 5 percent. The rate of increase in average hourly earnings then seems to depend very little on the level of unemployment, and much more on the rate of change in the cost of living and other factors. (See chart 3-4.) Otto Eckstein has reached similar conclusions with respect to the relationship between changes in earnings and changes in employment.³⁷ Decreasing job opportunities seem to have a noticeable effect on the size of annual wage increases. But when employment is rising, the rate of increase appears to have little relationship to the rate of employment increase. This may be, in part, explained by the fact that the level of frictional unemployment varies with the degree to which the composition of demand is shifting. A rise in employment spread evenly throughout all of the major sectors allows of a larger utilization of the labor force, and raises the level of full employment as a percentage of the total labor force.

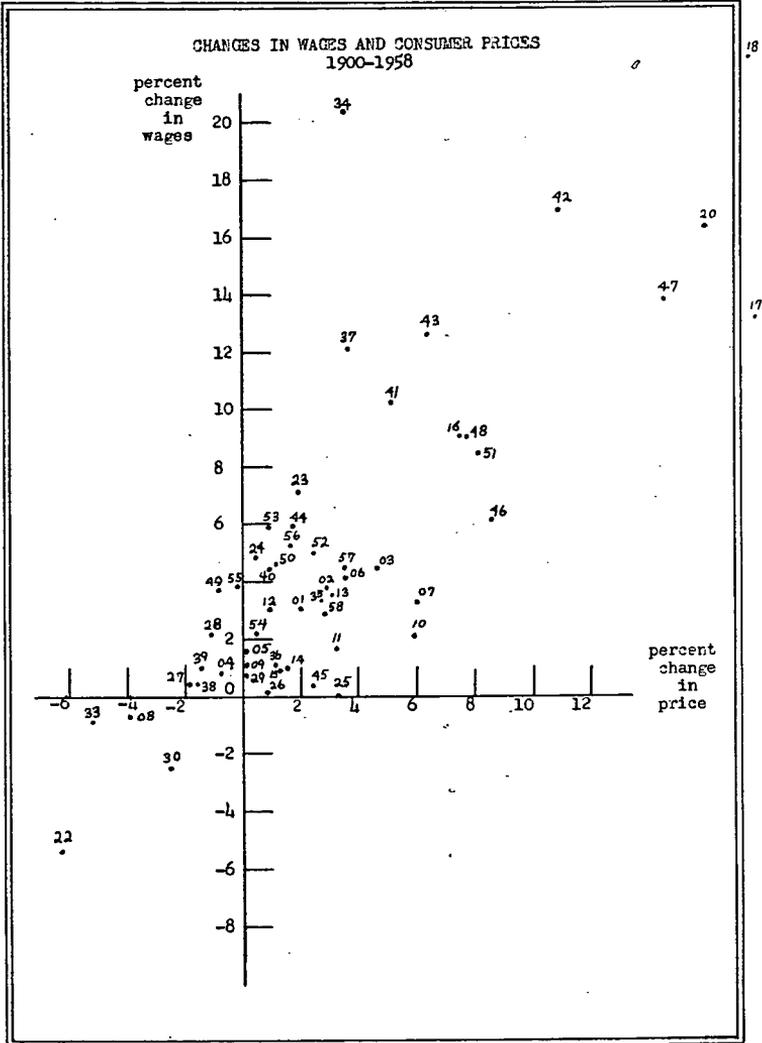
Charts 3-3 and 3-4 present annual comparisons between changes in average hourly earnings and changes in the Consumer Price Index. There is a decidedly better relationship here than in the earnings-unemployment case. If, as in chart 4, we select 1900-15 and 1947-58 as two separate periods for comparison, we achieve a clearer relationship between changes in consumer prices and changes in average hourly earnings. Again as in the case of the earnings-unemployment comparison, the post World War II period has an upward bias in comparison with the early part of the period. In the 1900-15 period years of small changes in the level of consumer prices were associated with small wage-rate gains. The years in which wage gains were less than that suggested by the line of average relationship were with one exception also years of relatively high unemployment. In the postwar period changes in wage rates continued to exhibit some relationship to changes in consumer prices. However the average line of relationship shows a much higher level of wage-rate change for a given change in the price index. In part this may be explained by the larger average gains in productivity which took place in the postwar years, compared to those which occurred in 1900-15. At any given level of prices the change in the demand for labor will be greater, the greater the change in productivity, other things being equal.³⁸

³⁷ Otto Eckstein, "Inflation, the Wage-Price Spiral, and Economic Growth," "Relationship of Prices, etc.," Joint Economic Committee, 1958, pp. 365, 366.

³⁸ In technical jargon, the marginal revenue productivity curve, and hence the demand for labor shift further to the right, the greater the shift in productivity—other things being equal.

An examination of monthly data for the postwar period shows a wide variation in the speed with which wage-rate changes adjusted to changes in the cost of living. In general, wages lagged behind the sharp upsurge of prices in 1946-48, and again in 1950-51. On the other hand wage advances preceded the rise in consumer prices (although not the rise in industrial wholesale prices) during the 1955-57 period.³⁰ As we have repeated innumerable times, leads and lags do

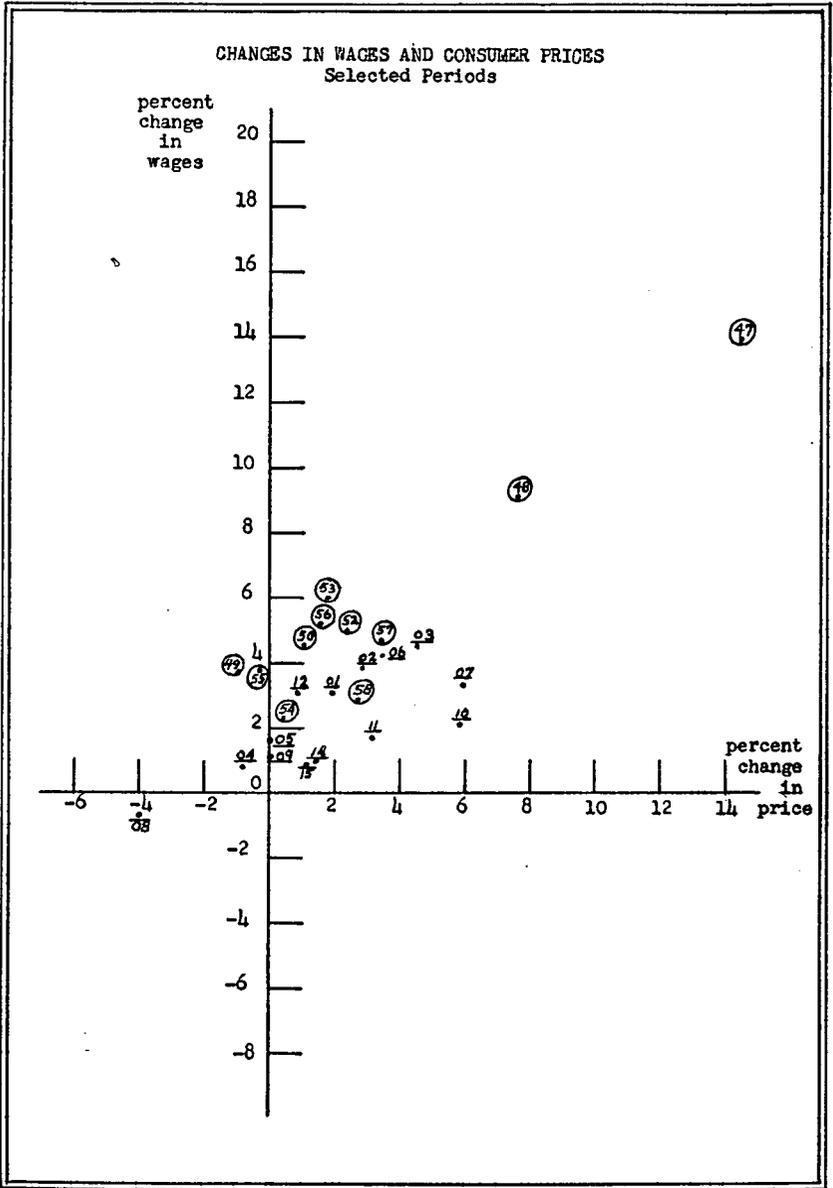
CHART 3-3



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³⁰ Cf. Hickman, *op. cit.*, *passim*, and Eckstein, *op. cit.*, p. 366.

CHART 3-4



not in themselves reveal the basic nature of the inflationary process. However the postwar behavior of wages relative to prices does tend to strengthen the hypothesis that the administered nature of the wage bargain slows down the typical excess demand inflation while it reinforces a creeping, cost-oriented inflation.

The downward rigidity of wage rates in the face of all but very substantial cutbacks in unemployment is not a new phenomenon. Sumner Slichter has ascribed it mainly to the sizeable decreases in worker efficiency which are likely to accompany a wage cut. While we often talk about wage increases and decreases as if they were general, in the real world they take place firm by firm, plant by plant. To the individual worker any wage cut means a cut in relative income. The dissatisfaction thereby caused is widely recognized as a potential source of poor efficiency, and lowered productivity.⁴⁰ Despite the existence of many unemployed and willing sellers of labor, the effect on plant efficiency of dissatisfaction among employed workers has always been a deterrent to reducing money wage rates.

The increased rigidity of wage rates to changes in the demand for labor has been ascribed to a number of factors.⁴¹ The cessation of large-scale immigration is one such factor. The growth of unions is another. Whatever one believes about the power of unions to raise wages, it is surely true that they are a major force in strengthening the (already existing) floor under money wages. That workers and their unions will resist money wage cuts more strenuously than cuts in real wages due to rising prices has been labeled a "money illusion," implying, it would seem, some sort of irrationality. As a matter of fact, this attitude is eminently sensible. A union has some measure of control over the money wage paid its members, very little over the price of the product sold by the employer, and none at all over the general level of prices. If the worker or his union agrees that the price of the product should fall, and so offers to take a wage cut—

* * * his loss is immediate, tangible, and measurable, while only an economist would have the colossal effrontery to assure him that his real income would not suffer from the choice.⁴²

While the overall downward rigidity of wage rates and the upward influence exerted on wages by rising consumer prices help explain the spread of inflationary pressures throughout the economy, an even more important characteristic is the tendency of wages in different industries to move in a roughly uniform pattern. Although we shall examine the evidence for this in some detail in chapter 5, a brief résumé of recent experience is warranted at this point.

The average increase in output for all manufacturing industries between 1953 and 1957 was 6½ percent; the average increase in average hourly earnings of production workers was 17 percent. The top 25 percent of industries in terms of production increase had an average production gain of 18 percent, almost three times the average for all industries. But the average increase in hourly earnings for these rapidly expanding industries was almost exactly the same as the average for all industries (18 percent versus 17 percent). Whereas production changes ranged from -5 percent to +25 percent, the smallest increase in average hourly earnings was 10 percent and the highest 23 percent. A plot of the change in average hourly earnings against changes in output reveals no systematic relationship. A comparison between changes in average hourly earnings and changes

⁴⁰ Cf. Slichter, *op. cit.*, p. 323; also Alfred Kuhn, "Market Structures and Wage Push Inflation," *Industrial Labor Relations Review*, January 1959, p. 249.

⁴¹ Cf. Slichter, *op. cit.*, p. 327, and Harold Levinson, "Unionism, Wage Trends, and Income Distribution," *Michigan Business Studies*, vol. X.

⁴² Kuhn, *op. cit.*, p. 246.

in production worker employment reveals a similar lack of relationship.

If earnings, output, and employment are compared for the period between mid-1955 and mid-1957 the same results emerge. Indeed, in this case, the average earnings increase for the most rapidly expanding industries (12 percent output gain) was slightly lower than the average increase for all industries (2.7 percent output gain). Yet, in the rapidly expanding industries production worker employment rose 2 percent, while for all manufacturing it declined 4 percent.

The same interindustry comparisons between changes in wage rates and changes in output and employment have been made by the United Nations covering some nine industrial countries of the West for the period 1950-56.⁴³ Strikingly similar results occurred. There was very little difference between the average wage increase for all industries and that for industries which had experienced the most rapid expansion in output.

A more significant comparison, perhaps, is between price changes and wage changes industry by industry. Presumably those industries whose prices advanced most rapidly would be the ones in which excess demands were most in evidence. Between mid-1955 and mid-1957 industries producing capital goods or closely allied to capital goods production, though accounting for only 30 percent of the total weight of industrial products in the wholesale price index, accounted for 62 percent of the total price increase. Prices in these industries rose 15 percent compared to an average 4 percent increase for all other industrial products. Yet average hourly earnings in the industries with the largest price advance rose 11½ percent compared to 10 percent for all other industries.⁴⁴ Thus, the industries in which excess demand was slight or nonexistent experienced wage increases almost matching those granted in the areas where excess demands were clearly present.

The tendency for wage increases to be relatively uniform throughout the economy implies that most industries match the increases granted in rapidly expanding sectors. This uniformity is, of course, what one would expect if there were a very high degree of short-run mobility in the labor market. But we know that this is not the case. Unemployment in some industries and regions of the country exists for long periods of time during which there are labor shortages in other industries and regions. Similarly shortages in some occupational categories coexist with a surplus of labor in others. Depressed areas and "sick" industries continue to suffer their malaise in the midst of all but the most vigorous of booms. Yet even in the short run wages in most industries move closely together, with little evidence, in recent periods at least, of systematically larger gains in industries with the largest increases in the demand for labor.

Alfred Kuhn, building particularly upon the work of Ross and Garbarino has evolved an explanation for this phenomenon which appears both eminently reasonable and in accord with the facts as we know them.⁴⁵

In the short run the fairly large fluctuations in demand which confront many firms are met primarily by changes in the work force. It

⁴³ United Nations, "World Economic Survey, 1957," table 8, p. 37, reproduced below, p. 114 as table 5-8.

⁴⁴ See pp. 113-117 below for a more detailed discussion.

⁴⁵ Alfred Kuhn, "Market Structures and Wage Push Inflation," *Industrial and Labor Relations Review*, January 1959.

is clearly preferable in such circumstances to meet the demand for increased output by adding to employment rather than to fixed costs. During periods of full employment, such firms must attract workers from other employers. Generally, however, workers have a low wage-oriented but a high job-oriented mobility. Relatively small differences in wage rates will not induce a large scale exodus of workers from one firm to another, particularly where seniority, pensions, and job security are in question. As a consequence the employer who wishes to increase his labor force must draw upon the small but steady stream of those who are quitting their jobs in good times and bad in order to improve their positions, to change surroundings, or for a host of other reasons. The employer must attempt to insure that such people will first seek work at his establishment. *He must therefore establish a reputation as a permanently high wage firm.*

The combination of substantial fluctuations in short run demand for labor and an inelastic supply means that large employers, in order to have ready access to additional labor, have a strong incentive to keep wage levels above the market average. When we further consider the nature of the oligopolistic industries who make up a large part of the demand side of the industrial labor market, these conclusions are reinforced. Any gains from higher productivity, for example, can be disposed of in three fundamental ways: By a reduction in price, an increase in profits, or an increase in wages. Unlike a cost reduction due to lower factor prices, one which stems from higher productivity is likely not to be equal in magnitude and simultaneous in timing throughout the industry. A price reduction would entail the danger of upsetting the balance within the industry. And unless the specific technique which led to the advance in productivity is somehow protected, any advantage gained by a price cut is likely to be quite temporary. Passing along at least part of the gain in the form of higher wages would, on the other hand, enable the firm to achieve the high-wage reputation which it requires if it is to maintain its market position. An attempt could be made, of course, to hold the line on both prices and wages. Clearly, some of the productivity gain may be maintained to build up the profit position of the firm. And part of it will be used for research and development, the exploitation of new products, and the like. But, as we discussed in the prior section, there is good reason to believe that most large firms aim at some "satisfactory" level of profits. Insofar as the firm fears that too lush a growth in current profits may endanger future profits by encouraging entry of new firms into the industry, a wage increase is as efficient a barrier against entry as a price cut. Yet it involves none of the dangers of retaliation and market disruption which might result from a price cut; finally it promotes a positive objective of management, the acquisition of a high-wage reputation. The same reasoning applies to the "divvying up" of gains from a booming market. At least part of the profits accruing from higher prices and increased utilization of capacity will flow into wages, not only because the union will fight for it, but also because it is in management's interest to do so.

There seems to be no need to argue that workers and their unions will press for money wage advances where productivity gains or price advances have occurred. In theory the worker would be just as well off if the productivity gains were passed on in the form of lower prices,

or if the price increases were of the one-round variety, rather than being compounded by a wage-price spiral. In actuality, of course, there is a world of difference. Money wage increases are tangible and immediate. Price reductions are out of the worker's control, and in the case of oligopolistic industries, there is substantial doubt about the certainty of their occurring. Further, wage increases do, and price cuts do not win union elections. If lowering steel prices would present a problem to Mr. Blough of United States Steel, how much more of a problem would they present to Mr. MacDonald if he were to offer a price cut to his union members in lieu of a wage advance.

As wages are raised in industries which have experienced large excess demands or gains in productivity, other firms will find it necessary to raise wages also. It is not so much that the higher wages elsewhere reduce the work force in these firms. Indeed in many cases they may be laying off workers because of lower demand. As we noted above, labor force mobility tends to be job oriented rather than wage oriented. But this does not mean that the appearance of a wage differential in a particular labor market will not cause trouble for employers paying at the low end of the spread. Worker dissatisfaction is a marvelously *efficient* way of insuring *inefficient* production. It is the threat to productivity rather than the threat to the size of his working force which presses the typical employer to give in to the pattern of wage increases established by the leading firm or firms in the market. Even within a particular firm the problem of worker response to job differentials guarantees an upward bias in wage rate determination. An oligopolist, given the particular nature of his production process and the particular labor market confronting him, may need to establish a high wage reputation only for certain skills and occupations. To some extent, of course, differentials will be changed as a result. But there is a fairly narrow limit, particularly in the short run, to the degree of change in differentials which can be made without inducing dissatisfaction. Hence the whole wage structure of the firm may be shifted to create a high wage reputation for certain skills. And, in turn, this interfirm differential has its impact on the wages which must be paid by other firms, regardless of their own market situation.

Oligopolistic firms, therefore, find it to their own advantage to pass on a goodly part of the increased revenue from improving markets or productivity in the form of wage increases. A high wage reputation is a distinct asset from a business standpoint. And the pecuniary motives are strengthened by considerations of prestige, public relations, and general community good will.⁴⁶ In competitive industries wages are as low as the particular labor market permits. But pressure to restore differentials forces these industries to keep pace with the increases granted by their larger and more affluent competitors in the labor market.

If all markets were more nearly competitive, and if small wage differentials were effective in shifting workers from industry to industry, the situation described above could not exist. Wages would be flexible in the truest sense of the word. If aggregate demand were

⁴⁶ The spate of recent pronouncements from high government sources deploring the effects of "excessive" wage increases may, however, remove some of the nonpecuniary advantages from large wage settlements. If the public becomes convinced that these settlements are the basic "cause" of inflation, then well-publicized industrywide wage settlement may become a liability rather than an asset to the industry in its public relations.

stable, industries whose output was expanding could bid labor away from other industries with only small wage differentials. Larger than average productivity gains would tend to result in price reductions; slower than average productivity advances would lead to price rises. The very nature of oligopolistic product markets, the lack of wage oriented labor mobility, and the effect of growing wage differentials on efficiency in low wage industries, combine to insure some rough degree of uniformity in wage increases. The uniformity, however, does not flow from some averaging procedure. Rather it is a uniformity in which wage rates in most industries and for most skills tend to imitate the behavior of wages in the most rapidly expanding sectors of the economy.

The pattern setting nature of wage increases in oligopolistic industries does not depend on the existence of labor unions. It is explainable in terms of the nature of the product market and certain characteristics of the labor market which would exist even without unions. There is no doubt, however, that unions strengthen this tendency toward uniformity. As Garbarino has pointed out, the existence of administered prices and large productivity gains establishes a potential "kitty" out of which wage gains can be paid.⁴⁷ Following Kuhn, we have summarized the reasons why it is usually advantageous to the oligopolistic employer to use the "kitty" for wage advances rather than for price cuts or for boosting profit rates to unsustainably high levels. Further, we have indicated why the wage advances in such firms will be matched by other firms not so advantageously situated. Clearly the existence of powerful trade unions adds still another reason why the pattern of wage determination should be as we have described it. That unions are able to exert pressure on management to distribute the gains of productivity or improved market position in the form of wage increases should come as no surprise. And in firms which have, at any given moment, no "kitty" to distribute, the organized dissatisfaction which a union can muster probably hastens the inevitable response to wage increases initiated elsewhere. Industrywide bargaining institutionalizes the tendency toward pattern setting which would exist in a weaker form without unions.

Such a brief summary of the reasons for uniform wage advances carries with it the danger of misinterpretation. A few caveats are thus in order. In the first place, there is only a tendency to uniformity. Important differences in the pattern of wage increases do exist, and we do not wish to adopt a rigid version of the theory. In some important cases wage rate increases in industries with no excess demands *exceed* the gains in other industries; the steel industry in recent years is a notable example. The central feature that we wish to stress, however, is that on the average wage rates in industries with declining demands show no systematic tendency to be lower than in industries with rising demands. This rough uniformity of behavior does not reflect a simple averaging of positive and negative changes in the demand for labor. The average wage bargain is more strongly influenced by the conditions existing in industries with above-average demand and productivity gains than by those in industries with below-average gains. Second, we do not wish to be accused of a conception

⁴⁷ Joseph Garbarino, "Theory of Inter-Industry Wage Structure Variation," *Quarterly Journal of Economics*, May 1950.

of wage bargains in which benevolent employers vie with each other to see who can provide their workers with the largest increase in money wages. The foregoing analysis simply attempts to spell out the reasons why an oligopolist, confronted with a fluctuating demand, finds it to his advantage to acquire the reputation of a high-wage firm. There are benefits accruing to the employer from paying out "monopoly gains" in the form of high wages. This does not mean that union demands will be limited to the size of those gains, or that employers will not wage a vigorous fight to keep the wage increase to the lowest level consistent with the other objectives of the firm. Henry Ford was neither a beneficent philanthropist nor an incompetent businessman when it came to the payment of high wages—he simply recognized the substantial advantages of having a favorable wage differential compared to his competitors in the labor market.

From particular to general price increases

Excess demand in particular industries transmits its impact to the rest of the economy through its influence on the prices of materials and the wages of labor. Crude material prices are normally quite flexible, and are unlikely to increase significantly in the absence of excess aggregate demand. Prices of intermediate materials, supplies, and components, however, tend to be more cost determined, and fairly rigid downward. Prices of those materials which are chiefly consumed by industries with excess demand rise, since excess demand for the final good will normally (though not inevitably) imply excess demand for specialized materials. On the other hand, prices of materials and supplies used mainly by industries in which demand is deficient do not decline, unless the demand deficiency is very large. Substantial excess demand in particular sectors of the economy will result, therefore, in a general increase in the cost of intermediate materials; industries which have no excess demand will nevertheless find themselves confronted with advancing materials costs.

In the industries with excess demand, wages will be bid up and wages in other industries will tend to follow. In some cases the size of wage increases will be determined by long-term wage contracts concluded in periods of excess demand; the annual increments will continue even when demand is no longer excessive. Further, there is abundant evidence that in the short run productivity gains tend to be associated with output gains.⁴⁸ Hence industries with rising demand and rising output will have a twofold advantage in bidding for labor—rising prices and rising productivity. Increases in the cost of living will further accentuate the tendency for wages to rise.

The spread of wage increases from industries with excess demand to other industries strengthens the rise in materials costs. The influence of rising costs and the resistance of prices to declining demands will be the greater the closer the product is to the finished state, other things being equal. Finished products have usually passed through a number of intermediate stages, each requiring a determination of prices. As the degree of fabrication increases so also does the proportion of wage costs to total costs. The opportunities for rigidities to build up and for rising wages to affect prices are multiplied.⁴⁹

⁴⁸ See below pp. 115-117 for the evidence on this point.

⁴⁹ See below, pp. 105-106 for some recent evidence of this. The tendency for price rigidity to be associated with the degree of fabrication has been pointed out by a number of writers; cf. for example F. C. Mills, "Price and Quantity Interactions in Business Cycles," National Bureau of Economic Research.

Rising costs will thus confront most producers of finished goods including those the demand for whose products is stable or declining. Even under the purest classical maximizing principles prices would tend to rise with increasing prime costs. But under most conditions the rise of prices would be less than proportional to the rise in factor costs. With full-cost pricing the upward adjustments are more nearly proportional. In competitive sectors of the economy the rising costs will be partly absorbed. And even in the industries in which full-cost pricing prevails, markups will tend to be shaded when excess capacity begins to rise. As inflationary pressures spread out from excess demand sectors; their force will be somewhat damped in the absence of an aggregate excess of demand. So long as markups are more sensitive in an upward than in a downward direction, and wages tend to follow the pattern set in the rapidly expanding industries, however, the general level of prices will rise.

The kind of inflationary process we have described is difficult to label. On the one hand it owes its origin to the emergence of excess demands in particular sectors of the economy. On the other hand such localized excess demand leads to a general price increase only because of the downward rigidities and cost-determined nature of prices and wages generally. The creeping inflation that results is attributable neither to *aggregate* excess demand nor to a generalized *autonomous* push of wages against prices. Indeed its major characteristic is that it cannot be understood in aggregate terms; it is the inevitable accompaniment of a rapid shift in the composition of demand in an institutional environment in which price and wage flexibility is far from perfect.

ADDITIONAL CONSIDERATIONS

So far we have attempted to isolate various types of inflationary processes in their "pure" form. In the real world, however, we seldom find such ideal types. Aggregate demand is usually not in exact balance with aggregate supply. Even if demand, both in the aggregate and in each of the major sectors of the economy were never excessive, it may well be (though I know of no way of demonstrating it) that our wage and price making institutions have so altered that we would experience a modest upward push on the general level of prices. The actual course of any inflation will be a mixture of many phenomena, but each particular one will have its dominating characteristics. In chapter 5 we shall attempt to demonstrate that the 1955-57 inflation can be largely explained by the spread of inflationary pressure from excess demand in the capital goods sector; the general rise in prices was not, in the main, the result of either aggregate excess demand or an autonomous cost-push. However the rapid and quite generalized rise in monetary demand during the recovery of 1955 did leave a legacy of built-in price and wage increases which added to the selective inflationary pressures emanating, during the succeeding 2 years, from the capital goods sector of the economy.

In chapter 2 we pointed out that if prices and wages are cost determined, and if there is a lag in the response of one to the other, an initial excess demand inflation can continue after the excess demand is eliminated. All of our recoveries from postwar recessions have been relatively sharp and rapid. Expectations usually proceed at an even more exuberant pace. Even before physical output reaches capacity,

demands may become excessive, insofar as order backlogs begin to pile up and long-term commitments are made in response to expectations that demands will continue to rise. Productivity almost invariably advances sharply, reflecting the technological improvements made earlier, but not translated into specific performance during the recession period when output was falling. Between 1910 and 1957 the average gain in output per man-hour (for the private nonagricultural economy) during the first year of recovery from recession or depression was 5.2 percent compared to an average annual gain over the whole period of only 2.1 percent.⁵⁰

Margins improve dramatically; at the later stages of the recovery the inflated margins lead to a sharp rise in the demand for factors of production. Even when the demands are specialized they transmit their impact to the prices of other factors, through the pressure of unions and workers to maintain differentials. Wage contracts may be signed for two, three, or even more years ahead, incorporating built-in annual wage increases, and provisions for escalation with the cost of living.

During the period of recovery itself, productivity gains are so large and capacity so ample that prices of most finished goods do not rise. Indeed the highest gains in output and the smallest increases in prices are normally found during recovery. But as Bent Hansen has stressed, an inflationary situation can arise when prices of finished goods are stable, if margins are such as to lead to excess demands for factors of production. And unlike finished goods, raw material prices do normally rise sharply during recovery periods. Ruth Mack has pointed out that this fact alone can provide a "ratchet" under the price level, for even when the excess demand tapers off, the downward rigidity of prices results in a permanent incorporation of higher costs into the price structure.⁵¹

If prices and wages were flexible, the initial tendency for rising demands and expectations to result in rising wage and raw materials prices would cease, so long as the recovery did not turn into a full-fledged boom. But the cost-determined nature of prices and wages tends to perpetuate the influence of buoyant expectations during the recovery, even when a quieter mood takes hold. Advance commitments and long-term wage contracts formally bring into the present the events of the past. Lagged adjustments of prices to rising costs and of wages to rising prices even in the face of falling demand play a similar role. In this way the rapid surge of the economy in 1955 led to changes in the structure of costs and prices which had an inflationary impact lasting into 1957 and 1958, even though, in the aggregate, demands were only excessive for a short period of time in late 1955.

Had this delayed impact of excess demands been the only inflationary force at work, however, the price rises of 1955-57 would have been significantly smaller. Without the stimulus of substantial excess demand in the capital goods industries, the increase in the general level of prices would soon have tapered off; we have already noted how quickly a reduction in markups, of prices over wages and wages over prices and productivity, will damp a rise in prices:

⁵⁰ "Productivity, Prices, and Income." Joint Economic Committee, 1957, table 3, p. 89.

⁵¹ Ruth Mack, "The Destabilizing Influence of Raw Materials Prices," "The Relationship of Prices, etc.," Joint Economic Committee, 1958, pp. 269-284.

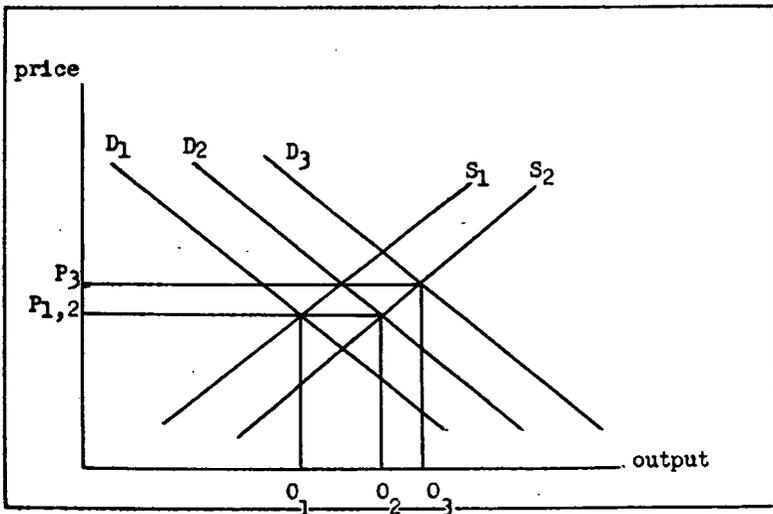
Thus our explanation of creeping inflation rests on a combination of factors. It originates in the general excess demands which temporarily emerge as we pass from recession to full employment, and from the particularized excess demands which often remain when the aggregate excess has been eliminated. But it is perpetuated and spread throughout the economy by the downward rigidities and cost-oriented nature of our price and wage making institutions.

THE RELATIONSHIP OF RELATIVE DEMANDS TO RELATIVE PRICES

If the hypothesis we have presented is substantially correct we should find that the relative rise in prices among different commodities is related to the relative strength of demand, *but* with an upward bias. A given increase in demand will lead to a price increase significantly larger than the price decline accompanying a fall in demand of the same magnitude. This result emerges from the existence of downward rigidities in prices and from the influence on prices of cost increases generated in areas of rising demands.

We have no measures of excess demand. However, we can use the relative rates of growth in output as a rough and ready substitute. A growing labor force and rising productivity imply a constantly increasing level of full employment output; supply curves are continually shifting and to the right. If prices and wages were perfectly flexible, price increases would only be associated with increases in output larger than the rightward shift in supply curves. Schematically, the situation is depicted below in chart 3-5.

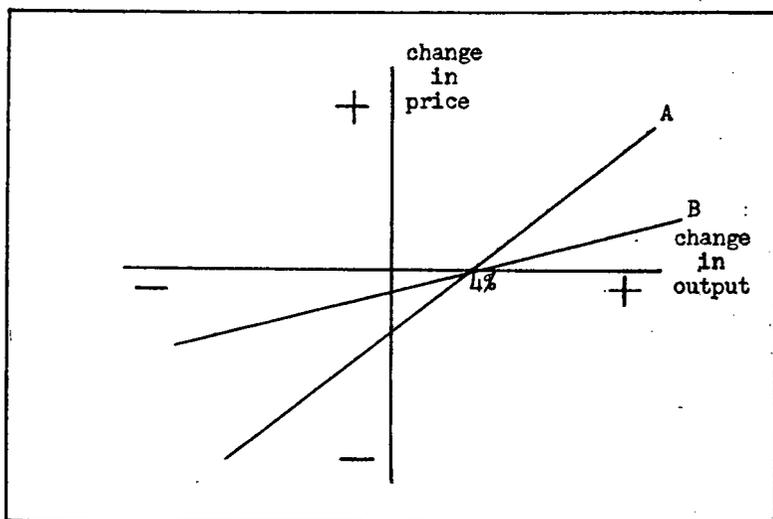
CHART 3-5



As the supply curve shifts rightward demand does not become excess, and prices do not rise, unless demand increases by a larger amount than supply. A plot of price changes against output changes industry by industry during some given period, say a year, should produce a relationship about like that shown in chart 3-6. If aggregate demand

is not excessive, then aggregate output can rise moderately with no increase in the average level of prices. For illustrative purposes we have assumed a 4 percent rightward shift in supply curves. Prices should fall in industries whose output gain is less than average, while industries with larger than average output gains will experience price increases. If resources are very mobile, then a significant dispersion in the mix of demand should yield a price-output curve like B above—relative prices need change only modestly to reallocate resources. If resources are immobile, larger than average output gains will generally require substantial price increases, and declining output will involve large price decreases—curve A.⁵²

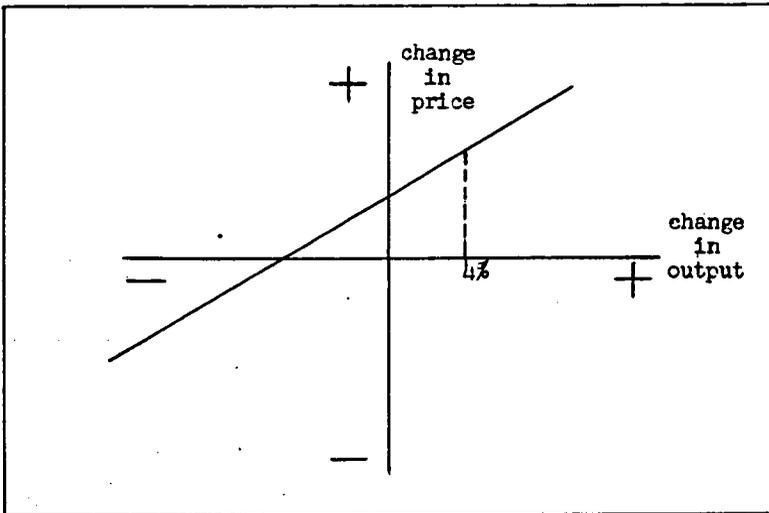
CHART 3-6



In our explanation of creeping inflation, however, the composition of demand is an important determinant of the general price level. Sharp increases in demand in some areas, balanced by decreases in others, lead to an overall rise in the price level. If we plot the relationship of changes in prices to changes in output, our hypothesis would lead to us expect a relationship of the following nature:

⁵² The greater the mobility of resources the more elastic will be the supply curves of chart 3-6.

CHART 3-7



There will be an upward bias in the relationship of prices to demand. Industries with no excess demands—under our rough assumptions, those whose output is expanding modestly—will nevertheless be characterized by rising prices. Only those industries with substantial deficiencies of demand will be marked by falling prices. *If we match, in some detail, changes in industrial prices and output during the 1955-57 period we find a relationship exactly as depicted above.*⁵³ There was a positive association between price increases and output increases; but the relationship is not the one that would exist if prices and wages were symmetrically flexible. Although the average gain in output was quite small, there was a significant rise in the general price level. Many industries whose output rise was significantly less than the rightward shift in their supply curves nevertheless raised their prices. Generally speaking, prices were reduced only in situations where production was sharply curtailed.

A demonstration that price increases tend to be associated with demand increases, industry by industry, is, therefore, no proof that inflation is generated solely by excess aggregate demand.⁵⁴ The mere fact of such a relationship is quite consistent with the hypothesis we have presented in this chapter. Indeed the specific shape of the relationship and the values of its parameters during recent years tend to confirm the fact that the inflation was not primarily generated by excess aggregate demand.

⁵³ For an extended discussion of this relationship see below, pp. 110-113.

⁵⁴ Richard Selden in a recent article ("Cost-push vs. Demand-pull Inflation," *Journal of Political Economy*, February 1959) has convincingly shown that the 1955-57 price increases were greatest in industries with excess demand. He then proceeds to argue, however, that this fact demonstrates the excess aggregate demand nature of the inflation.

SECULAR INFLATION

The mechanism by which shifts in the composition of demand tend to generate a rising price level did not suddenly emerge in the post-war period. Many prices and most wages have always been relatively insensitive to moderate downward shifts in demand. The magnetic effect of rising costs in particular sectors of the economy on the general level of costs is not a novel phenomenon. But the recurrence of sharp and prolonged general depressions was usually sufficient to break through these rigidities and enforce a reduction in the most insensitive prices and wages.

During depression years the widespread bankruptcies and reorganizations also led to massive write-downs in the value of fixed assets. This provided an additional damper on secularly rising prices. Increases in capital goods prices which accompany a short run inflation normally leave a legacy of continued upward pressure on the level of costs. Even after capital goods prices cease to rise the replacement of lower priced assets—valued at the prices ruling before the inflation began—with new, higher priced assets tends to raise the level of costs. The fact that the new capital goods are more efficient than the ones they replace is no offset, for the rise in productivity so generated will normally be absorbed by higher returns to factors of production. One may argue over the importance of capital costs per unit in short-run pricing decisions. In the long run it is quite clear that they do affect prices. The downward revaluations of capital assets during severe depressions removed this legacy of rising capital costs left by prior inflations. Thus by breaking through the ratchet which holds up prices and costs, the severe depressions of earlier periods interrupted the tendency of prices and wages to rise secularly. There is little likelihood that any administration would permit a recurrence of such protracted depressions in the future.

There is yet another way in which downward rigidities⁶⁵ in the price system tend to engender a secular rise in the price level. We pointed out earlier that productivity increases most rapidly during the early phases of a recovery as the fruits of earlier investment outlays are realized. Even though wages increase moderately during such periods, profit margins rise dramatically. Prices, based on the level of costs incurred during the prior boom, are too high relative to the new and lower level of costs. Had prices been reduced during the recession, profit margins would simply return to a normal level during recovery. Downward price rigidity, however, implies excessively high margins when recovery occurs. *Ex ante profit margins*, at a full employment level of output are too high in the recession, even though *ex post* margins are somewhat lower than normal. The excessive margins lead in turn to overexuberant expectations when the economy moves back to full employment. As a consequence, even though prices of final goods do not rise during the typical recovery, factor prices are bid up. We have the kind of process emphasized by Hansen and Turvey—a factor price inflation. The sharp rise in profit margins is halted, and then reversed well before the succeeding downturn in economic activity.⁶⁵

⁶⁵ The cyclical behavior of profit margins suggested here, is confirmed by the study of Osborne and Epstein; "Corporate Profits Since World War II," Survey of Current Business, Department of Commerce, January 1956.

If prices were flexible during recession, the rapid growth in productivity during the subsequent recovery would restore margins to normal levels, with costs somewhat lower than at the prior peak. The sharp productivity advances in recovery years would thus provide an offset to the rise in costs and prices during other periods. Instead, with rigid commodity prices, the productivity gains are dissipated in higher factor prices.

The rigidities in costs and prices are thus sufficient to provide a ratchet under the price level, preventing its falling back from levels attained during periods of inflation. Adjustments in relative prices tend to be accomplished by upward movements only, even though aggregate demand is not excessive. Imbalances in general price-wage relationships also tend to be overcome by a rise in one relative to the other, rather than by a mutual adjustment toward a common center.

SOME QUALIFYING COMMENTS

The kind of inflation which results from the process we have described in this chapter is a gradual process. So long as aggregate demand is not excessive, inflation will be mild. The rigidities and cost-oriented characteristics of prices and wages are not so firm that they completely withstand the influence of deficient demand. Our exclusive concentration on the inflationary consequences of sharp changes in the composition of demand should not be interpreted as a sign that the resulting inflation is a particularly awesome affair. Popular articles on inflation often begin by reciting all of the evils of a hyperinflation; and then assign those evils as the consequence of any inflation, no matter how gradual. The inflation we have here described need have none of these characteristics. Mild inflation is, in fact, one of the ways in which an economy with downward rigidities in its cost and price structure allocates resources. There are arbitrary income gains and losses accompanying any shifting about of resources. Whether individual well-being and social equity are better preserved when resource shifts entail only relative price changes instead of overall price increases I do not pretend to know. Certainly, however, it is not a question whose answer is obvious.

CHAPTER 4

THE IMPACT OF OVERHEAD COSTS ON THE INFLATIONARY PROCESS

INTRODUCTION

We have argued that the average level of prices is influenced not only by changes in aggregate demand, but also by changes in its composition. Even if aggregate money demand is not rising at an excessive rate, a sharp change in the mix of demands will entail a rise in the general price level. Any *given* increase in money demand will thus involve a smaller increase in actual output, the greater is the shift in its composition. If aggregate money demands are rising at a rate about equal to the increase in output which might be expected from labor force and productivity growth, then a rise in the general level of prices will reduce the rate of growth in real output. Assume, for example, that output normally must rise by some 4 percent per year to absorb the growing labor force; if aggregate money outlays rise at 4 percent per year, any increase in the price level will reduce the growth in output below 4 percent and normally lead to rising unemployment. This is simply another way of saying that an increase in prices not caused by excess aggregate demand will lead to an increase in unemployment unless sufficient money demands are forthcoming to clear the market at the higher prices.

During the 2 years from mid-1955 to mid-1957 aggregate money expenditures rose by about 5 percent per year, only slightly faster than the rate of increase in real output which has normally characterized the American economy since World War II. Yet prices rose 3½ percent and real output by only 1½ percent. The proportion of the rise in money expenditures which was dissipated in higher prices was much larger than might have been expected on the basis of aggregate analysis alone. The rise in output was only slightly larger than the increase in the labor force during these years. Had productivity risen at its "normal" postwar rate, substantial increases in unemployment would have occurred. In fact productivity did not rise and unemployment remained for the entire 2 years at a stable 4 percent of the labor force.

We shall argue in this chapter that the failure of productivity to rise was not a technological phenomenon. Rather it resulted from the combination of rapidly increasing overhead costs and slowly growing output.¹ All of the additional employment during the period was concentrated in jobs which are generally considered in the category of fixed expenses. When output failed to grow such employees were not discharged. As a consequence the statistical measure of produc-

¹ We shall present in the next chapter evidence that the disappointing productivity rise was not caused by disruptions in output associated with the large investment boom.

tivity showed a disappointing rise, and the unemployment ratio remained low.

This rise in overhead employment during a period of small gains in output led to substantial increases in fixed unit costs. Other elements of overhead costs—research and development, capital consumption allowances, and so forth—also increased rapidly. In fact fixed costs were by far the largest component of the increase in total unit costs. Thus overhead costs have a twofold importance in our analysis; they not only help explain the fact that unemployment failed to increase in the face of a rise in prices not fully “validated” by rising aggregate expenditures, but they also help explain part of the rise in prices. In the rapidly expanding sectors of the economy price increases stemmed largely from the influence of excess demands. In other sectors, however, the smaller, but still significant, rise in prices is traceable not only to the advance in wages and materials prices, but also to the substantial rise in overhead costs.

THE CHANGING STRUCTURE OF COSTS, 1947-57

One of the major, though little noticed, features of the postwar period has been the rapid change in the cost structure of the American economy. The proportion of total costs accounted for by relatively fixed items of expense has risen sharply. This has resulted not only from a change in the internal structure of costs within individual industries, but also from a shift in the importance of different industries.

The distinguishing characteristic of “fixed” or “overhead” costs is their inescapability.² The longer the time period under consideration the more any given cost will be escapable. There is, consequently, no absolute criterion by which to define what are and what are not fixed costs. Rather, we are faced with a spectrum of costs, ranging from those which can be quite readily varied in accordance with fluctuations in output, to those which will continue for long periods of time regardless of the level of output. In many cases the fixed nature of a particular cost arises not from the physical impossibility of escaping it, but from the economic nature of its contribution to the production process. The salaries of managers, engineers, technicians, salesmen, administrative personnel and the like represent costs which fall into this category. Except for those cases in which long-term employment contracts are in effect, there is no physical or legal impediment to reducing the employment of such people when output declines. But, in fact, such personnel are hired in the context of longer run requirements. Their services do not contribute to the profitability of the firm in a way which depends closely on the level of output. Just as in the case of plant and equipment outlays, or research and development expenditures, their salaries represent an investment in the long-term future of the firm.³ Over the long run, outlays for these fixed or quasi-fixed costs are adaptable in the light of the firm’s actual experience. But a temporary shortfall in sales and production below expected levels is not likely to induce a large scale reduction in these costs. Of particular relevance to our analysis of the 1955-57 period is the fact that a temporary failure of output to

² Cf. W. Arthur Lewis, “Overhead Costs,” Unwin Bros. Ltd., London, 1949, pp. 9-30.

³ Even if the employment of such personnel simply reflects the operation of “Parkinson’s law” in corporate bureaucracies, they are *presumed* to have been hired with some longrun requirement in mind.

rise to the levels anticipated when the costs were initially incurred does not necessarily induce firms to pare them down. An inspection of nonfarm employment data classified by occupations (Census) and manufacturing employment classified between production and nonproduction workers (BLS) confirms this view. Of the total decline in employment during recessions, almost all is accounted for by occupations other than those we would classify as "fixed" or "overhead"; similarly in manufacturing, almost the entire reduction in employment takes place among production workers—employment of nonproduction workers declines very slightly.

TABLE 4-1.—*Employment by occupation, 1947-57*

Occupation	Employees (millions)			Percent change		Percent of total change	
	1947	1955	1957	1947-57	1955-57	1947-57	1955-57
Total nonfarm employment.....	49.8	56.5	58.8	18.1	2.8	100.0	100.0
Overhead type employment ¹	20.2	24.6	26.5	31.2	7.7	70.0	92.6
Direct labor ²	23.6	24.7	24.9	5.5	.8	14.4	8.7
Service workers and miscellaneous.....	6.0	7.2	7.4	23.3	2.8	15.6	8.7

¹ Professional and semiprofessional, managerial, sales, clerical, and kindred personnel, and proprietors.

² Craftsmen, foremen, operatives, and laborers.

Between 1947 and 1957 total nonfarm employment rose by slightly more than 8 million. More than 6 million of this rise was accounted for by increased employment of overhead type personnel, and only 1½ million by direct labor. From 1955 to 1957 the relative gain of overhead personnel was even larger; total nonfarm employment rose 2.3 million, employment in those occupations whose payrolls are normally considered direct costs accounted for only 200,000 of this rise.

TABLE 4-2.—*Employment in manufacturing, 1947-57*

	Employees (thousands)			Percent change		Percent of total change	
	1947	1955	1957	1947-57	1955-57	1947-57	1955-57
Total manufacturing employment.....	15,290	16,563	16,782	9.8	1.3	100.0	100.0
Production workers.....	12,795	13,061	12,911	1.0	-1.1	7.8	-68.0
Nonproduction workers.....	2,495	3,502	3,871	55.0	10.5	92.2	168.0

Within manufacturing the shift to overhead labor has been even more radical. All of the postwar gain in employment has taken place among nonproduction workers. From 16 percent of total employment in 1947 they have risen to 23 percent in 1957. Between 1955 and 1957 the relative growth was even more rapid, as nonproduction worker employment rose 10 percent while production worker employment was declining.

It is not only overhead labor costs which have risen. Other types of relatively fixed costs have increased as a proportion of total costs. The rapid growth of research and development expenditures is partly reflected in the rising employment of technical personnel. But it

also shows up in increased plant, equipment, and materials outlays— inseparable in the data from the total outlays on such items for all purposes. There is some evidence that the overall capital-output ratio has risen during the past 10 years, although not back to its earlier peaks prior to World War I.⁴ More importantly the ratio of relatively short lived equipment to long lived plant has risen substantially.⁵ As a consequence, even with capital output ratios constant, depreciation as a proportion of total cost would tend to rise. The much sharper increase in plant and equipment prices relative to the average price level has further accelerated the rise in unit depreciation charges compared to other costs. As table 4-3 brings out, prices and construction costs have risen far more rapidly than any of the standard general price indexes. Reflecting this rise in relative prices, and also the fact that throughout the postwar period depression-priced plant and equipment was continually being replaced by higher priced equipment, the average "price" of a unit of capital "services" rose very rapidly.⁶

TABLE 4-3.—*Percent change in selected price indexes, 1947-57*

GNP deflator.....	30.3
Wholesale price index: all commodities.....	23.7
Wholesale price index: industrial commodities.....	32.2
Consumer Price Index.....	29.2
Producers' durable equipment deflator.....	50.8
Private nonresidential construction deflator.....	54.4
Average price of a unit of capital equipment services in manufacturing ¹	54.7

¹ Cf. footnote 6, above

There is no generally acceptable way of calculating depreciation on an economic basis. However calculated, it is clear that depreciation charges have risen quite substantially as a proportion of total costs.

While we have no data allowing us to attempt a breakdown of costs for all industries, it is possible to construct a set of cost estimates for manufacturing. In tables 4-4 and 4-5 the rapid growth in the importance of overhead costs stands out clearly.

⁴ Cf. Machinery and Allied Products Institute, *Capital Goods Review No. 22*; Daniel Creamer, "Studies in Capital Formation and Financing," Occasional Paper 41, National Bureau of Economic Research, 1954; Israel Borenstein, "Capital and Output Trends in Mining Industries," Occasional Paper 45, National Bureau of Economic Research, 1954; Melville Ulmer, "Trends and Cycles in Capital Formation by U.S. Railroads," Occasional Paper 43, National Bureau of Economic Research; "U.S. Income and Output," Department of Commerce, 1959, table V-15, p. 196; also the forthcoming publication of the National Bureau of Economic Research on "Capital Formation and Financing in Manufacturing and Mining" by Creamer, Borenstein, and S. P. Dobrovolsky.

⁵ See the following:

Ratio of equipment to plant (based on constant values in 1954 dollars)

	1929	1947	1957
Total private economy.....	0.52	0.63	1.00
Manufacturing.....	.47	.73	1.04

⁶ The average price of a unit of capital services is taken to be the implicit deflator used in converting depreciation charges based on current replacement cost values into values expressed in constant dollars. Cf. Donald Woodin and Robert Wasson, "Manufacturing Investment Since 1929," Survey of Current Business, Department of Commerce, November 1956.

TABLE 4-4.—*Manufacturing costs, 1947-57*

[Index, 1947=100]

	1953	1955	1957
Total gross income originating.....	168.8	181.6	197.4
Wage payments ¹	163.6	165.1	178.3
Salary payments ²	179.5	203.3	252.3
Capital consumption allowances.....	226.8	294.5	335.3
Profits and other property income ³	169.1	191.5	177.8
Indirect taxes.....	150.6	162.6	183.1

¹ Includes an estimated allocation of "supplements" to wages.² Includes an estimated allocation of "supplements" to salaries.³ Includes corporate profits, income of unincorporated business, and net interest.TABLE 4-5.—*Change in selected manufacturing costs*

	Percent change		Percent of total change	
	1947-57	1953-57	1947-57	1953-57
Total gross income.....	97.4	16.9	100.0	100.0
Wage payments.....	78.3	9.0	39.9	24.9
Overhead.....	171.4	42.8	34.7	53.7
Salaries.....	153.3	40.6	25.6	39.3
Capital consumption.....	235.3	47.8	9.1	14.4
Addendum: Profits plus capital consumption.....	103.6	14.1	24.8	20.7

NOTE.— See footnotes to table 4-4.

The capital consumption allowances used in the tables are based on bookkeeping records, and hence reflect original cost valuation of assets. They also reflect changes in depreciation methods (accelerated tax amortization, 1954 Revenue Code liberalization, etc.). Despite these shortcomings the evidence is clear that "fixed" costs have risen quite rapidly as a proportion of total costs. In 1947 salary payments and depreciation together accounted for 21 percent of total income originating in manufacturing. By 1957 they were 29 percent of the total. Of the \$68 billion increase in total value added in manufacturing between 1947 and 1957, \$25 billion went to the overhead cost categories, about the same as the amount accounted for by the increase in the wage bill. After 1953 the relative growth of overhead items is much more striking; \$12 billion of the \$22 billion rise in total value added went to salaries and depreciation, only \$4 billion to wages.

Overhead costs per unit of output

The aggregate dollar costs developed in table 4-4 can be converted to costs per unit of output. Using 1947 as a base period, we can extrapolate the gross product in manufacturing (equals gross income originating) by an output index and thus obtain a constant dollar measure of output. Dividing the current dollar estimates of gross product by its constant dollar equivalent, we obtain the implicit price deflator of manufacturing gross product. Since price per unit is simply the sum of charges against output, calculated per unit of output, we can convert our cost aggregates into unit costs which sum to an index of the price of value-added.⁷ The cost data become "points"

⁷ See the author's "Construction of Consistent Price, Output, and Unit Cost Estimates," (to be published as a comment in the 1958 Conference on Income and Wealth (vol. 25), National Bureau of Economic Research, for a fuller description of the process and some of the index number problems involved.

in the price index. Similarly by appropriately weighting the value-added deflator and an index of the prices of raw materials purchased by manufacturers, an overall product price index can be constructed, and compared with the published BLS index of manufacturers' prices.

TABLE 4-6.—*Prices and unit costs in manufacturing, 1947-57*

[Index, 1947=100, and index points]

	1947	1951	1953	1955	1957
Manufacturers' price index:					
Actual ¹	100.0	120.4	117.6	119.9	128.5
Calculated ²	100.0	120.9	117.3	120.4	127.8
Raw materials price index.....	100.0	114.6	103.1	98.4	100.8
Price index of value added ³	100.0	123.5	123.4	129.8	139.4
Wage cost.....	49.9	57.5	59.7	58.9	62.8
Salary cost.....	17.0	20.0	22.3	24.7	30.3
Gross margin.....	22.3	35.6	30.4	34.7	33.5
Capital consumption.....	(3.8)	(5.1)	(6.3)	(8.0)	(9.0)
Profits and interest.....	(19.5)	(30.4)	(24.1)	(26.7)	(24.5)
Indirect taxes.....	9.9	10.5	10.9	11.5	12.8

¹ BLS index.² Calculated by weighting the raw materials index by 0.3 and the price of value added by 0.7.³ "Value added" is equivalent, in this context, to gross product originating.TABLE 4-7.—*Changes in manufacturing prices and unit costs, 1947-57*

	Percent change			Percent of total change allocated to each item		
	1947-57	1953-57	1955-57	1947-57	1953-57	1955-57
Manufacturers' price index: Actual.....	28.5	9.3	7.2	-----	-----	-----
Raw materials price index.....	.8	-2.2	2.4	-----	-----	-----
Price index of value added.....	39.4	13.0	7.4	100.0	100.0	100.0
Wage cost.....	25.9	5.2	6.6	32.7	19.4	40.5
Salary cost.....	78.2	35.9	22.7	33.8	50.0	58.1
Gross margin.....	43.8	10.2	-3.5	25.9	19.4	-12.1
Capital consumption.....	136.8	42.9	12.5	13.2	16.9	10.8
Profits and interest.....	25.6	1.7	-8.2	12.7	2.5	-23.0
Indirect taxes.....	29.3	17.4	11.3	7.4	18.8	13.5

We shall be using the data in these tables extensively in chapter 5. At this point the major feature to warrant attention is the very large proportion of the increase in total unit cost (equals price) accounted for by salaries and depreciation. Of the 40-point rise in the value-added deflator between 1947 and 1957, 19 points were accounted for by these overhead costs. Salary costs and gross margins together accounted for 62 percent of the rise in total unit costs. After 1953 the rise in salaries and depreciation charges per unit was equal to four-fifths of the rise in price. Wage costs, on the other hand, which were one-half of total charges against gross product in 1947, accounted for less than one-third of the increase in costs during the next 10 years. In the latter years of this period they accounted for an even smaller proportion of the rise in costs. Whatever one's interpretation of the significance of these data, they clearly bring out the radical change in the cost structure of manufacturing over the past 10 years.

These cost data are, of course, ex post reflections of a complicated interaction between costs and demands. We do not mean to imply that the increase in any particular component of costs "caused" an equivalent rise in prices. We shall, in fact, spend the remainder of

this chapter attempting to unravel the effects on prices, productivity, and incomes of rising overhead costs, both in a secular and in a cyclical context.

SECULAR ASPECTS

It is convenient to consider the influence of overhead costs on other economic variables under two different sets of conditions: First, the situation in which output is proceeding according to the expectations of entrepreneurs when they committed themselves to the additional overhead expenses; second, the situation in which output falls short of expectations. In analyzing costs under the first set of conditions we shall not need to worry about unutilized capacity, unemployment, or output variations as such; technically speaking we are dealing only with changes in costs associated with changes in the shape and position of cost curves; changes in costs brought about by movements along a specific curve we shall, temporarily, ignore.

Overhead labor

To a large extent the growing employment of overhead personnel represents a substitution for production labor. Technological improvement in the postwar period has led not only to a reduction in labor requirements per unit of output but also to a change in the kind of labor used. Automation of production methods, instrumentation of control functions, mechanization of office and accounting procedures, self-regulating materials handling equipment—all of these developments require a growing complement of professional and semiprofessional personnel in supervisory, operating, and maintenance roles. The growth of formal research and developments as a separate function in many firms has displaced the more informal catch-as-catch-can type of research performed in production departments. As the nature of production processes has been altered, so also has the composition of the labor force required to service them.

Statistically this substitution has yielded a rate of growth in production worker output per man-hour larger than the overall growth in labor productivity. It is never correct, of course, to impute to any one factor of production the "causal" role in the advance of average productivity. However, so long as the capital-output ratio and the rate of return on capital investment are constant, wages can rise as rapidly as the advance in average labor productivity without causing any rise in total unit costs. The substitution of overhead for variable labor⁸ is in some respects analogous to the substitution of capital for labor. Both involve the replacement of one kind of input by another. In the case of capital, however, the maintenance of some "satisfactory" rate of return per unit of capital is normally sufficient for dynamic equilibrium. In the case of overhead labor, however, the rate of return per unit of input—the average salary—will inevitably tend to rise along with rising wage rates. Even if the growth of overhead labor is proportioned to the growth in output—analagous to a constant capital output ratio—the average overhead cost per unit of output will rise. In other words, if the increase in the productivity of wage labor involves a substitution of salaried for

⁸ We use the terms "overhead" and "salaried" labor interchangeably; so also, "wage" and "variable" labor.

wage labor, then total unit cost stability requires that wage rates rise by less than the growth in wage labor productivity.

Table 4-8 summarizes the changes in man-hour requirements per unit of output,⁹ average compensation, and unit costs for manufacturing production and nonproduction workers. The 1947-55 time period was chosen, instead of 1947-57, because the 2 years after 1955 were dominated by cyclical, rather than secular behavior.

TABLE 4-8.—Changes in productivity, earnings, and unit costs—Production and nonproduction workers in manufacturing

[Percent]		
	1947-55	1951-55
Salary cost per unit of output.....	46.0	22.2
Man-hours per unit of output.....	3	2.7
Compensation per employee man-hour.....	45.6	19.0
Wage cost per unit of output.....	18.0	2.7
Man-hours per unit of output.....	-28.5	-14.1
Compensation per employee man-hour.....	60.5	19.9
Total labor cost per unit of output.....	25.0	7.8
Man-hours per unit of output.....	-22.2	-11.3
Compensation per employee man-hour.....	60.7	21.4

The increase in employment of salaried labor between 1947 and 1955 was just about equal to the increase in output. The increase in salaries was somewhat lower than the rise in wage rates, but solely in the early part of the period. It was during the years after 1951 that the relative growth of salaried employment to wage employment was most striking, and this development reflected itself in an increased rate of growth in salary rates.

Using the data in tables 4-6 and 4-8, we can compute the amount by which wage rate increases must fall short of wage-labor productivity gains if unit cost stability is to be maintained.

Let:

I_L = Index of total unit labor costs

I_w = Index of wage rates

I_s = Index of salary rates

Z_w = Index of wage labor output per man-hour

Z_s = Index of salaried labor output per man-hour

\bar{P} = Base period proportion of wage costs in total labor costs

When the I 's and Z 's are expressed as lower case letters, i and z , they represent the annual percent change in the index. (e.g., if $I_w = 105$, $i_w = 5$)

Then:

$$I_L = \bar{P} \left(\frac{I_w}{Z_w} \right) + (1 - \bar{P}) \left(\frac{I_s}{Z_s} \right) \tag{1}$$

Assume that the increase in salary rates will keep pace with the increase in wage rates. Then,

$$I_s = I_w \tag{2}$$

⁹ A measure of unit man-hour requirements is the reciprocal of productivity.

If the employment of salaried labor keeps pace with the rise in output, as it did between 1947 and 1955, then the second term of equation (1) reduces to:

$$(1-\bar{P})I_w \quad (3)$$

Then, if total unit labor costs are to be stable,

$$I_L \equiv 1 \equiv \left[\frac{I_w}{Z_w} \right] \cdot \left[\bar{P} + Z_w(1-\bar{P}) \right] \quad (4)$$

$$I_w \equiv \frac{Z_w}{1+(1-\bar{P})(Z_w-1)} \quad (5)$$

and

$$i_w \equiv \frac{\bar{P} \cdot z_w}{1+z_w(1-\bar{P})} \quad (6)$$

During the 1947-55 period the average annual rate of growth in wage-labor output per man-hour was 3.9 percent. The proportion of wage costs in total labor costs was approximately 0.75.¹⁰ *Substituting in equation (6) we find that with a 3.9-percent rate of growth in wage labor output per man-hour, any rise in wage rates larger than 2.9 percent leads to rising unit labor costs.* We have, of course, assumed that salary rates tend to rise *pari passu* with wage rates, whereas during the period under consideration they actually rose at a somewhat lower rate. However, there are two important considerations which suggest that this assumption is the most useful one to make. Wage rates can indeed rise more rapidly than our equation suggests if salary rates lag behind. But in this case unit labor cost stability is only maintained by one group falling behind in the improvement of real incomes. Secondly, it is doubtful, in any event, that salary rates would continue to fall behind wage rates, particularly in view of the relative shift in the demand for labor away from wage labor toward salary labor. In fact, after 1951 the rate of increase in average salaries was about equal to the wage increase, and after 1955 somewhat larger.¹¹ Quite probably the larger rise in wage rates between 1947 and 1951 reflects a readjustment of the wage-salary structure which had gotten somewhat out of line during the depression and war years.

Where the employment of overhead labor is rising relative to direct labor, therefore, one of the conditions for price stability is that wage rates rise less than direct labor productivity. This in itself does not imply that the growth in overhead costs inevitably leads to price increases. Nor does a rise in wage rates greater than that implied in our equation (6) tell us anything about the "cause" of the price rise which will usually follow such an occurrence. This we stressed at length in chapter 2. We have only specified a requirement for price stability, not provided a means for ascertaining the causes of price increases. However, the fact that the requirement for price stability is a more stringent one than the matching of wage increases with direct labor productivity, probably does make it more likely that the

¹⁰ This ratio gradually falls as salaried labor replaces wage labor. A more "sophisticated" formula would allow for this. For purposes of short period analysis, the results we obtain from our formula are, however, satisfactory enough.

¹¹ The reader should be warned, at this point, that the average salary data is not particularly reliable for measuring short-term movements. Small differences in the rates of increase are probably not too meaningful.

requirement will be violated. In any event, the one clear implication of equation (6) is that the impact of wage increases on total unit costs cannot be ascertained from a mere comparison of wage rates and productivity growth. The fact that, *ex post*, wages have increased during a particular period by no more than the rise in productivity, does not tell us that they had no effect on total unit labor costs.

Other fixed costs

The rise in unit overhead costs during the postwar period has not been confined to the category of salaried personnel. We noted earlier the impact on overhead costs of rising capital-output ratios and increases in the relative price of capital goods.¹² In the long run this will be reflected in prices not only through the medium of higher depreciation charges, but also through higher profits. For in the long run profits become a cost. If dynamic equilibrium is to be maintained, some reasonably satisfactory rate of return must be earned on invested capital. Fellner has investigated this phenomenon, and pointed out the long run stability of profit rates over the past century.¹³ After correcting both profits and net worth to reflect replacement cost depreciation, George Terborgh has similarly discovered an almost exact equality between net profit rates in the 1920's and in the postwar period. If profits are not to fall below some minimum level, given by the "reservation price of capital," than any increase in the value of capital stock per unit of output will, other things being equal, lead to a rising price level.

Let:

V = the total flow of gross income to asset owners

O = output

q = profits per dollar of invested capital

k = physical capital-output ratio

p = the average price per unit of invested capital

d = the ratio of annual depreciation, in dollar terms, to the value of invested capital

Then capital cost (including profits as a cost) per unit of output equals

$$\frac{V}{O} = (q+d) kp. \quad (7)$$

Granted a stable q in the long run, then stability in unit capital costs will depend on the total expression, $(q+d) kp$ remaining unchanged. Any rise in any one of d , k , or p must be offset by changes in the others.

We noted that d has risen in the postwar period because of the shift in the mix of investment toward a higher proportion of short-lived equipment. k appears to have risen slightly for a variety of reasons, but in particular because it was abnormally low at the end of the war. p has risen, not only in line with other prices—in which case it would not be a separate phenomenon—but faster than other prices. As we pointed out, p will continue to rise even after prices stabilize. For p is really a moving average of input prices of capital equipment. Hence it will rise as lower priced capital equipment purchased some years ago is replaced by the new equipment purchased at current prices. This assumes that q is a "required" rate of return based on the book cost

¹² Actually an absolute rise in the price of capital goods will tend to raise unit depreciation charges. We are, however, interested in those aspects of unit fixed costs over and above those generated by the common impact on all costs of a general rise in the level of prices and wages.

¹³ William Fellner, "Trends and Cycles in Business Activity," appendix to pt. 3.

of assets. If during the inflation, however, producers have been able to raise their selling prices to cover depreciation and a "required" rate of return based on replacement costs, then further increases in price will not be necessary to cover the higher cost of replaced equipment; selling prices already include a "*p*" which reflects current replacement costs.

If we combine the requirements for stability in unit labor costs and unit capital costs, we find that we have a fairly complicated set of relationships, depending on a variety of factors. While the requirements in themselves tell us nothing directly about the likelihood of achieving price stability, stating them in the explicit form as we have done has one major advantage. It makes it quite obvious that, even in the long run, *price stability will not necessarily follow from the equality of wage increases and productivity gains*. Wages of direct labor are now less than 50 percent of total value added in manufacturing, and an even smaller proportion of total price, when we take raw materials into account.

One of the major results of the growth in fixed unit costs has been to increase the output sensitivity of total unit costs. Even when the rise in overhead takes the form of special equipment for model change-overs (which is usually written off in a short period of time) the cost of such equipment is fixed; the actual level of unit costs will depend heavily on the level of output. Quite apart, then, from the secular impact on prices of a rising proportion of fixed costs, there is a cyclical impact—the higher the proportion of fixed costs, the greater will be the fluctuations in total unit costs accompanying cyclical fluctuations in output. It is this aspect of the cost structure which warrants particular attention in an analysis of the creeping inflation to which we have been subject in recent years.

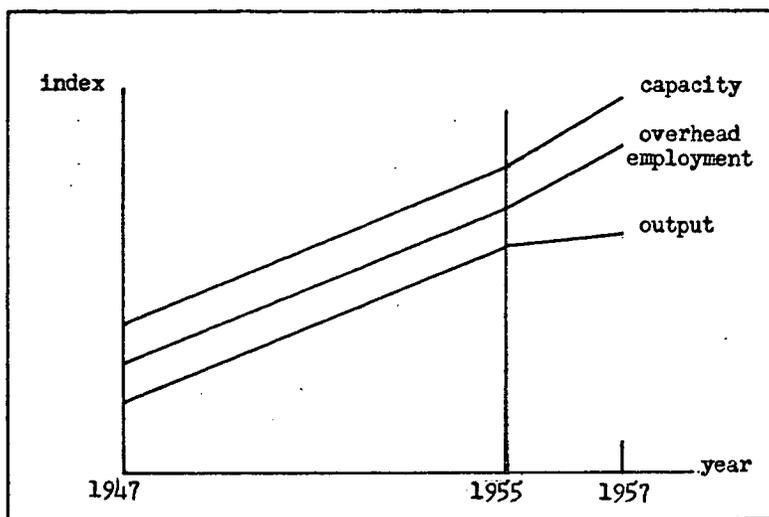
CYCLICAL ASPECTS

The rate of increase in overhead costs per unit accelerated significantly after 1955. On examination, this is seen to be the result not of an acceleration in the technological shift to overhead costs, but of the failure of output to continue rising after late 1955. The behavior of overhead costs is shown schematically in the following diagram, while relevant data are given in table 4-9.

Taking the period from 1947 to 1955 as a whole, capacity, overhead employment, and output rose at about the same rate. With respect to overhead employment (i.e., nonproduction workers) two distinct processes were involved; first the staffing of additional capacity required an expansion of nonproduction worker employment; secondly the new production techniques required a larger ratio of overhead to production workers than the old techniques. By the middle of 1955 output had recovered from the recession of the prior year—output, employment, and capacity were more or less in a "normal" relationship to each other.

During the following 2 years capacity was added at an even more rapid pace. Just as in the prior 8 years, overhead employment was expanded to staff the new capacity, and to provide the complement of managerial, technical, and clerical personnel required by changing technology and management techniques. However, output, in the aggregate, did not rise very much from 1955 to 1957. In fact after

CHART 4-1



the end of 1955, it did not rise at all. The increase in overhead costs per unit up until 1955 had resulted mainly from rising prices of overhead inputs—inputs of overhead per unit of output did not change significantly. From 1955 on, however, the failure of output to match the growth in capacity and in overhead employment, resulted in a sharp rise in overhead inputs per unit of output.

TABLE 4-9.—Indexes of capacity, employment, and output in manufacturing industries

[1947=100]

	1955	1957
Capacity:		
A.....	156	175
B.....	146	163
Non-production-worker employment.....	140	155
Production-worker man-hours.....	103	100
Output:		
χ.....	140	145
γ.....	140	142

A: McGraw-Hill department of economics estimates.

B: Fortune magazine estimates.

χ: Federal Reserve Board index of manufacturing production.

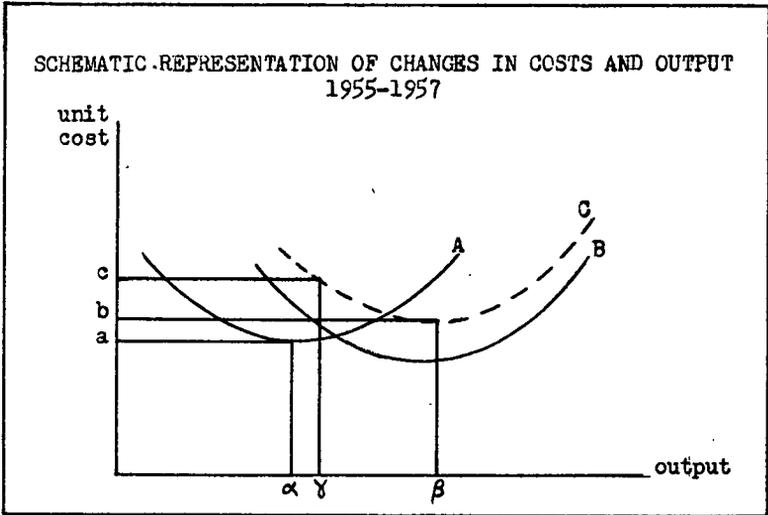
γ: Deflated value added in manufacturing industries

Average prices of fixed inputs also increased, at a somewhat faster rate than during prior years. Fixed costs per unit of output therefore rose sharply. Calculated at levels of output for which the new capacity had been installed and the overhead personnel hired, fixed unit costs did not rise so sharply; but calculated at actual levels of output they rose quite abruptly. Stated in an alternative form, cost curves were shifting out to the right; the optimum points on these new curves were, indeed, somewhat higher than the optimum points on the old curves, because the rise in factor prices was greater than the rise in productivity associated with optimum output;¹⁴ however, the failure of out-

¹⁴ See below, pp. 94, 95.

put to grow in accordance with the shift in cost curves, led to an even larger rise in unit costs. Schematically the situation is depicted in chart 4-2 below. Curve A represents total unit costs with 1955

CHART 4-2



capacity and techniques; B represents the new curve as it would look after 2 years of heavy investment, with factor prices unchanged; C is curve B with allowance made for higher factor prices. Cost b, is the unit cost which would have been experienced had output risen along with capacity, i.e. to point B on the output abscissa. Cost c represents the actual unit cost, in 1957; it is on the same cost curve as is cost b, but is substantially higher because of the shortfall in output. Thus the rise in fixed unit costs between 1955 and 1957 and the associated lack of rise in productivity appears to have arisen not from technological causes but largely from the behavior of output. In chapter 5 the detailed discussion of the 1955-57 period will examine further the evidence for this hypothesis.

Fixed costs and price policies

The fact that fixed costs statistically account for the largest part of the rise in total costs is not, of itself, evidence that they were responsible for part of the price increases between 1955 and 1957. Even in terms of ex post reasoning, we must take account of the fact, pointed out earlier, that stability of total labor costs per unit requires a fall in wage costs. The contribution of wage costs to the total rise in costs is thus somewhat larger than the bare statistics would indicate. Even after allowing for this, however, we must still ask, what is the influence of variations in fixed costs on short run pricing decisions?

The standard answer of orthodox pricing theory to this question is that fixed costs have no impact on pricing decisions in the short run. Even full cost pricing theories normally do not attribute any importance to changes in fixed costs arising out of variations in output

around the "standard" operating rate. We can conceive of full cost pricing as a markup either over prime costs or over total unit costs. In the former case the markup is designed to cover fixed costs plus a desired profit rate calculated at some standard volume of operations. In the latter case the markup is applied to a total unit cost figure; but the fixed cost component is also calculated on a standard volume basis. Fluctuations around the standard volume are assumed to be ignored, even though they do affect actual unit costs. Now it is quite clear that an actual decrease in output will seldom lead to a price rise, despite the resulting rise in fixed unit costs. However, we are dealing in this case, not with a decline in output but with its failure to rise at the same rate as capacity and overhead employment. Producers incurred higher costs. With the new capacity and additional staff personnel, an output larger than actual level could have been supported. Yet such output was not forthcoming. In a situation characterized not by declining sales and output, but by stable or slowly rising output, it is not at all unlikely that these higher costs formed the basis for price increases. The distinguishing characteristic of the 1955-57 period was a continued investment boom in the face of stable aggregate output; all industries were expending their capacity and their employment of overhead personnel, yet only a select few were enjoying a concomitant rise in sales. Finding themselves faced with shrinking margins during a period of supposed prosperity, it is quite likely that producers attempted to recapture some part of their increasing costs in higher prices.¹⁵ Large firms with permanent accounting staffs were presented with direct evidence of rising payroll costs—the fact that a large part of the payroll increase was caused by the enlarged employment and higher salaries of overhead personnel was quite probably irrelevant to much of the decision making involved. Smaller firms may have only attained to a knowledge of their mounting unit costs indirectly via shrinking net profits. In both cases, however, the implications were clear. Price increases were "required."

Insofar as direct labor costs are concerned, they can be varied with output. The disappointment of sales expectations has a much smaller impact on unit variable costs than on fixed costs. It is evident from table 4-9, that production worker employment was reduced when output failed to rise appreciably between 1955 and 1957. Measured from mid-1955 to mid-1957, rather than from year to year, the cut in production worker employment was quite large.

The self-defeating nature of the premature "capture" of overhead costs

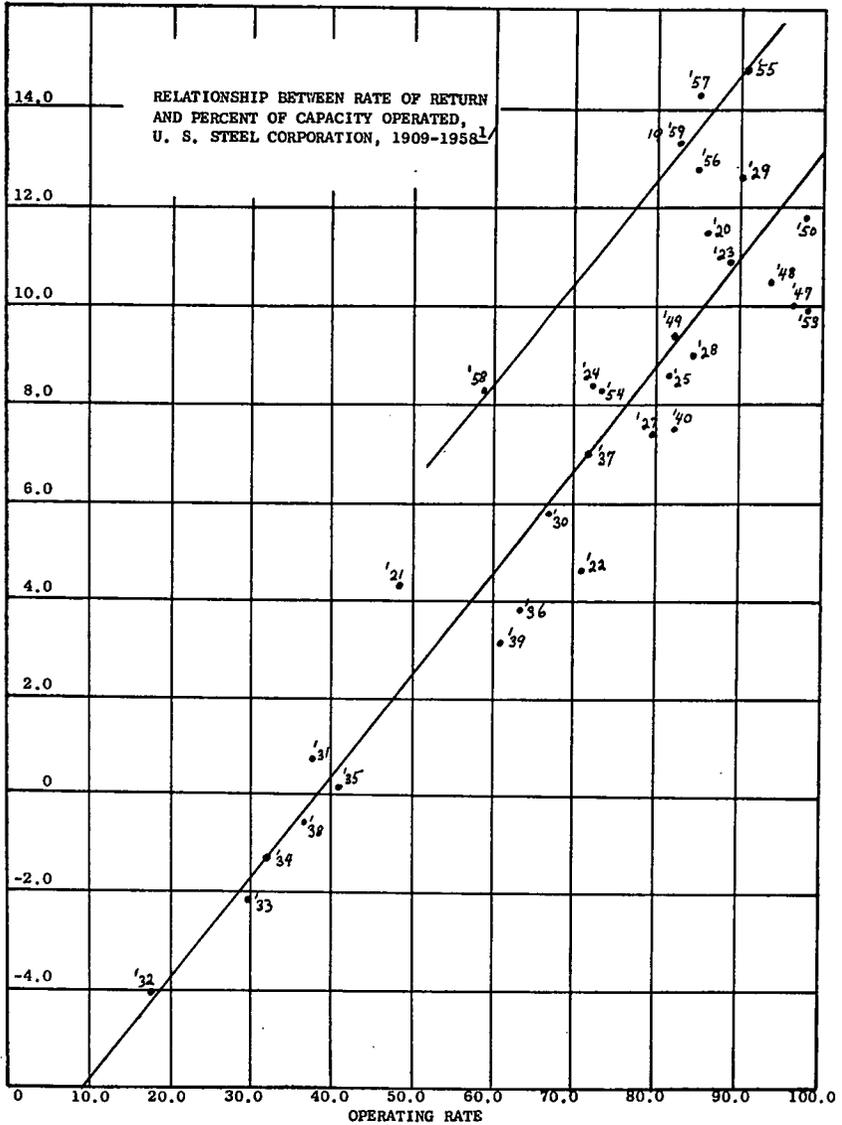
The attempt to recover an expansion in fixed costs and a target rate of return at levels of output which fall increasingly short of optimum can be likened to a reduction in the "standard volume" on which pricing decisions are based. Chart 4-3 is an example of this phenomenon. Adapted from one presented by John Blair¹⁶ it shows for the United States Steel Corporation the relationship between net profits as a percent of stockholders' equity and the operating rate.

¹⁵ The influence of rising overhead costs on prices is here presented as a hypothesis, there is no way to "prove" that the specific cause of some of the price increases was an increase in overhead costs. In ch. 5, however, we shall attempt to show that this hypothesis is capable of explaining a number of the particular and to some extent puzzling, features of the 1955-57 price rise.

¹⁶ "Administered Prices: A Phenomenon in Search of a Theory," *American Economic Review*, May 1959.

CHART 4-3

Rate of return ^{2/}



^{1/} Adapted from a chart by John Blair; see Appendix A. (Excludes 1941-46 and 1951-52.)

^{2/} After tax rate of return on stockholders' equity.

The line of regression labeled "A" was computed for the years 1920-56. According to the Brookings study, as cited by Lanzilotti,¹⁷ the corporation's target was an 8 percent after-tax rate of return when operations were at a "normal" rate, 80 percent of capacity being considered

¹⁷ Op. cit., p. 447.

normal. The regression indicates that price-cost relationships were so maintained as to yield this target—indeed to yield about 9 percent return at 80 percent of capacity. Starting in 1955, however, a new relationship appears. Prices were set relative to costs to yield 8 percent, not at 80 percent of operations but at 60 percent. Looked at from another standpoint, price-cost margins were set to yield a 12 to 13 percent rather than an 8 to 9 percent rate of return when operations were at 80 percent of capacity. For our present purposes it makes little difference whether the reason behind the shift to a new pricing policy was to compensate for the understatement of depreciation forced on the company by original cost depreciation regulations (as some officials of the industry avowed), to provide for a greater cash flow for investment purposes (as other officials indicated), or simply to earn a higher net profit.

In one respect the *U.S. Steel* case is not representative of the kind of changes in pricing policies which characterized the 1955–57 period. In many industries price increases were, in part, a response to the growth in fixed unit costs associated with the failure of output to rise; the implicit reduction in the standard volume used to calculate costs was probably an unintended end result, rather than a deliberate technique. In the case of the steel industry, on the other hand, the price increases were much larger than could be explained by the increase in fixed costs. However, the basic phenomenon is the same—at any given rate of operations profits will be higher if prices are set to recapture costs at a reduced volume of operations.

An attempt to recapture increased overhead expenses (including a target rate of return) at constant levels of output, when capacity and overhead outlays are rising, will yield a higher schedule of ex ante profit rates. In other words the schedule of profit rates earned at any given rate of operations will be raised. Whether, for any particular firm, this will result in higher ex post profits depends mainly on the price elasticity of demand for its products—what will be the effect of the higher price on its sales. But for all firms taken together, the move is almost certain to be self-defeating. For in this case we are dealing with the income elasticity of demand. The general rise in prices will lower real incomes; i.e., at any given level of employment and wage and salary payments, prices will be higher. Hence the real volume of sales is almost certain to be reduced below what it otherwise would have been, unless the ex ante rise in margins further stimulates real investment. During the 1955–57 period, however, the capital goods industries were already operating at capacity; it was the other sectors of the economy in which excess capacity existed. Hence the net effect of the price policies of the period was to impede the growth in real output.

The analysis of the preceding paragraph may be clearer if reworked in another way. An expansion of capacity and overhead personnel is normally based on the expectation of a rise in sales and output. The attempt to cover the higher costs at existing levels of output raises the ex ante profit margin at all output levels. This in turn raises the ex ante gross saving rate for the economy, and thus tends to reduce real consumer purchases and to block a rise in output to planned levels. Unit overhead costs, instead of increasing only moderately—as would be the case if the planned output were attained—rise abruptly when output fails to increase. Ex post, therefore, net profit

margins may rise very little, or perhaps not at all, despite the upward shift in the price-wage ratio. To some extent, a kind of "vicious circle" occurs. The failure of production to grow leads to a rise in fixed unit costs. Insofar as prices are increased relative to wage and salary rates in order to recover these higher unit costs, the forces impeding the growth in output are strengthened. This in turn keeps fixed unit costs high, and prevents the realization of the efficiencies of which the new plants and new techniques are capable.

We do not mean to aver that the failure of output to match the growth in capacity during the 1955-57 period may be solely attributed to the pricing policies pursued. There were, as we shall see, many other factors involved. Even if prices had been set to recapture fixed costs at full capacity utilization, it is clear that this alone would not have been sufficient to raise output to full capacity levels. More formally this can be shown as follows:

Let

F = total fixed costs, including an allowance for a target rate of return. We assume that output can rise to full capacity levels without any change in F .

b = direct labor and raw materials cost per unit of output. We assume that b is constant over the range of output with which we are dealing.¹⁸

O = the output at which unit fixed costs are calculated.

O_F = full capacity output, i.e., the output in expectation of which the fixed costs were incurred.

P = price.

C = cost per unit [including a profit margin].

If we hypothesize a situation like the one we have been describing, in which prices are set to recapture fixed costs at some actual output less than full capacity, then

$$P = C = \frac{F}{O} + b; \quad O = mO_F; \quad m > 1.$$

where m represents the ratio of actual output to full capacity output. Then the percent change in price accompany a percent change in the output level at which fixed costs are calculated equals,

$$\eta_P = \frac{dC}{dO} \cdot \frac{O}{C} = -\frac{F}{F + bO}$$

But $\left(\frac{F}{F + bO}\right)$ is the ratio of fixed costs to total costs. Taking manufacturing as an example we find from table 4-6 that fixed costs were about 50 percent of total value added in 1955; assuming that raw material purchases from outside the manufacturing sector equal 30 percent of total costs, then we may take fixed costs to be some 35 percent of total costs. Hence a change of 1 percent in the level of output upon which fixed costs are calculated leads to 0.35 percent reduction in price. Assume that fixed costs and capacity together increase, say 10 percent, but actual output does not rise. Suppose that prices have been raised to cover the increase in fixed costs at the existing level of output. A redetermination of prices to cover costs at full capacity output would lower prices by 3½ percent. If the real income elasticity of demand is equal to or less than one (an income

¹⁸ But see pp. 115-117 below for evidence that direct labor productivity is also positively correlated with changes in output.

elasticity of greater than 1 is quite unlikely) output will rise by no more than 3½ percent; actual—ex post—fixed costs per unit will be higher than costs calculated at full capacity output, and less than a "target" rate of return will be earned.

To recapitulate: the failure of output to rise significantly after 1955, in the face of a sharp increase in investment outlays and overhead employment tended to lower productivity and raise fixed costs per unit. The attempt to pass along these increased costs in higher prices was in itself a partial cause of the disappointing rise in output, and the consequent increase in unit costs. Pricing policies during the period were, in a word, unimaginative. J. C. R. Dow in discussing a similar association between output, productivity and prices in Great Britain put the matter as follows:

[There was] no tendency for prices to be reduced in anticipation of the increase in productivity which would occur if output were increased and which would make it possible to reduce prices. * * * Expansion of output, undertaken in order to reduce costs and prices, would tend to create the increase in real demand which would justify the increase in output.¹⁹

SUMMARY

In the last two chapters we have attempted to lay out some of the basic factors which contribute to the phenomenon of creeping inflation. Because of the downward rigidity and cost oriented nature of wages and prices, and the tendency for wage changes in rapidly expanding industries to be matched in most other industries, excess demand in particular sectors of the economy can initiate a rise in the general price level, even if aggregate demand is stable. The larger the shift in the composition of demand, the larger will be the price increase accompanying a given increase in aggregate demand. It was in part for this reason that the relatively modest rise in aggregate demand between mid-1955 and mid-1957 was accompanied by such a large rise in prices and such a small rise in output.

The postwar growth in the proportion of fixed costs to total costs has made productivity increasingly sensitive to cyclical fluctuations in output. The period after 1955 witnessed not only an investment boom but also a continuation, indeed an acceleration, of the substitution of fixed for variable labor inputs. Hence the failure of aggregate real expenditures to rise significantly, resulted in underutilization of capacity, a disappointing increase in productivity, and a sharp rise in fixed unit costs, rather than a growth in unemployment. The upward shift in ex ante profit margins which occurred when producers attempted to recapture the rising fixed costs at actual rather than capacity output, led to additional price increases. At the same time such "premature" recapture of investment outlays itself helped prevent a rise in output to capacity levels.

In a secular context, the downward rigidities and cost orientation of prices and wages give a mild upward bias to the price level. Adjustments in the structure of prices and in the relationship of prices and wages to each other are normally accomplished by increases, rather than by mutual changes around a stable center. The growing importance of fixed costs and the substantial rise in the relative prices of capital goods during the past decade have further accentuated the

¹⁹ Dow, *op. cit.*, p. 296.

rigidities in the structure of costs. In earlier periods of our history, and in particular during the 19th century, the importance of the agricultural sector with its very flexible prices, and the generally larger weight of raw materials in total costs, moderated whatever inflexibilities existed in the industrial price structure. Even more effective was the occurrence of massive depressions which broke through the "ratchets" beneath the price and wage level. In recent years the economy has not been nor is it likely in future years to be administered such strong purgatives, whose ill effects far outweigh any good they might do.

With some exceptions we have, to this point, presented the analysis in the form of hypotheses. We have asked the reader to take many things on faith, liberally scattering footnotes directing his attention to the pages which follow. The detailed examination which is there presented, of the process of inflation during 1955 and succeeding years, will show, we believe, that the events of the period are consistent with our hypotheses, and that the analytic schema developed in the preceding pages is a useful tool for explaining the phenomena associated with creeping inflation.

CHAPTER 5

THE NATURE OF INFLATION, 1955-57

SOME PHENOMENA TO BE EXPLAINED

At the end of 1957 consumer prices were 56 percent higher than 12 years earlier, at the end of World War II. Wholesale prices had risen by 70 percent and the price deflator for gross national product by 53 percent during these years. There were three distinct periods of increase, in the intervals between which prices were relatively stable. The first major period of rise was between the end of 1945 and autumn 1948; the second period between the middle of 1950 and the middle of 1951 (or late 1951 in the case of consumer prices). The overall level of wholesale prices began to rise again in the middle of 1955, and consumer prices in early 1956. The increase continued throughout 1956, 1957, and into 1958. The three periods of relatively sharp price rise account for slightly less than half of the time but for all¹ of the total increase in the consumer price index between the end of 1945 and 1957. The increases amounted to 35, 11, and 6 percent in each of the respective periods.

The last upsurge of the general price level differs in one major respect from the other two. From 1946 to 1948 and again from 1950 to 1951, inflation was associated with war or the aftermath of war. In 1946 the removal of price controls, the highly liquid condition of consumers and firms, and the release of pent-up wartime demands gave rise to substantial aggregate excess demands whose effects were felt in every sector of the economy. Faced with major problems of reconverting from military to civilian output, capacity in every major industry was nevertheless strained to the limit. The number of new firms mushroomed, and business failures were at an alltime low. Unemployment remained below 4 percent of the labor force, despite a rise of more than 7 million in the civilian labor force. The shorter, but equally rapid increase in the price level after mid-1950 was directly attributable to the sharp rise in aggregate demand associated with the opening of hostilities in Korea. Although deliveries of military goods did not immediately rise orders were placed in large volume. Anticipatory buying on the part of consumers and business firms reached huge proportions; in early 1951 inventory accumulation was proceeding at an annual rate of almost \$15 billion. The Nation's resources in terms of plant capacity, labor force, and raw materials were fully, indeed over-fully utilized. Industrial production rose from an index of 113 in June 1950 to 123 in December 1951; by early 1951 the unemployment ratio had fallen to 3½ percent of the labor force, and in the second half of the year it fell to less than 3 percent, where it remained until the 1953-54 recession intervened.

¹ In fact the compounded price increase for the three inflationary periods was greater than the total post-war rise. Consumer prices declined during 1949.

As in the case of the immediate postwar reconversion, here was a clear case of aggregate excess demand. However much one might wish to add other considerations to the analysis, there is little dispute that the major part of the inflation during these two periods is explainable by orthodox aggregate demand theory.

The 1955-57 period is another matter. There is evidence that as the economy approached a state of full employment during its recovery from the 1954 recession, excess demand did begin to make itself felt. The three major volatile sectors—business investment, housing, and automobiles—were all rising rapidly, and the latter two had reached record levels. But this state of affairs lasted only briefly. Demand for housing, autos, and other consumer durables fell off sharply. Nonfarm inventory investment reached a peak in the first quarter of 1956, and declined steadily thereafter. The output of most nondurable consumer goods expanded quite slowly. Only in the industries supplying capital goods did the boom continue, although there it was indeed quite a boom.

After the third quarter of 1955 total gross national expenditures rose at a rate of 5 percent per year. This is little more than the 4 percent per year gain in output which we have come to expect in "normal" periods from increases in the labor force and productivity. Nevertheless the overall price level rose by $3\frac{1}{2}$ percent per year and output by only $1\frac{1}{2}$ percent. Excess capacity began to appear in more and more industries. In late 1955 manufacturers were operating at about 92 percent of capacity, slightly above the rate, which on the average they considered "desirable." By the end of 1956 they were operating at 86 percent, and by the middle of 1957, just before the recession began, at about 83 percent.²

Yet prices rose. Industrial wholesale prices between June 1955 and December 1957 increased by 9 percent; consumer prices began rising in March 1956, and in the next 21 months rose 6 percent. Industrial prices rose most sharply in the industries closely related to the boom in capital investment, but prices rose in other industries as well, even where excess capacity was growing. The increase in consumer prices was more evenly distributed, in food, services, and both hard and soft goods.

Some might argue that the 5 percent per year rise in money expenditures represented substantial excess aggregate demand. Due to the time lag involved in installing and breaking in new plant and equipment, the very investment boom itself, according to this argument, slowed up the rise in productivity and kept supply curves from shifting to the right by as much as the postwar "norm" would suggest. In other words the $1\frac{1}{2}$ percent annual increase in real output reflected the limit of the economy's capabilities during the period; the difference between the rise in money outlays and real output thus represented the excess demand of the period. Were this correct we should be wrong in our implicit assumption that the actual increase in output was less than the shift in the aggregate supply curve.

There are two basic reasons why this line of reasoning is not valid. In the first place the 5 percent annual increase in money expenditures is an *ex post* magnitude. It most assuredly overstates the *ex ante* increase in money demand. At least part of the rise in money outlays

² Data are those published annually by the McGraw-Hill Publishing Co. in its annual survey of businessmen's investment plans.

would not have occurred had not prices risen in the first place. In other words, if our hypotheses in chapters 3 and 4 have any application to the 1955-57 period, the price increases in many sectors of the economy had nothing to do with excess demand in those sectors. A. J. Brown put it quite nicely—

Not only may prices go up because people want to overspend, but people may want to overspend because prices have gone up.³

Since higher prices per unit mean higher incomes to at least some factors of production, aggregate money income and money demand will rise when price increases occur. We discussed at length in chapter 2 the factors which determine the response of money demand to higher prices and wages. While money demand may not rise *pari-passu* with prices, there is no doubt that it will rise to some extent. Up to this point we have not demonstrated the validity of our hypotheses—hence the preceding is hardly an answer to the contention that the rise in aggregate monetary demand was excessive. However, in judging whether aggregate excess demand (in an *ex ante* sense) did exist during the period, it is essential for the reader to bear in mind the fact that the magnitude of the rise in *ex ante* aggregate money demand was less than the 5-percent increase in money outlays which finally occurred.

Even if the 5-percent annual rise in money outlays did reflect the size of the increase in *ex ante* aggregate demand, there are a number of reasons for rejecting the hypothesis that the 1½-percent increase in actual output measured the rightward shift in supply curves, and hence the increase in *ex ante* aggregate supply. In the first place the data on equipment expenditures by producers is based on installations of equipment. In theory at least, expenditures on producers' equipment do not enter the national income accounts until the equipment is installed. The boom in investment activity reflected in expenditures on producers durable equipment thus represents a boom in installations of equipment, not simply in plans or orders. Similarly the McGraw-Hill figures on capacity in manufacturing industries are based on the response of business firms to a questionnaire which requests data on capacity in being and capable of production. The index developed from the responses rose from an average of 130 in 1955 to 146 in 1957. This gives us another measure of installations. For these reasons the "indigestion" hypothesis—i.e., that the investment boom itself temporarily disrupted productivity gains and the growth in output potential—cannot rely on a lag in installations but only on a lag in breaking in the expanded and technologically more advanced facilities. But there is no warrant in the historical data to conclude that periods of investment boom are normally accompanied by subnormal rates of growth in output. Table 5-1 shows the output increases which have occurred in a number of selected years during which investment activity was particularly high. There seems to be no tendency for high investment years to be associated with small rises in output. An examination of changes in productivity during the past 50 years (see, for example, table 3, "Productivity Prices and Incomes," Joint Economic Committee, 1957) also shows no evidence of a poor productivity performance in years of heavy investment. True, pro-

³ "The Great Inflation, 1939-51," Oxford University Press, 1955; p. 16.

ductivity gains are largest during recovery years and tend to taper off in the remaining years of cyclical upswing. But subnormal increases in output and productivity are not particularly associated with years of high investment.

TABLE 5-1.—Change in output, selected periods¹

[Percent change per annum]

	1928-29	1st quarter 1947 to 3d quarter 1948	3d quarter 1950 to 2d quarter 1953	[3d quarter 1955 to 3d quarter 1957
Gross national product in constant dollars.....	5.8	4.1	5.2	1.4
Industrial production.....	11.0	3.7	5.4	2.5

¹ Selected to include years of high investment, but to exclude recovery periods.

A more convincing reason for rejecting the "indigestion" hypothesis, however, is the behavior of production worker output per man-hour. As we noted in the previous chapter postwar technological changes have involved a rapid substitution of nonproduction workers for production workers. This process accelerated during the investment boom of 1955-57. Production worker output per man-hour in manufacturing rose at an annual rate of 2.3 percent between 1955 and 1957 compared to a rise of only 0.7 percent in output per man-hour of all employees (i.e., production workers plus nonproduction workers). Using another measure of manufacturing output, the increases are 3.5 percent and 2 percent respectively.⁴ Between the fourth quarter of 1955 and the second quarter of 1957 (i.e., before the 1957-58 recession began) production worker employment declined about 300,000, some 2½ percent, and production worker man-hours about 4 percent (seasonally adjusted); nonproduction worker employment during the same period rose by 325,000, an increase of about 9 percent. Manufacturers were able, therefore, to utilize the changed production techniques incorporated in their investment programs—otherwise they would not have been able to substitute nonproduction for production workers.

Finally, and perhaps the most convincing evidence of all, is the fact that, during the period, there was a high correlation between output and output per man-hour in manufacturing industries.⁵ Those industries whose output rose significantly did in general achieve a substantial gain in efficiency. Since the average rise in output was

⁴ The first set of output per man-hour estimates was based on a Bureau of Labor Statistics output measure the second on the Federal Reserve Board index. This brings up one of the major statistical problems confronted in this study. There were two basic measures of manufacturing output available, the Federal Reserve Board index of manufacturing production and the Bureau of Labor Statistics current year weighted net output index. The latter is not published but can be derived from the output per man-hour figures given in table 3a, p. 778, Joint Economic Committee, "Hearings on the January 1959 Economic Report of the President." There are a number of differences in the composition of the two indexes. Through 1955 they move fairly closely together. Between 1955 and 1957, however, the BLS index shows a smaller rise than the Federal Reserve index, 1.2 percent versus 3.6 percent. While this is not particularly large in terms of the level of the index it does make a significant difference in the computation of changes in productivity and unit labor cost. Wherever possible we have used the BLS index for two basic reasons. 1. For industries incorporating about half the weights, the FRB index during recent years is constructed by applying an assumed productivity gain to man-hour data; the BLS study is based solely on deflated value data. 2. A calculated index of manufacturing prices built up from unit cost indexes agrees closely with the published index of manufacturing prices (see table 4-6) if the BLS output measure is used in deriving the unit cost indexes; if the Federal Reserve index is used, however, the calculated price index rises substantially less than the published index. This is no proof that the BLS output index is superior. Use of the BLS index, however, does allow us to achieve greater consistency in our various measures of prices, costs, and productivity.

⁵ See below pp. 115-118, for a fuller discussion of this relationship. The coefficients of correlation for production worker output per man-hour against output was 0.79, and for all employee output per man-hour, 0.71.

small the average gain in productivity was limited. But the industries which had less than average output and productivity increases did not have larger than average investment programs. In other words the "indigestion" hypothesis finds no confirmation in the data. Conversely, the hypothesis that the potential gains in output were larger than the actual gains does appear to be borne out.

Table 5-2 summarizes the changes in capacity and output in manufacturing industries between 1953 and 1957 and between 1955 and 1957. To avoid reflecting the 1957-58 recession, third quarter 1957 production data were used. In almost all industries the increase in capacity was substantially larger than the increase in production, particularly during the 1955-57 period. There are a number of qualifications on the meaning of the growth in excess capacity. In the first place the capacity data are developed by weighting—with Federal Reserve Board index weights—responses to questionnaires addressed to business firms. Since there is no control over the consistency of the capacity concepts employed in responding to the questionnaire, the resulting capacity measures are very rough estimates at best. Small differences in the relative growth in output and capacity are probably not significant.

TABLE 5-2.—Capacity and output: Manufacturing industries

Industry	Capacity ¹ (December 1950=100)			Production (1947-49=100)			Percent change			
	1953	1955	1957	1953	1955	3d quarter, 1957 ²	1953-57		1955-57	
							Capacity	Production	Capacity	Production
All manufacturing.....	118	130	146	136	140	147	+23.7	+8.1	+12.3	+5.0
Ferrous metals.....	114	121	132	133	138	129	+15.8	-3.0	+9.1	-6.5
Nonferrous metals.....	131	149	170	129	143	137	+29.8	+6.2	+14.1	-4.2
Nonelectrical machinery.....	126	142	171	143	135	151	+35.7	+5.6	+20.4	+11.9
Electrical machinery.....	131	156	185	194	194	213	+41.2	+9.8	+18.6	+9.8
Autos, trucks, and parts.....	130	146	168	126	153	129	+29.2	+2.4	+15.1	-15.7
Other transportation equipment.....	160	188	220	276	272	345	+37.5	+25.0	+17.0	+26.8
Chemicals and allied products.....	128	147	170	147	167	185	+32.8	+25.9	+15.6	+10.8
Pulp and paper.....	116	130	146	130	149	154	+25.9	+18.5	+12.3	+3.4
Rubber products.....	114	132	146	128	143	138	+28.1	+7.8	+10.6	-3.5
Stone, clay, and glass products.....	114	124	140	133	149	158	+22.8	+18.8	+12.9	+6.0
Petroleum refining ⁴	113	124	134	130	135	142	+18.6	+9.2	+8.1	+5.2
Food and beverages.....	108	116	127	107	109	113	+17.6	+5.6	+9.5	+3.7
Textile mill products.....	110	114	124	104	107	101	+12.7	-2.9	+8.8	-5.6

¹ Average of beginning and end of year.

² Seasonally adjusted.

³ Average for year.

⁴ Production figures are for petroleum and coal products;

In addition to this statistical qualification there are a number of substantive factors which must be taken into account in evaluating the results. In the nonelectrical machinery, electrical machinery, and automobile industries between 1953 and 1957, there was a substantial shift away from defense production and toward civilian production. This necessitated an increase in capacity for producing civilian goods. As a consequence of these developments, some of the apparent growth of excess capacity is spurious and results from a changed production mix. Similarly, the machinery industries manufacture both investment goods and consumer durables. On the basis of data on capital goods purchases, order backlogs, prices, etc., it is very unlikely that

there was any excess capacity in establishments manufacturing investment goods before the beginning of the recession. But since establishments producing consumer durables did build up substantial excess capacity, the overall machinery industry figures show a growth in capacity well in excess of the growth in output.

Thus, a partial answer to the question as to what factors were responsible for the limited increase in production during a period of rapid capacity expansion is that this phenomenon reflects a change in the pattern of demands within the economy. Not only does this factor help explain the developments in individual industries, but also the general growth in capacity relative to output. Through late 1955 almost all sectors of the economy were expanding very rapidly. Thereafter, while most industries were continuing to order and install new plant and equipment in very large volume, demand for output in a number of important sectors fell off noticeably, in particular housing and automobiles. On balance therefore aggregate demand and output rose very slowly, not because each sector in the economy was rising slowly, but (in a proximate sense) because the effects of the very rapid demand increases in the investment goods sector were substantially moderated by declining or only slowly growing demands elsewhere.

In summary then, there is no reason to believe that the relatively small gains in output— $1\frac{1}{2}$ percent per annum for the economy as a whole—represented the supply potential. The gap between the 5-percent annual rise in money expenditures and the $1\frac{1}{2}$ -percent increase in output does not reflect the magnitude of ex ante excess aggregate demand. Indeed if we compare the 5-percent rise in expenditures with the $3\frac{1}{2}$ - to 4-percent rise in output of which the economy is normally capable, and remember that the expenditure rise overstates, to some unknown degree, the ex ante increase in money demands, it is clear that after late 1955 aggregate excess demand was insignificant. Once we have eliminated the "indigestion" hypothesis, the widespread growth of capacity relative to output is a good common sense indicator of this fact.

The rise in prices during a period in which aggregate excess demand was absent might suggest the existence of an autonomous wage push. Yet, insofar as we can tell from the data, prices rose at a faster rate than unit wage costs. Between 1955 and 1957 the deflator of value added in manufacturing rose about $7\frac{1}{2}$ percent. Unit wage costs rose by 6.7 percent (table 4-7). Prices of manufactured products began to rise in mid-1955; unit wage costs only very late in the year. Moreover unit wage costs in 1955 were still lower than in 1953 (table 4-6)—it was not until 1956 that they surpassed those levels. We do not have similar data on wage costs (separate from salary costs) for the rest of the economy, but insofar as manufacturing is concerned, price advances were earlier and somewhat larger than the increase in unit-wage costs.

Despite the rise in prices relative to wage costs, profit margins declined. Manufacturing gross profit margins per unit of output were about the same in 1957 as in 1955. But since prices had risen, gross profits as a percent of total gross income originating declined. Total corporate gross margins as a percent of gross corporate product also declined, from a 1955 level somewhat above the postwar average to a level in 1957 slightly below average.

There are, therefore, a number of features in the 1955-57 period which require explanation, and which can be explained neither by an aggregate excess demand nor an autonomous wage-push theory of inflation. To summarize them briefly:

1. Total money expenditures rose 5 percent per year. Instead of a 4 percent rise in output and a 1 percent gain in price, we experienced a 3½-percent rise in prices and only 1½-percent rise in output.

2. Overall labor productivity rose very slowly after late 1955. Yet installations of new and improved facilities were proceeding at an unparalleled rate. And the industries whose output did rise achieved substantial gains in productivity.

3. Prices rose earlier and somewhat more rapidly than unit wage costs, yet gross profit margins declined.

PRICES, EXPENDITURES, AND OUTPUT

The pattern of demands

Between the trough of the 1954 recession and late 1955 the rise in expenditures in both current and constant dollars was quite large. It was also spread widely throughout the economy (table 5-2). Military outlays for durable goods were the only expenditure category which declined during the period, and most of the decline had occurred by early 1955. Residential housing and consumer purchases of automobiles led the recovery, and by the third quarter of 1955 were at peak rates. Total automobile sales for the year were 7.2 million, while housing starts totaled 1.4 million. Although starts had begun to decline after mid-year, actual construction in progress continued to rise through the third quarter. Business investment in plant and equipment only began to rise in the second quarter of 1955, but thereafter increased very rapidly. Personal consumption expenditures on durables, nondurables and services also rose sharply; the personal saving rate averaged less than 6 percent during the first three quarters of the year, lower than it had been at any time since early 1951.

TABLE 5-3.—Changes in expenditures and prices, 1954-57

[Percent change at annual rates]

Expenditure category	3d quarter 1954 to 3d quarter 1955			3d quarter 1955 to 3d quarter 1957		
	Expenditures in current dollars	Expenditures in constant dollars	Price	Expenditures in current dollars	Expenditures in constant dollars	Price
Gross national product.....	11.4	9.8	1.5	5.2	1.4	3.6
Durable goods and construction.....	19.1	16.5	2.1	4.4	-4	4.8
Fixed business investment.....	11.7	8.5	3.0	11.0	3.6	6.9
Producers equipment ¹	9.2	6.1	2.9	12.3	4.3	7.3
Construction.....	14.6	11.1	3.5	9.7	2.8	6.2
Government purchases of durables.....	-10.3	-13.4	3.5	10.8	4.5	6.0
Public construction.....	0	-2.5	2.8	9.2	3.4	5.6
Net exports.....	0	0	-----	25.0	15.6	-----
Personal consumption.....	31.0	30.2	.7	-2.0	-4.3	2.6
Autos and parts ¹	48.1	45.5	2.0	-6.1	-9.2	3.9
Other durables.....	14.2	16.1	-1.7	3.2	1.1	2.0
Residential construction.....	19.6	15.2	3.9	-5.3	-8.2	3.4
Inventory investment ²	4.9	4.9	-----	.6	.4	-----
Nondurable goods.....	8.6	8.9	-4	4.4	2.0	2.4
Personal consumption.....	5.4	5.8	-3	5.7	3.0	2.5
Food and beverages.....	3.3	5.2	-1.8	6.1	3.2	2.6
Clothing and shoes.....	8.8	8.3	.5	3.2	1.2	1.7
Other nondurables.....	7.3	5.6	1.6	6.6	3.8	2.6
Inventory investment ²	3.6	3.6	-----	-1.5	-1.9	-----
Services.....	7.6	5.0	2.5	7.8	4.1	3.3
Personal consumption.....	7.5	5.6	1.7	7.5	4.5	2.7
Government purchases of services.....	7.9	3.6	4.3	8.5	3.4	4.6

¹ Business purchases of automobiles reallocated from producers equipment to personal consumption.² Inventory changes given in dollar terms. In some cases the change was from a negative to a positive figure.

Industrial production increased rapidly and by the latter part of 1955 the excess capacity which existed in 1954 had been generally eliminated.

Finished goods prices during the recovery period were relatively stable. Productivity rose very rapidly, and despite increases in wage and salary rates, unit labor costs did not rise significantly. Rapidly increasing consumption and inventory accumulation of nonagricultural raw materials did lead to fairly sharp increases in prices of these commodities. By the end of the year prices of nonagricultural raw materials had risen 9 percent from their 1954 lows. Farm prices, however, continued to fall throughout the year, offsetting part of the increase in other raw materials prices. The overall deflator for gross national product rose 1½ percent during the recovery mainly in its latter stages. This was a relatively small amount considering the vigor of the rise in demand and output. The average price increase among nonfarm products was somewhat larger than this, the overall total being held down by declining farm prices. Profit margins, both gross and net increased rapidly during 1955. Corporate profits (adjusted for inventory valuation) reached \$46 billion in the fourth quarter, 40 percent above the 1954 trough and 15 percent higher than the prerecession levels of first half 1953. In manufacturing, gross profit margins per unit of output for the year 1955 as a whole were equal to the peak levels of 1951, and in the final half of the year were even higher.

While the economy may have approached a state of aggregate excess demand in late 1955, this situation was not long maintained. Housing starts and automobile sales had reached unsustainable rates, and

after the third quarter of 1955 expenditures on autos and housing declined quite rapidly. Fixed business investment on the other hand continued to rise vigorously. As table 5-2 indicates, the result was a sharp dispersion in the movement of expenditures during the next 2 years.

We have not attempted to construct a model to explain the behavior of expenditures during the period. The fall in housing outlays and the increase in the personal saving rate associated with the decline in purchases of automobiles, moderated the effect on disposable income of the substantial investment boom. Total gross national expenditures rose at the moderate rate of 5 percent per year and disposable income increased at a $5\frac{1}{2}$ -percent rate.

Changes in final goods prices: GNP categories

If we look down the final column of figures in table 5-2, the association of large price increases with large expenditure increases in individual sectors is clear. But prices rose, not only in those sectors in which expenditures were increasing rapidly but in all sectors.⁶ The sharp dispersion among expenditures in individual sectors is not matched by a similar dispersion of price changes. On the average money demand rose quite moderately; on the average prices rose significantly.

In the sectors where demands increased rapidly, price increases were quite large. Business investment, public construction outlays, and net exports of durable goods rose very sharply for 2 straight years. Military outlays on durable goods reversed their earlier decline and, particularly towards the end of the period, moved quickly upward. Price increases ranging between $5\frac{1}{2}$ and $7\frac{1}{2}$ percent per year characterized these sectors of the economy. Even after deflation for price changes, however, real purchases advanced. Capacity limitations undoubtedly limited the rise in some cases; nevertheless the constant dollar value of producers' outlays on durable equipment and military purchases of hard goods increased by 9 percent over the 2-year period; slightly smaller increases occurred in the real value of business and public construction.

The size of the expansion in investment demand is not fully reflected in the expenditure data. The surge of new orders was substantially larger than the capacity of the capital goods industries could accommodate. Between early 1955 and mid-1956 new orders ran continually at a rate some 10 percent higher than sales in the machinery industries.⁷ Backlogs of unfilled orders rose from \$31 billion in the second quarter of 1954 to \$42 billion in the same quarter of 1955 and to \$52 billion in the second quarter of 1956, at which level they remained until early 1957.

The major areas of declining demand, automobiles and housing, also impinged on the durable goods and construction sectors of the economy. Taken altogether, current outlays on durable goods and construction rose by some 9 percent over the 2-year period. Real output, however, changed little; this shows up both in the deflated GNP data and in the Federal Reserve Board's index of durable manu-

⁶ Prices of consumer appliances did fall slightly. But increases in other consumer durable goods prices (e.g., furniture) outweighed these declines. The price deflator for the category "Other durables" thus shows an increase.

⁷ And since most consumer appliance firms are classified within the machinery industry in the sales and new order data, these figures understate the excess of capital goods orders over sales; the appliance industry was not generally expanding during the period.

facturing production. The deflator for durable goods and construction rose almost 10 percent; although the largest increases occurred in the sectors with rapidly expanding demands, there were increases in the declining sectors as well.

Outlays on nondurable goods rose only moderately. Prices nevertheless increased, and the rise in the real value of purchases was quite small. Part of the price increase was accounted for by rising farm prices; but prices of other major categories of nondurable goods also advanced.

Outlays on services rose more rapidly than the other two major categories of expenditures. Government purchases of services represent mainly the compensation of Government employees, and the price increase is really an increase in the average salary of employees. Consumer expenditures for services rose quite substantially; although part of the increase was dissipated in higher prices, there was a 9-percent rise in the real value of service output over the 2-year period.

In summary, the 1955-57 period was characterized by a substantial business investment boom, largely offset by falling demand for automobiles and housing. As a consequence aggregate demand rose at a relatively moderate rate. There did occur, nevertheless, a significant rise in the general price level. Although price increases were largest in those areas of the economy where excess demands emerged, they also occurred in all other major sectors where demands were not excessive, and indeed were in some cases deficient. We argued at length, in chapter 3, that such behavior could be partly explained by the downward rigidity of prices and wages, and by the "feed out" of cost increases from excess demand sectors to the rest of the economy. Finished goods prices not only failed to decline in areas of weak demand but actually increased. We shall be able to observe this process more closely by an examination of the behavior of industrial wholesale prices and wages.

Industrial prices, wages, and output

The first two columns of table 5-4 show the increase in selected wholesale price indexes and construction costs during the 1955-57 inflation. The wholesale price index is broken down by economic sectors rather than by commodity groupings. During the latter half of 1955, when demands were generally expanding, the overall index rose very little. Industrial prices, however, were rising quite rapidly—3.6 percent in a half year. Prices of producers equipment, of most semi-fabricated durable goods, and of industrial raw materials increased sharply. The steep decline in farm and processed food prices—mainly attributable to a very large rise in meat supplies—kept the overall index from rising.

TABLE 5-4.—Wholesale prices and construction costs, 1955-57

[Percent change]

	June 1955 to De- cember 1955	Decem- ber 1955 to August 1957	Number of com- modities in index	Percent rising or falling (June 1955 to August 1957)	
				Rising	Falling
Wholesale price index, all commodities.....	0.9	5.5	-----	n.a.	n.a.
Industrial products.....	3.6	4.9	-----	n.a.	n.a.
Finished goods.....	-----	-----	159	93	7
Producers equipment.....	4.6	10.8	53	100	0
Consumer durables.....	2.6	4.2	45	89	11
Consumer nondurables.....	1.2	3.2	61	90	10
Intermediate materials, supplies and compo- nents.....	3.8	5.3	194	85	15
Materials for durable manufacturing.....	5.5	6.9	22	68	32
Components for manufacturing.....	7.3	8.2	30	100	0
Materials and components for construction.....	3.9	3.4	42	83	17
Containers, nonreturnable.....	4.8	8.6	10	80	20
Supplies for manufacturing.....	4.0	4.2	19	84	16
Supplies for nonmanufacturing (excluding animal feeds).....	2.3	4.8	22	100	0
Processed fuels and lubricants.....	1.6	6.5	8	100	0
Materials for nondurable manufacturing.....	1.3	2.1	41	76	24
Crude materials for further processing.....	11.5	-2	21	67	33
Farm products.....	-9.7	9.7	23	43	67
Processed food.....	-5.5	9.2	20	60	40
Construction costs:					
Residential.....	1.4	5.5	-----	n.a.	n.a.
Nonresidential.....	2.1	9.0	-----	n.a.	n.a.
Special index, manufactured products.....	1.9	6.2	-----	n.a.	n.a.
Durable.....	4.8	7.4	-----	n.a.	n.a.
Nondurable.....	-9	5.0	-----	n.a.	n.a.

The pattern of price increases after the turn of the year fits in quite closely with our hypothesis. Industrial output was approximately stable, despite rising capacity. Industrial prices nevertheless continued to rise. We may classify the commodity groupings in table 5-4 in two ways: by sector of final demand and by stage of fabrication. The largest increases among finished goods were those for capital goods—producers' durable equipment and nonresidential construction. Prices of finished consumer durable and nondurable goods rose by a much smaller amount, and most of the rise in consumer durable prices was accounted for by automobile prices.

Among the intermediate materials, supplies, and components, those mainly used by the durable goods industries had the largest price increases. Crude material prices did not rise at all. In general the more advanced the stage of fabrication of a commodity, the more likely it is to be cost-determined. The closer it is to a raw material, the greater will be the influence of demand. In general the table bears this out. The stability of aggregate industrial output is reflected in the stability of the prices of industrial raw materials. Among the semifabricated materials, supplies, and components, the categories most advanced in the stage of fabrication—components and containers—had the largest price increases. Although industrial

production was not rising, the cost increases arising out of excess demands in the investment goods industries led to price increases in these semifabricated products.

The last two columns give some further evidence of this tendency. In general the more advanced the stage of fabrication the less the prevalence of price declines among the various commodities making up each category. The greater the number of production stages behind each commodity the greater the possibility that rigidities in the price structure and increases in wages and other costs will affect its price. The table is not so finely broken down as to give more than the roughest sort of information on stage of fabrication. Take for example the category "Materials for durable manufacturing." Almost one-third of its product classifications experienced a price decline. In turn almost all of these were accounted for by the primary nonferrous metals; copper, lead, and zinc. These are products with very little fabrication, only one step removed from the raw material stage. They are not normally sold in the form of ore, and first reach the market in the form of primary refinery shapes. Had we a finer breakdown of economic categories by stage of fabrication, the greater rigidity of more fabricated products would be seen more clearly. This is not a universal rule, of course, only a general tendency. The relative magnitude of price changes and the frequency of price declines in each category were also affected by the influence of final demands for particular goods and services on the commodities which make up the category. But without a much more detailed classification of economic sectors, combined with an input-output table—enabling us to relate changes in the demand for final goods to changes in the demand for particular materials—we cannot construct the appropriate cross classification of stage of fabrication and relationship to final demand.

TABLE 5-5.—*Relationship of finished goods prices and materials costs, selected industries*

<i>Situation and commodity group</i>		<i>Percent change in price June 1955 to August 1957</i>
A	Lumber.....	-4.1
	Millwork.....	0
	Construction materials.....	7.4
	Residential building costs.....	7.0
A	Plant, animal, and synthetic fibers.....	-.9
	Textile products.....	0
	Apparel, wholesale.....	1.6
	Apparel, retail.....	2.9
B	Hides and skins.....	10.4
	Leather.....	9.3
	Footwear, wholesale.....	8.6
	Footwear, retail.....	9.1
B	Iron and steel and nonferrous metals.....	17.8
	Consumer durables, wholesale.....	7.0
	Consumer durables, retail.....	3.5
	Consumer durables, excluding autos, wholesale.....	5.0
	Consumer durables, excluding autos, retail.....	3.1
C	Iron and steel and nonferrous metals.....	17.8
	Producers durable equipment (less autos).....	20.9

Table 5-5 illustrates the kinds of price behavior we are attempting to describe.

Each bank in the table gives the price increase at various stages in the production and distribution process of a particular group of commodities, e.g., lumber, millwork, total building materials, and residential construction costs.

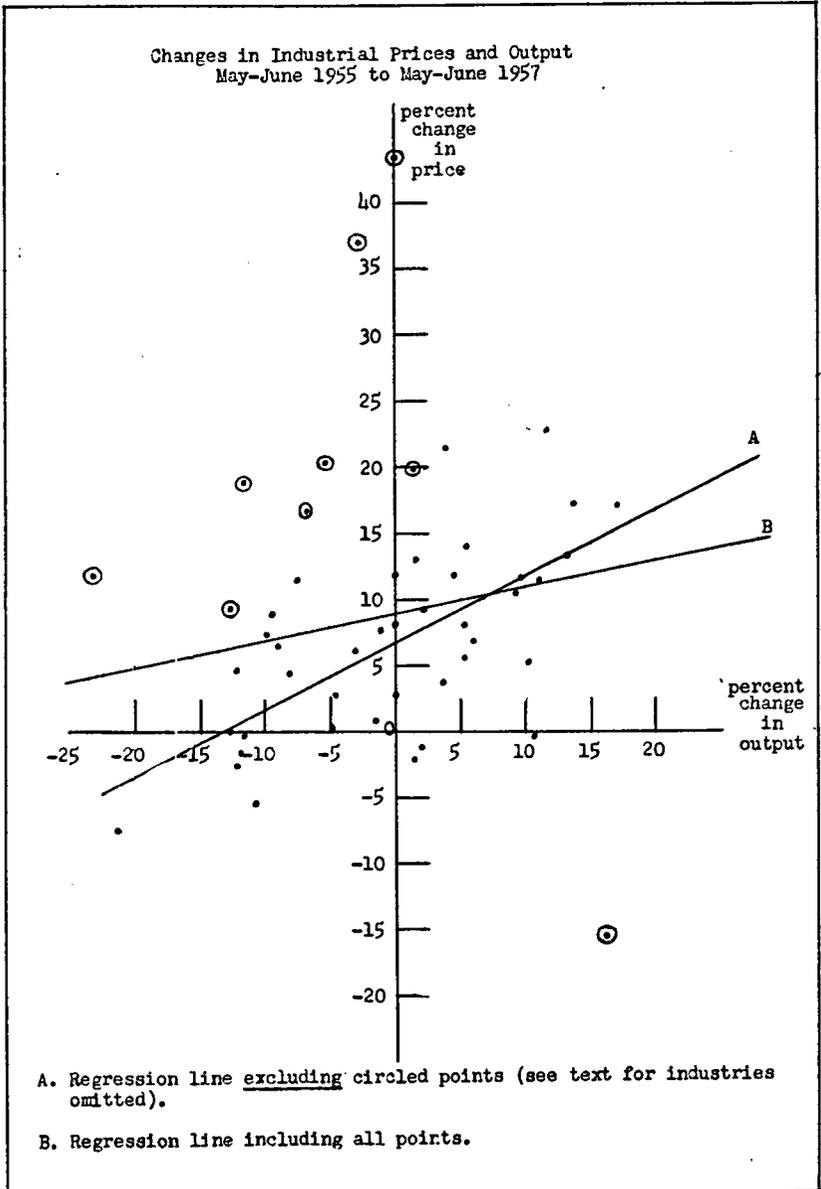
Situation A represents a case of declining, or at best slowly rising demand for the final product accompanied by falling prices of basic raw materials. As the degree of fabrication mounts, increased costs—particularly labor costs—lead to larger and larger increases in prices. In the case of residential construction, the average price of intermediate materials going into homebuilding was additionally raised by the sharply rising outlays for business investment and public construction (which do not impinge heavily on the demand for lumber). No such outside factors appeared in the gradual progression of apparel price changes, from a modest fall in fiber prices to a moderate rise in retail clothing prices. In situation B we are similarly concerned with finished commodities, the demand for which is either falling or at best slowly rising; but in this case we add the ingredient of steeply rising materials prices. Final goods prices also rose, but by less than the increase in materials prices. Finally, in case C, we have a pure excess demand situation. Producers' equipment prices rose very sharply, even more so than the increase in the price of metals used in their production.

Excess demands in the capital goods and related sectors of the economy thus led not only to steeply rising prices for the commodities directly involved, but to price increases for almost all classes of goods and services. Prices of materials and supplies whose chief use is in the capital goods industries were bid up; prices of most other materials fell slightly or not at all. The magnitude of wage increases in excess demand industries was matched by increases in industries with no excess demands (the evidence for this we shall examine later). Prices of commodities at advanced stages of fabrication were marked up in response to cost increases which cumulated as the stage of fabrication progressed. And downward rigidities in most prices tended to block the spread of any influence which excess inventories and rapidly declining demands for autos and housing might otherwise have exerted.

Another aspect of the pattern of industrial price behavior is shown in chart 5-1. Changes in industrial prices are there plotted against changes in industrial output for the period between mid-1955 and mid-1957. Commodity price data from the BLS wholesale price index were matched in detail with industry output measures from the Federal Reserve Board index of industrial production. The processed-food industries were omitted in view of the particular impact of changing agricultural supply conditions on their prices. In a number of industries there were no price data available for matching purposes; e.g., aircraft, shipbuilding, and instruments. In some cases price indexes were combined, with appropriate weights, to match a larger industry total. In a few cases both output and price measures were combined to provide matching groups. The industries for which matching prices were finally provided account for two-thirds of the total weight in the Federal Reserve Board index (after excluding processed foods from the total).

In general there is a positive relationship between price changes and output changes. The simple correlation coefficient is quite low, however (0.20). If we exclude the nine commodities or commodity group circled on the chart and recompute the regression, the correlation coefficient is substantially improved (0.66). In other words, if we assume that the change in output was a rough measure of the change in demand, there was a positive relationship between changes in demand and changes in prices for *most* industries. The average

CHART 5-1



(unweighted) change in output for all of the industries covered was -1 percent; the average price change, +8.7 percent. After excluding the nine "out of line" industries, average output change was zero, while the average price rise was 6.6 percent. If we weight the price and output changes by the 1955 relative importance of each item or group in the Federal Reserve index, the correlation is further improved (0.947). Also, since the industries with the larger price and output changes generally had higher than average weights the weighted output and price averages were both higher. (For all industries, the average price increase is 10.1 percent; after excluding the nine industries, the averages are 4.3 and 8.9 percent respectively.)

The average line of relationship cuts the price axis at a price change of 6.8 percent (using the smaller group of industries). On the average, stability of output was associated with a substantial price rise. With aggregate output rising less than capacity, however, there was no *aggregate* excess demand over the period. Had prices been flexible, the average relationship between changes in output and changes in prices should have been such that moderate increases in output were not on the average accompanied by price increases. This we discussed at some length in chapter 3.

An examination of the details of individual price-output relationships provides additional insights into the nature of the general price rise during the period. The three points above the regression line and furthest out to the right represent industrial and commercial machinery, electrical machinery and equipment (excluding appliances) and fabricated structural metal products. These were the three major industries which benefited from the investment boom. They accounted for 40 percent of the (weighted) price increase. The weighted average output rise of these three industries was 15 percent, compared to an overall rise of only 2 percent. Indeed, the average change in output for all other industries was a -2 percent. Yet the average (weighted) price rise for all other industries was over 8 percent. If we remove the nine industries whose price-output relations were out of line, and again exclude the three capital goods industries, the average price rise was 6 percent. The capital goods industries were thus the major areas in which industrial output rose. All other output combined actually declined slightly. Prices in these other industries nevertheless rose substantially on the average, though by less than the prices of capital goods.

We excluded nine industries from some of the calculations because their price-output relationship was "out of line." On closer examination these cases, despite their "out of liness," throw additional light on the nature of price behavior during the period. One of the industries, softwood plywood, had a sharp increase in output and a substantial *fall* in price. It is the one industry which is far out of line *below* the regression relationship. The combined effects of rapid technological advance and a substantial piling up of inventories in the face of declining demand explains its behavior. Plywood, together with residual fuel oil and lubricating oil (the two points far up on the price axis) have very small relative weights. Their exclusion improves the unweighted regression, but makes little difference to the weighted one. The other six commodity groups are another matter. They are listed below with their price and output changes.

TABLE 5-6.—Price and output changes for selected commodity groups, May-June 1955 to May-June 1957

[Percent change]		
Commodity group	Price	Output
Pig iron and ferroalloys.....	19.9	1.4
Steel mill products.....	20.4	-5.4
Foundry and forge shop products.....	18.9	-11.6
Tin cans.....	16.7	-6.9
Passenger cars.....	11.8	-23.1
Motortrucks.....	9.3	-12.8

NOTE.—Addendum: Relative importance of above groups in total, 15 percent.

The first four groups are closely associated with the steel industry, the remaining two with the auto industry. As we have seen, the magnitude of the average price increase among industries other than capital goods is increased by a third (from 6 to 8 percent) upon the inclusion of these industries. Because steel enters into so many industrial commodities, the sharp increase in its price becomes even more important when its role as a factor input is considered. The fact that steel and auto prices were so much out of line with the average relationship of price and demand changes in other industries—which relationship itself was biased upward—strongly suggests that administered increases in *ex ante* gross margins were responsible for part of the price advance. We have already examined the shift in *ex ante* margins in the steel industry.⁸ The evidence for such a shift in the auto industry is much weaker. In the first place the automobile companies, especially General Motors, produce such a diversified list of products that the profit data for the companies as a whole cannot be related to the production of automobiles alone. Further, the mere counting of the numbers of automobiles produced does not give a representative measure of output, in view of the changing nature of the product itself. An indirect test of the hypothesis was therefore made. By weighting the price indexes of various materials and components according to the importance of their use in the automobile industry (as shown in the 1947 inter-industry relations study), an index of materials costs was constructed. Between mid-1955 and mid-1957 this index—representing the average price paid for materials by the automobile industry—rose about 14 percent. During the same period average hourly earnings in automobile manufacturing rose by 7 percent; basic wage rates rose by more than this, but overtime declined substantially. Manufacturers' prices of automobiles rose some 10 percent over the same period. Even if we assume no gain in productivity, the price increase seems to be almost equal to the average rise in labor and materials costs combined. If we assume a modest increase in productivity of only 1½ percent per year, then it would appear that price increases were somewhat greater than cost increases. A rise in prices equal to or perhaps slightly greater than the rise in unit variable costs during a period in which automobile sales declined substantially, seems at first to confirm the hypothesis of a rise in *ex ante* margins, i.e., at the 1955 volume of car sales margins would have expanded. However, we have made no allowance for the increases in costs associated with the

⁸ See above, pp. 91-93.

widening, lengthening, and general styling changes occurring during the period. It is impossible to say how much this invalidates our data—which are, in any event, but rough approximations. As a consequence we cannot judge how much of the “out-of-lineness” of the change in prices relative to the change in demand in the automobile industry represents an attempt to increase ex ante margins, and how much it represents a particularly sharp rise in materials costs. At a minimum, the fact that prices could rise so much in the face of a sharp decline in automobiles sales, suggests a price structure very sensitive to cost increases and insensitive to declines in demand.

Summary

During the 2 years after 1955, total aggregate output and industrial production rose very slowly, and by significantly less than the increase in productive capacity. Aggregate demand was not excessive. The demands for capital goods, for exports, and for military equipment however, was in excess of potential supply, while housing and auto demand fell well below the capacity of the two industries. Instead of a realignment of relative prices around a stable center, prices of almost all final goods and services rose. Price increases were generally largest for those goods in excess demand, but were not confined to those goods alone. Among semifabricated materials and components, price increases also tended to be larger in the case of those materials consumed by the capital goods and allied industries; but again price increases were not confined to such commodities. The downward rigidity of prices in areas of deficient demand and rising costs of semifabricated materials generally, gave an overall upward bias to the relationship of demands and prices during the period.

THE BEHAVIOR OF WAGES

The effect of excess demands in the capital goods industries spread throughout the economy, not only by the mechanism of higher material costs but even more importantly through the mechanism of rising wage rates. In chapter 3 we examined some of the theoretical reasons why rising wage rates in industries with strong output and productivity gains should induce similar wage increases in industries not so fortunately situated. Evidence was presented that wages have behaved in this manner during recent years. That evidence is recapitulated in tables 5-7 and 5-8. Between mid-1955 and mid-1957 the increase in output in the most rapidly expanding manufacturing industries⁹ rose almost five times more than the average rise for all industries; the lowest quartile experienced on the average a 6 percent decline in output. Because, as we noted earlier, productivity gains tend to be largest in industries with the largest output increases, the variation of employment change was less than the variation of output change. Nevertheless employment in the lowest output quartile fell about 9 percent while it rose by 2 percent in the industries whose output was increasing most rapidly. Changes in average hourly earnings were insignificantly different, however. Despite the larger rise in demand and productivity in the expanding industries, the increase in wage rates was about the same as the average for all manufacturing, and only slightly higher than the rise for the lowest quartile. The same

⁹ The top 5 out of the 21 two-digit industry groups.

relationship between output, employment, and wages prevailed during the longer period, 1953 to 1957. The average rise in hourly earnings was about 2 percent lower than the rise in the top output quartile and 1½ percent higher than the lowest quartile. But the difference between the average increase in wages and the increase in the two outer quartiles was only one-half of 1 percent per year. The United Nations study of these relationships for a number of industrialized nations between 1950 and 1956 and between 1954 and 1956 matches our findings exactly. There is a systematic tendency for the average wage increase to equal the increase in the most rapidly expanding industries.

TABLE 5-7.—Changes in output, employment, and wage rates,¹ manufacturing industries, selected periods

[Percent]

	Output	Production worker employment	Average hourly earnings
1953 to 1957:			
All industries.....	6.7	4.0	16.1
Average of highest quartile ²	18.1	-1.4	18.2
Average of lowest quartile ²	-1.4	-10.4	14.5
May-June 1955: All industries.....	2.7	-3.1	9.8
to			
May-June 1957:			
Average of highest quartile ²	12.0	1.8	9.5
Average of lowest quartile ²	-6.0	-9.1	9.0

¹ All average are unweighted.

² Highest and lowest quartile selected in all cases on the basis of change in output.

TABLE 5-8.—Changes in output, employment, and wage rates in manufacturing, selected countries

[Average annual percent change]

	1950-56 ¹		1954-56 ¹	
	Output	Average hourly earnings	Output	Average hourly earnings
Canada:				
All industries.....	4.2	7.7	7.0	3.8
Average of highest quartile.....	10.1	8.1	14.5	4.2
Denmark:				
All industries.....	2.2	4.7	5.0	4.0
Average of highest quartile.....	7.0	4.5	11.5	3.8
Germany, Federal Republic:				
All industries.....	16.5	8.9	13.0	7.9
Average of highest quartile.....	28.4	8.6	18.6	8.4
Netherlands:				
All industries.....	7.0	6.8	9.5	9.6
Average of highest quartile.....	11.3	6.4	14.3	10.2
Norway:				
All industries.....	5.6	9.5	6.5	5.5
Average of highest quartile.....	9.5	9.3	11.9	5.6
Sweden:				
All industries.....	2.8	14.0	5.5	6.4
Average of highest quartile.....	7.8	15.6	11.6	7.2
United Kingdom:				
All industries.....	3.5	9.1	3.0	8.4
Average of highest quartile.....	5.6	9.5	4.6	9.2
United States:				
All industries.....	4.7	5.8	7.0	4.7
Average of highest quartile.....	8.7	6.0	11.0	5.1

¹ For Denmark: 1951-55 and 1953-55; for Netherlands, Norway, and Sweden: 1950-55 and 1953-56.

Before further discussion of the relationship between wage changes and demand changes, a digression on the relationship between output and productivity is necessary. During a period in which capacity is being increased and improved production methods introduced, it is quite likely, a priori, that increases in output per man-hour will, up to a point, be associated with increases in output. Only as the new capacity and improved facilities are utilized will be potential efficiencies incorporated therein be realized. Over a very long period of time the variation in output changes among different industries will reflect mainly changes in capacity. In the short run, however, a much larger proportion of the total variance will be due to changes in output relative to capacity. To borrow the terminology used by Friedman in his study of the consumption function, the part of the total inter-industry variance in output changes contributed by temporary components (i.e., changes in output relative to capacity) will be quite large in the short run; over a long period however most of the variance in output changes will be contributed by variations in permanent components (i.e., changes in capacity). There appears to be no reason why the mere expansion of capacity itself should influence the rate of change in productivity; but the rate of utilization of capacity will certainly effect the rate of productivity change. The combination of a large expansion of capacity and a small expansion of output in the period under consideration meant that the proportion of interindustry variance contributed by temporary components was quite high. As a consequence we should find a significant relationship between the change in output and the change in productivity.

The results of correlating changes in output with changes in productivity in manufacturing industries are summarized in table 5-9. Since a large number of the Federal Reserve Board industry output indexes are derived by applying an assumed productivity gain to man-hour data, we were unable to utilize the Board's measures. A set of output estimates was constructed by deflating industry sales and inventory changes, considering the sum of the two to approximate a measure of output. Comparable sales, inventory, and price data were only available for 15 of the 21 manufacturing industries. Hence our estimates suffer from incompleteness, as well as from all the other problems associated with deflated sales data. However, there is no reason to believe that the method biases the results in any systematic way.

TABLE 5-9.—*Regression of changes in output per man-hour on changes in output, 15 manufacturing industries*

	a	b	r
1953-57: Production worker man-hours.....	10.0	0.71	0.78
All employee man-hours.....	6.4	.58	.73
1955-57: Production worker man-hours.....	3.0	.59	.79
All employee man-hours.....	.5	.54	.71

NOTE.—"a" and "b" in the column headings are the regression coefficients in the equation, $Z = a + bx$, where Z represents the percent change in output per man-hour and x represents output. "r" is the coefficient of correlation.

Because so much of the interindustry variation in output change was associated with changes in the relationship of capacity to output,¹⁰ the

¹⁰ The average unweighted rise in output of these industries from 1953 to 1957 was only 5.4 percent, while from 1955 to 1957 output fell 1 percent.

correlation between output and productivity changes is rather high. Because of the rapid substitution of nonproduction for production workers, the average rise in output per man-hour for total employees is less than the rise for production workers in both periods. More importantly, the rise in productivity associated with a zero change in output is significantly smaller for all employees than for production workers. When employees are hired whose continuing employment is not affected by moderate short-falls in output below expectation, then output increases are essential for productivity growth and unit labor cost stability.

The extension of our cross section study to aggregates is a tricky business. But so long as we keep the range of output variations within moderate limits, so that aggregate restraints, such as the availability of labor, are not violated, we may usefully proceed. On the basis of the coefficients in table 5-9, a "normal" increase of 8 percent in aggregate manufacturing output over the 1955-57 period would have implied an increase in total employee productivity of about 4.8 percent—2½ percent per year. But a uniform expansion of output in all industries would not have achieved this result. We have used a linear regression, while a priori reasoning would suggest a curvilinear relationship—past a certain point, as output approaches the physical limits of capacity, further increases in output will not lead to gains in productivity. It was the industries whose output expanded less than capacity in which potential productivity gains were unrealized. Hence an aggregate rise in production chiefly composed of increases in industries in which excess capacity had emerged would have been the pattern most likely to have resulted in an overall gain in productivity.

The positive relationship between changes in output and productivity is confirmed by the United Nations study cited earlier. For a number of industrial countries changes in productivity for industries whose output expanded most rapidly were compared with the average rise in productivity. Without exception, productivity gains in the rapidly expanding sectors were greater than average.

The data for Germany also illustrates our proposition about the mix of output changes. From 1953 to 1957 the average *annual* gain in output for all manufacturing industries was 16.5 percent. (See table 5-8.) Under these circumstances only a small part of the inter-industry variation in output gains could have been due to "temporary" components (i.e., changes in output relative to capacity); most of the variation was probably attributable to permanent components (i.e., relative changes in capacity). As a consequence there was only an insignificant difference between the productivity rise in the most rapidly expanding industries and the average rise for all industries. A faster rise in output, even had that been physically possible, would most probably not have induced larger gains in productivity. It is only when the growth in output is less than the rise in capacity that productivity is output sensitive.

TABLE 5-10.—Changes in manufacturing productivity in 8 industrial nations
 [Average annual percent change]

	1950-55	1954-56
Canada:		
All manufacturing.....	2.4	1.9
Average of highest quartile ¹	6.8	7.1
Denmark:		
All manufacturing.....	1.5	3.1
Average of highest quartile.....	3.5	6.3
Germany, Federal Republic:		
All manufacturing.....	6.7	5.4
Average of highest quartile.....	7.0	6.3
Netherlands:		
All manufacturing.....	2.6	4.1
Average of highest quartile.....	4.8	7.0
Norway:		
All manufacturing.....	3.0	3.8
Average of highest quartile.....	5.1	7.5
Sweden:		
All manufacturing.....	2.8	2.0
Average of highest quartile.....	6.4	7.2
United Kingdom:		
All manufacturing.....	1.2	1.9
Average of highest quartile.....	1.7	3.0
United States:		
All manufacturing.....	2.3	3.1
Average of highest quartile.....	3.0	5.0

¹ Highest output quartile in all cases.

Within the limits we have suggested, then, the relationship of productivity changes to output changes suggests two important hypotheses with respect to the behavior of wages and unit labor costs. In chapter 4 we analyzed the reasons why firms in oligopolistic or quasi-oligopolistic industries would find it to their advantages to distribute, in the form of wage increases, a good share of the gains accruing from rising demand or from advancing productivity. But productivity gains are closely related, in the short run, to increases in output, while output gains, up to the limit of capacity increases, are related to the strength of demand. Hence the firms which experienced larger than average increases in demand during the 1955-57 period quite probably benefited also from larger than average gains in productivity. Even though the overall demand for labor was not excessive, the combination of these two factors induced rather large increases in wage rates in those firms whose sales were rising sharply. And, as we have seen, wage rates in other industries followed closely behind.

The uniformity of wage rate changes among different industries and the positive association of output and productivity increases, imply that unit wage costs among different industries will be negatively correlated with output changes, unless output in most industries is pressing on capacity. An inspection of tables 5-8 and 5-10 shows this to be the case for all of the nations covered. Wage-rate increases were about the same for the top quartile of industries as for all industries. Productivity gains were much larger, however, for the top quartile than the average for all manufacturing. As a consequence unit labor costs rose far less among the rapidly expanding industries than among other industries.

This finding does not, of course, mean that an expansion of aggregate output is always a means of achieving lower unit costs and hence lower prices. An additional expansion in output, even though it might be achieved in part through higher productivity, would still require additional labor and raw materials. The possible impact of rising demand for factors on factor prices cannot be ignored. However between 1955 and 1957, output in a large number of industries failed to keep up with the increase in capacity, while at the same time output in one major sector of the economy was pressing hard on capacity. In this case a discussion of output increases or decreases solely in aggregate terms misses the central point. It is the *composition* of output changes which so strongly influenced changes in wage rates and productivity, and hence unit labor costs. Under such conditions, the restriction of *aggregate* demand is a two-edged sword. So long as particular sectors of the economy continue to "boom," a reduction in aggregate demand may modify the increase in wage rates very little, but the increase in productivity very much.

By matching up changes in industrial prices as closely as possible with changes in associated wage rates, some additional insight can be gained into the price-cost relationships of the period. In table 5-11 the average increase in the prices of capital goods and materials heavily used by the capital goods industries (including steel) is compared to the average increase in the prices of all industrial other commodities in the wholesale price index.

TABLE 5-11.—*Prices and hourly earnings in capital goods and other industries, 1955-57*

Commodity group	Weight in industrial wholesale price index ¹	1955-57 price increase		Increase in average hourly earnings ²
		Percent change	Percent contribution to total change	
A. Capital goods and associated commodities	30	15.0	62	11.7
B. Other industrial goods in WPI ³	70	4.0	38	16.1
All industrial commodities.....	100	7.3	100	10.5
A.' A, plus autos and paper products.....	41	13.5	75	10.8
B.' B, minus autos and paper products.....	59	3.1	25	10.3

¹ Relative importance, December 1954.

² Production workers only.

³ Wholesale price index.

The selected commodity groups (25 in all) account for 30 percent of the total weight of the wholesale price index (excluding farm and food products). But these same groups accounted for *62 percent* of the rise in industrial prices over the period. On the average their prices rose 15 percent, compared to an average rise of 4 percent for all other commodities. At the same time, however, wage rates rose only slightly faster in the industries producing capital goods and associated products than in all other industries. If we add to our selected group of commodities two other groups, automobiles and paper products, we account for 41 percent of the weight, but 75 percent of the total price rise. Yet wages increases in these industries averaged almost exactly the same as the rise in all other industries.

TABLE 5-12.—*Prices, hourly earnings, and unit costs in capital goods and other industries, 1955-57*

[Percent change]

	Prices	Average hourly earnings	Unit wage costs		
			I	II	III
Capital goods and associated commodities.....	15.0	11.7	4.3	6.7	5.2
Other industrial goods in WPI.....	4.0	10.1	2.8	5.1	5.6
All industrial commodities.....	7.3	10.5	3.2	5.5	5.5

In table 5-12 we attempt some illustrative conversions of the wage changes into unit cost changes under varying assumptions. In the first illustration (I) we assume that production worker productivity in both groups of industries rose by the same as the average for all industries.¹¹ In this case wage costs are seen to rise by less than prices in both groups of industries. In illustration (II) we have corrected the rise in productivity to allow for the effect on costs of substituting indirect for direct labor. The reader will recall that in chapter 4 we pointed out that if some of the increase in direct labor productivity was made possible by a substitution of indirect labor, an increase in wage rates equal to the increase in direct labor productivity would still lead to a rise in unit labor costs. If salary rates rise by the same amount as wage rates, the latter must rise less than direct labor productivity if unit labor costs are to be stable. Correspondingly, any given rise in wage costs per unit will imply a somewhat larger rise in total labor costs per unit. When salary rates rise with wage rates and salaried employment increases in a 1-to-1 relationship with output, then unit labor cost stability requires that

$$i_w = \frac{\bar{P} \cdot z_w}{1 + z_w(1 - \bar{P})}$$

where i_w is the wage rate increase, z_w the direct labor productivity gain, and \bar{P} the proportion of wage costs in total labor costs. The right hand term will clearly be less than z_w ; i.e. wage rates must rise by less than direct labor productivity.

By substituting the actual 1955-57 values of Z_w and \bar{P} into the equation, we can calculate the wage rate increase which would have been consistent with stable labor costs. The excess of the actual wage increase over the "required" increase then reflects the labor cost increase attributable to wage advances. Those cost increases are the ones entered in column II of table 5-11. As a matter of fact salary rates rose more than wage rates during the period. However this part of the rise in costs cannot be attributable to wage increases, and so we have not altered the formula to take account of this. Similarly salaried employment rose more rapidly than output, whereas the correction formula assumes an equal rise. But again, the rise in salaried employment relative to output was not a consequence of technological change, but rather of the failure of output to rise with capacity. The data for the 1947-55 period suggest that secularly,

¹¹ We have used the Federal Reserve Board index of industrial production in computing productivity. Use of the BLS output measure would raise unit costs by an additional 3 percent on the average.

overhead employment is rising equally with output. Any additional relative rise, stemming from a shortfall in output, we do not want to incorporate in our correction formula.

Finally in column III we have attempted to take account of the fact that the industries in which prices rose most rapidly also had the largest rise in output. Hence productivity most probably increased more in those industries than in the others. Unfortunately our productivity data are not available in sufficient detail to allow an actual matching up. Moreover we have included the steel industry in the industries associated with capital goods; since output and productivity in the steel industry did not rise particularly sharply from 1955 to 1957 the degree to which productivity gains in the capital goods industries exceeded the average is reduced. Primary steel products account for less than one-quarter of the weight in the group, however, and output of most of the other commodities in the group did expand substantially. Consequently there is a high probability that the average productivity gain for the group exceeded the average for all industrial commodities. For our illustration we have conservatively estimated that direct labor productivity in the capital goods and associated group of industries rose by 4¼ percent per year compared to an average of 3½ percent for all manufacturing. This implies a 3-percent rise for all other industries.

The application of these various "corrections" to the raw wage data suggests, as indicated by column III, that unit wage costs in the industries with the largest price increase advanced by no more than in other industries. Further, it suggests that the rise in prices in the industries with large price increases was substantially greater than the increase in unit wage costs. Conversely prices in other industries rose by a smaller amount than the increase in wage costs.

Since prices of capital goods seem to have risen substantially more than wage costs and slightly more than materials costs (see table 5-4), an expansion of profit margins must have occurred. It is difficult to determine the precise degree of margin expansion, since the profits and sales data available for the machinery industry include the profits and sales of many firms producing consumer durables. Despite the inclusion of such consumer goods producers, whose margins were probably declining during the period, the overall gross margin (profits plus depreciation) on sales in the nonelectrical machinery industry rose from 12.6 percent in the first three quarters of 1955 to 13.5 percent in the same three quarters of 1956; gross margins then declined slightly, to 13.1 percent in the first three quarters of 1957. (Since the fourth quarter of 1957 was sharply affected by the recession, only the first three quarters of each year were used for comparison purposes.) During the same period, gross margins for manufacturing industry as a whole were declining. The increase in machinery industry gross margins per dollar of sales, during a period in which prices rose by some 15 percent, implies an even larger increase in gross margins per unit of output. Further, the inclusion in the data of a number of consumer goods establishments, whose margins were probably declining, suggests that the figures cited above understate the rise of margins in establishments producing capital goods. Net profit margins also rose in the machinery industry, but by a smaller amount than gross margins.

The hypothesis that the 1955-57 inflation was mainly traceable to an autonomous rise in wage costs appears to be sharply contradicted by these data. Commodities which account for less than one-third of the weight in the industrial wholesale price index accounted for almost two-thirds of the price rise. Yet in these same industries prices rose by a substantially larger amount than did wage costs. To suggest that wage increases originated in the industries with little rise in output, demand, or productivity and were somehow transmitted to the industries facing excess demand would fly in the face of any reasonable theory of wages. Neither can the rise in wage costs be traced to an aggregate excess demand for wage labor. It is true that in late 1955 aggregate excess demand was for a short time in evidence. The sharp rise in profit margins during the period did raise expectations and quite probably lead to a general demand for factors of production which had some lasting effects, particularly where long-term labor contracts were involved. But during the succeeding 2 years demands in the aggregate were not excessive and capacity increased more rapidly than output. This we have already discussed in detail. The unemployment rate, while only 4 percent of the labor force, did not fall any lower. Most importantly, the employment of direct labor declined throughout the period; census statistics on employment by occupation and Bureau of Labor Statistics data on manufacturing production workers both give evidence of this fact. Hence, while wage rates may have been subject to the lagged influence of the excess demand and swollen profit margins of late 1955, there was no current *aggregate* excess of demand for factors of production during 1956 and 1957 to account for the wage advances of the period.

Summary

The data we have examined on the interrelationships among expenditures, output, prices, wages, and productivity seem to confirm our hypothesis with respect to the nature of the 1955-57 inflation. During those years the economy attempted to accomplish a sharp change in the allocation of resources. Because of the limited mobility of resources and the nature of price and wage making processes, this resulted in a rise in the general level of prices rather than a mere shift in relative prices. Overall demand was not excessive, and aggregate output rose very little. Industries confronted with excess demand raised prices however and bid up costs of materials and wages. In deficient demand sectors neither goods prices nor factor prices fell significantly. In fact the rising cost of materials, and the advance in wage rates in the expanding sectors, spread throughout the economy. As a consequence, prices not only failed to decline, but actually rose in many industries characterized by growing excess capacity. The tendency for most prices to rise was greatest among finished goods, where cost pressures built up in earlier stages of fabrication, and weakest among crude materials where demand conditions played a more important role. The cost increases which did occur throughout industry appear to have spread out from the sectors in which excess demands were present. An examination of the relationship between prices and wages does not confirm the hypothesis that the cost increases resulted mainly from an autonomous wage push; indeed the data seem to contradict this view.

OVERHEAD COSTS

In chapter 4 we distinguished between an increase in overhead costs per unit stemming from long-term secular factors and an increase originating in the failure of output to match the growth in capacity. Both of these factors were at work during the 1955-57 period. The secular trend toward substitution of overhead for direct labor continued; the addition of new capital facilities proceeded at a very rapid pace; the price of capital goods rose relative to other prices; research and development outlays continued to increase at an exceedingly sharp rate; and, in many consumer goods lines, the investment in new tools and equipment required by elaborate model changeovers swelled the fixed costs which had to be written off during the life of the model.

Not only was the relative proportion of fixed to variable costs rising within each industry, but the shift in the interindustry composition of employment led to the same results on an economywide basis. The industries which absorbed the largest part of the rise in employment were those in which employment is not particularly sensitive to moderate changes in output (table 5-13). About two-thirds of the rise in employment came in service, finance, and government. If we add manufacturing nonproduction workers the proportion rises to more than three quarters. The rest is accounted for by the distribution industries. The volatile industrialized sectors of the economy—mining, construction, manufacturing, transportation, and public utilities—accounted for only 13 percent of the increase in employment, and all of this represents increased nonproduction worker employment in manufacturing. If we exclude nonproduction workers, employment in these industries, which amounted to 40 percent of total nonfarm employment in 1955, did not increase at all.

TABLE 5-13.—*Employment by industry, 1955-57*

	Employment (thousands)		Change		
	1955	1957	Thous- ands	Percent	Percent of total change
Total nonfarm wage and salary employment....	50,056	52,162	2,106	4.2	100.0
Mining.....	777	809	32	4.1	1.5
Construction.....	2,759	2,803	49	1.8	2.3
Manufacturing.....	16,563	16,732	219	1.3	10.4
Production workers.....	13,061	12,911	-150	-1.1	-7.1
Nonproduction workers.....	3,502	3,871	369	10.5	12.8
Transportation.....	2,727	2,741	14	.5	.7
Communications.....	750	810	60	8.0	2.8
Public utilities.....	585	600	15	2.6	.7
Wholesale trade.....	2,873	3,065	192	6.7	9.1
Retail trade.....	7,973	8,237	264	3.3	12.5
Finance, insurance, and real estate.....	2,219	2,348	129	5.8	6.1
Service.....	5,916	6,336	420	7.1	19.9
Federal Government.....	2,187	2,217	30	1.4	1.4
State and local government.....	4,727	5,409	682	14.4	32.3
Addendum:					
1. Mining, construction, transportation, public utilities, and manufacturing production workers.....	20,659	20,679	20	.1	.9
2. Service, finance, etc., government and manu- facturing nonproduction workers.....	18,551	20,181	1,630	8.8	77.4
3. Wholesale and retail trade.....	10,846	11,302	456	4.3	21.7

One of the characteristics of employment in the service and distribution areas is its relative inflexibility in the face of moderate fluctuations in output. Just as in the case of nonproduction workers in manufacturing, therefore, unit costs are particularly sensitive to output changes. Of course, a large part of the rise in service-type employment was in State and local government. The concepts of prices and unit costs have a quite different meaning in this case, but they are not meaningless. A significant portion of the Consumer Price Index, for example, represents various taxes and charges levied by State and local government. The levels of these taxes per unit of services furnished are by no means insensitive to changes in the costs of providing the services.

Factor inputs and unit costs

Even after the overall level of output ceased to expand rapidly, entrepreneurs continued to add to their plant and equipment and to undertake heavy research and development expenditures. Employment of all types expanded rapidly during the recovery period in 1955; after the latter part of that year, however, direct labor requirements fell off; output failed to increase while direct labor productivity continued to rise moderately. At the same time that business firms were expanding their facilities and bidding vigorously for professional, clerical, and other overhead personnel to staff these facilities, they were reducing their employment of production labor (tables 5-14 and 5-15).

TABLE 5-14.—Changes in total private nonfarm wage and salary employment,¹ April-July 1955 to April-July 1957

Occupation group	Thousands of employees	Percent
Professional and technical.....	727	26.6
Clerical and kindred.....	743	11.2
Operatives and laborers.....	-660	-5.6
Other.....	938	5.0
Total.....	1,748	4.0

¹ Excludes self-employed and unpaid family workers.

TABLE 5-15.—Change in manufacturing employment,¹ 4th quarter 1955 to 3d quarter 1957

Category	Thousands of employees	Percent
Production workers.....	-474	-3.5
Nonproduction workers.....	345	9.7
Total.....	-129	-.8

¹ Seasonally adjusted.

The investment boom, thus carried with it a substantial expansion in relatively fixed commitments, not only in terms of capital but also in terms of labor inputs. Had output expanded in line with the expectations held when the commitments were undertaken, these factor inputs per unit of output would not have risen very significantly. But the stability of output, on the average, resulted in a sharp increase in the ratio of such inputs to output. Even without the rise in factor prices there would have been a rise in unit costs:

The cost data presented in chapter 4 are amplified in table 5-16. Changes in unit costs in manufacturing are allocated between the change in factor price and the change in the factor input-output ratio. The capital input measure is the roughest sort of estimate. It is a measure of the constant dollar value of depreciation charges (depreciation being calculated by applying to historical estimates of capital inputs estimated rates of depreciation).¹² While neither capital nor overhead labor inputs had risen significantly faster than output between 1947 and 1955—when output increases matched capacity increases—the ratio of fixed inputs to output rose sharply between 1955 and 1957. From midyear 1955 to midyear 1957 the increase was even greater.

In terms of the absolute contribution to cost increases, overhead costs were substantially more important than wage costs during the period. More than half of the total increase in costs is accounted for by higher salary costs per unit, and three-quarters by salaries and depreciation together.

TABLE 5-16.—Changes in manufacturing prices and costs, 1955-57

[Percent]

	A ¹	B ¹
Deflator of gross product.....	4.9	7.4
Unit wage costs.....	4.4	6.7
Factor price.....	11.4	11.4
Factor input per unit of output.....	-7.0	-4.8
Unit salary cost.....	19.3	21.9
Factor price.....	12.0	12.0
Factor input per unit of output.....	6.7	9.2
Unit gross margins.....	-2.6	-3
Factor price.....	-6.8	-6.8
Factor input per unit of output ²	4.0	6.5
Unit indirect taxes.....	5.8	8.3

¹ The estimates in col. A are based on Federal Reserve Board output measures, col. B estimates on BLS output measures.

² Gross margins per constant dollar of depreciation.

TABLE 5-17.—Relative importance of different costs, 1955-57, manufacturing industries¹

Cost category	Percent change	Percent of total change accounted for by each cost category
Deflator of gross product.....	7.4	100.0
Unit wage cost.....	6.7	39.5
Unit salary cost.....	21.9	54.2
Gross margins.....	-3	-1.0
Capital consumption.....	(19.4)	(19.8)
Profits.....	(-7.0)	(-20.8)
Indirect taxes.....	6.8	8.3
Addendum: Salaries plus depreciation per unit.....	21.2	74.0

¹ Based on BLS output measures.

¹² Cf. Woodin and Wasson, *op. cit.*, *passim*.

The increase in prices, in excess of the rise in wage costs, can be at least partly explained by the phenomenon of rising overhead costs. Outside of the capital goods and associated industries excess capacity was growing. Prices were not increased to reflect fully the rise in fixed-unit costs, and margins declined. Nevertheless some recapture of the higher fixed costs was attempted, with the result that on the average the rise in prices exceeded the rise in prime costs. And the increase in fixed costs was itself a result, in part, of the failure of output to increase during an investment boom accompanied by the extensive incurrence of overhead outlays of all sorts.

As we discussed in chapter 4, the attempt to recover fixed costs in higher prices at a reduced level of output, when carried out by a large segment of industry, is likely to prove self-defeating. Had prices not risen so much, output could have been higher, enabling manufacturers to spread their fixed costs over a larger volume of output. We noted that the elasticity of costs to output was substantially less than unity, a 1-percent increase in output reducing costs by about 0.35 percent. This calculation however, takes account only of the output sensitivity of fixed costs per unit. But direct labor productivity is also sensitive to changes in output, within moderate ranges. Our regression coefficients in table 5-9 indicate that a change of 1 percent in output between 1955 and 1957 was associated with a 0.5-percent increase in direct labor productivity, and an equivalent reduction in wage labor costs. Appropriately weighted, this gives an elasticity of total costs of 0.25. Combining our two cost elasticities, fixed and variable, we find that a 1-percent additional increase in output during the period could have resulted in a 0.6-percent decline in unit costs.

The failure of output to rise was thus a major factor in the increase in costs during the period. In turn the lack of advance in output resulted from the demand situation of the period, aggravated by the attempt to recapture unit fixed costs at less than optimum rates of output. This is not to say that output expansion is always the answer to rising unit costs. Nor would any random pattern of output increases have filled the bill. But rising output in those numerous industries which experienced growing excess capacity after 1955 would have led to a significant reduction in unit costs and possibly a somewhat lower rate of price increase. If, in addition to an increase in the demand for the products of those industries there had been a moderate reduction in the demand for capital goods, there is little doubt but that the overall price increase would have been substantially smaller and the output increase significantly larger.

CONSUMER PRICES

An analysis of the way in which developments in the industrial sector influenced the price level—particularly the consumer price level—must take into account the tremendously diverse and complex mechanism by which the effects of price increases in one part of the economy get diffused throughout the whole. In the Consumer Price Index, food, nonfood commodities, and services each account for approximately one-third of the total weight. Even among nonfood commodities manufacturers' prices make up not much more than half of the total price, the rest being transportation, wholesaling, and retailing costs. The service component of the CPI is made up of a

long list of heterogeneous items, including such things as auto, real estate, and medical insurance, public-utility rates, haircuts, postage, and interest rates. Thus it would seem that the direct impact of changes in industrial prices and wages on the CPI is relatively limited. Yet an increase in the prices of manufactured products diffuses itself throughout the economy by many indirect routes. Steel prices rise, school construction costs go up, and property-tax rates are adjusted upward; an initial rise in the CPI on account of an increase in industrial prices leads, with some time lag, to rising wages in the service industries and, e.g., auto-repair charges rise; and the examples could be multiplied ad infinitum. There are in addition special factors influencing the prices of particular groups of consumer prices. An appreciation of the nature of the overall price rise requires an examination of these particular influences.

TABLE 5-18.—Changes in consumer prices, March 1956 to September 1957

Item	Percent change	Percent of total change	Item	Percent change	Percent of total change
Consumer prices, all items..	5.6	100.0	Services.....	5.8	35.4
Food.....	7.3	37.4	Rent.....	3.1	3.3
Meats, poultry, and fish.....	18.9	21.8	Other services.....	6.2	31.3
Other foods.....	3.9	15.7	Medical care except hospital and group insurance.....	4.2	2.9
Durable commodities.....	4.1	10.3	Hospital rates.....	12.6	.5
New automobiles.....	2.6	1.3	Group hospitalization.....	9.7	2.0
Used automobiles.....	21.4	5.6	Auto repairs.....	5.3	1.1
Tires and tubes.....	1.8	.1	Auto insurance.....	10.6	1.7
Appliances.....	-1.2	-.7	Transit fares.....	5.1	1.1
Furniture and bedding.....	3.9	1.2	Railroad fares, coach.....	10.4	.5
Nondurable commodities.....	4.1	16.9	1st mortgage interest.....	10.6	3.1
Apparel.....	2.4	4.0	Residential water rates.....	5.6	.4
Textile housefurnishings.....	1.7	.2	Residential telephone service.....	2.4	.5
Gasoline.....	5.5	2.4	Gas and electricity.....	1.8	.7
Motor oil.....	9.5	3.8	Miscellaneous.....	6.9	5.6
Solid fuels and fuel oil.....	4.7	1.2	Men's haircuts.....	7.5	1.0
Toilet goods.....	3.8	.8	Beauty-shop services.....	5.7	.3
Tobacco products.....	5.9	2.1	Domestic services.....	4.3	.4
Alcoholic beverages.....	3.8	1.6	Refinishing floors.....	6.4	.2
Newspapers.....	14.6	2.6	Repainting rooms.....	11.6	.6
			Repainting roof.....	9.2	.5
			Repainting garage.....	17.7	.5
			Laundry services.....	5.0	.7
			Drycleaning and pressing.....	6.0	1.4

The Consumer Price Index began to rise in March 1956. Between then and September 1957, before the recession set in, the index rose 5.6 percent. (See table 5-18.) Of that increase 72 percent was contributed by food and services, and only 28 percent by nonfood commodities. The level of consumer commodity prices is of course mainly determined by manufacturers' prices of those goods. Since we have discussed the factors at work in the manufacturing sector we shall not spend much time on the price behavior of these commodities, but rather concentrate on food and services prices. Before doing so however, there are a few important features in the behavior of nonfood commodity prices which deserve comment. Appliance prices were the one major group of prices to decline during the period of general price rise. Retail appliance prices fell despite a gradual increase in

manufacturers' prices. The fall in appliance prices during 1956 and 1957 was the continuation at a reduced rate, of a decline begun in 1951. It reflects mainly a revolution in distribution techniques, characterized by the rise of the discount house, the belated attempt of standard distributors to match discount prices, and the gradual abandonment of attempts to fair-trade this merchandise. In view of the fact that the declining prices were accompanied by a decrease in the distributive services rendered per unit of sales, the price index overstates the decline in price—i.e., in part the price decrease represents a fall in the "quality" of product. This is at least a partial offset to the opposite bias in the indexes for other commodities where quality improvement is reflected in a price increase.

It is surprising to learn from table 5-18 that the increased price of newspapers contributed more to the rise in the index than the increased new car price. In part this is spurious, because discounts on new cars are seasonally greater in September (the last month of our comparison) than in March (the first month of comparison). Nevertheless, newspapers, alcoholic beverages, and tobacco products together account for about 25 percent of the rise in nonfood commodity prices. Used cars account for another 20 percent. Used-car prices had fallen to very low levels in 1955, as sales of new cars rose to peak levels. The fall in demand for new cars during 1956 and 1957 did not lead to a price fall, but the accompanying rise in demand for used cars, combined with the relatively low stock of cars available, resulted in a very sizable rise in prices—an interesting example of asymmetry in demand-price relationships.

Food prices

Food prices accounted for 36 percent of the rise in consumer prices. After 1951 prices of farm products declined steadily until early 1956. Livestock prices fell particularly sharply, hogs most of all. In 1956, however, supplies of livestock leveled off, after the large increases between 1953 and 1955, and prices received by farmers rose from the postwar lows of late 1955.

TABLE 5-19.—*Indexes of farm production and marketings*

[1947-49=100]

	Production						Volume of food marketed
	Total	Livestock and products		Crops			
		Total	Meat animals	Total	Food grains	Vegetables	
1953.....	108	114	116	103	96	96	113
1954.....	108	117	121	101	85	94	116
1955.....	112	120	127	105	80	96	121
1956.....	113	122	123	106	84	101	126
1957.....	113	121	120	106	79	96	127

Rising retail prices of meat accounted for 65 percent of the increase in food prices between the first quarter of 1956 and the third quarter of 1957. Of this 65 percent about 9 percentage points was due to increased marketing margins; the other 56 points represented higher prices for meat on the farm. Foods other than meat contributed 35 percent of the food-price rise. The farm value of these foods actually fell, but

marketing margins rose by more than the decline in farm value so that prices to the consumer increased. Taking both meat and other foods together, table 5-20 indicates that about one-half of the rise in food prices was brought about by increasing marketing margins and the other half by higher farm prices.

TABLE 5-20.—*Distribution of increases in food prices, 1st quarter 1956 to 3d quarter 1957*

	Percent change	Percent of total change contributed by each item
Total food.....	8.0	100
Meat.....	24.5	65
Marketing costs.....	6.4	9
Farm value.....	46.8	56
Other foods.....	4.3	35
Marketing costs.....	7.5	39
Farm value.....	-1.2	-4
Total marketing costs.....	7.3	48
Total farm value.....	12.2	62

TABLE 5-21.—*Components of food marketing margins*

[Indexes, 1947-49=100]

	1952	1953	1954	1955	1956	1957
Food marketing margins.....	114	115	117	119	120	128
Labor costs ¹	121	124	125	125	127	128
Rail and truck transportation costs.....	122	125	125	124	129	136
Corporate profits before tax.....	95	99	94	111	123	121
Other costs ²	120	122	124	128	136	141

¹ Includes the earnings of wage and salary workers and the self-employed, in the processing, distribution, and transportation of food.

² Includes costs of nonfood materials and supplies, depreciation, and earnings of unincorporated business.

TABLE 5-22.—*Changes in food marketing margin and its components,¹ 1955-57*

	Percent change	Percent of total change contributed by each item ¹
Index of food marketing margins.....	7	100
Labor costs.....	3	21
Rail and truck transportation costs.....	10	19
Corporate profits before tax.....	9	7
Other costs.....	10	53

¹ Based on the relative importance of each item in total unit margins in 1955.

Or, putting it in terms of the total Consumer Price Index, the increase in *farm* prices of foods was responsible for about 1 point of the 5.6 percent rise in the Consumer Price Index, while marketing costs were responsible for another 1 point. This contribution of food marketing margins was larger than that of either durable or nondurable commodities (other than food) taken separately.

Marketing margins cover all of the charges, including profits, of transporting, processing, and distributing food. Table 5-21 gives a breakdown of margins into component cost items; table 5-22 summarizes changes in margins and cost components during recent years. Margins increased quite slowly from 1952 to 1956, but in 1957 increased 6½ percent. The sharp rise in margins coincided with a year in which, for the first time in years, the volume of food marketed did not rise significantly. All elements of costs rose. Profit margins, which from 1952 through 1954 had been below the 1947-49 levels, rose abruptly in 1955 as farm prices fell. They rose again in 1956 despite the recovery of farm prices, and then fell slightly in 1957. Unit labor costs contributed about one-fifth of the increase in costs between 1955 and 1957; average hourly earnings in the food marketing industries rose 10 percent, but productivity also rose significantly. In the food processing industries, production worker employment declined while nonproduction worker employment rose; consequently it is quite probable that a large part of the rise in labor costs was attributable to rising overhead labor costs—just as it was in manufacturing generally. The sharp increase in margins occurred at a time when the volume of food marketed was not rising. The largest contributor to the rise in margins was the component labeled "other costs." Two factors were mainly responsible for this increase—rising depreciation charges and increased prices of supplies and equipment purchased by the food processing industries.

Of the total rise in consumer food prices, therefore, half was accounted for by rising marketing margins. In turn the increase in marketing margins arose from factors quite similar to those which affected industry generally—the spread of wage and material cost increases from excess demand sectors and the rise of fixed costs per unit. Some unknown part of the increase in marketing margins was attributable to the gradual secular rise in the "built-in maid services" incorporated in processed food. But this can hardly explain the sharp jump in margins in 1957.

The other half of the rise in food prices is traceable to the increase in farm prices. Here, changes in livestock supply conditions rather than excess consumer demand for food were mainly responsible. Since meat prices had fallen to an abnormally low point in late 1955, the price increases from that point on were more in the nature of a return to normal than a new inflationary force. Indeed, one might interpret the direct and indirect consequences of this change in farm prices as a factor changing the timing rather than the degree of inflation. Part of the price stability from 1951 to 1955 was due to the fall in farm prices to abnormally low levels. Part of the general price rise thereafter may conversely be interpreted as a postponement of increases which would normally have taken place earlier.

Service prices

Consumer services cover a wide variety of economic activities, ranging from the highly industrialized public utilities to men's haircuts and domestic service. Included in this category are also a heterogeneous collection of items whose prices are regulated through political or institutional decision making, and reflect only gradually, and in discrete steps, the general forces at work in the economy. Such items include

real estate taxes, property insurance premiums, automobile insurance and registration fees, mortgage interest, and public utility rates. It is quite difficult to trace the influence of general economic developments on the specific timing and magnitude of price changes in the service industries. However, such interrelationships do exist. Changes in wage rates in the highly industrialized sectors of the economy exert an attractive influence on wages in the service industries. Rising prices of materials and supplies gradually affect the costs of providing services, even those which are generally thought to consist mainly of labor; higher prices of building materials raise the cost of providing State and local services and eventually force an increase in tax rates; higher prices of parts and supplies increase the cost of auto repairs and lead to an advance in insurance premiums; hospital rates and group hospitalization charges reflect the increase in the costs of building and maintaining hospitals. Finally, the rise in consumer prices itself, regardless of cause, exerts a powerful force on the wages and other labor costs incurred by the service industries. There is undoubtedly a lag involved, but inflationary pressures in the industrialized sectors of the economy will spread to the service industries. And, of course, vice versa.

Ever since World War II service prices have been rising steadily, through economic expansion and contraction. They have risen not only absolutely but in relation to the prices of commodities. Service prices, however, rose quite slowly during the war. Their subsequent increase has only recently brought them back to the prewar relationship to other prices. The prewar relationship represents, of course, no fixed standard. However the relatively low level of service prices at the end of World War II may explain at least part of their steady rise since then. It is another example of those adjustments in relative price levels which seem to take place only by the lower group of prices rising toward the higher—the reverse seldom occurs.

In table 5-18 the increases in service prices during 1956 and 1957 are given in some detail. In general prices of most services rose at a somewhat faster rate than prices of other major categories, except food. Gas, electric, and telephone utility prices, however, increased quite slowly. Prices of such utilities, being regulated, tend to adjust to inflationary pressures with some timelag. During the period immediately following the opening of Korean hostilities, when other prices were rising rapidly, public utility prices increased quite slowly. Thereafter, when commodity prices were stable, utility rates increased more rapidly. Similarly in 1956 and 1957 the rise in utility rates was less than the general price rise; starting in late 1957 and continuing into 1958, however, they rose at a much faster rate.

The rise in the "prices" of such items as real estate taxes, insurance, postage, and mortgage interest was in part determined by institutional factors. Many of these prices were introduced into the index only in 1952. Since then, taken as a group, they have increased more rapidly than service prices generally. In the long run such items tend to be influenced by general economic conditions; the specific timing of price changes, however, is usually determined by noneconomic considerations.

Prices of other services are generally characterized by a very low degree of industrialization, and a high proportion of labor costs in total costs. Productivity gains tend to be smaller than the average for the

economy; indeed in some cases, e.g., domestic service, the price of the service is the wage rate. Even conceptually productivity gains are excluded. Prices of such services will tend to rise with increases in wage rates. In turn wage rates will be closely influenced by changes in the cost of living and by the behavior of wages in other industries. Since these services constitute a large portion of total service prices, and since other service prices are also influenced by wage rate changes, though to a lesser degree, we should expect to find some relationship between the rate of change in service prices and the general conditions in the economy which determine the behavior of wage rates and the Consumer Price Index.

In table 5-23 the quarterly rates of change in service prices do show a sensitivity to conditions elsewhere in the economy. Changes in consumer prices tend to affect service prices after some lag. In 1949 consumer prices fell, and were more or less stable during the first 6 months of 1950; service prices in 1949 and 1950 rose at a reduced rate. Between late 1951 and early 1956 consumer prices in general moved up very little. Service prices in 1952 continued to rise at a fairly rapid rate, although less than in 1951. In 1953, the rate of increase moderated further, and in 1954 and 1955, when wage rates rose gradually and consumer prices were stable, the rate of increase in service prices was quite small. Starting in 1956, however, service prices began to rise more rapidly and continued to do so in 1957. Again the cessation of increases in consumer prices and the lower rates of wage increases in 1958 affected the rate of increase in service prices during that period.

TABLE 5-23.—Rate of change in service prices

[Percent change at quarterly rates ¹]

Year or quarter	Change	Year or quarter	Change	Year or quarter	Change
1947.....	1.4	1954—1st quarter.....	0.6	1957—1st quarter.....	1.0
1948.....	1.5	2d quarter.....	.4	2d quarter.....	1.1
1949.....	.9	3d quarter.....	.5	3d quarter.....	1.0
1950.....	.9	4th quarter.....	.4	4th quarter.....	.9
1951.....	1.3	1955—1st quarter.....	.4	1958—1st quarter.....	1.1
1952.....	1.1	2d quarter.....	.4	2d quarter.....	.8
1952—1st quarter.....	1.1	3d quarter.....	.5	3d quarter.....	.5
2d quarter.....	1.2	4th quarter.....	.5	4th quarter.....	.4
3d quarter.....	1.2	1956—1st quarter.....	.3		
4th quarter.....	1.1	2d quarter.....	.5		
1953—1st quarter.....	1.0	3d quarter.....	.9		
2d quarter.....	.8	4th quarter.....	.8		
3d quarter.....	1.0				
4th quarter.....	.9				

¹ Data are averages of quarterly changes for 2 quarters, centered on the last quarter, e.g., 1957, 2 quarters change is the average quarterly rate of change from March to September 1957.

Increases in service prices influence and are influenced by changes in other sectors of the economy. It is impossible to trace the specific links in this interrelationship in any detail, partly because of the very nature of the service industries and, in the case of a number of services, because of the institutional nature of price decisions. Changes in wages and prices in the industrial and agricultural sectors of the economy do spread to the service industries, however gradual the process may be. Conversely, service prices have themselves been an independent influence on other prices. Partly because of their relatively low level at the end of World War II, and partly as a result

of the small productivity gains in many service industries, prices of services have risen relative to other prices during the postwar period. Through its effect on the overall level of consumer prices this trend in service prices influenced wage rates throughout the economy, and thus became an independent factor in the behavior of the general price level. The demand for services has also been strong throughout the period. The major feature of the demand for services, however, has been the constancy rather than the magnitude of increase. Between 1947 and 1957, for example, the increase in real expenditures on consumer services was substantially less than the rise in consumer purchases of durables. Yet service prices rose much more rapidly than those of consumer durables.

SOME IMPLICATIONS

The major part of the rise in the general level of prices during the 1955-57 period we have attributed to two sets of factors.

1. The downward rigidity and cost-oriented nature of prices and wages in most of industry. During a period in which dynamically stable aggregate demand veils a sizable shift in the composition of demand, such market characteristics result in a general rise in the level of prices. The years after 1955 were such a period. Prices rose where demands were excessive and failed to decline elsewhere. Rising prices of materials led to cost increases for industries not faced with excess demands. Wage rates were bid up rapidly in expanding industries, and attracted other wages up to the same levels. Thus the excess demand in the capital goods industries not only led to price increases not balanced by price declines elsewhere, but to general cost increases which forced prices up even where demands were stable or declining. The degree of price increase in various industries was generally associated with the magnitude of the rise in demand, but with an upward bias, so that on the average prices rose, even though on the average demand did not rise excessively. Cost increases tended to be more uniform throughout industry, so that the increase in prices was greater than the rise in costs in rapidly expanding industries and less in stable or declining industries.

2. The attempt to recapture in prices the rise in fixed unit costs which occurred when a vigorous investment boom and a rapid substitution of fixed for variable labor input impinged on a situation of sluggish growth in output. This process was to some extent self-defeating. The rise in *ex ante* gross margins which resulted from the attempt to cover fixed costs at low rates of output itself impeded the rise in output. Had output in the industries with excess capacity been higher, overhead costs per unit would have increased by a smaller amount. And since even direct labor productivity was positively correlated with production, there is even more reason to believe that a rise in output would have led to somewhat lower unit costs.

None of the foregoing analysis is designed to indicate that all inflations are the result of these processes. Excess aggregate demand has been the basic cause of all of our major inflations. And even the 1955-57 price increase bore the imprint of the influences of the temporary

aggregate excess demand of late 1955. But the major thesis of this study has been that the creeping inflation of 1955 to 1957 was different in kind from classical excess demand inflations. Such mild inflation may be expected in a dynamic economy whenever there occur sharp changes in the composition of demand. It is, in effect, a feature of the dynamics of resource allocation where prices and wages tend to be rigid downward. Moreover, these rigidities give a secular upward bias to the price level so long as the major depressions which "broke" the ratchets in the past are avoided in the future.

The conclusions of this analysis with respect to the future possibility of inflation are not so pessimistic as it might appear at first glance. There is an upward bias imparted to the price level by the nature of our price and wage setting mechanisms. But the magnitude of the secular bias is not given by the degree of inflation we faced in the last several years—assuming, of course, that we do not allow classical excess aggregate demand to get started.

1. The magnitude of the shifts in demand between mid-1955 and mid-1957 were unusually great. We should not be continually subject, for example, to a 2-year increase in fixed business investment of some 25 percent (and a much larger rise in order backlogs) accompanied by a 20-percent decline in residential construction and automobile sales.

2. Rising overhead costs were particularly troublesome because of the nature of the shift in demand. The very fact that it was investment in fixed facilities and overhead labor which expanded rapidly, while other sectors of the economy did not keep pace, was a major source of difficulty from the cost side.

3. The upward price pressure arising out of attempts to recapture fixed costs at reduced "standard volume" is a "one-shot" phenomenon. It is unlikely, indeed impossible, for the average operating rate at which entrepreneurs attempt to recapture fixed costs to continue falling indefinitely. Indeed the very size of the current ex ante profit margin, at full utilization of capacity, which resulted from this reduction in standard volume should become a dampening factor, offsetting price pressures from other sources as output rises toward full utilization of capacity.

We have not attempted in this study to deal with the policy aspects of creeping inflation. Nor shall we do so. However there are certain obvious implications which are relevant to the formulation of policy.

In the first place it is quite clear that monetary and fiscal weapons designed to combat inflations stemming from aggregate excess demand are of limited value in situations characterized by the absence of aggregate excess demand. When, as in recent years, prices are rising during a period of growing excess capacity, a further restriction of aggregate demand is more likely to raise costs by reducing productivity than it is to lower costs by reducing wages and profit margins.

Monetary and fiscal policies which do not restrain aggregate demand, but impinge only on the sectors where demand is excessive may indeed limit the inflationary forces during such a period. Between 1955 and 1957 a slower growth in investment demand, coupled with a more even rise in auto and housing demand would undoubtedly have resulted in a smaller price increase and a larger output gain.

The whole question of selective tax and credit controls is far too broad to be discussed here. Their application involves economic and

social problems of substantial magnitude. At the same time however, our analysis does indicate that counterinflationary policy must be designed to take into account the composition as well as the magnitude of excess demand. By using monetary and fiscal policy to prevent excess aggregate demand from emerging we can control one type of inflation. With a dynamically stable aggregate demand inflation can still arise. Faced with this situation we can either attempt to alter the composition of demand by using selective controls or we can accept the moderate price increases that ensue. This is our choice. We cannot solve the problem, indeed we shall do positive harm, by a further repression of aggregate demand through monetary and fiscal policy.

Creeping inflation is associated with the dynamics of resource allocation. One cannot, simply because it is called inflation, attribute to it all the evil effects of a classical hyperinflation. Like many other aspects of the resource allocation process, it benefits some individuals and harms others. It is, in part, a reflection of the attempt by groups of income recipients to ease the adjustments in relative income status which accompany a change in the use of resources. It probably disturbs the social structure less than do the rapid changes in technology, the shifts in income among industries, and the movement of industry between regions which are continually taking place in a dynamic economy.

1. Runaway

- a) no excess capacity
- b) full emp.
- c) excess aggregate demand.
- d) use fiscal & monetary policy

2. Creeping

- a) no excess aggregate demand
- b) shift in composition of demand
- c) upward bias of price mech.
 1. higher fixed cost
 2. Big labor & industry.
- d) fiscal & mon. policies may be bad
- e) need selective controls.
- f) may have excess capacity & unemployment.

APPENDIX

APPENDIX A

NOTES AND SOURCES FOR CHARTS AND TABLES

Table 1-1, page 10: See notes to tables 2-3 and 4-6.

Table 1-2, page 11: Capacity estimates, McGraw-Hill Department of Economics and Fortune magazine. McGraw-Hill does not publish estimates from 1947 to 1950. For these years the McGraw-Hill series was extrapolated backward by the Fortune estimates. Employment and man-hours, Bureau of Labor Statistics, U.S. Department of Labor (BLS). Output, Federal Reserve Board index of industrial production.

Table 2-1, page 25: Deflators and prices from the Economic Report of the President, 1959, table C-8, page 97. Average hourly earnings from various issues of the United Nations Statistical Bulletin and BLS.

Table 2-2, page 32: The construction of these price and cost estimates are briefly described in chapter 4, page 4-11, and more fully in the author's paper in the forthcoming "Studies in Income and Wealth", volume 25, National Bureau of Economic Research.

Table 2-3, page 33: Price of manufactured products and of raw materials from BLS. For the construction of the manufacturing deflator of value added, and its cost components see the notes to table 2-2. In brief the technique is as follows: An estimate of capital consumption allowances and indirect taxes was added to the Department of Commerce data on national income originating in manufacturing, to arrive at gross national product originating. An adjustment was made to change the profits, interest, capital consumption, and indirect tax estimates from a "firm" to an "establishment" industry classification. An estimate of constant dollar gross national product originating in manufacturing was constructed by moving the 1957 GNP originating with a BLS measure of manufacturing net output. This series is described in BLS Bulletin 100. Revised estimates, through 1957, are incorporated in the BLS manufacturing productivity estimates presented in table 3a, page 778, in the Joint Economic Committee's "Hearings on the 1959 Economic Report of the President." Division of the current dollar by the constant dollar GNP yields the price deflator. Division of the various cost components by the output index yields costs per unit of output. Labor costs include wages, salaries, and supplements. Gross margins include corporate and unincorporated business profits, net interest paid, and capital consumption allowances. Indirect taxes are allocated on the basis of the industry making the actual tax payment, regardless of final incidence.

Charts 3-1 and 3-2, pages 60 and 61: Wages, average hourly earnings in manufacturing, 1900-14, from Paul Douglas, "Real Wages in the United States," 1914-58, BLS. Unemployment, 1900-40, Stanley Lebergott, Annual Estimates of Unemployment in the United States, "The Measurement and Behaviour of Unemployment," NBER, table 1, page 215.

Charts 3-3 and 3-4, pages 63 and 64: Wages, see note to charts 3-1 and 3-2. Consumer prices, Ethel Hoover and George Taylor, "Hearings before the Joint Economic Committee," April 9, 1959; table 2, page 397.

Table 4-1, page 80: Employment data by occupation from the Census Monthly Report on the Labor Force.

Table 4-2, page 80: Employment data from BLS.

Table in footnote 5, page 81: Based on table V-15, "U.S. Income and Output," Department of Commerce, 1958 and on data supplied by the Machinery and Allied Products Institute.

Table 4-3, page 81: Prices from BLS wholesale price index. Deflators from "U.S. Income and Output." "Average Price" of a unit of capital equipment services in manufacturing derived as described in footnote 6, pages 4-8.

Table 4-4, page 82: See notes to table 2-3. The breakdown of labor costs into wages and salaries is based on a comparison of BLS payroll data with Department of Commerce data on combined wage and salary payments. Indexes of wage and salary costs furnished by Murray Wernick of the Federal Reserve Board were also utilized in constructing the estimates. Finally the estimates were checked against the unpublished data on wages and salaries which underlie the Department of Commerce "wage and salary disbursements" figures. "Supplements" were allocated to wages and salaries on the basis of the relative magnitudes of the two. The resulting estimate of supplements checks closely with the new estimates presented by Albert Rees in "Wages, Prices, and Productivity," the American Assembly, Columbia University Press, 1959; table 1, page 15, which was not available until this study was completed.

Table 4-5, page 82: Derived from table 4-4.

Table 4-6, page 83: See notes to table 2-3. Since the "price" of value added is equal to current dollar GNP divided by constant dollar GNP, the various cost components (which add up to total current dollar GNP) can be converted into "points" in the price index.

Table 4-7, page 83: Derived from table 4-6.

Table 4-8, page 85: Wage and salary data from table 4-4. Employment and output from BLS.

Table 4-9, page 89: See notes to table 1-2. The "B" output index is the BLS measure referred to in the notes to table 2-3.

Chart 4-3, page 92: Adapted from a chart by John Blair, "Administered Prices: A Phenomenon in Search of a Theory," American Economic Review, May 1959. The 1958 rate of return has been adjusted to make it comparable with other years; during most of 1958, the United States Steel Corp. did not make payments into its pension fund, having overpaid in earlier years. The regression line for 1955 through first quarter 1959 is a freehand line.

Table 5-1, pages 100: GNP in constant dollars, "U.S. Income and Output." Industrial production, Federal Reserve Board.

Table 5-2, pages 101: Capacity from McGraw-Hill, Department of Economics. Production, Federal Reserve Board.

Table 5-3, pages 104: The GNP in current and constant dollars, classified by economic sector is published by the Department of Commerce only on an annual basis. Many of the components are available quarterly, however, in the new quarterly deflated GNP series. The other components were estimated by the author from various sources. About 25 percent of total automobile purchases are allocated to "producers durable equipment" in the Commerce GNP series. Such purchases were reallocated back to consumer expenditures on "autos and parts" to emphasize the dispersion in changes in demand during the period.

Table 5-4, pages 107: Wholesale prices and the special index of manufactured goods prices from BLS. Construction costs from the Department of Commerce. The number of "commodities" in each economic sector, is really a count of the product classes and subclasses used by BLS in constructing the indexes. In some cases the same product class is assigned to two or more economic sector classifications.

Table 5-5, pages 108: Price data from BLS.

Chart 5-1, page 110: Prices of 49 commodity groups were matched as closely as possible with equivalent Federal Reserve Board production indexes. In some cases BLS product classes were combined to match a Federal Reserve Board classification. In other cases the opposite procedure was followed. Price and output indexes were averaged for May and June of the initial and terminal years to minimize "freak" deviations. Another regression was calculated using August-September data (1955 and 1957) to check the results of the May-June regression. Similar results were obtained.

Table 5-6, page 112: BLS wholesale prices, and Federal Reserve Board output data.

Table 5-7, pages 114: Federal Reserve Board output data; BLS employment and average hourly earnings data.

Table 5-8, pages 114: From table 8, page 37, "United Nations World Economic Survey, 1957."

Table 5-9, page 115: Production worker man-hours from BLS. Nonproduction worker employment from BLS. Working hours of nonproduction workers were assumed to remain constant at 40 hours per week. Output indexes derived by deflating individual industry sales and inventory changes. It would have been more accurate to use changes in finished and goods-in-process inventories only. Inventories by stage of fabrication are not published in sufficient detail for this

purpose, however. The sales and inventory data are those published monthly by the Department of Commerce, Business Structure Division. Appropriate BLS price data were matched with the industry sales and inventory data to obtain the deflators. The inventory deflators were lagged from 1 to 4 months, depending on the industry involved.

Table 5-10, page 117: See notes to table 5-8.

Table 5-11, page 118 Capital goods and associated industries includes 12 machinery industries, commercial furniture, iron ore, iron and steel blast furnaces and rolling mills, iron and steel foundries, 4 fabricated metal products industries, trucks, cement, structural clay products, coal, and coke. Prices and average hourly earnings from BLS were matched as closely as possible with each other.

Table 5-12, page 119: The estimation of unit wage costs is described in the text.

Table 5-13, page 122: BLS employment data.

Table 5-14, page 123: Census data on employment by occupation, adjusted to exclude the self-employed and unpaid family workers. Data are collected every third month. Two months (April and July) were averaged in the initial margin and terminal years to minimize "freak" variations.

Table 5-15, page 123: BLS employment data.

Table 5-16, page 124: For unit wage and salary costs, see notes to table 4-8. Gross margins include capital consumption allowance, profits, and net interest. The "factor price" in this case is the gross margin per constant dollar of depreciation. The "factor input per unit of output" is constant dollar depreciation per unit of output. Constant dollar depreciation from table V-13, "U.S. Income and Output."

Table 5-17, page 124: Derived from table 4-6.

Table 5-18, page 126: BLS Consumer Price Index. The contribution of each item or group to the total price increase is based on the December 1955 relative importance of each item or group in the total. Not all of the components of the index are shown in the table. A few are not published. The remainder were items of very small weight in the index.

Table 5-19, pages 127: Data from various issues of the Marketing and Transportation Situation, and the Demand and Price Situation, U.S. Department of Agriculture.

Table 5-20, pages 128: The change in the retail cost of a constant basket of food (Department of Agriculture) was divided between meat and other foods and in turn, within each of these two categories, between farm value and marketing margins. The relative importance of margin and farm value changes was then assigned to the change in the BLS price indexes for meat and for "other foods." During the period in question the retail cost of a constant basket of food (Department of Agriculture) and the BLS price index for "food at home" moved in a very similar fashion. The corresponding Agriculture and BLS subindexes for meat and for "other foods" also moved parallel to each other.

Table 5-21, pages 128: Unit cost indexes from various issues of the Marketing and Transportation Situation.

Table 5-22, pages 128: Changes in the various unit cost indexes of table 5-21 were combined with weights representing the relative importance of each cost component in total marketing margins. The relative importance of each cost component was taken from the Marketing and Transportation Situation, July 1958; table 5, page 13.

Table 5-23, pages 128: Service price component of the BLS consumer price index.

