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Inflation and Market Structure, 1967–1973

ABSTRACT: In various studies it has been found that firms which "administer" prices tend to raise their prices in relation to costs during periods of slack demand. The implication is sometimes drawn that such firms are raising prices to support profit margins depressed by declines in demand and output. An alternative explanation is that the prices of these firms are slow to respond to shifts in demand and tend to lag behind general inflationary movements; later, these prices catch up and may continue rising even after demand slackens. ¶ A cross-sectional statistical analysis of 86 industries supports this alternative explanation for the recent period. Firms with ability to administer prices are identified by two indexes, one of market concentration and the other of firm size. Each of these indexes in turn is included as an independent variable in regressions of industry price changes on unit materials and labor costs. The indexes have a negative partial effect on price changes from 1967 to 1969, when inflation accelerated, and a positive effect in 1970–1971, when inflation subsided. The effect turned negative again thereafter with the imposition of price controls in August 1971 and the resurgence of inflation in 1973. These results are

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consistent with the findings of other studies that concentrated industries and large firms do not spearhead inflation but actually delay the transmission of inflationary pressures.

INTRODUCTION

The rise in prices since World War II has come in several inflationary movements which usually began sharply but moderated slowly. A sizable decline in the price level has occurred only once (in the 1948–1949 recession). In the other postwar recessions the price level rose or remained constant. Furthermore, following the inflationary surge of 1955–1956, the price level continued rising for several years despite excess capacity in most industries; and following the Vietnam inflation of 1965–1969 the price level continued rising despite a recession in 1970 and a slow business recovery in 1971–1972, after which, in 1973, inflation accelerated again. The periods of rising prices in the face of slack demand indicate that inflationary movements subside slowly and that costs continue to push up prices for some time after the pressures of excess demand have eased.

The slow transmission of inflation is itself not a new phenomenon; historically, inflations have generated a momentum which generally subsides slowly. But the absence of sizable declines in the price level since 1949 and the persistence of increases are unusual. Wholesale prices declined appreciably in 1949 and earlier business recessions, and the deceleration of inflation during and after the 1958 and 1970 recessions was slower than usual.[1] Prices appear to have become less responsive to short-run shifts in demand and more dependent upon costs as the channel through which inflationary pressures are transmitted.

Postwar price behavior has been described as partly resulting from a cost push in price-setting firms. In this view, firms are classified into price takers and price setters. Price takers operate in fully competitive markets in which prices at all times are determined by supply and demand. Price setters operate in less than fully competitive markets and have some freedom to "administer" their selling prices. It is argued that administered prices are set to reflect changes in unit costs as a rule-of-thumb procedure for following the equilibrium price path, and as a result these prices are determined largely without regard to short-run shifts in demand.[2] The ability to administer prices in this way is thought to depend upon the structure of the industry, such as is indicated by the degree of market concentration.

Price increases administered in the face of slack demand have been

given two different interpretations. One is that such increases may reflect the delayed transmission of previous inflationary pressures via higher costs. The second is that some firms with ability to administer prices may initiate increases to maintain profit margins which are being depressed by slack demand. These latter increases initiate inflationary pressures, whereas the former merely transmit pressures that have originated elsewhere in the economy. Both kinds of price increase can occur in periods of slack demand after excess demand has eased, and thus give the appearance of cost-push inflation, regardless of whether they merely transmit or actually initiate inflationary pressures. But the two interpretations have different implications for firms that administer prices. The first implies that these firms raise prices only to pass through cost increases and largely disregard short-run shifts in demand; hence their prices lag in a period of excess demand when inflation accelerates, and they catch up later as the inflationary pressures work through the pipeline of costs. The second implies that these firms actually initiate price increases in periods of slack demand ahead of price movements elsewhere in the economy and do not fall behind at other times.

Previous empirical studies of price movements in different industries are inconclusive on this point. The most pertinent studies are cross-sectional analyses of a broad group of industries in which differences in market structure are represented by the concentration ratio. This ratio is not ideal for such purposes because of the difficulties of specifying a self-contained product without close substitutes, but it is the best available index and is widely used. In an earlier literature, largely theoretical, it had been suggested that concentrated industries tend to raise prices more, thereby exerting a permanent upward push on the price level.[3] In empirical studies, however, the opposite finding or no consistent relation has usually been reported.[4] An important study by Weiss [1966] showed a positive response from 1953 to 1959 but little or no effect later, from 1959 to 1963. Weiss interpreted this as evidence that concentrated industries do not continually raise prices faster, though they did in the earlier period in catching up to lagged increases during and after World War II. In a follow-up study of the years 1963 to 1969, Weiss[5] found a negative effect, which he took as confirmation of a lag in price setting by concentrated industries, though he did not verify that this was followed by catching-up increases.

If the lag-and-catching-up theory is correct, the concentrated industries should have exhibited greater increases when inflation waned in 1970 and 1971. In this study I examine the data for such a pattern. Since the purpose is to test the implications of previous studies by examining the results they would obtain when extended to a later period, the same framework and regression equations are employed despite various limitations which will be noted. In particular, I follow earlier studies in the use of the concentra-

tion ratio even though other industry characteristics for which concentration is a proxy may be more important in explaining differences in price behavior.

FRAMEWORK OF THE STATISTICAL ANALYSIS

Weiss [1966] showed that price changes among industries were significantly related to concentration after allowing for the effect of costs. He held labor and materials cost constant and found the partial effect of concentration on prices. The present analysis follows his approach with a modification introduced by Phlips [1971] and Dalton [1973] of weighting the costs in each industry by their relative importance in that industry. The price equation is

$$\begin{aligned}\text{price change} = {} & \alpha\ (\text{weighted change in unit labor costs}) \\ & + \beta\ (\text{weighted change in unit materials costs}) \\ & + \gamma\ (\text{concentration or firm-size ratio}).\end{aligned} \tag{1}$$

The changes are in percentages per year. The weights are the respective shares of the value of shipments attributable to labor and materials purchases at the beginning of the period.[6] Of course, in the long run, price equals total costs by double-entry bookkeeping, but in the short run profit margins absorb deviations from variable costs until prices and factor costs are adjusted to each other; hence the coefficients need not sum to unity.

A rationale for an equation in which prices depend upon costs rather than vice versa is that pricing decisions in many industries are operationally based upon anticipated unit costs. *Actual* unit costs of labor and materials can be used in the equation because these are either correctly anticipated or are taken as largely irreversible and are passed through to prices within a short period. It is also argued that price leaders prefer to relate price changes to factor costs as a means of simplifying the setting of prices and the coordination of changes among firms in an industry. Price changes based on costs are more readily accepted by customers and are less likely to lead to competitive undercutting or government intervention. The equation is consistent in the long run with traditional price theory in which price equals total average cost, but in the short run discrepancies occur because of lags of adjustment.

In equation 1, no explicit account is taken of shifts in demand. In other studies, attempts have been made to allow for demand effects, using changes in quantity sold or produced in the industry as proxies.[7] An improvement over these proxies [Lustgarten 1974] is to use the change in output of customer industries (which confines the analysis to intermediate

products sold to other industries). In none of the studies has the demand variable been found to be very important or to affect the estimated coefficients of the other variables. This was confirmed in this study by regressions (not shown) including the various proxies for demand. The small effect of demand variables suggests that most manufacturing prices are not highly responsive to short-run shifts in demand, but at the same time such results may be deficient because the demand effect is not measured properly. While this question awaits further research, enough has been done to suggest strongly that the estimates of the effect of concentration are not greatly affected by the omission of properly measured demand shifts.

DATA

A major problem in fitting this equation is that there are differences in coverage between the data available on prices and on costs: the *Annual Survey of Manufactures* contains data on costs and shipments for four-digit SIC industries, while the BLS wholesale prices pertain to selected individual products. It is necessary to construct weighted price indexes of the product prices for four-digit industries, and this objective is hampered because many products are not covered by BLS price series. In recent years the BLS has attempted to rectify this deficiency, and it now publishes price indexes for 90-odd four-digit SIC manufacturing industries for which the price data pertain to at least 50 per cent of industry shipments in 90 per cent (by value) of the five-digit components [Moss 1965]. While these new indexes still entail problems of coverage, they avoid much of the mismatching in previous alternatives. For the period since 1967 the indexes cover 86 four-digit industries of which 20 are in food processing and the remainder are scattered among other manufacturing industries. Among previous studies, Dalton [1973] and Weiss in his second study [1971] utilized these new indexes.

The dollar value of shipments and labor and materials cost for four-digit SIC industries is given in the *Annual Survey of Manufactures*. Concentration is the ratio of shipments by the four largest firms to total industry shipments for 1967 modified by average regional ratios in 1963 for thirteen selected local industries.[8] However, the concentration ratio does not measure the overall size of firms in an industry because in diversified firms, sales pertain to a number of different industries. To measure size, therefore, I use an index of the fraction of output (approximated by employment) in each industry produced by divisions of parent corporations that have total annual sales of $100 million or more.[9] These are the Tier I firms singled out in the Phase II price regulations.

Given the price index, quantity sold is derived as the value of shipments divided by the BLS price index. Then unit labor cost is the production worker payroll divided by quantity,[16] and unit materials cost is cost of materials divided by quantity. These are annual data only, and the corresponding prices are annual averages of months. The variables are expressed as percentage changes per year for three periods: the two years of the Vietnam War expansion, 1967–1969; the 1970 recession; and the 1971 recovery. These three periods were chosen to test the effect of market structure on prices during different stages of an inflationary episode. The inflation that began in 1965 reached a high point and began to moderate during 1970; it continued to subside, albeit slowly, until the end of 1972. Some results for 1972 and 1973 are also presented without the cost variables, which at the time of writing were not available for those years.

MULTIPLE REGRESSIONS WITH CONCENTRATION AND FIRM-SIZE VARIABLES

Following the approach of previous studies, a test of the effect of market structure on the pattern of price changes is presented in Table 1. These regressions account for about half of the variation across industries in percentage price changes. Unit materials cost is the dominant variable; most or all of its change is passed through to prices within the period. Prices responded equally to labor cost in the period of expansion, but increasingly less so under conditions of excess capacity during the period of recession and recovery. Unit labor cost can be subdivided into productivity (quantity sold per man-hour) and hourly wage rates (payroll per man-hour). Prices are affected positively by wages and negatively by productivity. When these two variables are used instead of their combination (not shown), the coefficients reflect a larger (absolute) effect for wages than for productivity but a diminishing effect for both in consecutive periods, and virtually the same effects for the concentration index.

The variables for market structure show a pattern indicative of a lag in response. The coefficients are initially negative in 1967–1969 and still negative in the recession year of 1970, and then positive in the first year of recovery. Since these variables are ratios and the dependent variable is a percentage per year, the meaning of the coefficient of −2.5 in the first row is that an industry with a concentration of 0.75 compared with one of 0.25, for example, had a rate of price change lower on average by 1.25 per cent per year. Not all of the market structure coefficients are statistically significant at the 0.05 level ($t > 1.9$), but their change of sign from negative in 1967–1969 to positive in 1970–1971 is highly significant by the F ratio

TABLE 1 Regression of Industry Price Changes on Changes in Costs and Index of Market Structure, 1967–1971

Period	Regression Coefficients (t values in parentheses)					
	Constant Term (1)	Weighted Unit Labor Costs (2)	Weighted Unit Materials Costs (3)	Concentration Ratio (4)	Firm-Size Ratio[a] (5)	R^2 (6)
1967–1969	2.57	.93(3.6)	0.81(9.3)	−2.5(2.4)		.60
1969–1970	3.06	.32(1.2)	0.86(8.5)	−1.8(1.1)		.48
1970–1971	0.58	.00(0.0)	1.07(10.5)	+3.6(2.3)		.63
1967–1969	2.04	.83(3.1)	0.85(9.9)		−1.1(2.4)	.60
1969–1970	3.33	.43(1.7)	0.91(9.3)		−2.0(3.0)	.52
1970–1971	1.73	.03(0.1)	1.07(10.1)		+0.9(1.3)	.62
1967–1969	2.59	.87(3.3)	0.83(9.4)	−1.7(1.3)	−0.7(1.2)	.61
1969–1970	2.97	.45(1.7)	0.92(9.3)	+1.1(0.6)	−2.3(2.8)	.52
1970–1971	0.57	.00(0.0)	1.07(10.3)	+3.5(1.9)	+0.1(0.1)	.63

NOTE: R^2 = coefficient of multiple determination. Signs of t values have been dropped. Regression is text equation 1 with constant term. The coefficients in columns 1, 4, and 5 are in percentages per year and those in columns 2 and 3 are pure numbers. Number of observations (industries) = 86.

[a]Because of double counting (see text note 9), a revised ratio for size of firms was prepared in which the 22 ratios above 0.90 were set equal to 0.95. For the middle set of regressions, this gave the following coefficients for the ratio: 1967–1969, −1.9(2.8); 1969–1970, −2.4(2.3); 1970–1971, +0.9(0.8).

(not shown). The changeover is shown by both concentrated industries and large firms, though the latter were slower to catch up.[11]

The concentration and firm-size ratios are not fully distinguishable (their coefficient of correlation is +0.56). They are nonetheless included in the same regression in the bottom section of the table to help identify their separate effects. Most of the joint catching-up effect in 1971 is due to concentration, casting doubt on the market significance of size per se as a source of price increases, though measurement errors in the size index, noted earlier, may account for its small coefficient for 1970–1971 when it is included with the concentration ratio.

The concentration ratio, which can theoretically vary from zero to unity, does not necessarily measure differences in market power accurately. To test the assumption of linearity in the relationship, the industries were divided into three concentration groups. The boundaries chosen were 0–0.44, 0.45–0.67, and 0.68–1.00, which gives a reasonable three-way grouping and at the same time puts the main cluster of industries in each group in the middle of the boundaries rather than at the edges. Dummy variables were used to differentiate the concentration groups.

The results are shown in Table 2. The dummy variables for the concentration groups confirm the Table 1 results. Compared with the low-

TABLE 2 Regression of Industry Price Changes on Changes in Costs and Concentration Groups, 1967–1971

Period	Regression Coefficients (*t* values in parentheses)					
	Constant Term (1)	Weighted Unit Labor Costs (2)	Weighted Unit Materials Costs (3)	Differences Between Concentration Groups[a]		R^2 (6)
				Middle-Low (4)	High-Low (5)	
1967–1969	1.85	.92(3.5)	0.82(9.4)	− 0.8(1.7)	− 1.2(1.9)	.60
1969–1970	2.66	.31(1.2)	0.86(8.4)	−0.5(0.8)	− 1.4(1.5)	.48
1970–1971	1.59	−.04(0.1)	1.08(10.8)	+0.7(1.0)	+2.9(3.2)	.65

NOTE: R^2 = coefficient of multiple determination. Signs of *t* values have been dropped. Data series are the same as for Table 1.

[a]Range of concentration groups (and average ratio) is 0–0.44(0.30), 0.45–0.67(0.56), and 0.68–1.00(0.82). Number of industries in each group is 38, 34, and 14, respectively.

concentration group, the middle and high groups lag behind at first and then start to catch up, and the high group has the larger swing from below to above the low group. This confirms a monotonic relationship between price change and degree of concentration.

However, these results depart appreciably from a linear relationship. The lag in price change increases less than proportionately to the increase in the concentration ratio in the first period, but more than proportionately in the recession, and the catch-up price increase in the recovery is more than proportionate.[12] The use of higher-power terms to allow for this nonlinearity would result in an increase in the estimated total effect of the concentration variables, but such a cumbersome addition to the equation seemed unnecessary and was not pursued.

MARKET STRUCTURE AND PRICE CONTROLS

Although price increases in more concentrated industries began to be put into effect in 1971 to make up for previous shortfalls, the estimates suggest that the process was not completed that year. In Table 2 the middle- and high-concentration groups had price increases smaller than the low-concentration group for three years from 1967 to 1970, (giving a total shortfall of 2 x 0.8 + 0.5 = 2.1 per cent and 2 x 1.2 + 1.4 = 3.8 per cent, respectively), and the amount of increase above the low group in 1971 made up only partly for the previous shortfall. In addition, the residuals from the price-cost equation do not show a negative relation between the earlier and later periods.[13] Apparently the catch-up did not occur dramatically in a year or two, which is consistent with Weiss's interpretation of his findings for the 1950s.

If the catch-up was incomplete in 1971, it ordinarily would be continued until completed. But price controls, imposed in August 1971, were directed mainly against large firms. What was the effect on the process of catching up? We cannot run the same price equations for these periods, because the Census data cover full calendar years (besides being unavailable at this writing for the later years). A partial answer can be given, however, from simple correlations between market structure and price changes both before and after imposition of the controls. The results of these correlations are shown in Table 3. To pinpoint the time period of the price changes, they are based on three-month averages surrounding the months indicated.

From November 1969, a business cycle peak, to August 1971, the beginning of the Phase I freeze, the price change among industries is positively correlated with the concentration index, as was found in Tables 1 and 2 for the calendar-year change from 1970 to 1971. The regression

TABLE 3 Regression of Industry Price Changes on Index of Market Structure, 1969–1973

Period and Industry Coverage	Regression Coefficients (*t* values in parentheses)			
	Constant Term	Concentration Ratio	Firm-Size Ratio[a]	R^2
Nov. 1969–Aug. 1971				
All industries	3.44	1.23(0.6)		.004
All industries	4.22		−0.34(0.3)	.001
Aug. 1971–Aug. 1972				
All industries	4.54	−2.78(1.2)		.018
All industries	4.44		−2.27(1.5)	.027
Excluding foods	3.87	−1.90(0.9)		.012
Excluding foods	4.13		−1.98(1.4)	.030
Aug. 1972–Aug. 1973				
All industries	29.52	−32.36(2.4)		.065
All industries	23.03		−16.78(1.9)	.041
Excluding foods	9.95	−8.70(2.1)		.006
Excluding foods	6.96		−2.26(0.8)	.010

NOTE: R^2 = coefficient of multiple determination. Signs of *t* values have been dropped. Dependent variable is percentage change per year in three-month average of prices between dates indicated. Number of all industries = 86; number of excluded food industries = 20.

[a]Because of double counting (see text note 9), a revised index for size of firms was prepared in which the 22 ratios above 0.90 were set equal to 0.95.

coefficient is not significant here, however, and that for size of firms is insignificantly negative. The absence of a significant positive effect, as was found in Tables 1 and 2, reflects the omission of the cost variables and the inclusion here of 1970, when the effect was still negative. Nevertheless, the simple correlations help to indicate the direction of the effect. In the twelve months following August 1971, during Phases I and II, the concentration effect turned negative, suggesting that the controls imposed relatively greater restraint on concentrated industries.[14]

A stronger negative effect also occurs for the large firms, which correspond to the Tier I corporations singled out under Phase II. In the following year, August 1972 to August 1973, the negative effect is greater for both indexes (even after excluding the food industries, which were particularly affected by extraneous developments), reflecting a combination of controls and a resurgence of inflation in which the concentrated industries again exhibited their characteristic lag. Although changes in costs are disregarded in these results, it is probably safe to conclude that the effect of the controls was to hold down the profit margins of the more concentrated industries, which were the ones singled out in the enforcement of the Phase II regulations. A justification for this policy based on the larger price increases of those industries before August 1971 is not supported by this evidence, however, since those increases appear to have been a belated and incomplete attempt to make up for earlier shortfalls.

SUMMARY OF FINDINGS AND QUESTIONS FOR FURTHER RESEARCH

One of the significant characteristics of inflationary movements is that price increases in relation to costs tend to differ according to the degree of industry concentration. This has been the basis of one version of the familiar cost-push theory, whereby inflation originates in firms which are in a position to administer prices and continually raise them rather than merely maintain profit margins. This version of cost push, however, is made doubtful by the finding that concentrated industries, which supposedly wield more such control than other sectors, sometimes raise prices less than the others. Another explanation of the relation between concentration and prices is that any firm, to the extent that it has some ability to set its own prices, adjusts them to demand and cost changes with a lag. The implication is that prices in more concentrated industries tend to fall behind in periods of generally accelerating inflation and to catch up later as over-all inflationary pressures subside. This, too, is an old idea, and in a few studies some evidence of differential lags has been presented.

This study has built upon previous empirical work on pricing among industries to test the implication of a *changing pattern* of pricing in concentrated industries, which previous studies had not tested directly. Price changes of 86 four-digit industries for which the BLS publishes price series were regressed on changes in unit labor cost and unit materials cost and a measure of market structure. Two measures were used. The first was the 1967 fraction of shipments in each industry by the four largest firms. It is, despite deficiencies, the commonly used measure of market structure for these purposes. The second was an NBER compilation of the fraction of industry shipments made by divisions of parent corporations with total annual sales of $100 million or more (the Tier I firms of Phase II). The regression equations are designed to hold constant some of the main determinants of prices from the cost side; the equations are not to be viewed as a complete explanation of price changes.

In these regressions the coefficient of the market-structure variable was negative for 1967–1969 and 1969–1970 and positive for 1970–1971. This gave confirmation of a changeover in pricing behavior of concentrated industries and large-size firms between 1970 and 1971 as the inflation reached a peak and began, for a time, to subside. It is true that more concentrated industries display less dispersion of price changes and in that sense their prices are less volatile [Cagan 1975] perhaps because in those industries there is greater underreporting of market discounting or other special characteristics. But this would not account for their price changes falling short and then exceeding those in other industries.

In a comparison of concentration and large-size firms, the concentration variable exhibited the stronger changeover pattern, though whether it is the more appropriate variable for that purpose is not certain. The assumption of linearity, implicit in the use of the concentration ratio as a single variable, was tested and found to be weak, but dividing concentrated industries into three groups did not alter the basic findings.

The findings point to lags in the adjustment of prices by firms which in the traditional sense are price setters as distinct from price takers. The reason for the lag, presumably, is that price setters tend to disregard short-run shifts in demand. They can avoid the inconvenience and disruption of frequent and unpredictable changes in prices by adhering to an equilibrium price path as indicated by changes in unit costs at a standard level of capacity utilization. Such behavior is suggested by the theory of price setting under uncertainty, assuming that changes in prices are costly to make. But it is not at all clear why greater concentration should lead to slower price response. Possibly concentration is acting here as a proxy for some other characteristics of the industries. This question requires further exploration.

It is puzzling, moreover, that the lags appear to be so long; the evidence

provides no clue to the reason. The catch-up after the 1967–1969 period appears to have been incomplete even after two years, and the price increases of concentrated industries fell further behind other industries in 1973 when inflation accelerated again, though at that time the imposition of controls may have played a special role. I found no indication that the industries which fell most behind in 1967–1969 had the largest catching-up increases in 1970–1971. Furthermore, attempts to measure the lag in adjustment of concentrated industries to changes in costs or to proxies for shifts in demand (not reported) were not successful. This also raises questions for further study.

Although the results leave considerable room for further inquiry, this and other studies point to lagged adjustments by concentrated industries. The weight of this evidence is that, contrary to widespread popular opinion, concentrated industries pass along inflationary movements and do not originate them, even though because of lags these industries can be observed to continue raising prices in a catching-up process after market demand has slackened.

NOTES

1. This is documented in Cagan [1975].
2. For a survey of the theoretical and empirical literature, see Eckstein [1964] and Nordhaus [1972].
3. For a discussion of this literature, see Bronfenbrenner and Holzman (1963).
4. See de Podwin and Selden [1963], Yordon [1961], Phlips [1971], de Silva [1971], Weiss [1966], Eckstein and Wyss [1972], and Dalton [1973]. Of these, the last three show a positive effect of concentration on prices, and the others do not.
5. See Weiss [1971]. Dalton [1973] reported a positive effect for 1967–1969, though the concentration coefficient was not statistically significant at the 0.05 level. My results for this period agree with Weiss's. Apparently, Dalton's opposite result reflects his use of a different set of data. The disagreement raises a question about the general applicability of all these studies.
6. Changes in output will not affect these measures of unit costs provided that manufacturing cost curves are fairly flat. Changes in capital costs due to plant expansion or variations in interest rates are ignored as minor (but see note 11).
7. As judged by statistical significance and a positive sign for the quantity variable, Eckstein and Wyss [1972] and Dalton [1973] had partial success.
8. U.S. Bureau of Census [1967, Tables 25 and 26]. These regional ratios improve the fit, but not dramatically.
9. Derived from National Bureau data for 1970 [Gort and Singamsetti 1974]. These data are subject to some double counting, causing several of the ratios to be erroneously above unity. To avoid errors due to double counting, an alternative index was constructed by setting the ratios that were above 0.90 (of which there were 22) equal to 0.95.
10. Other employees are ignored. In the weighting, the ratio of production worker payrolls to shipments was used, but application of alternative weights using the ratio of total payrolls to shipments made little difference.
11. It has been pointed out [Lustgarten 1974] that the omitted capital costs in these

equations may be more important for concentrated industries because they tend to be more capital intensive. Hence a positive effect of concentration may pick up the effect on price of capital costs. Such an effect, however, would not account for the coefficient of the concentration variable being first negative and then positive, since the pattern of capital costs could not change so rapidly.

12. Linearity would imply that the change in the concentration coefficient from the low to the middle and from the middle to the high group is proportional to the corresponding increase in the group average ratio. (The average ratio goes from 0.30 to 0.56 and from 0.56 to 0.82, which gives an increase of 0.26 for both.) These proportionalities from Table 2 are as follows:

	Low to Middle Group (1)	Middle to High Group (2)	Slope (2)/(1)
1967–1969	−0.8/0.26	−0.4/0.26	0.5
1969–1970	−0.5/0.26	−0.9/0.26	1.8
1970–1971	0.7/0.26	2.2/0.26	3.1

13. The residuals are those from the price equation excluding an index of market structure: price change = constant + α (weighted unit labor costs) + β (weighted unit materials costs) + residual term, for the three periods. (The changes, as before, are in percentages per year.) Regressions of the later on the earlier residuals give the following results:

Dependent Variable	Regression Coefficients (t values in parentheses)			
	Constant	Concentration Group		
Residuals for	Term	Low	Middle	High
		Residuals for 1967–1969		
(1) 1969–1970	.23(0.8)	−.23(0.8)	+.47(2.1)	+1.19(4.8)
		Residuals for 1969–1970		
(2) 1970–1971	−.04(0.1)	−.10(0.5)	−.24(1.3)	+0.19(0.9)
		Residuals for 1969–1970 +2 × Residuals for 1967–1969		
(3) 1970–1971	.03(0.1)	−.04(0.3)	−.06(0.6)	+0.07(0.7)

The coefficients for concentrated industries in line 1 were positive, indicating a tendency for the residuals to continue in the same direction throughout the period 1967 to 1970. As shown in line 2, this was largely ended during 1970–1971 but not reversed. Because of these crosscurrents, the 1970–1971 residuals show no relation to the cumulative residuals representing 1967–1970 in line 3.

The absence of significant negative coefficients for the more concentrated industries may indicate that the residuals from the price equation do not measure the appropriate profit margin, though how the equation might be improved is unclear.

14. Other evidence suggests, in addition, that Phases I and II had more effect on prices than on wages [Gordon 1973 and Cagan 1973].

REFERENCES

Bronfenbrenner, M., and F. D. Holzman. "Survey of Inflation Theory." *American Economic Review*, September 1963, pp. 593–661, especially p. 622.

Cagan, P. "Changes in the Recession Behavior of Wholesale Prices in the 1920s and Post-World War II." *Explorations in Economic Research*, Winter 1975, pp. 54–104.

. "Controls and Monetary Policy, 1969–1973." In *A New Look at Inflation*, American Enterprise Institute, Domestic Affairs Study 17, September 1973.

Dalton, J. A. "Administered Inflation and Business Pricing: Another Look." *Review of Economics and Statistics*, November 1973, pp. 516–519.

de Podwin, H. J., and R. Selden. "Business Pricing Policies and Inflation." *Journal of Political Economy*, April 1963, pp. 116–127.

de Silva, K. E. A. "Industrial Concentration and Price Change in Canadian Manufacturing Industries, 1961–67." *Quarterly Review of Economics and Business*, Spring 1971, pp. 80–84.

Eckstein, O. "A Theory of the Wage-Price Process in Modern Industry." *Review of Economic Studies*, October 1964, pp. 267–283.

Eckstein, O., and D. Wyss. "Industry Price Equations." In O. Eckstein, ed. *The Econometrics of Price Determination*. Washington, D.C.: Board of Governors of the Federal Reserve System and Social Science Research Council, 1972, pp. 133–165.

Gordon, R. J. "The Response of Wages and Prices to the First Two Years of Controls," *Brookings Papers on Economic Activity*. Washington, D.C.: Brookings Institution, forthcoming.

Gort, M., and R. Singamsetti. "Microdata in the Analysis of Profits." Conference paper, International Association for Research in Income and Wealth, January 1974.

Lustgarten, S. "Administered Inflation: A Reappraisal." Unpublished, 1974.

Moss, B. R. "Industry and Sector Price Indexes." *Monthly Labor Review*, August 1965, pp. 974–982.

Nordhaus, W. D. "Recent Developments in Price Dynamics." In O. Eckstein, ed. *The Econometrics of Price Determination*. Washington, D.C.: Board of Governors of the Federal Reserve System and Social Science Research Council, 1972, pp. 16–49, especially pp. 31–33.

Phlips, L. *Effects of Industrial Concentration*. Amsterdam: North-Holland, 1971, Chap. 2.

U.S. Bureau of the Census. *Concentration Ratios in Manufacturing Industry 1963*, Part II. Washington, D.C.: Government Printing Office, 1967.

Weiss, L. W. "Business Pricing Policies and Inflation Reconsidered." *Journal of Political Economy*, April 1966, pp. 177–187.

———. "The Role of Concentration in Recent Inflationary Price Movements: A Statistical Analysis." *Antitrust Law and Economics Review*, Spring 1971, pp. 109–121.

Yordon, W. J. "Industrial Concentration and Price Flexibility in Inflation: Price Response Rates in Fourteen Industries, 1947–1958." *Review of Economics and Statistics*, August 1961, pp. 287–294.