The Administered-Price Hypothesis Revisited

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Abstract: The relationship between market structure and firms' pricing behaviour has been a major and controversial issue in industrial economics. The question of how firms' pricing behaviour differs across market structures is the focus of the administered-price thesis. In this paper the authors review theories providing rationales for the administered-price thesis and their empirical underpinnings, and methodological controversies concerning price series of differnt industries.

Introduction

The relationship between industrial prices and market structure remains a controversial issue in industrial and macroeconomics, as economists disagree whether firms having market power exhibit different pricing behaviour than

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competitive firms (see e.g., Carleton and Perloff, 1994; Martin, 1988; Scherer and Ross, 1990; Shughart, 1990; and Tirole, 1988). Some perceive modest or rapid price changes in concentrated sectors (Domberger, 1980; Dixon, 1983; Carlton, 1986; Ross and Krauz, 1986), and others question the existence, and/or interpretation of such evidence (Garber and Klepper, 1980). The main difficulty in resolving the controversy is the lack of a clear-cut rationale explaining the phenomenon, if it exists. Additionally, methodological debates involving the empirical research have entered into the controversy.

This paper reviews the existing theories of relating market structure and firms' pricing behaviour, the empirical studies of the administered-price thesis, and the methodological controversies. Although, this literature has been reviewed many years ago (Kamerschen, 1975), there has been considerable research going on this subject.

Means (1935a, 1935b, 1939) argued that some firms administered prices to make them more downward-sticky than in a competitive market. His argument was a challenge to classical economics and caused considerable controversy (Baldwin, 1983). Means made another challenge to classical economics (1959, 1975, 1983) that received considerable attention from policy makers. The controversy was whether firms with market power, by administering prices, were more upward-aggressive than competitive firms. Both challenges constitute the administered-price hypothesis. However, the second one had a complicated connection to macroeconomics that suggested administered prices were an important factor in the recessionary inflation of the 1957-58. This inflation-related administered-price hypothesis is called the administered-inflation hypothesis and has a vast of literature of its own.

Numerous studies tested statistically the administered-price hypothesis, or the relationship between industry structure and firms' pricing behaviour. But the hypothesis remains confusing and controversial. The confusion has arisen largely because of inadequacies of the empirical research. The controversies are mostly because of methodological rather than theoretical differences. However, the main difficulty in resolving the controversies is the lack of cogent theory explaining why and how firms with different market structure show different pricing behaviours. Statistical research that is not based on the convincing theory is seldom persuasive.

There are two types of statistical studies. The first compares price series of the administration-dominated sector with those of the market-dominated sector over the business cycle. The second estimates the price equation, separately for periods of expansion and contraction, to examine the effect of industry concentration on industry prices. The two types of research are not only distinctively different in method, but they are also differently related to the development of theories. Although the administered-price thesis started with Means' statistical findings, they were interpreted so differently as to cause much controversy. In the process of controversy,

especially between Means and Stigler and Kindahl (1970), the definition of the administered price often changed, which affected the new formation of theories. On the other hand, the second-type studies have followed the theories already established.

Methodological Controversy Comparing Administration-Dominated Prices and Market-Dominated Prices

Means originally defined an administered price as 'a price which is set by administrative action and held constant for a period of time', whereas a market price is 'one which is made in the market as the result of the interaction of buyers and sellers' (1935a, p. 1). Instead of offering any theoretical explanation of why the administered price occurs, he said, 'We have an administered price when a company maintains a posted price at which it will make sales or simply has its own price at which customers may purchase or not as they wish'. Stigler (1962) claimed the definitions are conceptually unclear and are not operationally revealing.

Means' defined administration as the infrequency of price change over time, and measured it by frequency of price change per price reporter. From 747 Bureau of Labor Statistics (BLS) wholesale price series for 1926 to 1933, he found that 374 items (50 per cent) changed in price at the rate of less than once every four months, 191 items (25 per cent) changed less than once every ten months, and 95 items (13 per cent) changed less than five times in eight years (1935a, pp. 2-3; 1935b, p. 402). His suggestion of deficiencies in the price system stimulated considerable research and caused much controversy. Some authors, such as Humphrey (1937) and Tucker (1938), denied that Means' administered price was a recent and astonishing event. (For a detailed discussion see Gordon, 1981).

Means believed that the frequency of price changes was positively correlated with their amplitude. He divided wholesale price indexes into five groups, according to the frequency of their changes, and the average price indexes of each price group were compared in their amplitude (1939, pp. 146-7). In the depression from 1929 to 1932, there was a progressively greater decrease in an average value of more frequently changing prices (or in a more market-dominated price index), but only a smaller decrease or no decrease in an average of less frequently changing prices (or in a more administration-dominated price index). In the recovery period from 1932 to 1937, much of this bias was eliminated by a symmetrically opposite behaviour of those average price indexes. Means opined that the *amplitude* of price changes was as crucial as their *frequency* in the administered-price hypothesis.

Means argued that the administered price resulted 'from the relatively small numbers of concerns dominating particular markets' (1939, p. 143). This reason for

the administered price was interpreted as implicitly indicating oligopoly tension, or as being directly associated with industrial sellers' concentration (Danielsen and Kamerschen, 1986).

Most empirical studies have examined and contrasted differences in the pricing behaviours of more or less concentrated industries. This way of constructing the empirical studies, together with increased attention to the industrial concentration, put an exclusive emphasis on the amplitude of price changes over the cycle, switching away from their frequency.

The industrial prices dominated by administration showed some downward-stickiness during the depression period 1929-32, which was not the way the market-dominated prices behaved. Means pointed out a disruptive effect of this typical behaviour of the administered-price on the functioning of the US economy (1935a, pp. 10-12; 1935b, p. 405). That is, a general drop in demand leads to a drop in sales and production, instead of lowering prices. The drop in aggregate output reduces income and aggregate demand. A vicious cycle starts, amplifying the original drop in the aggregate demand. Amazingly enough, this cumulative process is exactly like Keynes' story (1936). According to Means, downward-sticky administered-prices were an important factor in the cataclysmic Great Depression of the 1930s.

Two decades later, Means observed that, in recession, industrial prices rose and administration-dominated prices rose even more, being upward-aggressive (1959, pp. 13-7). He presented to the US Senate Antitrust and Monopoly Committee BLS data on 17 product groups for 1953 to 1958. Seven groups were classified as concentrated, 4 as mixed, and 6 as competitive industries. Over the five-year period, the level of aggregate demand was not high and sustained, and the prices of competitive industries like farm products fell. However, the wholesale price index rose by 8 per cent during the period, and the prices of concentrated groups (steel and steel using) accounted for 85 per cent of the increase. Means argued that there would have been no inflation in the 1950s if it were not for the upward trend of prices in the concentrated sectors.

According to Means, administered prices rose only sluggishly in booms but continued to rise even when the recession set in. This price behaviour was a new phenomenon in the 1950s, and not affected by the aggregate demand management or monetary policies (1959, pp. 33-6; 1975, p. 14). The inflation accompanied by recession brought Means' administered price hypothesis back to the centre of heated controversies in the 1960s and 1970s, under the new name of administered-inflation hypothesis. The controversies were largely independent of those of traditionally classified as demand-pull or buyers' inflation (i.e., a general rise in prices because total planned expenditures increase faster than total production), cost-push or sellers' (suppliers') inflation (i.e., a general rise in prices because restrictions are placed on

the supply of one or more resources, or when the price of one or more resources is increased) or structural inflation (i.e., a general rise in prices because producers cannot readily shift production in response to changes in the structure of the economy). US policy makers also took the administered-inflation thesis seriously, as had many Congressional leaders in the late 1950s. However, Means did not offer any theoretical rationale for how some firms having market power could ignore the market situations to administer their prices, and did not provide any clear explanation as to how the prices administered by those firms are related to inflation.

The upward-aggressiveness of the administered prices in the recession of the 1950s is contrasted with their downward-rigidity in the depression of the early 1930s. So, the prices of concentrated sectors are characterised as insensitive to the business cycle. Means' operational definition of the administered price changed from the infrequency of industrial price adjustments to low amplitude, and finally to perversity of behaviour (or countercyclical) over the business cycle. This definitional change caused confusion and controversy in empirical research. There are at least three other issues in the controversies over administered-prices: the (i) measurement of prices (ii) classification of market- and administration-dominated prices, and (iii) definition of turning dates over the general business cycles.

Let us examine the issue of price measurement first. McAllister (1961) found the frequency of price change for a given commodity was positively related with the number of companies reporting prices to the BLS. This suggests that the frequency distribution of price changes may be influenced by characteristics of the sample. Stigler (1962), after analysing the BLS price data for the 1950s, supported McAllister's finding, and argued that the low frequency of price change found by Means was because of a small number of price reporters within each commodity group. Stigler also opined that the BLS price data: (1) were not the economically relevant data because of the predictions of economic theory which relate to when actual transactions take place, and (2) did not properly represent the frequency of price change and these transactions prices are largely unrecorded by the BLS statistics, because of discounts, changes in the terms of trade, and secret concessions.[1]

Stigler and Kindahl (S and K, 1970) supported by the National Bureau of Economic Research (NBER), collected 64 contract prices actually paid, rather than asking prices, by 179 government purchasing agencies and industrial companies between 1957 and 1966. They found the NBER prices changed more often and more smoothly than the BLS prices in the short-run, with the latter exhibiting discontinuous jumps, and the quoted BLS prices lagged behind the changes in transaction NBER prices by an appreciable time interval. The correlation coefficient between corresponding monthly movements of the two price indices was low (r = 0.32), and the NBER price series were substantially different from the BLS price series. S and K argued the BLS price data were essentially irrelevant to the issue.

S and K also tested the administered-price thesis, using the new buyer-based price indexes. They divided the 10-year period into two contractions and two expansions, and found that prices moved procyclically 56 per cent of the time, stayed constant 17 per cent, and moved countercyclically 27 per cent time. In contrast, the corresponding BLS data of the same period showed that prices moved procyclically only 43 per cent of the time. S and K concluded the new NBER price indexes moved in response to general business activity and it was not appropriate to use the BLS price data in comparing prices of different market structures over the business cycle. S and K concluded the alleged phenomenon of administered prices was because of measurement error in the BLS price data as surrogates for actual transaction prices.

Means (1972) responded, after examining the new NBER price data, that S and K's conclusion was partly because of their partial characterisation of the administered-price thesis, and partly due to the misclassification of market- and administration-dominated prices. He also objected to S and K's view that two separate expansions had occurred between 1960 and 1966. Claiming that the entire period showed strong and sustained growth, Means redated the turning points of the cycles by setting the two test periods to be July 1957 to June 1959 and January 1960 to March 1962.

Means claimed S and K interpreted his thesis in strict conformity of price movements to the business cycle and treated all price decreases as in conflict with the thesis even if the declines were relatively small compared with the competitive market prices. Instead of S and K's partial characterisation of the administered- price thesis, Means proposed a full version. That is, non-classical behaviour can take any one of the following three forms in the business cycle. In a recession, an administered price i) might fall substantially below competitive market prices—relatively inflexible; ii) it might show no substantial change—rigid; or iii) it might rise countercyclically. In a recovery, it might rise less, show no change, or actually fall. Now, the thesis of administered price emphasised both frequency and amplitude of industrial prices, and perverse price behaviour, too.[2]

Among the total 64 NBER price series, Means classified thirteen price series as the market-dominated category and omitted them in testing the administered-price thesis. Applying the partial thesis and using the remaining 50 price series regarded relevant to the administered-price thesis, Means reduced the component of procyclical movement to 32 per cent from the 56 per cent that S and K had originally estimated. Next, he further reduced the procyclical component to 13 per cent by applying the full thesis. That is, of the 50 price indexes, forty-six show countercyclical behaviour in at least one of the four opportunities (2 recessions and 2 recoveries) available to the two test periods. Only four show no countercyclical behaviour. He believed the NBER price data disclosed a substantial number of prices that tend to rise with cyclical recessions and fall with cyclical recovery. Means

claimed the new NBER data overwhelmingly supported the administered-price thesis.

S and K (1973) replied that 'industrial prices are administered by Dr. Means', and that if there is no well-defined set of criteria and the periodicity of the trade cycle is subject to different interpretations, Means' hypothesis becomes indeed difficult to refute or confirm. S and K concluded that their work undermined the most fundamental proposition of the administered-price thesis. The two contradictory inferences from the same sample of price changes illustrated dramatically the methodological problems involved in testing the administered-price hypothesis.

The issue of transaction versus list prices is important, because almost all empirical tests of the administered-price hypothesis have been based on list prices. There are some studies that have compared the two series of NBER and BLS prices. Constructing a third price set, Weiss (1977) compared simple averages of 1958 and 1963 monthly values for the NBER and BLS price series with the relative unit values of 1958 to 1963. All correlations are significant at one per cent level, which implies that all three indexes contain similar information. He also computed the correlation between changes in the BLS index and the NBER index for the two contractions and expansions that S and K defined. The results confirmed that the two sets of prices faithfully reflected each other's movement. Weiss concluded that the two sets of prices could be used interchangeably for longer-run analyses without significant bias.[3]

Ross and Krausz (1986) also investigated the price series from NBER and BLS collected by S and K (1970), using a nonparametric time series test. The two price series showed sufficiently similar behaviour during two business cycles to reject the null hypothesis that each is generated by different stochastic process. Furthermore, both price series revealed that prices from concentrated markets are less flexible than prices from unconcentrated markets, confirming the administered-price thesis.

Theories of Price Rigidity and Market Structure

Sweezy (1939) proposed a kinked demand theory for oligopolists, based on the assumption that, without collusion, rivals follow price decreases but not price increases. The kinked demand theory appeared capable of rationalising an oligopolist's price rigidity. However, the theory has many serious problems. First, it is not clear how the initial (and then ruling) price is determined. Second, the kinked demand curve may be valid only when firms do not have interim knowledge of rivals' reaction. In other words, it can explain only a short-run phenomenon, but not a long-run stable situation (See e.g., Clarkson and Miller, 1982, pp. 155-156).

Moreover, using the kinked demand theory to rationalise the administered-price thesis has another problem that Whitehead (1963) pointed out and Stigler (1978, p. 194) emphasised. The kinked demand theory predicts that oligopoly prices are fully responsive to a downward movement in costs and demand, but they are unresponsive to upward movements in costs and demand. However, the downward rigidity of industrial prices was what Means was concerned about in the 1930s, and the upward aggressiveness of the oligopoly prices was what he observed in the late 1950s. Therefore, there is an incompatibility between the industrial price behaviour of the administered-price thesis and the prediction of the kinked demand theory.

Hall and Hitch argued, based on interviews with 38 British firms, businesspeople tried to apply rules of thumb called 'full cost' pricing (1939, p. 113).[4] Full cost is average cost, including both variable and fixed costs. Although the variable costs are assumed to remain constant per unit of output, the average fixed costs vary inversely with output. Therefore, the derivation of a full-cost price requires using some normal or standard volume of production. If, both unit fixed costs and unit variable costs are constant, and some mark-up for profit is added to them, the result is a 'benchmark' price (see Blair, 1972, p. 470, and the critique by Kamerschen, 1975).

Since the theory of full-cost pricing was published, a great deal has been written on the relation of costs to prices. Abstracting from many of its variations, full-cost pricing held that firms set their prices according only to total unit costs at some assumed output. This theory became an explanation for price rigidity, because price is seldom varied for changes in demand. Prices are not changed, but output rises or falls moderately, except when a rival decreases a price first. As Heflebower (1955, p. 363) pointed out, full-cost pricing presented a direct challenge to two tenets of generally accepted economic theory: first, demand as well as costs conditions should enter into price determination; second, the rational solution of all price problems requires the equating of marginal revenue and marginal cost.

Kaplan, Dirlam, and Lanzillotti (1958, pp. 10-12, and p. 130) argued pricing decisions were the results of pricing procedures, pricing policies, and company goals. Just as pricing procedures are used, or modified, to carry out price policies, price policies are used to achieve long-term goals. The most commonly-stressed company pricing policy is that price must be sufficient to return a specified or predetermined percentage of the investment. This target rate of return pricing is a variant of full-cost or mark-up pricing. Lanzillotti (1958, p. 928) argued that the principal pricing goal of dominant oligopolists was to secure a target return on investment.

Eckstein and Fromm (1968) emphasised that competitive firms appear to respond to changes in both cost and demand conditions, whereas oligopolistic firms adjust prices in response to changes in standard unit cost, but not to changes in demand. Oligopoly prices respond to a demand change largely when it affects input prices and thus standard unit cost. This implies that oligopolists have considerable discretion in

setting prices. Eckstein and Fromm (1968, p. 1165) also claimed target return and full-cost pricing policies have a number of advantages for large firms. First, they provide a necessary, internal consistency with the target-return investment criterion. Second, they are suitable for price leadership. Third, they call for few price changes, which is often a desirable characteristic for customers. Finally, they are particularly suitable for the long-term supply contracts that are common for materials in heavy industry.

There are divergent opinions about oligopolistic firms' pricing behaviour. Even under simple full-cost or target return pricing, a firm's pricing decision depends upon the type of rule used (Scherer, 1980, p. 351). But the fundamental characteristic of an oligopolistic industry is the fragility of its co-ordination due to mistrust and uncertainty of conjectural variations, and the firms' lack of information concerning the behaviour of market demand. Therefore, firms' pricing behaviour in the industry should be determined so that their pricing co-ordination is maintained. The pricing co-ordination results in a tendency toward price stability.

Ferguson (1964, pp. 107-8) reasoned that the proponents of the administered-price thesis have frequently rejected profit-maximisation behaviour, and instead taken some other assumption, such as maximisation of sale volume[5] or mark-up pricing. However, the pricing rules of thumb taken by business decisionmakers are shown to be equivalent, at equilibrium, to the marginal principle of maximising profits (Martin, 1988, p. 361). According to Scherer (1980, p. 187), although the rules of thumb used by business decisionmakers appear to be irrational, they may actually yield the highest level of profits, given information and other transaction costs. Silberston (1970, pp. 545-6) also argued that, although the procedure of calculating prices very often starts with an average cost calculation, this may be modified quickly to become a marginal calculation.

There are other factors to consider in explaining price rigidity of oligopolistic industry. First, the theory of price leadership is consistent with price rigidity, even if it does not explain why a particular price is selected by the leader (Clarkson and Miller, 1982, p. 311). Second, non-price competition (e.g., advertising and quality variations) can lead to stable prices. Third, under conscious parallelism, where oligopolists recognise their interdependence, their pricing behaviours tend to avoid vigorous price competition. Fourth, inventories and backlogs contribute to price stability. If there is an oversupply because of a firm's mistake, for example, its reaction for the next period is to change inventories or order backlogs, rather than to cut prices. Fifth, government policy is also a cause for downward-rigid prices, e.g., farm price-support programmes, public-utility pricing, and fair-trade laws (Ross, 1969, p. 319).

Theories of full-cost and target return pricing were developed on the basis of interviews with business decisionmakers, and other reasons for price rigidity are

loosely explained. These theories are devoid of any rigorous economic model, and most of them do not invoke the generally-accepted assumption of profit-maximisation. The subsequent theories that we discuss explain the inflexibility of prices on the profit-maximising assumption.

According to Schramm and Sherman (1977), if the returns on securities of firms are highly correlated with the market, investors in stock shares have less opportunity to lower their portfolio risk. The investors value a (price-setting) firm partly on the covariance between its rate of return and the return on a portfolio composed of the securities of all firms. The firm that faces fluctuating demand reduces profit fluctuations by a stable-pricing policy to raise its stock-market value. However, the stable price makes employment unstable under fluctuating demand, causing workers to request a wage premium. This increases labour costs to the firm. Therefore, there is a trade-off between profit stability and employment stability, and the choice involves consideration of its effects on the costs of risks borne by capital and labour. When the benefit of stable profit valued by investors exceeds the cost of unstable employment evaluated by labour, the firm chooses a stable pricing strategy.

The observed evidence about price behaviour is so inconsistent with simple theories of market clearing that more sophisticated theories are appearing. Mankiw (1985) rationalises the rigidity of industrial price, using the principle of profit-maximisation.[6] He assumed a monopoly firm must incur a small menu cost if it alters its posted price after an aggregate demand shock. These costs include printing new catalogues, distributing them to customers, and having salespeople inform customers of the new price. He proved that the firm's price adjustment decisions are suboptimal, and the welfare loss can far exceed the causal menu cost. He also shows that private incentives produce too much price adjustment following an expansion in aggregate demand and too little price adjustment following a contraction in aggregate demand. In other words, prices are downwardly rigid, but upwardly flexible, exactly as Means (1935, 1959) suggested. This asymmetric price adjustment for expansion and contraction is derived in the model because the natural rate of output is below the social optimum.

Rotemberg and Saloner (1987) contend that monopolies change their prices less often the tight oligopolies. They show that: (1) cost (demand) changes create a larger incentive for duopolists (monopolists) to change their prices, and (2) when changes in the overall price affect both demand and costs, the cost effect dominates the demand effect. Therefore, they believe that in the presence of a small, fixed cost of altering prices, duopolists change their prices in response to smaller perturbations in underlying conditions. Using the same theoretical framework, however, Kamerschen and Park (1992 a,b,c, and 1994) showed the contradictory result that the demand effect dominates the cost effect in both short-run and the long-run homogeneous and

heterogeneous products, making monopoly pricing more flexible than oligopoly pricing.[7]

Impact of Sellers' Concentration on Industry Price

The empirical studies in this area are too vast to be considered here in detail. However, there are certain studies that are important methodologically, that have led to a certain conventional method of empirical study. Accordingly, we discuss here only the methodologically important once.

Means and S and K tested the administered-price thesis by comparing the price series in the administration-dominated sector with the competitive sector in their frequency and/or amplitude, or their conformity with the business cycle. A sector was classified into competition and administration on the basis of their own perception about the sector, without referring to any index of sellers' concentration. As a first major econometric test of administered-inflation, DePodwin and Selden (D and S, 1963) regressed an index of price changes on four- and eight-firm sellers' concentration ratios for 322 US five-digit Standard Industrial Classification (SIC) industries for 1953-1959. They argued that their correlation analyses were adequate evidence to 'put the administrative inflation hypothesis to rest'.

Weiss (1966) argued that D and S's statistical model was misspecified with the true relationship between concentration and price changes for an industry blurred by fluctuations in its cost and demand conditions. D and S's model implied that, without the concentration effects, all industries would have had similar price changes. However, each industry's price movements are affected differently by changes in its cost and demand variables. Therefore, Weiss introduced cost and demand proxy[8] variables into their statistical equation, and regressed it for the two periods, 1953-59 and 1959-63. He found a positively significant impact of concentration on price changes in the early period, but not in the later one. He, thus, suggested that administered inflation had largely ended in the United States by 1959, even if the earlier relative price increases in concentrated industries were not reversed in the later period.

Weiss's statistical model became a classic form of econometric analysis—testing the residual effect of market concentration on price change.[9] The typical regression model was associated with the markup-price formula of Eckstein and Fromm (1968) relating price and a mark-up on unit labour and unit material costs. After their mark-up price formula is redefined in growth terms, if two variables are added to it (one to capture the demand fluctuations, and the other for market concentration)[10], it becomes the Weiss-type equation for testing the administered-price thesis. The other typical way of conducting empirical tests was to relate market concentration to price

movements over long periods, and test the lag and catch-up process of the administered-inflation thesis. Most often, periods of four to six years were taken to represent the appropriate time interval between price changes, but these have usually been bounded by estimated turning points in the business cycle.

Among the numerous similar empirical tests conducted, Dalton (1973) used US data (with weighted cost variables) for an almost identical time 1958-1963 as Weiss's later one, and found a large positive and significant impact of concentration. Contrariwise, Lustgarten (1975) analysed annual industry data for 1958-1970, using sales growth instead of output growth, to control for demand fluctuations. However, positive effects for concentration were not observed during the recessions of 1960-1961, and 1969-1970. Even if there were cases of sign reversals, it was not clear they were related to the business cycle.

Jones and Laudadio (1977) argued their version of the administered-price thesis was supported by Canadian data. In the earlier period (1958-61) of generally falling prices, the effect of concentration was positive and statistically significant or near-significant in seven multiple regressions. The general results in the later period (1965-69) of rising prices were superior to those of the first case. McRae and Tapon (1979), using a time series technique, analysed 334 monthly observations on price data (1948-75) for 34 Canadian industries. The results of nonparametric range tests are consistent with a time-series version of the administered pricing thesis—with relatively infrequent but large jumps in price. However, their time-series method could not determine whether an industrial price series was stabilised because of firms' administrative discretion or because of the non-existence of a random-walk price.

Qualls (1978) investigated a sample of 85 four-digit SIC industries over 1967-1972 to test some versions of the administered-price thesis. An interesting variant is that he found the concentration-inflation relationship U-shaped for cyclical expansions and inverted U-shaped for cyclical contractions. That is, price inflexibility was found only at intermediate ranges of market concentration. He found evidence of a U-shaped impact of concentration on inflation over 1968-1969, and weaker evidence of an inverted U-shaped impact for the 1969 contraction. On the other hand, Dudley's (1984) results from analysing data from 52 industries for three sample years, the recession of 1974, and the expansions of 1976-1977, did not support the parabolic, shared-monopoly theory of pricing behaviour.

One characteristic found in the previously-mentioned studies is contradictory empirical findings. One explanation for such conflicting evidences is that the traditional econometric tests suffer from measurement errors in the data that Garber and Klepper (1980) pointed out, or from specification errors that Domberger (1983, pp. 41-2) discussed. Qualls (1978) argued sample bias might lead to conflicting findings in those studies where a monotonic relationship between price change and

concentration is postulated. That is, if the data for a study were sampled from a low concentration sector, one study might estimate the left-hand portion of the U (or the inverted U), and another study where data were sampled from a high concentration sector might estimate its other side. Another serious problem (Domberger, 1983, p. 42) is the inability to disentangle the effect of short-run lags of adjustment from long-run equilibrium relations that are implicitly embedded in these estimates.

Statistical analysis of the traditional concentration-inflation relationship changed direction at one point. Domberger (1979; 1980) argued that when costs rose, a high level of concentration would cause, over a given period, a higher rate of price increase.[11] To test this argument, the speed of price adjustment was estimated from a statistical equation (based on the partial adjustment model) that expressed the actual price as a convex combination of the desired price and a one-period lagged price. Then the relationship between the estimated adjustment speed and industry concentration was again estimated and analysed. Using data on 21 British industries for the period 1963-74, Domberger showed that market concentration accelerated price adjustments. However, Carlton (1986), who investigated the US S and K data, found the opposite result: the average length of a period of price rigidity was positively related with seller concentration.

Kamerschen and Park (K and P 1992 a,b,c, 1993 a,b, and 1994), critique and extend some of the approaches and, in particular, modify Hall's (1986; 1988) ingenious method of estimating market power for major industry categories with the mark-up ratio of price to marginal costs. Hall utilises the fact that price exceeds marginal cost if the increase in the total value of an expanded output exceeds the increase in total cost.

However, Hall's statistical equation can be changed into a different form. Domowitz, Hubbard, and Peterson (hereinafter D, H and P, 1988) apply Hall's methodology to a more disaggregated classification of manufacturing industries in the US from 1958-1981. While Hall finds an average Lerner price-cost monopoly power mark-up of 60 per cent, D, H and P find an average of 30 per cent. Neither find that sellers' concentration is a statistically significant factor in explaining the Lerner mark-up. However, Shapiro (1987) finds a strong correlation between sellers' concentration and margins with a variant of Hall's approach.

D, H and P conclude that price-cost margins are procyclical (countercyclical) in relatively concentrated (unconcentrated) industries and it is relatively extreme unionisation in the concentrated industries that keeps wages relatively stable over the cycle. Scherer (1980, Ch. 8) disagrees with D, H and P concluding that margins in concentrated industries are likely to be countercyclical slowly adjusting prices to cost changes. Bils (1987) also finds that margins are generally countercyclical and marginal costs (D, H and P use average variable costs) are procyclical with no effect from sellers' concentration.[12]

The two equations in Hall and DHP are observationally equivalent when an instrumental estimation technique is used and one cannot tell which equation is estimated. An alternative method of measuring market power is estimated by KP using the mark-up ratio of price to marginal revenue. In estimating the alternative mark-up ratio, the price movements are assumed to have a substantial random element. This assumption implies that the price changes are spuriously procyclical, and their spurious procyclicity is the evidence of market power.

The statistical model in this alternative method, as in Hall's method, can be expressed in two different forms. However, the alternative method can avoid the problem of observational equivalence. It is possible to differentiate the instrumental variables for estimating the two equations to discern which equation is estimated. The alternative method has two other advantages that: (1) it is not constrained by the assumption of constant returns to scale; and (2) the number of variables needed for the test is smaller and the data are easily collected.

With the panel data of 74 four-digit US SIC industries, and for 1958-1981, the alternative mark-up ratio is estimated by K and P for the two statistical equations. The average of the estimated ratios is 2.29 for one form, and 1.33 for the other form, even though the two average values are supposed to be equal. Hall's mark-up ratio is estimated using the instrument identified for one of these two equations, and the average of the estimated ratios is 1.45. These results imply that US industries, on average, priced above marginal cost. When the multiple instruments of the government monetary and fiscal policy are used, the estimation results are statistically better than those in the single instrument case. Considering the limitations of the data used, the overall results are moderately encouraging. But the most that can be claimed is the occasion for further future research on this challenging topic.

NOTES

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[1] It was also suggested that the incidence and magnitude of discounts on list prices tend to vary with the trade cycle. Scherer (1980, p. 54) argued that oligopolists are more inclined to make price concessions than competitors when the demand is weak.

[2] Means used research methods very similar to the those employed by business cycle researchers. In fact, the operational definition of the administered price seems to have been influenced by business-cycle theory (see Mitchell, 1951).

[3] Bohi and Scully (1975) tested whether the NBER and BLS price series came from essentially different stochastic processes. They argued that nearly three-fourths of the total variance patterns (46 out of 64 price indexes) were not significantly different for both long-run and short-run cyclical movements. However, as Stigler (1975) pointed out, their spectral analysis was subject to flaws.

[4] They also proposed the kinked demand curve in their paper.

[5] A major goal of oligopolistic firms in the kinked demand curve theory is the maximisation of sale volume.

[6] Carleton and Perloff (1994, pp. 728-747) discuss several of the more sophisticated theories that were developed to reconcile economic theory and the observed evidence. These theories recognise intertemporal substitution is important, marketing is a costly activity, and nonprice methods are often used for allocation.

[7] The short-run and long-run analysis of the (homogeneous) heterogeneous goods are dealt in Kamerschen and Park 1992a, b, c, and 1994 respectively.

[8] Since demand change cannot be observed directly, he introduced indexes of output change (more specifically, change in industry shipments deflated by the industry price index) in his equations to capture the possible demand changes.

[9] It was roughly in the 1980s that industrial economists started emphasising structural models or comparative statics and downplayed reduced-form trend equations.

[10] Demand does not seem to be important in explaining price changes (Weiss, 1966; Lustgarten, 1975). If so, only one variable needs to be added for market concentration.

[11] Ross and Wachter (1975) made the opposite argument that firms in an oligopoly would delay price adjustments.

[12] Carlton and Perloff (1994, ch. 18) provides a comprehensive summary of both the US and international studies on the theory and facts of market clearing.

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