REFERENCES


INTRODUCTION

Over the past few years the focus of many studies of price stickiness has shifted from an imperfectly competitive factor market to an imperfectly competitive product market. This new perspective is typified by the works of Rotenberg and Woodford [1991] and Carlson [1989] which assert that frequent price adjustments can alienate customers, break down collective marketing agreements and/or reduce inventory speculation. When the cost associated with these conjectured responses exceeds the second-order gains identified with conventional short-run profit maximizing price adjustments, the supplier decides against any price change. In these circumstances sticky price behavior is clearly optimal, and may even result in an optimizing framework. Not everyone shares this exclusive product market focus. Recent work by Blinder [1991] and Gordon [1990] is more eclectic and argues that imperfectly competitive factor markets together with the firm's input-output structure can also contribute to price stickiness.

In this study, we test the relative merits of the competing product/factor market arguments by examining empirically the comparative contributions of five more narrowly defined price stickiness hypotheses associated with Okun, Hicks, Schotzsky, Shupp, and Leonstef. The first three of these five hypotheses are consistent with the new product market focus. The latter two are more congruent with an older focus on factor markets and on input-output structure. The acronym OHSIEL is used to refer to these five hypotheses.

In the next section we define the five price stickiness hypotheses and outline an optimizing model incorporating the same. In the subsequent section we test the hypotheses using data from 22 three-digit and 9 two-digit SIC industries.

THE FIVE HYPOTHESES AND AN OPTIMIZING MODEL

In this section a formal model incorporating the defining elements of the five OHSIEL hypotheses is developed. Each sector or industry is modeled as a profit-maximizing representative firm competing in an imperfectly competitive market and facing a demand schedule given by

\[ x_p = x_{p_0} - b p_0 \]

where \( x_p \), \( x_{p_0} \), and \( p_0 \) denote respectively the outside demand, the degree of market penetration, and the price level of the \( p \)th firm (industry) in period \( t \). The coefficient \( b \) measures demand response to a price change. Outside demand in equation (1) above is

is defined here to include both final demand and the transactions component of inventory demand, which varies systematically with final demand.

The Okun Hypothesis

Okun [1981] discusses price stickiness or conversely price flexibility in terms of customer and auction markets, defined respectively by the presence or absence of implicit contracts between buyer and seller. Customer markets are characterized by an invisible handshake, which promises "fair" treatment by the firm in exchange for customer loyalty. Fairness precludes price increases as an appropriate response to cyclical or other forms of temporary excess demand. Price increases are permitted only in response to cost increases. This implies a cyclically invariant mark-up. Customer loyalty, and therefore the market share or market penetration of the firm, is thus promoted by adhering to an established mark-up and is diminished by deviating from the same. This argument can be modeled by

\[ s_y = a_{y-1} - d_y [p_y - c_y] + e_y \]

where \( c_y \) and \( d_y \) denote the unit variable cost and the established mark-up of the firm industry. The mark-up includes a charge against fixed costs. Intuitively, price increases which exceed cost increases occasion a loss of customer loyalty and a concomitant reduction in market share or penetration as measured by \( a_y \). It follows from this formulation that the loss of market share depends critically on the magnitude of the Okun coefficient \( d_y \). It is hypothesized that \( d_y \) is relatively large for customer markets.

The seller's interest in a long-term (customer-firm) relationship is obvious; the buyer's may be somewhat less so. Okun argues that buyers possess imperfect information about the distribution of price and quality across sellers and that engaging in the requisite search is costly. After an initial search the buyer becomes an informed customer who from that point forward buys from one particular seller until, and unless, that seller alters her price in a way perceived to be unfair. As noted above, firms in a customer market setting pursue a pricing strategy designed to encourage and preserve such customer loyalty and to discourage search. By contrast, in auction markets, which are characterized by homogenous goods and openly quoted prices, the relevant quantity and price information is available at little or no cost. Sellers become price takers and buyers lack the incentive to develop loyalty to any individual supplier. It follows directly that in these auction markets, the Okun coefficient \( d_y \) is small.

The Hicks Hypothesis

Hicks [1974] discusses price stickiness or price variability in terms of flexprice and fixedprice markets. His market classification is rooted in differences in inventory behavior. In fixedprice markets inventory is typically held by the producer; in flexprice markets they are held by a middleman or speculator. More importantly, in fixedprice markets inventory behavior is both production and price smoothing. The flexprice inventory demand is included in the outside demand of equation (1) above. Conversely, in flexprice markets inventory demand is dominated by traders or speculators who react to expected price changes. To the extent that these price expectations are formed adaptively, the speculator's demand simply exacerbates any existing price and quantity movements. Hicks also emphasizes the purely random character of speculative inventory demand, which he calls inside demand. Since the inside demand, \( x_{ip}^s \), is only weakly correlated with outside demand, \( x_{ip}^* \), via adaptively formed price expectations, and is dominated by a random component \( s_{ip} \), it can be modeled by

\[ x_{ip}^s = \bar{x}_i + \phi (1 - \Phi) \delta a_{ip} + (1 - \Phi) s_{ip} \]

where \( \bar{x}_i \) denotes the trend inside demand in the \( i \) th industry in period \( t \), and the extraction coefficient \( \phi \) is defined by \( \phi = \phi \sigma \left( \sigma_{ip} + \sigma_{ip}^* \right) \) where \( \sigma_{ip} \) and \( \sigma_{ip}^* \) in turn denote the variances of inside and outside demand. As noted above, total demand is the sum of inside and outside demand and is obtained by combining equations (1) and (3) and rearranging as

\[ x_i = \left[ (1 - \Phi) \sigma a_{ip} - b \sigma P_i \right] + \bar{x}_i + v_i \]

where \( v_i = \left[ 1 - (1 - \Phi) \right] \sigma_{ip} \).

The Sclotsky Hypothesis

Sclotsky's [1978] approach to price stickiness is perhaps the most commonly acknowledged. He argues that the rise of large enterprises characterized by considerable scale economies implies a market concentration which confers a significant price-making capacity to these enterprises. In addition, he reasons that the increases specialization or differentiation nature of consumer and producer goods, coupled with rising real incomes, has significantly reduced demand elasticity. Both these factors, he alleges, occasion a considerable degree of price inflexibility in response to short-run or cyclical excess demand. The Sclotsky market concentration/elasticity argument is captured in the model by the magnitude of the demand response coefficient \( b_i \) of equation (1). The more concentrated the market, the more inelastic the demand and therefore the stickier the price.
The Shupp Hypothesis

Shupp’s [1982] treatment of price stickiness focuses on the input-output structure of the firm and emphasizes the ratio of fixed to variable costs. He argues that production processes which are capital or land intensive (i.e., which are characterized by high fixed costs) are prone to price reductions in a recession, while processes which are labor or material intensive (i.e., which are characterized by high variable costs) are prone to price reductions. The rationale for this response is that a quantity contraction generates significant cost savings whenever variable costs represent a large fraction of total costs. Conversely, when most input costs are fixed, little savings are produced by a quantity contraction, and, therefore, the firm lowers its price to stimulate demand. It follows that fixed cost intensive sectors exhibit greater price flexibility in a recession. The argument, however, is asymmetric. The same fixed cost intensive sectors will exhibit less price flexibility in a boom because the cost of meeting the increased demand is quite modest and this favors quantity rather than price adjustment. A further complicating variant of the Shupp argument is the so-called GM pricing rule. This rule maintains that prices are raised in a recession in an attempt to earn a targeted return on undervalued capital.

The Leontief Hypothesis

The Leontief [1962] approach to price stickiness also focuses on the input-output structure of the firm or industry rather than on its product market setting. This argument holds that production processes which are flexprice-input intensive generate cyclically flexible output prices. More particularly, this hypothesis notes that input prices exhibit varying degrees of flexibility, both cyclical and non-cyclical, and that production processes similarly exhibit differing proportions of these inputs. To the extent that the mark-up paradigm is operative, these two observations imply that output prices in a particular sector vary in relation to the product of the share of flexprice inputs and the price variability of those same inputs. Conversely, sticky input prices imply sticky output prices.

To capture both the Leontief and Shupp arguments we posit a production process defined by a fixed capital stock and by variable labor and material inputs. Total costs are thus given by

\[ c_p = c_{wp} + c_w p \]

with

\[ c_{wp} = \thetaswana + \theta_{wp} p \]

where \( c_{wp} \) and \( p \) denote respectively the fixed capital cost, the wage rate and the unit materials price in period \( t \), and \( \thetaswana \) and \( \theta_{wp} \) denote unit labor and unit material requirements for the \( n \)-industry. The Leontief argument depends crucially on the degree of cyclical flexibility of the \( c_{wp} \) term defined by equation (5), while the Shupp argument depends critically on the relative magnitude of the \( c_{wp} \) and \( c_w \) terms of equation (5).

The five OHSSHL hypotheses are incorporated in a single model by postulating that the \( n \)-period profits of the representative firm in the \( n \)-industry are defined by

\[ \pi_n = (p_n - c_w) x_n - c_{wp} \]

Substituting equation (4) into (6) and maximizing profits subject to the Okun constraint (2) over a \( T \)-period horizon yields

\[ \sum_{t=1}^{T} \pi_n = \sum_{t=1}^{T} (p_n - c_w)(1/(a_{wp} - b p_n)/(1 - \phi)) + x_n + p_n \]

subject to

\[ \phi = a_{wp} - d p_n - c_{wp} - k \]

where \( \phi \) is the state variable and \( p_n \) is the policy or decision variable, and where \( c_{wp} \) is the demand shock \( s_n \) are given exogenously.

The \( T \)-period pricing rule implied by the model is given by

\[ p_n = [(1 - \phi)/(x_n + p_n)/(2(b + d))] + [(a_{wp} - d)/(b + c_{wp})]/(2(b + d)) + [(c_{wp}/2)/(b + d)] + c_{wp}/2 \]

Comparable expressions can be found for other periods. A variant of this relationship is estimated in the next section.

EMPIRICAL RESULTS

In the previous section, output price flexibility (stickness) is related to variability in the mark-up margin (Okun), variability in speculative inventory demand (Hioka), the degree of market imperfections or concentration (Schoorv), relative fixed cost intensity (Shupp) and input price flexibility (Leontief). The relative contributions to price stickiness of each of these five OHSSHL arguments can thus be estimated using the regression equation given by

\[ \sigma_n = \beta_0 + \beta_1 \sigma_{sh} + \beta_2 \sigma_{le} + \beta_3 \sigma_{hu} + \beta_4 \sigma_{sh} + \beta_5 \sigma_{le} + \beta_6 \sigma_{hu} \]
where \( \sigma_i^2, \sigma_j^2, S, SH, L, \) and \( \sigma_0^2 \) denote respectively the Okun, Hicks, Scitovsky, Shupp, Leontief, and excess demand proxies. These proxies are derived from and are consistent with the optimizing behavior illustrated by equation (8) above.

Recall that Okun's hypothesis relates price stickiness (flexibility) to mark-up stickiness (flexibility). The mark-up here is defined as the ratio of price to unit variable cost, i.e., by \( \frac{p_i}{c_i} = \frac{p_i}{c_{iv}} \) where \( c_{iv} \) is approximated by \( c_{iv} = \sigma_i \mu_i + \sigma_i \mu_j \). The Okun proxy \( \sigma_0^2 \) is the variance of this mark-up series.

Recall also that Hicks argues that inventories are held either for transaction purposes (primarily in flexprice markets) or for speculative purposes (chiefly in flexprice markets). The transaction demand varies systematically with final demand while the speculative demand is more random in character. The observed inventory series therefore have been decomposed into permanent and transient components. These component series are assumed to correspond respectively to the transactions and speculative demands identified above. The variance of the transient or speculative component \( \sigma_0^2 \) is used as the Hicks proxy in estimating equation (9).

Scitovsky's hypothesis focuses on seller power and reflects the traditional assumption that monopoly power is manifested in sticky prices. Conversely, firms in competitive markets are assumed to lack any discretionary price-setting power, and therefore prices vary substantially with cyclical changes in excess demand. The four-firm concentration ratio (CR4) is a widely accepted measure of market power and is employed here as the Scitovsky proxy \( S \).

Leontief's input-output argument states that flexprice intensive production processes give rise to output-price variability, while flexprice intensive processes generate output-price stickiness. Leontief's argument \( L \) is proxied by the relative share of materials input, i.e., by \( \frac{\theta_0}{(1 - \theta_0)} \), where \( \theta_0 \) is the share of materials, \( w \), calculated as the value of shipments (output) minus value added in the production process.

The Shupp hypothesis maintains that capital (or fixed cost) intensive firms exhibit greater output price flexibility than do labor (or variable cost) intensive firms. This argument \( SH \) is proxied by the relative share of capital, i.e., by \( \frac{(1 - \theta_0) - \theta_0}{(1 - \theta_0) + \theta_0} \), where the share of labor, \( \theta_0 \), is calculated as the ratio of payroll for all employees to value of total shipments.

Finally, a separate cyclical excess demand argument denoted by \( \sigma_0^2 \) is included as an explanatory variable. This argument is proxied by the variance of the detrended rate of change of new orders. (An alternative measure, the detrended rate of change of the value of shipments, yields almost identical estimates when used as the regressor.)

To assess the explanatory power of each of the OHSSHL arguments, equation (9) is estimated using quarterly price, wage and inventory data for 22 three-digit and nine two-digit SIC sectors. The data cover the period 1976:1 - 1985:4. The Cooley-Presscott filter is used to detrend the price\( i \) series data, and the variance of the detrended series is the measure of price variability used as the dependent variable in the regression studies reported in Table 1A. Relative price variability, defined by the variance of the difference between the sectoral price and the aggregate price, is also regressed on the OHSSHL proxies. The results of these regression studies are reported in Table 1B.

Both sets of regressions are strongly supportive of most of the OHSSHL arguments. According to the theory outlined above, the expected signs on the Okun, Hicks and Leontief proxies are positive while the expected signs on the Scitovsky and Shupp proxies are either negative or indeterminate. As can be seen by examining Tables 1A and 1B, the coefficient estimates are correctly signed and statistically significant for the Hicks, Okun, and Leontief proxies. However, the Shupp and Scitovsky variables are consistently positive, which is at variance with their primary theories. Furthermore, the Scitovsky coefficient is statistically insignificant in all cases.

The positive Scitovsky coefficient implies that price flexibility increases (rather than decreases) with market concentration. While this result is inconsistent with Scitovsky's primary argument, it agrees with his secondary argument relating concentration to cost changes more quickly and completely. It is also consistent with the work of Scherer (1980) and Dombrowski (1975), rejecting the conventional wisdom that price stickiness increases with market concentration.

The coefficient of the Shupp argument is consistently positive, implying that large fixed costs contribute to price stickiness over the cycle. While this result is inconsistent with Shupp's primary hypothesis that fixed costs lead to flexible prices in a recession, it should be recalled that the argument is asymmetric and that these fixed costs induce price stickiness in an expansion. Furthermore, the secondary or GM argument is also consistent with the observed positive coefficient. The sign ambiguity implied by the theory may also help to explain the statistical insignificance of two of the four regressions.

Perhaps the most surprising finding of the regression studies is a failure to detect any statistically significant independent impact of cyclical changes in excess demand on price behavior, as is shown in runs (1) and (3) of both Tables 1A and 1B. While this finding is inconsistent with short-run market clearing behavior, it should not be misconstrued. It says nothing about the longer-run relationship between price and quantity since the data series used have been detrended.

A second thrust of the study is to measure the explanatory power of each of the OHSSHL arguments. Three criteria are used for this purpose. These are (1) a comparison of the standardized beta-coefficients appropriate to the regressions discussed above, (2) a comparison of the simple correlations between the price stickiness variable and the OHSSHL proxies, and (3) a comparison of the partial correlation coefficients between the same sets of variables.

The standardized beta-coefficients appropriate to the regression studies presented in Tables 1A and 1B are reported in Tables 2A and 2B respectively. Ranking the hypotheses on the basis of the mean value of these standardized coefficients yields the following order: Leontief (0.587), Shupp (0.309), Okun (0.277), Hicks (0.260), and Scitovsky (0.132). Using this measure, the first four clearly explain considerably more of the price stickiness (variability) than does the last one.
### TABLE 1A
Sources of Price Stickiness: $P^t_1$

<table>
<thead>
<tr>
<th>Run</th>
<th>Constant</th>
<th>H</th>
<th>O</th>
<th>L</th>
<th>S</th>
<th>SH</th>
<th>Q</th>
<th>$\Delta$</th>
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<tbody>
<tr>
<td>1</td>
<td>-3.507</td>
<td>0.016$^a$</td>
<td>1.109$^b$</td>
<td>1.625$^b$</td>
<td>0.009</td>
<td>4.419</td>
<td>-0.004</td>
<td>0.455</td>
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<td>(1.583)</td>
<td>(1.029)</td>
<td>(1.779)</td>
<td>(2.178)</td>
<td>(0.456)</td>
<td>(1.261)</td>
<td>(0.246)</td>
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<tr>
<td>2</td>
<td>0.179</td>
<td>0.020$^a$</td>
<td>1.022$^b$</td>
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<td>-0.004</td>
<td>0.374</td>
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<td></td>
<td>(0.128)</td>
<td>(1.055)</td>
<td>(2.709)</td>
<td>(1.902)</td>
<td>(0.621)</td>
<td>(0.667)</td>
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<tr>
<td>3</td>
<td>-0.838</td>
<td>0.013$^a$</td>
<td>1.245$^a$</td>
<td>0.030$^a$</td>
<td>0.021</td>
<td>-0.003</td>
<td>0.448</td>
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<td></td>
<td>(0.666)</td>
<td>(1.888)</td>
<td>(2.382)</td>
<td>(1.875)</td>
<td>(0.840)</td>
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<tr>
<td>4</td>
<td>-3.424</td>
<td>0.016$^b$</td>
<td>1.113$^b$</td>
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<td>(1.060)</td>
<td>(1.932)</td>
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<td>(1.050)</td>
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$P^t_1$ is Var($p^t$) where $p^t$ is the detrended (seasonally adjusted) inflation rate.

### TABLE 1B
Sources of Price Stickiness: $P^t_2$

<table>
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<tr>
<th>Run</th>
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<th>Q</th>
<th>$\Delta$</th>
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<td>-2.057</td>
<td>0.019$^a$</td>
<td>0.770$^a$</td>
<td>1.482$^a$</td>
<td>0.014</td>
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<td>(1.564)</td>
<td>(2.020)</td>
<td>(1.444)</td>
<td>(1.974)</td>
<td>(0.907)</td>
<td>(1.260)</td>
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<tr>
<td>2</td>
<td>0.329</td>
<td>0.023$^a$</td>
<td>1.523$^a$</td>
<td>0.037$^b$</td>
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<td>(3.352)</td>
<td>(2.545)</td>
<td>(2.545)</td>
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<td>(0.783)</td>
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<td>0.607$^a$</td>
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<td>(1.149)</td>
<td>(2.229)</td>
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<td>(1.536)</td>
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<td>(2.188)</td>
<td>(1.384)</td>
<td>(1.314)</td>
<td>(1.641)</td>
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$P^t_2$ is Var($p^t$ - $p^o$) where $p^o$ is the detrended overall inflation rate. $N=61$; The $i$ subscript denotes individual industries. Figures in brackets are ratios. $^a$ denotes significance at the 10 percent level of significance and $^b$ denotes significance at the 5 percent level.

### Table 2A
Standardized (Beta) Coefficients: $P^t_1$

<table>
<thead>
<tr>
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$P^t_1$ is Var($p^t$) where $p^t$ is the detrended (seasonally adjusted) inflation rate.

### Table 2B
Standardized (Beta) Coefficients: $P^t_2$

<table>
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<tbody>
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<td>0.605</td>
<td>0.027</td>
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$P^t_2$ is Var($p^t$ - $p^o$) where $p^o$ is the detrended overall inflation rate. $N=61$. The $i$ subscript denotes individual industries. Figures in brackets are ratios. $^a$ denotes significance at the 10 percent level of significance and $^b$ denotes significance at the 5 percent level.

Assessing the relative contributions of these same hypotheses using the squares of the simple correlation coefficients also places the Leontief, Okun, and Hicks hypotheses at the top. Using this criterion the Leontief argument is again ranked first, contributing an average 36.6 percent of the explained variation in price flexibility, followed by Okun, 23.4 percent; Hicks, 15.2 percent; Scitovsky, 9.7 percent; and Shupp, 6.9 percent.

Using the squares of partial correlation coefficients as the defining measure of explanatory influence yields: Leontief (18.2 percent), Hicks (12.8 percent), Okun (10.0 percent), Shupp (7.6 percent), and Scitovsky (3.1 percent). These figures reflect the percentage of total price flexibility explained by the respective hypotheses, after the other variables have been included in a regression.

In summary, the three-fold tests employed imply that the Okun, Leontief, Hicks, and Shupp arguments are of roughly equal importance while the Stolitzky argument is less strongly supported by the data set. However, only the secondary Shupp argument (that relevant to cyclical expansions) is strongly supported. The primary argument is soundly rejected.

### Conclusion
The purpose of this study is to examine five prominent hypotheses purporting to explain price stickiness. Three of these hypotheses are related to product market imperfections, while two are associated with factor market imperfections. The study finds significant support both for product market arguments of Okun and Hicks and the factor market arguments of Shupp and Leontief. This mixed outcome therefore lends simultaneous support both to the New Keynesian focus on the product market imperfections...
and to the more traditional (old Keynesian) focus on the factor market as major determinants of price stickiness.

**APPENDIX A**

The Hamiltonian appropriate to the optimization problem implied by the maximization of (7) subject to (2) is given by

\[ H = (p_y - c_0)(\lambda c_y - \beta p_y)(1 - \theta) + r_y + \psi_y^1 - c_y + \lambda \partial_a y_{\alpha, y} - d_y p_y - c_0 - 1 r_y. \]

The three canonical equations are (dispensing with the \( j \) subscript)

(a) \[ \dot{\lambda} = \lambda \partial H / \partial a_y = \partial_y/(1 - \phi) - (\partial c_y/(1 - \phi)) + r_y + \eta - \partial \phi = 0; \]

(b) \[ \lambda = \partial H / \partial a_y = \partial_y/(1 - \phi) - (\partial c_y/(1 - \phi)); \]

(c) \[ a_y = \partial H / \partial \dot{a}_y = (\partial^2 c_y)/(1 - \phi) + \partial_y + \partial \dot{y} + \xi_y. \]

Substituting (b) and (c) into (a), and solving for \( p_y \), we get

\[ p_y = \left( (1 - \phi) c_y + \psi_y^1 \right) / \left( 2 \lambda (1 + \psi_y) \right) + \left( (1 + \phi) c_y + \lambda \psi_y + \lambda \psi_y \partial c_y - 2 \right) / \left( \psi_y + 1 \right). \]

**APPENDIX B**

The Okun proxy \( O \) for an industry is defined as the variance of the ratio of the price index to an index of variable costs. The variable cost index was calculated as a weighted average of the input price indices (including construction [maintenance and repair], coal, crude petroleum, and electric, gas, and water) and the index of the industry's straight-time average hourly wage. The weights for the non-labor inputs are obtained from the Detailed Input-Output Structure of the U.S. Economy, 1977, Vol. II, (Department of Commerce, 1984).

Quarterly data on producer prices (PP) is obtained from the relevant issues of *Supplement to Producer Price Indexes* (Bureau of Labor Statistics); price indices pertaining to construction [maintenance and repair], coal, crude petroleum, and electric, gas, and water are from the relevant issues of *Survey of Current Business* (Department of Commerce). Straight-time average hourly wage figures are calculated from data on hourly earnings, and weekly overtime hours published in *Employment and Earnings* (BLS). Inventory (total) data is obtained from Manufacturer's Shipments, Inventories, and Orders:Mi-1083, Published and Unpublished Data, *FIVE SOURCES OF PRICE STICKINESS*.


**APPENDIX C**

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<th>Sources of Price Stickiness: ( P_y )</th>
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\( P_y \) is the VIF(\( P_y \)), where \( P_y \) is the seasonally adjusted quarterly inflation rate. N-21; This subscript denotes individual industries. Figures in parentheses are t-ratios. * denotes significance at the 10 percent level and ** denotes significance at the 5 percent level.

**NOTES**

The author gratefully acknowledges the helpful comments and suggestions by the editor and two anonymous referees of this Journal. I am highly appreciative of the guidance and valuable advice received from Franklin Shapp, my teacher.

1. In this paper we focus on product markets. Okun also applies his analysis to labor markets.
2. The specification in equation (3) can be derived as follows. Assume that the inside demand is a weighted average of the total demand and trend inside demand, i.e., \( x_n = \alpha x + (1 - \alpha) \bar{y} + x_n \). Since total demand, \( x_n \) is the sum of inside and outside demands, inside demand can be expressed as \( x_n = \alpha x + (1 - \alpha) \bar{y} + \alpha x_n \). Solving for \( x_n \) we obtain equation (3).
3. There are, of course, other arguments favoring price stickiness in concentrated industries. These include the sticky-prices argument of Cournot and Stackelberg in which prices are set strategically in response to the conjectural reaction function of a competitor, and the line-pricing arguments of Bain, Modigliani and Sylos-Labini in which prices are set to deter entry. In all of these models pricing in response to short-run excess demand is distinctly suboptimal to pricing in response to long-run strategic considerations. This behavior is consistent with Stigler's observation that concentrated industries are characterized by a discretionary pricing behavior that responds prim-
rily to changes in costs, while competitive industries lack this discretionary capacity and are therefore characterized by more flexible prices that respond to all shades of excess demand. It is also consistent with the Okun argument outlined above.

4. All versions of this fixed cost intensity hypothesis presuppose that the prevailing equilibrium price is set strategically (see above) in an imperfectly competitive market and is lower than the short-run profit-maximizing price. Price (quantity) adjustments to, e.g., a cyclical contraction are designed to minimize cyclically induced losses (from the previous equilibrium position). If firms ignore all strategic considerations and continually maximize short-run profits in response to cyclical demand shifts, fixed costs play no role in pricing decisions. For example, if demand is given by \( q = a - \alpha p \) and costs by \( c = c_0 + \eta p \), short-run optimizing implies that \( p = (a - c_0)/\eta \).

5. This hypothesis is also utilized in the previously cited studies by Hicks, Okun and Soltosvsky, and is carefully articulated in Shoup [1987]. It is also implicit in the earlier work of Taylor [1982] and given some empirical content by Ekelund [1992].

6. For proof see Appendix A.

7. See Appendix B for a detailed description of how the unit variable cost is calculated.

8. See Appendix B for a complete listing.

9. Price refers to quarterly rate of change in the producer price index.

10. All regression coefficients are similar when the un-dated inflation rate is used as the dependent variable. See Appendix C for the results of those regression studies. Additional specifications all yielding essentially the same results can be found in Jegg [1993].

11. One plausible explanation of this result, in addition to the imperfect market argument already noted, is that with larger firms in an industry, a localized (firm-specific) shock more closely resembles an industry-wide shock, and therefore it is easier for an individual firm to assess such information and respond quickly in terms of price adjustment.

12. The emphasis here is the independent since the partial regression coefficient measures only that impact of excess demand on price which is not accounted for by the other arguments.

REFERENCES


