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MARKET STRUCTURE AND CYCLICAL FLUCTUATIONS IN U.S. MANUFACTURING: COMMENT

David R. Kamerschen and Jae-Hee Park*

Abstract—Domowitz, Hubbard, and Peterson (DHP, 1988) estimate industry markups of price over marginal cost and show the influence of market structure on cyclical movements in total factor productivity, using a disaggregate panel data set of 284 four-digit, Standard Industrial Classification, industries. In this comment we examine whether DHP really estimate what they intend to estimate. DHP also claim their "estimates are not as large as those of Hall" (p. 56). If it is not clear what they estimate, the comparison is of limited usefulness. Nevertheless, the DHP study deserves consideration and contemplation by anyone interested in industrial economics.

Domowitz, Hubbard, and Peterson (DHP, 1988) estimate industry markups of price over marginal cost and show the influence of market structure on cyclical movements in total factor productivity, using a disaggregate panel data set of 284 four-digit, Standard Industrial Classification (SIC) industries.[1] They utilize Hall's (1988) innovative indirect measure of marginal cost based on the fact that when the increase in the total value of an industry's output is more than the increase in total cost, price must be greater than marginal cost (absent learning-by-doing and other effects of current output on future costs). They apply Hall's methodology to a more disaggregated classification of industries and like Hall conclude that concentration is not an important and statistically significant determination of price-cost margins. In this comment we examine whether DHP really estimate what they intend to estimate. DHP (1988, p. 56) claim their "estimates are not as large as those of Hall."[2] This opinion apparently is based on the comparison of Hall's (1986) and DHP's price-cost margin in DHP's table 3, which is partially reproduced in our table 1. If it is not clear what they estimate, the comparison is of limited usefulness.

To begin our investigation, let's look at Hall's (1986) statistical model.[3]

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We are indebted to David B. Robinson and anonymous referees for their helpful comments and suggestions. We are also indebted to Carlton and Perloff (1994).

[1] While DHP did earlier related studies (e.g., 1986a, 1986b, 1987)—and find, for example, price–cost margins in relatively concentrated (unconcentrated) industries are procyclical (countercyclical)—we focus on their 1988 paper. Hall (1984, 1988b) also did related studies worth investigating.

[2] Hall (1988) also admitted that DHP achieved "much greater power than the tests of this paper" (p. 942).

$$\Delta q_t - \alpha_t \Delta n_t = (\mu_t - 1)\alpha_t \Delta n_t + \Theta + u_t, \qquad (1)$$

where Δq is the rate of growth of the output/capital ratio, α is the factor share earned by labor, and Δn is the rate of growth of the labor/capital ratio. Thus, the left-hand side of (1) is the labor/capital ratio. Thus, the left-hand side of (1) is the Solow residual. In the right-hand side, μ is the ratio of price over marginal cost, Θ is the rate of Hicks-neutral technical progress, and u_t is random term. In estimating $(\mu - 1)$, Hall uses the instrumental estimation method. That is, a macro variable, Δz_t, is used for $\alpha_t \Delta n_t$ in the right-hand side of (1). If the estimated value is greater than zero, the joint hypothesis of competition and constant returns is rejected.

DHP's statistical model shown in (1) can be rewritten as[4]

$$\Delta q_t - \alpha t \Delta n_t = \beta \Delta q_t + (1 - \beta)\Theta + (1 - \beta)u_t, \qquad (2)$$

where $\beta = (P - MC)/P$ indicates the Lerner index of monopoly power. Equation (2) is the same as equation (1) because $\mu = 1/(1 - \beta)$. In estimating β, a macro random shock, Δz_t, is substituted for Δq_t in the right-hand side of (2) as an instrumental variable. If the estimated value of β is greater than zero, as in the first case, the joint null-hypothesis is rejected.

If we compare the two statistical models (1) and (2), in both of which the same instrumental variable, Δz_t, is used, all the terms are exactly the same except the variables to be estimated and the random term. The two statistical equations are observationally equivalent. In other words, if we observe an estimated regression of either equation (1) or (2) with the given data on Δq_t, α_t, Δn_t, and Δz_t, we don't know which model is regressed, and which variable of $(\mu - 1)$ and β is estimated. If monopoly power exists, the actual value of $(\mu - 1) = (P - MC)/MC$ is different from $\beta = (P - MC)/P$ as a monopolist produces where P is greater than MC. The problem of observational equivalence is due to the inability to identify whether the

[3] The statistical model Hall suggested was $\Delta q_t = \mu_t \alpha_t \Delta n_t + \Theta + u_t$, and the model he actually regressed was (1). However, the two models will give the identical estimated value of μ.

[4] In an attempt to clarify our arguments, we omit the material input from DHP's original equation. This does not affect the general tenor of our argument.

TABLE 1.—COMPARISON OF THE ESTIMATED PRICE-COST MARGIN

(A) Two-Digit SIC Industry Group	(B) Hall's Estimation of $(\mu - 1)$	(C) Hall's Converted Value of $(\mu - 1)$ in terms of β	(D) DHP's Estimation of β (including materials cost)
20	2.09	0.676	0.332
21	0.28	0.219	0.198
22	0.05	0.048	0.298
23	0.3	0.231	0.351
24	0.0	0.000	0.288
25	0.38	0.275	0.388
26	1.68	0.627	0.360
27	0.61	0.379	0.513
28	2.39	0.705	0.379
29	(N.A.)		0.314
30	0.41	0.291	0.402
31	0.59	0.371	0.316
32	0.81	0.448	0.428
33	1.06	0.515	0.280
34	0.39	0.281	0.373
35	0.39	0.281	0.400
36	0.43	0.301	0.403
37	(N.A.)		0.289
371	1.07	0.517	(N.A.)
372	−0.09	−0.099	(N.A.)
38	0.29	0.225	0.508

Source: Domowitz, Hubbard, and Peterson (1988), table 3, p. 60.

instrumental variable, Δz_t, is for $\alpha_t \Delta n_t$ in (1) or for Δq_t in (2).

In DHP's empirical study of market structure, they convert Hall's estimated value of $(\mu - 1)$ into the value of β, and compare it with their value of β. This is shown in table 1. Column (B) shows Hall's $(\mu - 1)$ estimated by the model (1) using two-digit, or S.I.C. industries, and column (D) shows DHP's β estimated by the model (2) for the same industries as Hall's. Column (C) is Hall's converted values of $(\mu - 1)$, calculated by using $\beta = [1 - (1/\mu)]$, and the converted values are contrasted with DHP's estimated values of β in the column (D).

The conversion and comparison is correct only if both Hall and DHP use a separate and identifiable instrumental variable. However, DHP use the same growth rate of GNP as the instrumental variable in estimating the equation (2) that Hall uses in estimating equation (1). In this case of observational equivalence, they both estimate the same thing. Thus, Hall's estimated values of $(\mu - 1)$ in column (B) are supposed to be equal to DHP's β in column (D), if the two data sets represent reality. But it is still not clear what they estimate. If the instrumental variable represents $\alpha_t \Delta n_t$ of equation (1) more than Δq_t of (2), the estimated coefficient is closer to the true value of $(\mu - 1)$. And the reverse holds true. Therefore, it is not appropriate to convert Hall's $(\mu - 1)$ into the value of β in column (C) to compare with DHP's β, in column (D) as in table 1.

Thus, we conclude that all of DHP's conclusions based on the comparison with Hall are suspicious if not invalidated. This may also explain why, for instance, Shapiro (1987) applies a variant of Hall's approach and finds contrary to Hall and DHP a strong relation between concentration and price–cost margins. See Carlton and Perloff (1994).

REFERENCES

Carlton, Dennis W., and Jeffrey M. Perloff, *Modern Industrial Organization*, 2nd ed. (New York: HarperCollins, 1994), Chapters 10 and 18.

Domowitz, R. Ian, Glenn Hubbard, and Bruce C. Peterson, "The Intertemporal Stability of the Concentration-Margins Relationship," *Journal of Industrial Economics* 35 (1986a), 13–34.

———, "Business Cycles and the Relationship Between Concentration and Price-Cost Margins." *Rand Journal of Economics* 17 (1986b), 1–17.

———, "Oligopoly Supergames: Some Empirical Evidence on Prices and Margins," *Journal of Industrial Economics* 35 (1987), 369–398.

———, "Market Structure and Cyclical Fluctuations in U.S. Manufacturing," this REVIEW 70 (1988), 55–66.

Hall, Robert E., "The Inefficiency of Marginal Cost Pricing and the Apparent Rigidity of Prices," National Bureau

of Economic Research, Working Paper no. 1347 (1984).
_____, "Market Structure and Macro Fluctuations." Brookings Paper on Economic Activity 1 (1986), 285–322.
_____, "The Relation between Price and Marginal Cost in U.S. Industry." *Journal of Political Economy* 96 (1988a), 921–947.
_____, "A Non-Competitive Equilibrium Model of Fluctuations." National Bureau of Economic Research, Working Paper no. 2576 (1988b).
Shapiro, Matthew, "Measuring Market Power in U.S. Industry," National Bureau of Economic Research Working Paper no. 2212 (1987).

MARKET STRUCTURE AND CYCLICAL FLUCTUATIONS IN U.S. MANUFACTURING: REPLY

Ian Domowitz, R. Glenn Hubbard and Bruce C. Petersen*

Abstract—We reply to the Comment by Kamerschen and Park on our 1988 paper published in this *Review*. We find that the econometric point raised by these authors is flawed, because differences in model structure and data are ignored. In particular, the importance of materials input in assessing price–cost margins is reiterated here, and illustrated with the 1988 paper's original table. Other points of the Comment are refuted by direct reference to statistical results and inferred conclusions in the 1988 paper.

Given the importance of imperfect competition for models of economic fluctuations, we appreciate the continued interest in our work on the topic. Our (1988) paper centered on three points. First, the use of longitudinal data at a disaggregated level allows the further identification of factors influencing price-cost margins, including, for example, the importance of noncapital fixed costs in production. Second, industry price-cost margins display substantial movement over the business cycle, and the type and degree of fluctuation depend on market structure. Finally, intermediate inputs such as materials are very important for assessing the extent of realized industry price-cost margins.

The Comment by Kamerschen and Park concentrates on a single set of comparisons in our (1988) paper. Unfortunately, these authors have missed the message concerning intermediate inputs in general, and concerning the table to which they refer, in particular.

The econometric issue raised in the Comment is straightforward. If one uses an instrumental variables procedure to estimate regressions of Y on X and X on Y using the same set of data, the same model estimates should result. We agree that if the equation is exactly identified, the estimates should be numerically equal.

Neither the data nor the model in our (1988) paper are the same as that in Hall (1986), however. The authors' representation of our model in their equation (2) is incorrect. Indeed, their comment that omitting our correction for materials input does not affect their argument signals a misunderstanding of our (1988) paper. Equation (6) of our (1988) paper gives the estimating equation as

$$\Delta q_{it} - \alpha_{Lit}\,\Delta l_{it} - \alpha_{M_{it}}\,\Delta m_{it} = \gamma_i(1-\beta^*) + \beta^*\,\Delta q_{it} + (1-\beta^*)\,\Delta a_{it}, \quad (1)$$

where m is the logarithm of the materials capital ratio and α_M is the ratio of materials cost to the value of output.

Estimates of the price-cost margin based on equation (1) in the Comment will be unbiased only in the case that the change in materials use is uncorrelated with the change in output. This is not only highly unlikely, but also refuted by the results in our paper. The magnitude of the bias in markups from the elimination of materials clearly depends on the value of α_M and the correlations of materials with labor and output.

In order to obtain a sense of the size of the ratio of materials cost to the value of output, we present the complete version of our original table 3, an important part of which is omitted in the authors' comment. Examination of the table indicates that this ratio is 0.49, on average, with reasonable variation across industries. In all cases, however, the materials share is large relative to the labor share. In several industries in which Hall reports substantial markups, such as paper, chemicals, primary metals, and transportation equipment, the materials share is substantial, and our estimated markups are lower. The point is simple: inter-

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