A Review Essay

The productivity puzzle: numbers alone won't solve it

From vantage points in management, labor, academia, and government, contributors to four recent books grapple with the productivity slowdown, with little help from economic theory

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Over the last two decades, there has been a major decline in the rate of growth in U.S. productivity. The lag in the ratio of output to input has also occurred in many other industrial countries, including Japan.

Orthodox economic theory hypothesizes a basically technical link between trends in output and input, namely, the production function. This hypothesis has been put to a severe test, for the precise extent, the origins, and the significance of the productivity slowdown are yet to be analyzed with a clarity that would demonstrate the usefulness of traditional economics in analyzing such problems.

There is, in particular, a surprising contrast between the wealth of studies that attempt to quantify the decline and calculate its causes, and the poverty of material on the role played by such a lag in macroeconomic performance. It should be remembered that, in general, at a company and an industry level, labor productivity and profitability are *not* well correlated, and that in capitalist economies decisions are based on the latter, *not* the former. Paul Samuelson's neoclassical paradigm claims its originality in the capacity to link the two factors, in a synthesis of micro- and macro-economics. But so far, this approach has not shed light on the most elementary part of the productivity puzzle: Is the productivity slowdown basically a cause or an effect of current economic problems?

Research on productivity thus progresses somewhat unevenly. Three foci of study have emerged: data analysis, study of management practices, and research into labor relations and conditions. *Productivity: Prospects for Growth*, edited by Jerome Rosow, deals with all three subjects. The interdependence of the three themes makes this presentation most judicious. Three other recent books have also addressed one or other of these matters. Before discussing the major issues, we will identify the overlapping concerns of the four volumes.

Productivity: Prospects for Growth includes five contributions to the task of data analysis. Solomon Fabricant of New York University and Dale Jorgenson of Harvard University present the growth accounting data, Jerome Mark of the Bureau of Labor Statistics, the measurement consideration, and Howard Samuel and Rudy Oswald of the AFL-CIO, their views on the role of foreign trade and labor unions.

The reader seeking more detail on current data analysis methods can consult *Aggregate and Industry-Level*

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Productivity Analysis, edited by Ali Dogramaci and Nabil R. Adam, both of Rutgers University; this is the second volume of the Studies in Productivity Analysis series. Two papers address methodology: that by Ephraim Sudit of Rutgers University and Nachum Finger of Ben Gurion University presents a general survey and that by Douglas Moon of Columbia University, the dynamic input/output model. The formidable problems posed by time-series analysis are discussed by Lawrence Cohen of Columbia University and Salin Neftci of Boston College. Tom Boucher of Cornell University assesses technical change; J. R. Norsworthy and Michael Harper of the Bureau of Labor Statistics consider capital formation, and Frank Gollop of Boston College and Mark Roberts of Pennsylvania State University analyze imported intermediate inputs.

The next theme, management, is examined in *Productivity: Prospects for Growth* by John Donnelly, who discusses the role of the chief executive, and by Alfred Neal, former president of the Committee for Economic Development, who analyzes the role of the tax system. Exploring technological change at the corporate level are Reginald Jones, chairman of General Electric, John Diebold, chairman of the Diebold Group, Thomas Donahue, secretary-treasurer of the AFL–CIO, and Robert Ranftl of Hughes Aircraft Corp.

The problems of productivity management are also the theme of papers edited by Vernon M. Buehler and Y. Krishna Shetty, both of Utah State University, in *Productivity Improvement: Case Studies of Proven Practice.* Represented are 11 companies and three unions. Contributors also include Murray Weidenbaum, former chairman of the Council of Economic Advisers, and Clement Preiwisch of the General Accounting Office.

The last theme, dealing with labor, is discussed in *Productivity: Prospects for Growth* from four perspectives. Rosow of the Work in America Institute surveys the problems associated with the various "human factors" and discusses their possible remedies. Writing on worker participation are Stephen Fuller, vice president of General Motors, Douglas Fraser, president of the United Auto Workers, and Wayne Horvitz, director of the Federal Mediation and Conciliation Service.

These problems are given more theoretical treatment in Stephen Hill's *Competition and Control at Work: The New Industrial Sociology,* the fruit of his teaching at the London School of Economics.

The four books incorporate some of the most advanced thinking in this, somewhat fragmented, area of research. Our review will thus attempt to assess some of the strengths and weaknesses of the state of the art. The first two sections will deal with conceptual and analytical problems and will therefore consider the contributions of the Rosow volume and Dogramaci and Adam collection. The following two sections will cover the management and labor aspects, as they are discussed in Buehler and Shetty, Hill, and the other chapters of Rosow. In a concluding section, we sketch some alternative lines of research.

The conceptual problems of data analysis

The literature on the productivity problem shows little patience with the troublesome theoretical problems of economics. These books are no exception. Fabricant's overview gives theory scant attention; Mark's discussion of measurement problems includes an extensive survey of the reliability of our data, but from an exclusively pragmatic point of view. Sudit's discussion of methodological issues is broad-ranging but makes no effort to draw any conclusions concerning the value of the empirical work that is founded on fragile hypotheses. Most of his fellow contributors to the Dogramaci/Adam collection, concentrating on empirical industry-level and time-series analysis, struggle with the practical difficulties associated with these problems without the benefit of a viable theoretical framework. Not surprisingly, such studies are principally of interest to the professional student of productivity.

Two theoretical problems in particular would seem to merit discussion. Productivity analyses inspired by the neoclassical paradigm attempt to quantify the contribution of each factor of production to output growth. The productivity growth that cannot thus be explained, called the residual, has been attributed to technical change. Growth is thus decomposed into movements *along* a production function (representing a certain technology), and shifts *of* the production function (indicative of a change in technology). If this sounds plausible for small, marginal changes, Nelson[1] has already drawn attention to the absurdity of the attempt to extrapolate the procedure to major changes such as we have witnessed over the postwar period.

The second question warranting additional research takes us further back, into the great "Capital Debate" between Cambridge (U.S.) and Cambridge (U.K.). The conclusion was that the neoclassical attempt to base a theory of distribution on the theory of production was fatally flawed: even under competitive equilibrium conditions, the remuneration of capital is not determined by its marginal productivity, because the definition of a quantity of capital presupposes determination of the distributional variable. This conclusion vitiates much of the growth accounting exercise, because the calculation of a stock of plant and equipment—at first sight purely physical entities—involves a nontechnical factor like the rate of return. Multifactor productivity studies, however, continue to calculate a stock of capital (or a flow of capital services) by virtue, as C. E. Ferguson put it, of an "act of faith": "The question that confronts us is not whether the [British] Cambridge Criticism is the-

oretically valid. It is. Rather the question is an empirical or econometric one: is there sufficient substitutability within the system to establish neoclassical results? . . . Until the econometricians have the answer for us, placing reliance upon neoclassical economic theory is a matter of faith."[2] It is somewhat disconcerting to find the current productivity research pursued as if the Cambridge U.K. school had never existed.

Some relief from these attacks on the very legitimacy of growth accounting models may be forthcoming from the sophistication of more recent econometric techniques. Much of the capital debate concerned the circularity of reasoning in the neoclassical theory, attacking its explanatory power, but perhaps not its descriptive power. To our knowledge, however, none of the partisans of the growth accounting techniques has made this case. Most of the technical debates to date—for example, those surrounding the replacement of Laspeyres and Paasche indexes by Divisia indexes—are by comparison of limited import.

The basic problem posed by such theoretical interrogations concerns the usefulness of the neoclassical paradigm for dynamic analysis in conditions of real-world complexity. As Joan Robinson has written,[3] there is something inherently wrongheaded in trying "to find out from the record of what actually happened, what growth of output *would have been* if the value of capital had grown as much as it did without any technical progress having taken place." The value for long-term analysis of the distinction between shifts of and along a production function seems at best extremely limited.

The concrete problems of a choice of productivity indicators are thus posed against a backdrop of vast theoretical disputes; and the latter permeate the former. The usefulness of multifactor indexes, on the one hand, in attempting to define quantities of the different inputs, is limited by the need to assume that factors are remunerated at their marginal product. If this assumption is of dubious legitimacy for capital, the case of labor is not simple either. Obviously, different qualities of labor have different productive potentials; but it is much less clear that relative pay reflects these differences.

The use of simple labor productivity indexes, on the other hand, is theoretically uncontroversial. But their use does little to reduce the productivity puzzle to its purely quantitative dimension. The substitution of capital for labor must be somehow incorporated into the analysis. Relying on labor productivity, therefore, supposes the development of a model of accumulation, which the neoclassicists thought they had provided.

Beyond these properly economic disputes, there is also confusion over broader issues.

Measures of output, including those of the Bureau of Labor Statistics, are often approximate, especially in the many industries with no clearly defined products or quality range. In an extreme case, that of the computer equipment industry, the difficulty of the task of measuring quality change has led to total capitulation, and the price deflator is conventionally set at 1, as if there had been no qualitative improvement at all since the birth of the computer industry. Some, not implausible, estimates of quality changes in this industry can be shown to boost output measures so much that the productivity lag for manufacturing disappears entirely.[4]

The rapid development of the service sector aggravates this problem. It is remarkable that as we narrow our focus from GNP, to private business sector output, and further to manufacturing output, the productivity slowdown appears progressively less dramatic. This seems perhaps normal, when one contrasts automation trends in manufacturing with those of service industries like shoe-shining. But the image of a technically backward service sector is belied by the example of computerization in telecommunications, banking, and insurance.

Two hypotheses thus compete in explaining the difference between the roles of manufacturing and services in the productivity slowdown. The first is that we mismeasure and underestimate service output; pushed far enough, this hypothesis could lead to the argument that there has been no serious productivity lag. Against such skeptics, it can, however, be shown that in the manufacturing sector, too, and in particular in many industries where measurement problems are least important, there seems to have been a significant productivity slowdown. The second hypothesis reverses the perspective, to emphasize the collapse of the service sector's apparent productivity. Could this reflect a real breakdown

Books reviewed

Jerome Rosow, ed., *Productivity: Prospects for Growth.* New York, Van Nostrand Reinhold, Work in America Series, 1981, 340 pp. $19.00.

Ali Dogramaci and Nabil R. Adam, eds., *Aggregate and Industry-Level Productivity Analysis.* (Volume 2 of Studies in Productivity Analysis.) Hingham, Mass., Martinus Nijhoff, 1981, 195 pp. $25.00

Vernon M. Buehler and Y. Krishna Shetty, eds., *Productivity Improvement: Case Studies of Proven Practice.* New York, AMACOM, American Management Associations, Inc., 1981, 273 pp. $19.95.

Stephen Hill, *Competition and Control at Work: The New Industrial Sociology.* Cambridge, Mass., Massachusetts Institute of Technology Press, 1981, 280 pp. $25.00 cloth, $9.95 paper.

in the efficiency with which this sector performs its mediating and informational functions? Unfortunately, little research has been conducted on the industrial dynamics of these functions.[5]

Deeper conceptual problems are not absent here either: how should we treat nonmarket goods? Pollution control expenses are commonly included in the cost side of production, but are difficult to include in the output side as, for example, clean air. Do market prices bear sufficient relation to utility to justify our reliance on them for evaluating economic performance? There is a venerable tradition of rejecting output (and therefore productivity) statistics as irrelevant to real welfare. The rub, of course, is that even if the data reflect the specifically market forms of welfare calculation, it is such calculations which orient real-world decisions. As limited as these measures are, they therefore have a key role to play in analysis.

The Rosow and Dogramaci/Adam volumes give these problems but scant attention.

Looking for scapegoats

Beyond the conceptual and measurement difficulties, there has nevertheless probably been a fall in labor productivity growth rates. This deceleration is sufficiently important in a large enough range of indicators, both aggregate and industry level, to overcome most skepticism. Do we have an explanation for it?

In the aggregate data, the slowdown is particularly dramatic since 1973. In the total factor productivity framework, this shows up as a precipitous decline in the main factor contributing to growth, the residual. This fact alone should be sufficient to show that Edward F. Denison's interpretation of the residual as primarily reflecting advances in knowledge cannot be sustained.[6] Whatever slowdown one may imagine taking place in research and development, the accumulation of knowledge can hardly be imagined to have braked so suddenly.

A first hypothesis might be that companies today treat labor as a quasi-fixed factor, and that therefore the adjustment of employment to production is slower than it used to be. This has been verified statistically, and many of the contributors to the Buehler/Shetty volume claim that increased labor flexibility is the key to increasing corporate profitability. While this may explain a certain (downside) volatility of productivity ratios over the shorter period, the question remains as to why the slowdown persists.

Indeed, the U.S. debate has been characterized by a great resistance to the idea that the recent recessionary trends could be other than purely cyclical or exogenously generated. Jorgenson,[7] in *Productivity: Prospects for Growth* and elsewhere, develops the exogeneity thesis, arguing for the importance of energy prices in explaining the slowdown. The data are far from showing this; but, above all, one would want to ask: why have the major economies proved themselves to be so incapable of surmounting such a handicap? The vigor of the upturns in GNP growth since 1973 has slowed recognition in this country that the long-term growth path has been shifted downward.

Under the title "Free the Fortune 500," Weidenbaum presents the now-classic case for assigning the role of chief culprit to government regulation. No statistics, and certainly not Denison's, have been advanced to substantiate his claim. The text is a candidly ideological manifesto that gives the reader a glimpse into the mind set of the recently resigned head of the Council of Economic Advisers.

The most serious candidate for blame is capital formation—the object of a study by Norsworthy and Harper in *Aggregate and Industry-Level Productivity Analysis.* The proportion of GNP going to investment has been remarkably stable over the last decade, but as GNP growth has slowed, so has capital formation. Other data in this contribution indicate that the price of capital services sharply accelerated from 1973, almost reaching the rate of increase in hourly labor compensation. The combination of higher interest rates, massive increases in the labor force owing to the arrival of the baby-boom generation and to the "mobilization" of women, as well as more direct pressure on real wage levels, may have thus led to such a cheapening of labor relative to capital as to slow the substitution of the latter for the former.[8] The principal difficulty with these explanations of the productivity slowdown is that the reduction in investment *flows* only marginally affects the "productivity" of the *stock* of capital. A further hypothesis is explored by Alfred Neal in *Productivity: Prospects for Growth*; he blames "excessive" taxation for insufficient investment. The argument is weakened by the ubiquity of the slowdown in countries with widely different taxation trends. Energy costs have also been incriminated, their rise rendering redundant a certain fraction of the capital stock because of energy/equipment complementarities.

Any or all of these factors may have played a role, but a key lesson from John Maynard Keynes seems to have been forgotten: the "animal spirits" of the investor will surmount many such obstacles if the weather forecasts for the business climate are good.[9] In particular, that somewhat tired old culprit, deficiency in savings, cannot constitute a real brake in a modern economy in which investment is financed on a credit-based, forward-contract system. If business prospects are good, low levels of retained corporate earnings will be supplemented by extra external finance, and a lack of deposits in the lending institutions will be overcome by money-creating credit.

The problem would thus appear to be systemic rather than localized. Any particular difficulty can be surmounted, and, often, transformed into a stimulus. The search for the origin of, and the cure for, the productivity "problem" has therefore recently turned to management and labor, the major actors in a socioeconomic system, the dynamism of which may be faltering.

The role of management

The link between productivity and management is difficult to establish because product change and marketing flexibility are often more direct determinants of commercial survival and success than the technical efficiency with which a firm produces a hypothetically stable product. Accordingly, management itself tracks profitability rather than the more abstract notion of productivity.

The second part of Productivity: Prospects for Growth discusses a number of management problems related to the productivity issue. The principal area of analysis is the dynamism of technological change in the firm. Diebold sketches the (well known and still) fascinating account of the Office of Tomorrow, with a refreshingly pragmatic touch as to the limits both of the current technology and above all of its impact on office-work productivity. This contribution is valuable in reminding us that the availability of new technologies does not guarantee their rapid implementation—the delays are often measured in decades. Furthermore, implementation does not guarantee improvement of the standard productivity indexes, for new technologies create new tasks.

Other contributions include a disappointingly low-key union assessment of technological trends by Donahue, somewhat in contrast with the more thought-provoking piece by Oswald, AFL-CIO research director, on the general productivity question. The contribution of John Donnelly, the chairman of Donnelly Mirrors, Inc., is useful in outlining one manager's perception of the importance of practical labor-management cooperation in the framework of a Scanlon Plan.

This latter approach to labor, seeking to transform the presence of unions from a handicap into an advantage for corporate competitiveness, is in sad contrast to the approaches outlined in the case study volume published by AMACOM (a division of American Management Associations). The reader cannot but be impressed by the presence of such important companies as Kaiser Aluminum and Chemicals, Hughes Aircraft, and Burger King, even if the papers themselves are disappointingly short and lacking in detail. The message is basically that productivity demands more Taylorism, more control, more incentive pay schemes, and a small dose of Japanese-style Quality Circles. The last are designed to capitalize on workers' intimate knowledge of the production process. The Quality Circle view, in contrast to the "quality of worklife" philosophy to which Rosow and others allude, excludes any commitment to real cooperation in which the gains of labor would not be premised on the *prior* increase of company profits.

Some cracks do, nevertheless, appear in the management orthodoxy. Nucor Corp. insists on the importance of job security and has implemented group bonus schemes that include foremen and maintenance crew. Crompton Co., Inc., has instituted a 36-hour, 3-day workweek paid 40 hours. Hughes Aircraft declares its commitment to designing "meaningful" jobs by enlarging the range of tasks.

The union contributions by Cass Alvin of the AFL–CIO echo somewhat alone in this landscape. The conservatism of his interlocutors would indeed seem to constitute a major handicap in putting the United States back onto the map of innovative entrepreneurship. Abernathy, Clarke, Hayes, and Kantrow[10] have recently launched a major critique of this conservatism. They attribute the decline in the relative strength of U.S. companies to the short-term, bottom-line myopia of corporate decisionmaking. Overemphasis on quarterly and annual results, according to the Harvard authors, cripples American corporations' capacity for long-term technological programming. Symptomatic of the disease is the U.S. managers' tendency, perfectly explicit in the case studies, and above all in the "Free the Fortune 500" contribution, to interpret every constraint on their prerogatives as an intolerable shackle on individual creativity. Whence the paradox: in the United States, where Government intervention and unions are smaller and weaker than in most other developed countries, the blame attributed to Government and unions in causing the current crisis is greatest.

The difficulty, of course, with this critique of management, is that in less expert hands it can easily slide into the same "blame the victim" mode that constitutes one of management's own shortcomings. Can one sustain the argument that the current economic woes of the United States are principally due to a particularly incompetent group of managers? Is not their myopia the most rational programming strategy in a period of great uncertainty? Is it not the flip side of the flexibility of operations that European managers so envy? Is not long-term technological programming vastly easier for those in second place who are imitating the frontrunner?[11]

Alternatively, one could perhaps hypothesize that the cyclical characteristics of capitalist growth can be dampened in the shorter term but not eliminated. The problem is thus rephrased: in the current worldwide recessionary climate the only way to limit the cost of the market system's congenital myopia is by aligning short- and long-term prospects. Such a reconnection implies a

stabilization of macroeconomic conditions. Because markets are in themselves unable to provide such stability, capitalist growth seems to necessitate its imposition by non-market forces, via the further institutionalization of social consensus and conflict-resolution mechanisms.

The role of labor

The frequency with which incentive pay schemes are mentioned by the contributors to the case studies is perhaps not to be simply attributed to the blame-the-victim syndrome. Assuring the cooperation of labor is a major permanent task; poor labor relations can be very costly in terms of excess supervisory personnel, of under-performance of workers, of underutilization of plant, and of lack of product quality and timeliness. If these costs are less important than those associated with a deficit of technical and organizational adaptation, they are by no means negligible.

Stephen Hill's book presents a valuable framework for the analysis of these problems. Written from an English perspective, but with a solid grasp of U.S. developments, its dual reference to Max Weber and to a context where class conflict is manifest could prove a tonic for a U.S. audience. Especially in the current period when labor leaders have rediscovered the pertinence of a "class war" rhetoric.

U.S. industrial sociology has been dominated by a Durkheimian perspective which privileges the reproduction of a community of values. The absence of consensus thus constitutes the horizon of much social thinking: conflict is ever present but always on the horizon, beyond theoretical grasp. This approach contrasts with that of Weber, for whom the conflict of interests is the starting point of social analysis.

The fundamental hypothesis of Hill's work is that antagonistic interests compete within the firm. This conflict is not just over income distribution, but also over power, and in particular allocative power on the shop floor (work rules, staffing patterns and levels, work intensity, and so on). The fact that U.S. unions are seen as having de-emphasized allocative struggles in exchange for concessions in income distribution should not, in Hill's view, be interpreted as implying that shop-floor conflicts can be relegated to the status of a problem of maintaining consensus within the unions. The basic separation of ownership or control and productive activity—as opposed to their unity in a cooperative system—makes competition and conflict primary, if not permanent, features of the capitalist firm.

Hill's Weberianism is not the diluted version to which U.S. audiences are accustomed. Power within the capitalist firm is inexorably asymmetrical. The wage relation is a power relation, not just a "contract," because the worker, while free not to enter this or that *particular* employment contract, must enter *some* contract on pain of distressing unemployment. (Milton Friedman's identification of Capitalism and Freedom rests on obscuring the general constraint in order to vaunt the freedom of its particularity.)

This leads to an interesting if somewhat fragmented discussion of Taylorism that contrasts favorably with what one often finds in the U.S. literature. Hill follows much of the recent research which characterizes Taylorism as an expression of this asymmetry in the labor process: management control over the immediate labor process is gained at the expense of craft-type worker autonomy. But he tempers this account by a discussion of the limits of Taylorism: its partial adoption in management circles, the resistance of workers to its effects, and, most importantly, the fact that the production process always necessitates some degree of cooperation—even within the framework of conflict.

The conflictuality of labor-management relations is, in this perspective, somewhat independent of the degree of institutionalization taken by the forms of its resolution. By contrast, U.S. discussion of quality of worklife programs seems hampered by the assumption that *cooperative* and *adversarial* relations can and should be two totally distinct modes of labor-management interaction. It is as if an overly consensual (and individualist) ideology blocked recognition by management and by unions that plant-level conflict was healthy and that cooperative moments *within* this conflictual relation were perfectly normal. Whence a fruitless polarization between the cynics and the naive.

The import of such research for the productivity puzzle is considerable, for many discussants locate the root of productivity decline in shop-floor tensions. The value of Hill's work is to remind such "radicals"—who appear at all points of the political spectrum—that growth in capitalist economies is not a zero-sum game. Workers' gains are not simply capitalists' losses, because in the longer run such gains are one of the most potent stimuli to technical change and hence to productivity growth. Whether worker resistance plays this role depends on the dynamism of the system.

The dynamism of socioeconomic systems

The productivity puzzle is a valuable indicator of the current state of economics, reflecting this discipline's difficulties—heoretical, quantitative, historical, and sociological. Richard Nelson has drawn the uncomplimentary parallel with the drunk looking for his lost watch under the lamp post "because that's where the light is." But why is the economics profession tipsy? Part of the reason may be its excessive focus on formulating policy recommendations, an objective not always conducive to major theoretical research.

The role played by this policy focus might, however, shift from debilitating to revivifying. The urgent need

for vigorous policy remedies to current economic problems will not, we believe, be satisfied by a reliance on the automaticity of market adjustments. The demand for serious policy may thus, indirectly, become a stimulus for the revival of those theoretical trends that have for too long been relegated to the margins of economic theory: the heterodoxies of institutionalist and "fundamentalist" Keynesian theories.

The most fruitful areas of research may be at the intersection of Joseph Schumpeter and Nelson, in its proximity with that developed by certain French researchers[12] along the lines suggested by Michel Aglietta.[13] It would associate the analysis of macroeconomics to that of social institutions, going beyond the neoclassical, market-centered model by breaking with its implicit assumption that real developments, such as a productivity slowdown, can be accounted for by the juxtaposition of purely exogenous shocks and the spontaneous equilibrating market mechanism.

Market mechanisms need to be integrated into a historical model that explains their (always limited) pertinence to any given epoch. Periods of economic history are thus distinguished according to their money-creation regimes, wage-setting institutions, price determination mechanisms, and international trade hierarchies. The coherence of these social forms with the dominant macroeconomic relations of productivity and income growth—"deepening" or "widening" modes of accumulation—assures a harmonious balance in the expansion of output and demand; their incoherence generates a protracted, Kondratieff-like period of instability.

Periods of coherence naturally exhaust their dynamism. Tensions accumulate. The diffusion of finite sets of organizational and technological innovations reaches higher plateaus. Virtuous circles become vicious. No meta-auctioneer guarantees the timely replacement of failing system-stabilizers.

In such a perspective, the downward shift in growth paths, of which the productivity deceleration is but a symptom, is attributable neither to a single cause nor the accidental conjunction of several causes. Longer downswings are part of our economic history, as the system exhausts and then recreates the social-structural conditions of accumulation.

Economic history, the real history of cycles, short and long, of accumulation and crashes, is made in the interstices of "economics" as Academia currently imagines it. At least, such might be the lesson of the productivity puzzle. □

FOOTNOTES

[1] Richard R. Nelson, "Research on productivity growth and productivity differences: dead ends and new departures," *Journal of Economic Literature*, September 1981, pp. 1029–64.

[2] C. E. Ferguson, *The Neoclassical Theory of Production and Distribution* (London and New York, Cambridge U.P., 1969).

[3] Joan Robinson, *Contributions to Modern Economics* (New York, Academic Press, 1978).

[4] Unpublished paper by Michael J. McKee of the Council of Economic Advisers staff.

[5] But see Robert S. Cohen, *The Internationalization of Capital and U.S. Cities* (Ph.D. dissertation, New School for Social Research, 1979), and Thomas Stanback Jr. and Thierry Noyelle, *Services/the New Economy* (Montclair, Allanheld, Osmun, 1981).

[6] Edward F. Denison, *Accounting for Slower Growth* (Washington, The Brookings Institution, 1979).

[7] Dale W. Jorgenson, interview, *Challenge*, November-December 1980, pp. 16–25. Note, however, that the rate of capital/labor substitution does not seem to have slowed in manufacturing.

[8] Gregory Schmid, "Productivity and Reindustrialization: A Dissenting View," *Challenge*, January-February 1981, pp. 24–29.

[9] Martin Baily, "Productivity and the Services of Capital and Labor" (*Brookings Papers on Economic Activity*, 1, 1981) discusses this hypothesis in relation to Tobin's *q* ratio between market valuation and replacement costs of capital. The practical import of the Cambridge U.K. position may lie in the modeling of the tensions generated by the real-world gap between the competing *financial* estimates of capital stocks approximated in *q*'s numerator and denominator.

[10] William J. Abernathy, Kim B. Clark, and Alan M. Kantrow, "The New Industrial Competition," *Harvard Business Review*, September-October 1981, pp. 68–81; and William J. Abernathy and Robert H. Hayes, "Managing Our Way to Economic Decline," *Harvard Business Review*, July-August 1980, pp. 67–77.

[11] Robert Z. Lawrence, *Phase 1 Report: International Trade, to the National Science Foundation. Essay number two: Trade performance patterns*, unpublished paper, (Washington, The Brookings Institution, April 1982).

[12] See, in particular, Robert Boyer and Pascal Petit, "Employment and Productivity in the EEC," *Cambridge Journal of Economics*, Vol. 5 No. 1, March 1981, pp. 47–58. Also see Robert Boyer, "Wage Formation in Historical Perspective: the French Experience," *Cambridge Journal of Economics*, Vol. 3, No. 2, June 1979, pp. 99–118.

[13] Michel Aglietta, *A Theory of Capitalist Regulation: the U.S. Experience* (London, N.L.B., 1979).