## APPENDIX B

### Data

$W$ = the percentage change in compensation per hour in the private business sector.

$U$ = unemployment rate of all workers.

The source of the percentage change in compensation per hour in the private business sector for 1980 is *Economic Indicators*, April 1981. The source of all other data above is the *Economic Report of the President*, 1981.

ROBERT M. COSTRELL

# Overhead labor and the cyclical behavior of productivity and real wages

Orthodox supply-side theories of short-run employment fluctuations are generally based on the short-run marginal productivity theory (SMPT) of the inverse relationship between real wages and employment, dating at least from Marshall.[1] Two types of evidence have been adduced to challenge the SMPT: (1) direct evidence on real wages has failed to establish a systematic countercyclical pattern;[2] and (2) evidence on average labor productivity has convincingly established a systematic procyclical pattern.

With regard to the first type of critical evidence, the adherents of SMPT have taken solace in the critics' failure to establish a *pro*cyclical wage pattern. My objective, however, is to refute the somewhat more serious response which proponents of SMPT have accorded the nagging evidence on productivity.

There is widespread agreement that labor productivity[3] has indeed behaved procyclically throughout the postwar period, in this country as well as abroad. This has been summarized for the United States in Okun's Law that a 1 percent change in employ-

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[1] See Keynes (1939) for a history of the doctrine from Marshall to 1939, pp. 35-40.

[2] These studies date from the late '30s, when Dunlop and Tarshis presented evidence purporting to show that real wages move procyclically. For more recent evidence, see Bodkin (1969).

[3] Throughout this paper "productivity" will denote average productivity, except when modified by the term "marginal."

ment is associated with a 3 percent change in output. Hultgren's careful study of the first several postwar cycles provided a more detailed picture of the procyclical pattern, breaking the cycle down into phases.[4] Nerlove surveys a number of studies with estimated output elasticities in excess of unity.

The challenge to SMPT is thus well established. As Fair says, "This rather universal finding is contrary to what would be expected from the law of diminishing marginal productivity of classical economic theory, and Solow has commented that it is one of two main paradoxes, 'whose resolution would be a major step toward the unification of long-run and short-run theory'" (1969, pp. 1-2).[5]

Briefly stated, the "paradox" (or more properly speaking, the anomaly) is this: the cyclical evidence that average productivity rises with more labor. *ceteris paribus*, implies that average productivity is less than marginal productivity. But if labor receives its short-run marginal product, then its distributive share overexhausts output.

It is commonly believed that the overhead labor hypothesis (OLH) can resolve the "paradox" and defend SMPT from the challenge of the procyclical productivity data. The contribution of this paper will be to demonstrate theoretically that this claim is false.

Section I briefly reviews several of the conceivable interpretations of the productivity pattern but notes how they are inappropriate for resolving the "paradox." In Section II, which is the heart of the paper, I will turn to the overhead labor hypothesis and demonstrate that this hypothesis is also incapable of reconciling SMPT with the productivity pattern. In Section III I will briefly discuss the ramifications of abandoning SMPT,[6] particularly how the interpretation of the productivity pattern becomes more tractable. I will conclude with a few remarks on the theories of cyclical fluctuations in employment and real wages.

[4] See Hultgren (1965, pp. 39-42).

[5] The citation there is from an unpublished paper by Solow.

[6] In the interest of avoiding misinterpretation of motives, I should say that unlike many friends and foes of marginal productivity theory, I see no ideological stakes involved in its success or failure. J. B. Clark to the contrary notwithstanding, it simply does not say that each class gets what it contributes to output. This is particularly obvious in the case discussed in Note 11.

In its long-run form marginal productivity theory requires only cost minimization and constant returns. It is therefore consistent with many different theories and ideologies. In any case, I am here attacking only its cyclical version. Its long-run form may well be immune to the argument of this paper.



## I. Some possible interpretations of the procyclical productivity pattern

The simplest neoclassical interpretation of the procyclical productivity pattern[7] is to suppose that movements along the short-run production frontier are characterized by increasing marginal productivity of labor. More specifically, one can consider a putty-clay model which distinguishes between the (long-run) production function and the (short-run) utilization function.[8] The short-run elasticity of output with respect to labor is often assumed to be unity in such models; but if production calls for teamwork (e.g., an assembly line), it may well exceed unity.[9] Such an interpretation of procyclical productivity, however, could not be reconciled with SMPT, since short-run marginal productivity payments would outrun output.

Two other common interpretations of the productivity pattern focus on cyclical variations in intensity of effort. The first such interpretation, often associated with Marx's theory of the industrial reserve army, considers the state of the labor market as a determinant of the state of discipline on the shop floor.[10] In neoclassical terminology we would measure labor in efficiency units, and this argument would take efficiency units per worker as a function of the level and/or rate of change of unemployment. Such a formulation may well imply procyclical variations in average productivity per worker (not per efficiency unit), though typically it would also imply procyclical marginal productivity per worker, contrary to the usual version of SMPT.[11] In any case, one rarely finds ad-

[7] See also Kuh's discussion of possible explanations for the productivity phenomena (1965, pp. 7-9), and Fair's review of the literature (1969, chap. 2).

[8] See Soligo (1966), for an application to the productivity question. I am grateful to Gerry Duguay for impressing on me the significance of this argument and to John Pettengill for improving my formulation of it.

[9] If cyclical employment variations bring in and out of operation plants of older vintage and lower average productivity, then this argument is vitiated. To consider the argument in the text, we must be willing to assume that there exists excess capacity in plants of recent vintage, so older vintages are never used.

[10] See Boddy and Crotty (1975).

[11] It is possible for average and marginal productivity to move in opposite directions due to variation in efficiency units per worker. The condition under which this will occur is that the marginal product of labor be elastic with respect to labor (inelastic demand for labor). With a stable neoclassical production function, it has been shown that this would require the elasticity of output with respect to capital to exceed the elasticity of substitution. Under SMPT such conditions would imply that total wage payments are unambiguously reduced by labor-augmenting technical progress, speedup, and

herents of SMPT defending it with this type of argument about the social determinants of the production frontier.

It is far more common to interpret cyclical variations in intensity of effort as deriving from *general* labor hoarding[12] (to be distinguished from the argument below about hoarding *specific* labor—overhead labor). This view holds that costs of firing and rehiring workers discourage employers from responding completely or immediately to variations in demand.[13] In the slump firms cut output rather than build inventories, presumably because of high storage costs or interest costs on early purchases of materials, or in some industries, because of the specificity of batch-order production. As a result productivity falls, since firms reduce output without appreciably reducing employment. Formally the employers have chosen to move inside the production frontier.[14]

Although general labor hoarding may well be a significant factor in the procyclical productivity pattern,[15] it is certainly incompatible with SMPT. The short-run marginal productivity of labor is defined for a given point *on* the production frontier, but labor-hoarding firms are *inside* the frontier. Clearly, marginal productivity payments are nonsensical when additional output does not require more labor. Indeed, presentations of the labor-hoarding hypothesis explicitly distinguish between hours worked and hours paid for.[16]

## II. The overhead labor hypothesis

We now turn to the central issue of this paper, the attempt to reconcile the productivity pattern with SMPT by means of the overhead labor hypothesis (OLH). This argument is widely believed to have resolved the "paradox." For example, at least one leading macrotext, by Branson, has presented the OLH as the definitive resolution of the anomaly (1979, pp. 135-39). It may then be of

employment growth. It can also be shown to imply that under such conditions, total profits are unambiguously reduced by capital-augmenting technical progress and by capital accumulation.

[12] See Pettengill for a good discussion of this argument's shortcomings.

[13] Note that the very phrasing of the hypothesis suggests the difficulty in reconciling it to supply-side theories.

[14] For example, see Dornbusch and Fischer (1978, p. 348).

[15] Though some evidence suggests that productivity is still procyclical even after correcting for labor hoarding. See Pettengill. Sims (1974), however, presents results which suggest that man-hours adjust to demand variations by the end of six months.

[16] See Fair (1969) and also Kuh and Schmalensee (1973)



some significance if it can be demonstrated theoretically that the proposed reconciliation is internally inconsistent.

### *The proposed reconciliation*

The OLH was inspired by the argument in Walter Oi's 1962 paper, "Labor as a Quasi-Fixed Factor." Oi did not address himself directly to the productivity question but rather to the fact that some types of employment are less variable than others or, to use his term, have a higher degree of "relative fixity." His explanation of that difference was based on the argument that it is more costly for a firm to fire *some* types of labor in the slump and rehire in the boom, since the hiring and training expenses might be lost to the firm. In particular, those workers with high hiring and training costs—scarcer and more highly paid workers—should be treated as a quasifixed factor.

In support of his theory he presents evidence that, indeed, "the wage rate of an occupation is [inversely] associated with its percentage change in employment. Low-wage occupations, corresponding to low degrees of fixity, do experience relatively greater changes in employment" (p. 549). Without being so detailed as Oi, we can follow common practice in bifurcating the labor force into production workers and nonproduction (overhead) workers. (See the Appendix for the *n*-input generalization.) Overhead workers get paid more than production workers, and their employment is relatively more fixed. For example, in 1977 office workers averaged over all industries received 43 percent higher compensation per hour of work than nonoffice workers. In manufacturing (where office workers are defined to be identical with nonproduction workers), the figure was 51 percent.[17]

To be sure, these data may perhaps be explained by factors other than hiring and firing costs. What is relevant here, however, is the well-established fact that the employment of some workers—the highly paid workers—is less sensitive to cyclical fluctuations than the employment of low-paid workers.

This overhead labor phenomenon should be carefully distinguished from the view of *general* labor hoarding mentioned above. That view suggests that *every* type of labor is quasifixed and thus waters down the original differentiation between types of labor. The significance of this distinction is that general labor hoarding takes us inside the production frontier. On the overhead labor hypothesis, however, relative fixity of overhead (nonproduction) labor is compensated by adjusting variable (production) labor to the

[17] *Handbook of Labor Statistics*, table 132.

requirements of demand, keeping us *on* the production frontier. This difference has led some to believe that OLH can claim compatibility with SMPT, while general labor hoarding cannot.

To understand this claim, let us take OLH in its simplest (and strongest) form, where output ($Q$) is a function of capital[18] ($\bar{K}$, fixed), production labor ($P$), and nonproduction labor ($\bar{N}$, fixed). Figure 1 shows the alleged cyclical pattern of several variables, measured in percentage deviation from their cyclical means.[19] $P$ supposedly varies more than $Q$, so that marginal and average pro-

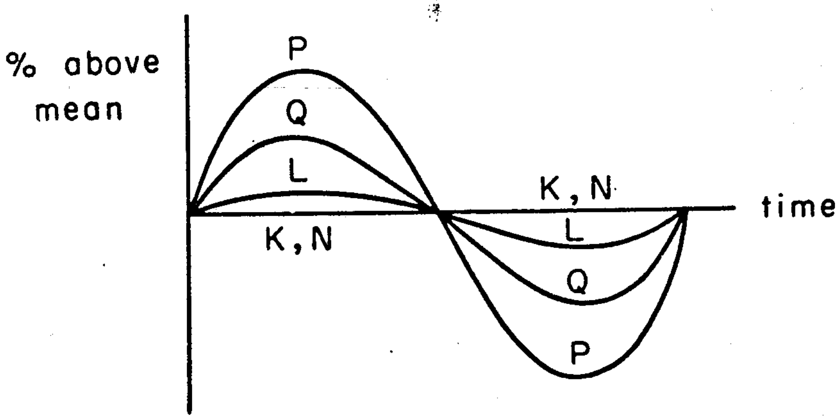
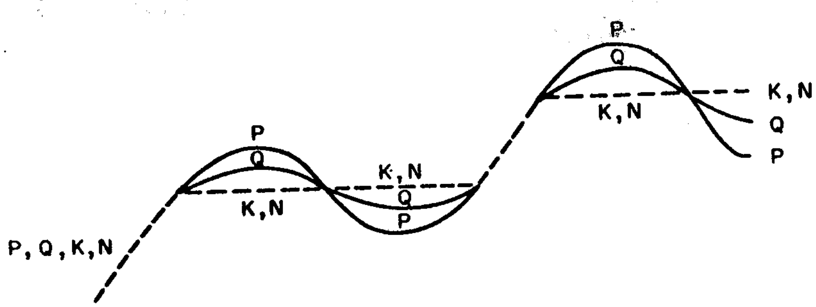



Figure 1

The overhead labor hypothesis

[18] In presenting this neoclassical model, I do not mean to suggest that the concept of aggregate capital is problem-free. My critique of SMPT is internal to neoclassical theory. It should be noted, however, that the problems of defining MPL over the cycle, where the array of capital goods may reasonably be considered fixed, are less severe than in long-run theory.

[19] To allow for growth cycles, the diagram could be modified along the lines of the theory of irreversible investment put forth by Arrow. The figure below shows capital and nonproduction labor treated identically (the hatched path). They are constant on "blocked" intervals and rise on "open" intervals.






ductivity of production workers move countercyclically in an orthodox fashion. Since $\bar{N}$ is fixed, however, it is argued that total labor, $L(\equiv \bar{N} + P)$, could vary less than output. Therefore, as Branson says, "we may see average labor productivity rising as the marginal productivity and real wage of production workers fall, due to the overhead labor phenomenon" (1979, p. 139).

More formally, we can write the production function as suggested by Branson:

$$Q = F(P, \bar{N}, \bar{K}). \tag{1}$$

This function, representing the underlying technology, is linearly homogeneous. Therefore the elasticity of output with respect to production labor, $\eta_P$, is less than unity.

It is then, however, suggested that we may not be able to directly observe $\eta_P$, a characteristic of the function $F(P, \bar{N}, \bar{K})$, with disaggregated inputs. Instead the anomalous productivity data measure characteristics of a more aggregated production function, $G(L, \bar{K})$.

Since $\bar{N}$ is fixed, $P$ and $\bar{N}$ can be (theoretically, if not empirically) inferred from total labor, $L$. Therefore $G(L, \bar{K})$ is indeed univalent and we can legitimately write

$$Q = G(L, \bar{K}) = F(P, \bar{N}, \bar{K}). \tag{2}$$

The functions are related by $G_L = F_P$, i.e., the observed variation in output due to variation in total labor, $G_L$, actually measures the marginal productivity of production workers, $F_P$. That is, the marginal worker *is* a production worker, not an overhead worker.

It is then easy to show that the observed elasticity of output with respect to total labor, $\eta_L$, will exaggerate the (allegedly) unobserved elasticity with respect to production labor alone, $\eta_P$.

$$\eta_L \equiv \frac{L}{Q} \cdot G_L = \frac{L}{Q} \cdot F_P = \left(\frac{L}{P}\right) \cdot \left(\frac{P}{Q} \cdot F_P\right), \tag{3}$$

or

$$\eta_L = \left(1 + \frac{N}{P}\right)\eta_P. \tag{4}$$

In particular, the observed elasticity $\eta_L$ may exceed unity, as we measure procyclical productivity movements, even with $\eta_P < 1$. The conclusion is then drawn that marginal productivity payments to production workers are not inconsistent with procyclical productivity. That is, production workers' observed share in national income, $\theta_P$, may equal their unobserved output elasticity, $\eta_P$, without exhausting output ($\theta_P = \eta_P < 1 < \eta_L$). This is as far as the proposed reconciliation has been developed.

At this juncture I should point out (though it is a digression from my argument) that some analysts claim to have observed $\eta_P$, and that it, too, exceeds unity (though not by as much as $\eta_L$, of course). Hultgren, it seems, first documented the procyclical productivity pattern with reference *solely* to production workers. It was only later that Hultgren expanded his data base to include nonproduction workers. "When all workers are considered," he notes, "the procyclical pattern is even more strongly marked" (1965, p. 39). So his data support the idea that OLH is *part* of the productivity explanation but by no means all of it—the pattern is evidently marked enough without considering nonproduction workers. This evidence shows up again when Kuh derives decidedly non-neoclassical results from regressions with production employment alone. In what follows, however, we will draw out the implications of supposing that $\eta_P$ is indeed less than unity.

### *The reconciliation fails*

We have discussed the relationship between the output elasticity of *total* labor and the distributive share of *production* labor under the proposed reconciliation. The question which immediately arises concerns the relationship between the output elasticity of total labor, $\eta_L$, and the distributive share of total labor, $\theta_L$. The answer will immediately debunk the proposed reconciliation.

We adopt the notation that an overhead worker's payment is "salary," $s$, and a production worker's payment is the "wage," $w$, both in real terms. Therefore

$$(5) \qquad \theta_L \equiv \frac{wP + s\bar{N}}{Q}.$$

The proposed reconciliation supposes $\eta_L > 1 > \theta_L$, while $w = F_P$. (Note that the following demonstration, and one of its generalizations in the Appendix, do *not* require us to assume short-run marginal productivity payments to overhead workers.) Then, from (3) and (5), we have

$$(6) \qquad \eta_L = \frac{F_P L}{Q} = \frac{wL}{Q} = \frac{wP + w\bar{N}}{Q} > 1 > \theta_L = \frac{wP + s\bar{N}}{Q},$$

which implies $w > s$. Production workers must get paid *more* than overhead labor! (In the Appendix this result is generalized to the case where $N$ is variable, but less so than $P$. For $n$ inputs, a slightly weaker result holds, applicable only to the strong version of SMPT, where *all* workers receive their short-run marginal product.)



In other words, since the marginal worker is a production worker, the output elasticity of total labor measures the share *as if all* workers received the production workers' marginal product. This hypothetical share exceeds the actual share only if production workers get paid more than overhead labor.

This is exactly the reverse of Oi's original proposition, not to mention all the available evidence. Indeed, in discussions of the OLH, overhead labor has been variously identified as management, foremen, and office workers.[20] There can be little doubt that overhead labor is in fact more highly paid than the more variable types of labor. The overhead labor hypothesis cannot, therefore, reconcile the productivity pattern with SMPT.

## III. Implications

Since the OLH cannot reconcile SMPT with the productivity data, we can briefly consider the ramifications of abandoning SMPT. In my view this course recommends itself by (a) permitting us to draw on *all* of the productivity interpretations discussed above; and (b) leading us back to Keynesian demand-side theories of employment fluctuations. It would, of course, also leave us with the challenge of developing a new theory of cyclical movements in the real wage.

### *Reconsidering the interpretations of the productivity cycle*

Abandoning SMPT allows us to reexamine the various arguments about the productivity cycle without worrying about the constraint of compatibility with SMPT. The interpretation of the observed productivity pattern thus becomes far more tractable.

We can begin by supposing that the short-run utilization function, discussed above, may be approximated by fixed coefficients. This accords with reverse-*L* cost studies and implies $\eta_P = 1$. This still leaves us considerably short of the usual estimates of the out-

[20] See Dornbusch and Fischer (1978, p. 349); Tatom (1979, p. 6); and Branson (1979, p. 135).

put elasticity, which are on the order of two or three (e.g., Okun's Law).

To this we can add the effect of the overhead labor phenomenon. Equation (4) directs us to the ratio $N/P$ for an empirical assessment of this effect. Insofar as the data on nonproduction versus production workers correspond to fixed versus variable labor, we find that in recent years, $N/P \simeq 0.40$.[21] Thus, according to (4), we could conceivably account for an output elasticity of about 1.40.

Since this still falls short of the usual estimates, one can conclude that cycles in work intensity, discussed above, have a role to play. Whether such cycles are due to variations in discipline or general labor hoarding may be hard to distinguish. Either way, we would find it necessary to relax the strict technical interpretation of the relationship between output and human inputs.

*Cyclical variations in employment and the real wage*

Abandoning SMPT, of course, has profound implications for the debate between supply-side and demand-side theories of short-run variations in employment.[22] Supply-side views argue that employment is directly and uniquely governed by the real wage, and that increases in aggregate demand can only stimulate employment by reducing the real wage (relative to trend). This view is built on SMPT and must be weakened by the failure to reconcile SMPT with procyclical productivity.

Demand-side theories, by contrast, hold that employment is directly governed by firms' perceptions of the vendibility of their product, i.e., by quantity constraints. The real wage does not uniquely govern employment unless it uniquely governs real effective demand. Such a theory can be divorced from SMPT. It may be compatible with any of the explanations of procyclical productivity. For example, Dornbusch and Fischer, in their popular text, call on general labor hoarding to explain the productivity pattern. This leads them to explicitly introduce quantity constraints into the firms' employment and output decisions. Thus they implicitly recognize that to model procyclical productivity, one is obliged to adopt a demand-side theory of short-run fluctuations.

[21] *Handbook of Labor Statistics*, table 76.

[22] Of course, SMPT's demise or triumph is irrelevant to the debate among *long-run* theories of employment. The issue there is more subtle—does demand adjust to supply or supply adjust to demand? See Costrell (1980).



Keynes himself, the quintessential demand-side theorist, felt that his theory could survive quite well without SMPT. To be sure, his presentation in the *General Theory* did embrace SMPT. Unlike supply-side theorists, however, he held that effective demand determines employment, and then, *given* that employment level, competition would somehow bring the real wage into line with the short-run marginal product. He was quite ready to abandon this view of wage determination when Dunlop and Tarshis challenged him with evidence of procyclical real wages. As he wrote in his important, but overlooked, 1939 response,

> it is evident that Mr. Dunlop, Mr. Tarshis, and Dr. Kalecki have given us much to think about, and have seriously shaken the fundamental assumptions on which the short-period theory of distribution has been based hitherto; it seems that for practical purposes a different set of simplifications from those adopted hitherto are preferable. Meanwhile, I am comforted by the fact that their conclusions tend to confirm the idea that the causes of short-period fluctuation are to be found in changes in the demand for labour, and not in changes in its real supply price; though I complain a little that I in particular should be criticized for conceding a little to the other view by admitting that, when changes in effective demand to which I myself attach importance have brought about a change in the level of output, the real supply price for labor would in fact change in the direction assumed by the theory I am opposing—as if I was the first to have entertained the fifty-year-old generalization that, trend eliminated, increasing output is usually associated with a falling real wage. (pp. 50-51)

Thus Keynes was perfectly prepared to drop this bit of Marshallian baggage since it would bolster his demand-side theory against the competing supply-side theories of Pigou et al.[23]

Finally, we note that abandoning supply-side theories in favor of a demand-side theory of employment fluctuations opens up the

[23] His characterization of Pigou's theory is interesting to a modern economist. According to Keynes, Pigou argued that expansionary fiscal policy only increased employment

> by the reduction in real wages covertly effected by the rise in prices which ensued on the increase in effective demand. It was held that public investment policies . . . produced their effect by deceiving, so to speak, the working classes into accepting a lower real wage, . . . (p. 40)

The irony is twofold: (1) "*le plus ce qui change* . . ."; and (2) these days, such "modern" theory is explicitly labeled "Keynesian" (e.g., by Branson)! Such are the tricks the living play on the dead.

question of real wage fluctuations. Keynes, for example, after being disabused of his orthodox view, suggested that "we shall not often go wrong if we treat real wages as substantially constant in the short period" (1939, p. 43). This, of course, is not much of a theory, even if it is true. The issue of why real wages show no pronounced systematic cyclical pattern—procyclical or countercyclical—should go on the research agenda.[24]

[24] See Costrell (1978), especially chaps. 1 and 4, for my own efforts in the theory and estimation of cyclical variations in the real wage.

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## APPENDIX

In this Appendix I extend the result of "The Reconciliation Fails" section in two ways: (i) considering $n$ types of labor instead of two; and (ii) considering the variability of employment to differ only by degree, from one type of labor to another, rather than positing strictly fixed overhead labor. My first result takes both extensions simultaneously but addresses itself only to the strong version of SMPT, where *all* workers receive their short-run marginal product. To treat economies where only the more variable kinds of labor are remunerated in accord with SMPT, we must confine ourselves to the two-input case; but it still generalizes beyond strict fixity of overhead labor, i.e., we can accommodate extension (ii) above.

Suppose there are $n$ types of labor, $L_i$, and that we can uniquely infer $L_i$ from $L$, so we can write $L_i = L_i(L)$. We can define the elasticity of employment of type $i$ with respect to total employment as $\epsilon_i \equiv LL_i^{!}(L)/L_i$. According to Oi, "the wage rate of an occupation is [inversely] associated with its percentage change in employment" (p. 549), which may be formally interpreted to mean that $Cov(\epsilon_i, w_i)$, the covariance between $\epsilon_i$ and the wage of type $i$, is negative. It is now easy to show that the OLH explanation of $\eta_L > 1$ implies $Cov(\epsilon_i, F_i) > 0$, where $F_i$ is the marginal product of type $i$. Thus $\eta_L > 1$ and the strong form of SMPT ($w_i = F_i$, for all $i$) jointly contradict the fact that $Cov(\epsilon_i, w_i) < 0$.

We begin by noting that $\Sigma L_i(L) = L$, so

$$(1) \qquad \bar{\epsilon} \equiv \Sigma a_i \epsilon_i = 1,$$

where $\bar{\epsilon}$ is the population mean of $\epsilon$, and where $a_i \equiv L_i/L$, the proportion of total labor accounted for by type $i$. This expression will be used below.

We can write the "observed" production function, $G$, as

$$(2) \qquad Q = G(L, \bar{K}) = F[L_1(L), \ldots, L_n(L), \bar{K}],$$

where $F$ is, of course, linearly homogeneous. The functions $G$ and $F$ are related by

$$(3) \qquad G_L = \Sigma F_i L_i^{!}(L) = \Sigma a_i \epsilon_i F_i.$$

Therefore we have the observed output elasticity of total labor given by

$$\eta_L \equiv \frac{LG_L}{Q} = \frac{L}{Q}\,\Sigma a_i \epsilon_i F_i > 1 \tag{4}$$

by the overhead labor hypothesis. But Euler's Theorem tells us

$$1 > \frac{\Sigma L_i F_i}{Q} = \frac{L}{Q}\,\Sigma a_i F_i. \tag{5}$$

Combining (4) and (5), we have

$$\Sigma a_i(\epsilon_i - 1)F_i > 0. \tag{6}$$

Finally, using (1),

$$Cov(\epsilon_i, F_i) \equiv \Sigma a_i(\epsilon_i - \bar{\epsilon})F_i = \Sigma a_i(\epsilon_i - 1)F_i > 0 \tag{7}$$

by (6). Thus $\eta_L > 1$ and the strong form of SMPT ($w_i = F_i$, all $i$) jointly contradict the fact that $Cov(\epsilon_i, w_i) < 0$.

For the two-input case, with production labor ($P$) and overhead labor ($N$), we can prove the stronger result that $\eta_L > 1$ and the weak form of SMPT ($w_P = F_P$) jointly contradict the fact that $Cov(\epsilon_i, w_i) < 0$.

To show the contradiction, note first that (1) may be rewritten as

$$a_N \epsilon_N = 1 - a_P \epsilon_P. \tag{8}$$

Note second that relative fixity of overhead labor means $\epsilon_P > 1 > \epsilon_N \geqslant 0$. Thus the two covariances, $Cov(\epsilon_i, w_i) < 0$ and $Cov(\epsilon_i, F_i) > 0$ (by (7)), can be summarized by

$$w_N > w_P = F_P > F_N. \tag{9}$$

Then, from (4), (9), and (8) we have

$$\begin{aligned} \eta_L &= \frac{L}{Q}[a_N \epsilon_N F_N + a_P \epsilon_P F_P] \leqslant \frac{L}{Q}[a_N \epsilon_N w_N + a_P \epsilon_P w_P] \\ &= \frac{L}{Q}[(1 - a_P \epsilon_P) w_N + a_P \epsilon_P w_P] = \frac{L}{Q}[w_N + a_P \epsilon_P (w_P - w_N)]. \end{aligned} \tag{10}$$

Since $\epsilon_P > 1$ and $w_P - w_N < 0$, this means

$$\begin{aligned} \eta_L &< \frac{L}{Q}[w_N + a_P(w_P - w_N)] = \frac{L}{Q}[a_P w_P + (1 - a_P) w_N] \\ &= \frac{P w_P + N w_N}{Q} \leqslant 1, \end{aligned} \tag{11}$$

since labor payments do not overexhaust output. Therefore $\eta_L > 1$ and $w_N = F_N$ jointly contradict $Cov(\epsilon_i, w_i) < 0$.

POST KEYNESIAN PORTRAITS

# Sidney Weintraub: a profile

ARTHUR I. BLOOMFIELD

Sidney Weintraub is one of the leading American exponents of that large and growing body of thought that has come to be known as post Keynesian economics. His extensive writings over the last forty years, his many guest lectures and lecture tours at home and abroad, and his coeditorship of the *Journal of Post Keynesian Economics* have earned for him an international reputation as a keen and imaginative economic theorist, a hard-hitting critic of the so-called neoclassical synthesis and of monetarism, and the coauthor and leading exponent of the plan for a tax-based incomes policy (TIP).

I first met Sidney sometime in mid-1942 when we were both working at the Federal Reserve Bank of New York. I had joined the bank's research department the preceding December, a week before Pearl Harbor, and Sidney had joined several months later. He had already served briefly with the U.S. Treasury Department and with the Office of Price Administration after getting his Ph.D. at New York University in 1941. He was brought to the bank to be editor of the bank's *Monthly Review* under the broad direction of the late John H. Williams who, in addition to his duties as a professor at Harvard, was the vice-president of the bank in charge of research. As it happens, Sidney did not find the job sufficiently challenging and, in any case, was drafted into the U.S. Army in the spring of 1943.

I do not recall exactly the substance of our conversation when we first met, but I do remember vividly Sidney's warmth, friendliness, and sense of humor—characteristics which have remained

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