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Commodity-Supply Shock and Full-Employment Monetary Policy

IF ONE OR MORE unanticipated disturbances should cause the expectation of a lengthy contraction of commodity supplies, what quick adjustment of the money supply—failing a quick adjustment of money wage rates—would be required to maintain the normal volume of employment? Or would the monetarist course be best suited to avoid both the Scylla of underemployment depression and the Charybdis of overemployment wage inflation? This question, first posed by Robert Gordon and me in early 1974 after a succession of supply shocks, became the focal issue in monetary policy over the ensuing slump.[1]

Gordon [3] warned of the recession that would result from the disturbances to food and fuel supplies if the money supply were not stepped up to accommodate the consequent rise of money prices. On the other hand, I observed [5], the appropriate rise of the money supply is unlikely to be proportional

* Portions of this material were presented at the Carnegie-Rochester conference in Pittsburgh, November 14–15, 1975, and at the Barnard-Columbia International Monetary Symposium, December 11–12, 1975. A National Science Foundation grant is acknowledged.

[1] Gordon and I happened to have early opportunities to ponder the problem: Gordon on April 10, 1974, at the annual meeting of the Saving and Loan Association in Chicago, and I at meetings sponsored by the American Enterprise Institute on April 1 and May 1 in Tokyo and Washington, D.C. Some others who addressed the issue are cited below. If the supply shocks produced inadequate professional attention and advice in this country, whatever good it would have done, the shortcoming was institutional more than intellectual.

Of course, had the supply disturbances then observed been as fleeting as was wished, the question could have been neglected at little cost. In fact, though, the oil cartel begun in late 1973 has held up despite the Scylla of depression; droughts which began in 1972–73 have continued intermittenly; even the wayward anchovy has remained so. Nor were the shocks minor in size. Estimates that the full-employment domestic product of the OECD economies fell in 1974 by about one year's growth give some idea, albeit not a full picture, of the scale of the supply shocks experienced.

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0022-2879/78/0578-0206 $00.50/0

to the rise of prices: the contraction of full-employment output due to the supply shocks ordains *some* decline of real cash balances in the new full-employment equilibrium—barring an attendant fall of interest rates so large as to offset the contraction of the transactions demand for liquidity. The critical issue was whether the supply shocks would drive up the demand price for the full-employment volume of output—the price level at which the decreased full-employment output could be sold—by *enough* (without a boost to the money supply) to reduce the real value of the pre-existing money wage down to the new and lower real wage level that producers, working with reduced commodity inputs, would require to go on employing the full-employment quantity of labor. *If* not, a slump would follow until wage negotiations finally brought the average money wage down to the point where the supply price that producers asked for the full-employment volume of output no longer exceeded the demand price at which that output could be sold.

Yet I, and perhaps others, had not then thought through the structural conditions under which this recession-spelling "if" would be the empirically applicable one. It was only at the end of 1974, when the price level had risen more than most had expected and indeed every sign pointed to a major recession, that I began urging a "quantum increase" in the quantity of money [4].[2]

The belated objective of this paper is a formal analysis of the theoretical question posed by Gordon and me. Gordon [2] has since performed a similar exercise in the form of a two-sector (food and nonfood) model. Ronald Findlay and Carlos Rodriguez [1] have produced an international model to much the same end. To differentiate my product, I analyze in part 1 a closed economy producing a single final good with attention to traditional matters of capital, inflation, and interest. The abundance of issues raised by this model, especially its treatment of wages, are then taken up in part 2.

1. A MODEL OF MONETARY ACCOMODATION

The supply shock will be represented by a permanent decline in the supply per unit of time, to be denoted σ, of some raw material consumed in the production process. In the simplest story, the material is produced without the assistance of labor and capital. In any case, the quantity of the material is hypothesized to enter into an aggregate production function

$$Y = F(\overset{+}{K}, \overset{+}{N}, \overset{+}{\sigma}), \tag{1}$$

[2] Much else in the way of antirecession advice was then being given. By September 1974, for example, Richard Cooper and Robert Mundell were advocating a massive tax cut to offset the "oil tax" on American consumers and investors. Franco Modigliani expressed concern over the erosion of real cash balances then developing, and James Tobin pleaded for fiscal and monetary expansion. Most professional forecasters were then predicting a large rise of unemployment in 1975. But it is the macrotheoretics of supply shock, especially in relation to monetary policy, not the historical record of forecasts and prescriptions, with which I am concerned here.

where F is strictly quasiconcave and linear homogeneous in capital K, employment N, and σ. The algebraic signs of the three first derivatives are indicated above the respective arguments of the function.

The supply price of this final output, to which the actual price quickly tends, is given by a "mark-up" function homogeneous of degree one in the average money wage w:

$$P^S = P^S(\overset{+}{Y}, \overset{-}{K}, \overset{-}{\sigma}; \overset{+}{w}). \tag{2}$$

Specializing for exactness and simplicity, I shall treat the P^S function as the industry marginal cost curve, so that

$$P^S = w \cdot [F_N(\overset{+}{K}, \overset{-}{N}, \overset{+}{\sigma})]^{-1}. \tag{2'}$$

I shall be assuming, as indicated, that σ and N are "complements" in the sense that, with the given K, the decline of σ reduces labor's marginal product $F_N(\cdot)$ for each N and thus, by (2'), raises P^S for each (N, w). See Figure 1 for the old and new supply-price schedules, corresponding to σ_0 and σ_1 respectively.

We shall be interested particularly in the supply price of final output at the "normal" or "full-employment" level of employment. The full-employment supply of labor $N^S(F_N, F, K, \cdots)$ will not generally be independent of σ. Perhaps it will be decreasing in σ, the income effect outweighing the substitution effect over the relevant range; perhaps it will be increasing in σ. A compromise

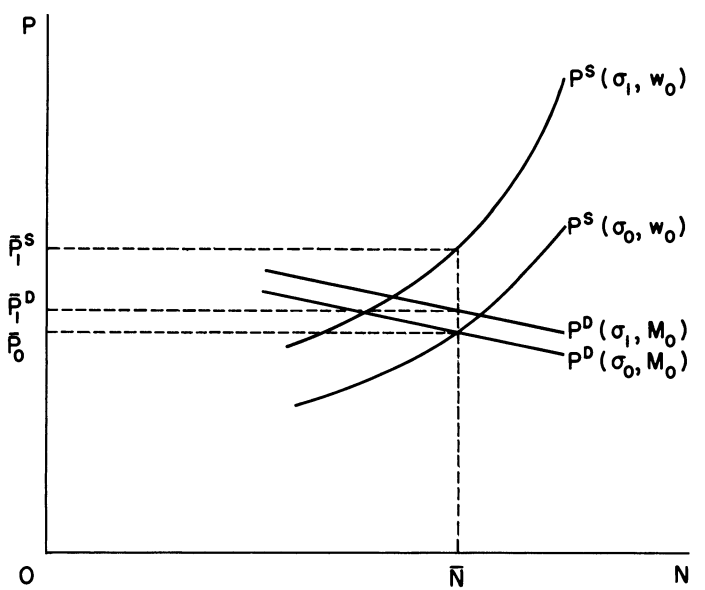

Fig. 1.

assumption is that the full-employment quantity of employment, to be denoted $\bar{N}$, is left unaltered by the particular decline of σ actually experienced:

$$N^S(\sigma_1, K_0) = N^S(\sigma_0, K_0) = \bar{N}, \qquad \sigma_1 < \sigma_0. \tag{3}$$

It remains to specify the behavior of the average money wage that figures in the supply-price function. I assume that the level of the money wage will be substantially unperturbed by the supply shock, at least over the near future. If we let w_o devote the preshock level of the average money wage and w_0 the postshock level—$t = 0$ being the moment of the supply shock—then

$$w_0 = w_o, \qquad w_o = \text{given} > 0. \tag{4}$$

The thrust of (4) is that money wages will not or cannot make the quick adjustment that might be necessary to maintain "full employment" following a supply shock; but by the same token an accommodative monetary policy can obviate the necessity for such a wage adjustment.

One theoretical justification of (4) appeals to the (possible) behavior of labor-market expectations. Suppose that wage setters expect the central bank to *accommodate* the supply shock by adjusting the money supply and thus the price level in such a way as to hold invariant the quantity of labor that will be demanded by firms at the pre-existing money wage w_o. Suppose also that wage setters, anticipating the invariance of the full-employment quantity of labor as postulated in (3), expect no change in the quantity of labor supplied. If they know they hold these beliefs in common, then their "rational expectation" is that the preshock money wage will equilibrate the labor market as it did before the shock. Each firm will expect the other firms to maintain their wages and it will do the same.

Another interpretation of (4) is available in economies where, because of the staggering of money-wage contracts, the average wage is a continuous-state variable like the aggregate capital stock: it can rise or fall only sluggishly in response to disturbances, so that its current *level* at any moment is given by past history. A key proviso here is that these contracts do not effectively "index" money wages to the money supply either directly or indirectly through cost-of-living escalators—at least not in an equiproportionate or unitary-elastic way (full escalation), for in that extreme case monetary policy would be powerless to accommodate the supply shock through its adjustment of aggregate demand and money prices.

A third justification of my wage assumption is possible when the latter is amended to read: $w_0 = w_\sigma$ if $N = \bar{N}$. It might be a feature of the understanding between firm and employees that their money wages will be reduced only if economic forces have in fact driven the firm to impose layoffs. These remarks in defense of (4) will be amplified when consideration is given to others wage theories in part 2.

It follows from the above equations that the supply price of full-employment output, which is defined by

$$\bar{P}^S = w_O \cdot F_N(\bar{N}, K, \sigma)^{-1}, \tag{5}$$

will be driven up by the decline of σ. The full-employment supply price—the final-goods price at which producers must be able to sell if they are to go on employing the quantity $\bar{N}$—is increased from $\bar{P}_0^S$ to $\bar{P}_1^S$ as shown in Figure 1.

Now suppose the economy was operating at full employment until the supply shock. If producers were soon to put their prices up to $\bar{P}_1^S$ and if the current money supply remained at M_0, would there be just enough "aggregate demand" at that price level and money supply to maintain full employment? Too much? Or too little? One's answer depends, of course, on the demand side of one's model. For illustration I adopt the equations of Tobin's [6] aggregative model, extending it later to incorporate the expected rate of inflation and the growth of capital.

A. A Statical Analysis

The *LM* equation is

$$M_0 = P^D \cdot L\big[F(K, \overset{+}{N}, \sigma), \bar{r} + x\big], \tag{6}$$

where r is the expected short-term real rate of interest and x, treated as a *parameter* to begin with, is the expected short-term rate of inflation. Hence $r + x \equiv i$ is the short-term money interest rate. Given r, (6) determines for each N the corresponding demand price of final output P^D. The latter is that price level (which if it were set by producers would be) just large enough to bring the demand for money up to equality with the money supply M_0 at a given employment level.

The following *IS* equation determines the expected real interest rate as a function of employment:

$$r = F_K(\bar{K}, \overset{+}{N}, \overset{+}{\sigma}). \tag{7}$$

Note the premise that lower σ spells a lower value of F_K.

Equations (6) and (7) together make the demand price a (single-valued) function of employment. Such a schedule is drawn—one for each σ—in Figure 1. Every point on the demand-price schedule corresponds to a *LM-IS* intersection in the (N, r) plane. At any point on this schedule where the corresponding *IS* curve cuts the *LM* schedule from above, the demand-price schedule is falling (with rising employment). The analysis below is confined to that normal case.

The *full-employment* demand price may now be seen to satisfy

$$\bar{P}^D = M_0 \cdot L\big[F(K, \bar{N}, \sigma), F_K(K, \bar{N}, \sigma) + x\big]^{-1}. \tag{8}$$

The maintenance of full employment requires that the right-hand side of equation (8) continue to equal the full-employment supply price given in equation (5). Though the fall of σ was seen to raise $\bar{P}^S$, there is no guarantee from (8) that $\bar{P}^D$ will be raised as much or even raised at all.

Let us calculate the proportionate (algebraic) *rise* of the full-employment demand price per unit of *decline* in σ. It is

$$-\frac{d\bar{P}^D}{d\sigma}\frac{1}{\bar{P}^D} = \frac{L_Y^+ F}{L}\cdot\frac{\overset{+}{F}_\sigma}{F} + \frac{L_i^- F_K}{L}\cdot\frac{\overset{+}{F}_{K\sigma}}{F_K} \tag{9}$$

by differentiation of (8). This calculation is to be compared to the proportionate rise of the full-employment supply price which, by differentiation of (5), is

$$-\frac{d\bar{P}^S}{d\sigma}\frac{1}{\bar{P}^S} = \frac{F_{N\sigma}^+}{F_N}. \tag{10}$$

If the right-hand side of (9) is less than the right side of (10), full employment will not be maintainable with unchanged M_0. In all normal cases, where the demand-price schedule cuts the supply-price schedule from above, the result will then be a fall from full employment.[3] The algebraic excess of (10) over (9) is precisely the proportionate increase of the money supply needed to maintain full employment, i.e., $-(1/\bar{M})\,d\bar{M}/d\sigma$.

Consider now a transparent example: $F_\sigma/F = F_{N\sigma}/F_N(>0)$ and $L_i = 0$. Thus, total product and labor's marginal product fall in equal proportion. If the demand for real cash balances $L(\cdot)$ is proportional to real income and insensitive to $i \equiv F_K + x$, then the fall of full-employment output will produce a proportionate rise in the demand price for full-employment output equal to the proportionate fall in the total and marginal product of the full-employment quantity of labor and hence equal to the proportionate rise in the supply price of full-employment output. In this example, therefore, no change of the money supply is needed to maintain full-employment.

It should now be evident that, in this example, the demand price $\bar{P}^D$ rises *less* than the supply price if and only if the income elasticity $L_Y Y/L$ is less than one. In that event, to repeat, "aggregate demand" will be insufficient to sustain full employment; in all normal cases, a recession of employment must occur until the money wage has dropped enough to bring the supply price of full-employment output down to the initially deficient demand price. Most empirical estimates, of course, put the income elasticity at considerably less than one.

A contraction of σ, contrary to the above example, may very well increase its own relative share in (the reduced) full-employment income. Then either F_N or F_K or both must fall in greater proportion than the fall of F. A contraction of σ that reduces full-employment F from 100 to 96 and increases its own share

[3] These are the cases in which the *IS* curve cuts the upward-slopping *LM* curve from above.

from 5 percent to 10 percent would reduce real wage *plus* capital income from 95 to 86.4, a decline of more than 9 percent (of itself). Should F_N decline by the representative 9 percent when F falls by 4 percent (at the full-employment N), the rise of the demand price $\bar{P}^D$ would be at least 5 percent short of the new and (9 percent) higher supply price—if $L_Y Y/L \leqslant 1$ and assuming still that $L_i = 0$. Then maintenance of full employment at the initial money wage would require a one-shot increase in the money stock of at least 5 percent.

Now suppose instead that $L_i < 0$. If $F_{K\sigma} > 0$, the decline of σ reduces F_K which, by (7), reduces r and thus, by (9), makes the new full-employment demand price smaller than it otherwise would be. This profit-rate effect is another element in the possible tendency to insufficient demand for maintenance of full employment.

In the above analysis we have taken $F_{K\sigma}$ and $F_{N\sigma}$ as independent. If instead we take $F_{\sigma\sigma}$ to be given independently, $F_{N\sigma}$ is smaller the larger is $F_{K\sigma}$. The connecting relation among the three derivatives is

$$\frac{F_{K\sigma}}{F_K} \cdot \frac{KF_K}{F} + \frac{F_{N\sigma}}{F_N} \cdot \frac{NF_N}{F} + \frac{F_{\sigma\sigma}}{F_\sigma} \cdot \frac{\sigma F_\sigma}{F} = 0. \tag{11}$$

Hence the excess of the right-hand side of (10) over that of (9), which difference is the proportionate increase of the money supply required for full employment, can be written

$$\frac{\overset{+}{F_{N\sigma}}}{F_N}\left[1 + \frac{\bar{L}_i r}{L} \cdot \frac{\overset{+}{N}\overset{+}{F_N}}{KF_K}\right] - \frac{\overset{+}{L_Y} F}{L}\frac{\overset{\pm}{F_\sigma}}{F} + \frac{\bar{L}_i \bar{F}_K}{L}\frac{\bar{F}_{\sigma\sigma}}{F_\sigma}\frac{\sigma\overset{\pm}{F_\sigma}}{KF_K} = -\frac{\bar{M}_\sigma}{\bar{M}}. \tag{12}$$

$\bar{M}$, being the full-employment money supply, is that value of M which equates $\bar{P}^D$ (a function of M) to $\bar{P}^S$ (a function of w). Assuming as before that $F_{N\sigma}/F_N > (YL_Y/L)F_\sigma/F(>0)$, the above expression is unambiguously positive if $0 > \bar{N}F_{N\sigma} + \sigma F_{\sigma\sigma} = -KF_{K\sigma}$, which was already implied. However (12) shows that even when $F_{N\sigma} < 0$ an increase of the money supply may well be required; for if $L_i < 0$, smaller $F_{N\sigma}$ is (at least partially) offset by larger $F_{K\sigma}$.

B. Dynamical Analyses

The remaining problem in calculating the change of the money supply required for maintenance of full employment is to release the expected inflation rate, x in our notation, from the pound of ceteris paribus. I shall use here the hypothesis of rational expectations: The expected inflation rate correctly forecasts the actual rate. Absent further shocks, the future path of inflation will be determined by the ensuing growth in the supplies of money and capital.

Three scenarios will be considered. In each, the money supply has been jumped to the new level initially required for full employment. And in each, the average money wage, though perhaps sluggish, is assumed to be moving

(if necessary) in relation to the path of the money supply in such a way as will maintain full employment thereafter. The implied path of the average money wage will, of course, depend upon the accompanying paths of capital and money. These full-employment scenarios are not equally plausible or desirable. They are intended mainly as reference points.

Imagine that the economy was in a full-employment, zero-inflation stationary state until the supply shock occurred. By hypothesis, $\bar{N}$ and the technology remain constant over the future, but K does not. I postulate that the fall of σ reduces consumption by less than output at each K, so that K must begin to decline along the (new) full-employment path.[4] I shall further suppose that the ensuing decline is monotonic, smooth, and asymptotic to some new stationary level $K^* < K_0$. These assumptions about the full-employment path of capital are amply captured by

$$\dot{K} = S(K;\sigma), \quad S_K < 0, \quad S_\sigma > 0; \qquad S(K^*,\sigma) = 0, \tag{13}$$

where $\dot{K}$ is net investment. In general, a dotted variable such as $\dot{Z}$ will denote the first time derivative of the variable. Also, since $\bar{N}$ is going to be treated as fixed through time, I shall supress it from the notation where possible, so that the production function, for example, will be written $F(K,\sigma)$.

1. In the first scenario considered, the money supply is continuously varied, following whatever initial adjustment was needed at $t = 0$ to accommodate the supply shock, so as to hold steady the *average money wage* level throughout the future at the same level that prevailed up to $t = 0$. The logic of this sequence is just a reiteration of equation (4). The central bank promises and delivers that growth of the money supply which will precisely and indefinitely underwrite continued "full employment" in the (desired) event that wage setters will maintain money wage rates—which wage setters then have every incentive to do.[5]

Accordingly the full-employment price level is given by $w_o F(K(t),\sigma_1)^{-1}$, where w_o is now a constant throughout time. Because K will be declining toward K^*, and $F_{NK} > 0$, the full-employment price level will be rising toward P^*, say. This transient after-inflation is the mechanism by which real wages decline to match the decline of the full-employment marginal product of labor that is entailed by the decline of the capital stock. The rate of inflation at any moment during this adjustment process is evidently $-(F_N)^{-1}F_{NK}\dot{K}/K$. Using (13), therefore, we obtain

$$\bar{M}(t) = w_o F_N(K(t),\sigma_1)^{-1} L\left[F(K(t),\sigma_1), F_K - F_N^{-1}F_{NK}K^{-1}S(K(t),\sigma_1)\right] \tag{14'}$$

[4] Possibly a society might produce *increasing* K to "make up" for the fall of σ. The analysis of that symmetrical story is left to the reader.

[5] If the monetary authorities are believed, and if our earlier assumptions (on behalf of uniqueness) are satisfied, any other wage trajectory would have to be based on mistaken wage expectations. But what would inspire a speculative bubble, say, in a setting where the equilibrium trajectory is so conspicuous?

for the path of the money supply necessary for continuing full employment at a "level" money wage. Plausibly, this money supply will be rising in the transition to a lower capital stock.

In this constant-wage scenario, then, the expected rate of inflation, zero by hypothesis before the supply shock, turns (transiently) positive afterwards in rational anticipation of the subsequent capital-shallowing postulated in (13). But it does not appear that the magnitude of the prospective inflation would be large enough to overturn the presumption reached in the previous section: that the money supply must jump up when the supply shock strikes if money wages will not jump down.

2. The second scenario has the money supply adjusting so as to keep the *price level* constant over time following its initial rise. Accordingly, rational expectations make $x = 0$ over the entire future. In this scenario, then, no expectation of subsequent inflation arises which might alter (reduce) the demand for money and thus lessen the required increase of the money supply at $t = 0$; there is only the unanticipated one-time jump of the price level attributable to the drop of σ. The expected rate of inflation x is thus constant—as it was treated in the statical exercise.[6]

The necessary path of the money supply for full employment with zero inflation is given by

$$\bar{M}(t) = \bar{P} \cdot L[F(K(t), \sigma_1), F_K(K(t), \sigma_1)], \tag{14''}$$

where, of course, $\bar{P}$ as well as σ_1 are constants. If, as postulated, K will move downward following the supply shock, and in so doing reduce the demand for real cash balances, then $\bar{M}(t)$ must decline following its initial jump in order to avoid inflation and its anticipation over the future.

3. The final scenario to be considered is monetarist. Here the *money supply* remains constant, following its initial adjustment at $t = 0$, and is announced and forecasted to be so:

$$\bar{M}(t) = \text{constant for all } t > 0. \tag{14'''}$$

If we suppose, as in the second scenario, that wages adjust to maintain full employment, so that $N = \bar{N} = \text{constant}$, then differentiation of (5) gives

$$(\dot{\bar{L}}_Y \dot{\bar{F}}_K + \bar{L}_i \bar{F}_{KK})\dot{K} + \bar{L}_i \dot{x} = -xL, \tag{15}$$

where we have used $x = \dot{P}/P$, $M/P = L$, and hence $\dot{L} = -xL$. Therefore $x = 0$ in any stationary state with $L > 0$. In the neighborhood of such a state, then,

[6] The behavior of x would complicate the conduct of the full-employment monetary policy if, because some or all prices were sticky, the price level took some time to reach the new full-employment supply-price level $\bar{P}^S(\sigma_1)$; then the money supply might have to adjust along a J-curve rather than rise abruptly. However, the analysis of a sticky-price system is beyond the scope of this paper.

(15) implies

$$\dot{x} = J(K, x, \sigma_1), \quad J_K < 0, \quad J_x > 0, \quad J_\sigma > 0. \tag{16}$$

The phase diagram in the (K, x) plane of the system (13) and (16), which the reader is invited to draw, discloses saddle-point stability; there exists a unique trajectory to the stationary state along which x initially jumps to a positive level and then declines, like K, monotonically to the rest point (where $K = K^*, x = 0$).

A brief word on the comparative merits of these three monetary strategies: the second scenario requires a (gradual) decline of money wage rates—a fall away from the previous trend path of wages if the economy is accustomed to secular inflation or productivity growth. So too does the third scenario, though to a necessarily lesser extent, if the decline of the capital stock (like the fall of σ) reduces the full-employment real wage proportionately more than it reduces the full-employment demand for cash balances. The neoclassical presumption, to overwork the familiar adjective, has been that a central bank can engineer the second (or the third) scenario as easily as the first: if money wages have to adjust, it is "rational" for them to do it, and so they will. But, if I am right, that outcome is the exception rather than the rule; the first scenario is the only one truly consistent with continuous full employment for the same reasons given in defense of equation (4).

2. WHY POLICY WAS UNACCOMMODATING

If the above macroeconomic model is not misleading, a monetary policy of supply-shock accommodation was both necessary and sufficient to forestall or foreshorten the post-1974 slump in aggregate employment. From that perspective it is striking and disturbing to observe that there was no effort at accommodation though the 1974–75 downturn was the deepest one since the Great Depression. This paper would be frustratingly incomplete without a consideration of the reasons for this surprising turn in monetary policy.

Current discussions offer a wealth of hypotheses in the political economy of government policy-making and central-bank policy in particular. In new-left theory, for example, recessions are occassionally inflicted on the work force to put an end to rising strikes and sagging worker efficiency. Yet sociological studies find that recessions produce mental illness and subsequent health problems, not a renewal of efficiency. (There is, however, a more influential hypothesis that strikes much the same note, so I shall be returning to the new-left perspective.)

In recent electoral theories, an electorate that is enjoying job security at election time will reciprocate the favor by rewarding the incumbent administration with reelection; such job security can be engineered by depressing employment before election year and restoring it during election year so that employment is rising and the chance of layoff is small on election day. Most of

the evidence on behalf of this theory comes from the 1930s. But the Democrats then had a double advantage; they could take credit for raising employment and blame the Republicans for the prior downturn. Incumbents might hesitate to create their own downturn without a promising excuse—would blaming the Arabs have been judged good enough in 1975? They might also fear the risk that recovery would be too little and too late. In any case, the Federal Reserve provided little or no stimulus to aid reelection of the Republicans in 1976.

Another theory observes that an unanticipated rise of the price level is hard on lenders, pensioners, and those living out their careers on outdated wage agreements; if the governors of the Federal Reserve meet that description, their bread must be buttered on the side of a temporary slump rather than a rise of the price level. But surely the normal person prizes his self-respect more than his "goods" and wants also the esteem of his community. This theory takes too narrow a view of self-interest.

A more plausible hypothesis starts from the political theory of concentrated benefits: Each agency of government becomes the captive of the pressure group that has the comparative advantage and comparative interest in dominating it. If the political equilibrium allocates monetary policy to "banking interests" hostile to unanticipated inflation, leaving trade and immigration to the labor unions, then the monetary accommodation of supply shocks has little chance of adoption. It is not obvious, however, that monetary policy should become the special preserve of a single interest group, nor why that group should be the banks. A few decades ago it was labor's capture of the central bank that was said to explain monetary policy.

A limitation of these hypotheses is their incomplete view of human motivations. When low-income voters seemed ready to spurn McGovern's 1972 plan for a $1,000 demogrant, I asked, "Whatever happened to the theory that people vote their self-interests?" My colleague Albert Hart shot back, "Their ideas are their interests." Government officials are presumably no exception to this observation and indeed they often complain of the pecuniary sacrifies they have to make in order to work for their beliefs. The concentrated-benefits hypothesis in particular overlooks the role played by "theory." To hold sway over monetary policy, vested interests may find it necessary to persuade the public (and perhaps themselves) that their policy is harmless or benevolent. The advent of new theories may tip the balance in the determination of public policy.

In the area of monetary economics, one need not look far to find a new belief. Monetarism, the doctrine of inflexible monetary policy, is in the ascendant. It is entirely possible that the rise of monetarism predisposed the Federal Reserve against accommodation of the recent supply shocks; the emphasis upon monetary aggregates instead of interest rates must have worked in that direction. Yet the original argument for monetarism could hardly have been very influential—the argument that fine tuning might be worse than no tuning, worse for the stability of employment as well as the stability of the price level.

It is hard to believe that the economics profession and the Federal Reserve could have worried that a small jump of the money supply in the winter of 1974–75 would have risked a boom and thus *de*stabilized employment. One wonders, therefore, what new arguments might have justified the Fed's stance against accommodation of the recent supply shocks.

The answer, I suggest, is that the Federal Reserve, and with it much of the profession, has come to operate on new or rehabilitated conceptions of money-wage behavior quite unlike that prevailing early in this decade: a *classical* theory according to which a policy of monetary accommodation was dispensable, because employment would recover quickly enough without it; and a *semiclassical* theory according to which accommodation would have been ineffective. Although these two theories are mutually exclusive, they share the implication that nonaccommodation is virtually harmless. Since both theories differ so from the wage theory underlying my own analysis of supply-shock accommodation, a critical survey of them seems in order.

A. Alternative Models of Nonaccommodation

In the *classical* theory, the prospect of unaccommodating monetary policy toward a supply shock will elicit a fall of money wage rates—in lieu of the rise of the money supply—large enough to maintain or soon restore full employment. If all firms' money-wage rate commitments for the next interval are perfectly synchronous, the temporary slump of employment caused by the the unanticipated supply shock will persist only until the date at which the new and lower wage rates can be established. If firms' wage commitments are nonsynchronous, full recovery will be reached on the expiration of the last surviving wage commitment made prior to the supply shock. In an economy where most wage and salary commitments run for one year and union agreements typically two or three, therefore, employment might recover about half its lost ground within one year and nearly all the ground within two.

One of the more precarious assumptions of the theory is its hypothesis of rational expectations based on *public* knowledge of the correct (in this case classical) econometric model. Suppose, contrariwise, that each firm, whatever its own certainty about the size of the general reduction of money wage rates needed to restore full-employment equilibrium, is uncertain about the estimates being made by other firms. Then each firm may reduce its own money-way scale insufficiently for full employment within the time span predicted by the classical theory if, for one reason or another, it would prefer its own wages to err on the high side rather than the low side of the market average. Uncertainty about the adjustment of their employees' expectations of wages elsewhere might also be a cause for caution.

An assumption in the theory regarding the terms of wage commitments is also crucial: that all or most such commitments specify a moving money-wage rather than a fixed money-wage over the contract period. In fact, long-term union agreements apart, the most common arrangement is a flat wage or salary

reviewed and revised every twelve months. If wage commitments are predominantly of that latter form and if their starting dates are staggered evenly over the calender year—half the firms revising wages every January and half every July, for example—then it can be argued that the average money wage will merely approach but never reach the reduced level predicted for it by the classical theory. Barring help from some new economic disturbance or some other adjustment mechanism (not envisioned by the classical theory), recovery to full employment will proceed asymptotically in a long dragged-out process.

Another difficulty for the classical theory is the matter of credibility. If firms chose not to cut their wages, wouldn't the central bank abandon its sincere and avowed intentions not to accommodate? If firms so believe won't they in fact decide to maintain their money wage rates, figuring that other firms will do the same and the central bank will consequently accommodate? It is a little like the familiar problem of deterrence in which the side aiming to deter is known to prefer not to carry out its threat if and when the threat fails and the damage is done.

The analogy is inexact though, because, unlike the decision to launch a nuclear strike, the decision of the central bank not to accommodate can be revised at any future moment. That reversibility may cut both ways. By refusing to accommodate at first, no matter what money wages do, the central bank can presumably establish in the minds of wage setters the riskiness of assuming that the bank will decide to accommodate in the future; in the case of synchronous wage setting this risk seems to be all the central bank requires to motivate wage cuts (though they may be insufficient at first to restore full employment for the reasons suggested earlier). On the other hand, the bank's problem may be made worse if wages are set nonsynchronously: firms currently revising wages may wonder whether the bank will not eventually settle for half a loaf, accommodating the remaining part of the supply shock if and when wages have fallen enough to satisfy the central bank. Then the decline of wages and the recovery of employment would proceed more slowly than if nonaccommodation were thought to be total and irrevocable.

A deep problem for classical theory arises if the year-to-year revisions in wage and salary commitments are manifestations of some much longer-lived "implicit contracts" between firm and employees. In the classical theory, a firm reduces its money wages in anticipation that other firms will be doing the same (concurrently or in the future when their turn for wage adjustments comes up) and hence in the anticipation that failure to reduce money wages would cause it to lose sales. It is possible, however, that the individual firm has an obligation, and will abide by the obligation for the sake of its long-range interests, not to reduce money wages except in response to a realized decline of the general wage level or a realized decline of employment. Then the classical theory of anticipatory money-wage reductions that preserve or quickly restore the level of employment evidently falls to the ground. Though each firm's money wage rates might fall with the decline of its employment level, and fall further if its wage rates were tied to other firms' similarly lower wages, these

wage reductions would be erased if employment were fully to be restored—since such contracts warrant lower wages only as long as employment and other wages remain lower. It may very well be that these quasicontractual constraints would gradually recede as the slump continued. Yet they might seriously retard the downward adjustment of money wage rates on which a full and prompt recovery of employment depends.

The notion that long-running implicit contracts or norms place confining limitations on wage and salary behavior leads conveniently to a discussion of what I called the *semiclassical* theory of wage behavior. This theory accepts only portions of the classical contentions: A permanent change of the money supply would cause all money wages and prices ultimately to change equiproportionately over what they would otherwise ultimately be, and thus it would have no lasting effects on output and employment. Any permanent shock that reduced only the demand price for the original level of output, not the supply price, would cause prices and money wages to fall to such an extent as to restore the original level of output. Yet the mechanism is not the classical one in which money wage rates tend to equilibrate the labor market and money prices the goods markets—thus working always toward *full* employment—with whatever independence they may need for that task. The semiclassical mechanism is, instead, the alleged tendency of labor contracts to tie money wage rates equiproportionately to the cost of living.

Some unclassical consequences of that mechanism emerge when the disturbance to equilibrium is a commodity supply shock. Suppose, for simplicity, that the impact of the shock leaves the full-employment demand price of output unchanged but raises the full-employment supply price. This reduces the real wage required to induce firms to continue producing at the full-employment level; but the real wage actually paid at full employment is stuck, money wages being tied to money prices. Barring new structural changes, policy-made or other, a slump of employment will result and persist as long as the real wage that goes with the full-employment level of activity stays fixed—as long as money wages wait for prices to fall and prices wait for wages from their newly elevated levels. We may think of the economy as coming to rest at the employment level where the marginal product of labor schedule, shifted downward by the supply shock, interesects an unchanged real wage schedule that shows contractual real wages as some (nondecreasing) function of the level of employment. From this semiclassical rest point, monetary policy can do nothing to hasten or assure the recovery of employment; any acceleration of employment achieved would raise prices in the process, and the ensuing catch-up of wages to prices would drive prices still higher until output and employment had slid back to where they otherwise would have been. A self-correcting mechanism will come into play, tending to restore full employment, only if and when firms are permitted (with the lapse of contracts) or compelled (by new entrants) to revise downwards the real wages they offer their employees.

An empirical appraisal of this theory might concede that the failure of money wage rates to fall or even to decelerate much in 1975 and beyond lends some

support to the semiclassicists; however, the objections and qualifications to the classical theory registered earlier provide alternative explanations of the disappointing behavior of wages. The most telling evidence so far seems to be against the semiclassical theory. Real wages were not maintained following the recent supply shocks—they fell relative to their trend and over some of the recent period they fell absolutely. A plausible and preliminary verdict based on United States data is that the semiclassical theory is at best half-right. A policy to accommodate an 8 percent rise in the full-employment supply price of output might have provoked a 4 percent extra rise of money wages and, hence, an additional 4 percent rise of prices, and so on; the process would then have ended with a 16 percent rise of the price level and an 8 percent rise of wages.

A theoretical examination of the semi-classical theory would also greatly weaken its argument. There is, first of all, the obvious point that wage "contracts," implicit or explicit, do not prevail in much of the labor market (the market for day labor and for piecework, for examples). There is also the point that wage-contract theory, where applicable, reaches the conclusion that money wages will be indexed *in proportion* to the price level by reasoning from a questionable (though fascinating) model. The model assumes that workers and firms alike know the exact character of each economic disturbance; they not only read the observable economic variables, they also know the true model and the present state of the world. From a different kind of model, in which workers have incomplete information, it can be argued that a rise of the price level will *not* cause money wage rates to be escalated in equal proportion. The rise of the price level serves as a signal of the appropriateness, on average, of accepting a reduction of real wages as a trade-off for lesser contraction of employment. A corrolary is that a monetary policy of accommodating supply shocks serves the useful function of amplifying that "signal" and, thus, lowering further the real wage that goes with a given level of employment. Escalator clauses and cola agreements there may be—but not full escalation.

These brief remarks on semiclassical theory are all that a wide-ranging survey will permit. The theory warrants the most intensive analysis, both theoretical and empirical. For, though the worst of the post-1974 slump is behind us in the United States, several economies, including the American one, are not yet out of the woods and, in any case, supply shocks will surely strike again. So the question of their monetary accommodation will be recurring, whether or not it is in abeyance at this moment. It is to be hoped, therefore, that we will soon be better able to appraise the semiclassical view of supply-shock accommodation than we have been to date.

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