

# MONETARY EQUILIBRIUM AND THE PRODUCTIVITY NORM OF PRICE-LEVEL POLICY

*George A. Selgin*

To a simple fellow like myself it seems that the lower prices which increased production makes possible would benefit everybody, but I recognize there must be a flaw in my thinking, for increased productivity has not brought—and does not seem likely to bring—lower prices. Presumably there is some good reason for this. Will someone explain?<sup>1</sup>

## Introduction

Now that the Phillips curve has disappeared, leaving an “empty place where it used to be” (Leijonhufvud 1981, p. 276), economists must come face to face with the problem of deciding how the price level ought to behave. They can no longer treat price-level policy as incidental to employment policy. Yet, rather than becoming an object of economic controversy, the place left vacant by the Phillips curve has become the exclusive, if somewhat barren, grazing ground of advocates of a stable consumer price level. These advocates appear to be winning the macroeconomic policy battle by default. The only challenge now facing them seems to be that of implementing price-level stabilization by means of a strict and unambiguous policy mandate.

---

*Cato Journal*, Vol. 10, No. 1 (Spring/Summer 1990). Copyright © Cato Institute. All rights reserved.

The author is Assistant Professor of Economics at the University of Georgia. He wishes to thank Don Boudreaux, Richard Ebeling, David Fand, Lawrence H. White, Bill Woolsey, and Leland Yeager for their suggestions and criticisms. Research for this paper was supported by an F. Leroy Hill Fellowship from the Institute for Humane Studies. An earlier version of this paper was presented at the Ludwig von Mises Lecture Series at Hillsdale College, April 22–24, 1990.

<sup>1</sup>A former Archbishop of Wales, in a letter to the *London Times*, as quoted in Robertson (1963, pp. 11–12n).

Robert Black (1986, p. 790) for example, argues that price stability should be “the preeminent and perhaps even the unique goal of monetary policy.” He adds that it should be enforced in an “automatic or quasi-automatic way” (p. 793). Others who have held similar views include Reynolds (1982, pp. 37–41); Barro (1986); Hetzel (1985); Meltzer (1986); Hall (1982, 1984a, 1984b); and Yeager (1986a). A strict policy of price-level stabilization is also supported by several well-known policymakers, including Jack Kemp, Richard Rahn of the U.S. Chamber of Commerce, and some members of the Board of Governors of the Federal Reserve System.<sup>2</sup> A recent Joint Resolution (H. R. J. Res. 409) introduced by the House Subcommittee on Domestic Monetary policy would, if adopted, require the Fed to achieve a stable price level (“zero inflation”) within five years.

Although price-level stabilization is the only widely endorsed price-level policy today, there was a time, just over half a century ago, when prominent economists from numerous schools favored a different approach—the “productivity norm” of price-level behavior. Under this approach, the consumer price level is allowed to vary inversely with changes in unit real costs of production. In theory, the productivity norm is equivalent to stabilization of a price index of factors of production; in practice, it is roughly equivalent to the stabilization of per capita nominal income.

This paper offers a highly preliminary reconsideration of the case for a productivity norm of price-level policy as against price-level stabilization. In so doing, the paper also revives and expands upon some forgotten early criticisms of price-level stabilization, and it shows the shortcomings and potential dangers inherent in proposals for the strict enforcement of a constant price level.<sup>3</sup> Because the paper is meant to compare the productivity norm to the alternative of price stabilization, it should not be construed as an attempt to demonstrate that the productivity norm is an optimal or first-best policy.

## The Rationale of Price-Level Stabilization

The alleged benefits of price-level stability—generally taken to mean stability of a consumer’s price index—include avoidance of debtor-creditor injustice and avoidance of macroeconomic disequi-

<sup>2</sup>For example, Messrs. Johnson and Angell.

<sup>3</sup>This paper is only incidentally concerned, however, with problems of *implementing* various price-level policies (e.g., index-number and time-lag problems). These problems are well recognized and have been discussed recently elsewhere (e.g., in Garner 1985).

librium. Debtor-creditor injustice is caused by unexpected changes in the value of long-term debts. Falling prices increase the burden of indebtedness, conferring a windfall gain on creditors, whereas rising prices do the opposite. Price-level stabilization prevents this injustice. However, because indexation schemes such as the tabular standard also avoid changes in the real value of debt, the principal advantage of a stable price level must be sought in its ability to combat short-run macroeconomic fluctuations.<sup>4</sup>

Leland Yeager has eloquently argued for the macroeconomic benefits of a stable price level. According to Yeager (1986b, p. 370), macroeconomic fluctuations—which can be taken to refer to fluctuations of employment and output around their “full information” or “natural” levels—are caused by monetary disequilibrium, that is, by “a discrepancy between actual and desired holdings of money at the prevailing price level.” The occurrence of monetary disequilibrium implies (in the absence of instantaneous or even anticipatory price adjustments) a violation of Say’s Law (though Yeager himself does not use this term): An excess demand for money implies a deficient effective demand for goods with concomitant windfall losses to producers; an excess supply of money implies an excessive effective demand for goods with concomitant windfall profits to producers. Because an excess supply of money leads to rising prices and a deficient supply leads to falling prices, general price changes can be viewed as “symptoms or consequences” of monetary disequilibrium (Yeager 1986b, p. 373). It follows that macroeconomic fluctuations will be avoided or reduced by a policy that adjusts the nominal money stock in such a way as to keep the price level stable.

Although it ultimately rests on a quantity-theoretic foundation, Yeager’s macroeconomic defense of price-level stabilization contradicts simpler versions of the quantity theory in a crucial respect: It rejects the view that changes in the money supply or in its velocity of circulation lead to instantaneous, uniform, and costless adjustments in all prices. Were such a simple interpretation of the quantity theory valid, monetary disequilibrium could never exist for more than an instant, and there would be no macroeconomic reason for advocating any particular money supply or price-level policy. Rather than accepting this view, Yeager and like-minded proponents of price-level stabilization argue that general price adjustments “do not and cannot occur promptly and completely enough to absorb the

<sup>4</sup>Irving Fisher remarked (1925, p. 261) that, in practice, a tabular standard “would never accomplish more than a small fraction” of what price-level stabilization could achieve.

entire impact of [a] monetary change and so avoid quantity changes" (Yeager 1986b, p. 373).

A number of reasons account for the sluggishness of general price changes. These include the presence of long-term contracts not subject to indexation and to other psychological sources of price rigidities such as implicit contracts and money illusion. Perhaps the most fundamental reason, though, has to do—according to Yeager (1986b, p. 377)—with the "public-good" nature of general price adjustments. This stems from money's role as a general medium of exchange that, "unlike other goods, lacks a price and a market of its own":

No specific "money market" exists on which people acquire and dispose of money, nor does money have any specific price that straightforwardly comes under pressure to clear its (nonexistent) market. Money's value (strictly, the reciprocal of its value) is the average of individual prices and wages determined on myriads of distinct though interconnecting markets for individual goods and services. Adjustment of money's value has to occur through supply and demand changes on these individual markets.

The consequence is a diffusion of the impact of monetary disequilibrium across various markets, where each affected transactor regards the value of money "as set beyond his control, except to the utterly trivial extent that the price he may be able to set on his own product arithmetically affects money's average purchasing power" (Yeager 1986b, p. 392). Optimal adjustments in individual prices do not take place because their social value may exceed their perceived value to the persons who have to make them. This outcome is all the more likely given that particular price adjustments, rather than being costless as they are often portrayed, frequently involve lump-sum or "menu" costs—of printing, labeling, and negotiations. In consequence, rather than being achieved automatically following a monetary disturbance, a market-clearing general price level has to be "groped towards" by means of a "decentralized, piecemeal, sequential, trial and error" process (Yeager 1986b, p. 375).

Because price adjustments may be slow, they are also likely to be uneven—a result, in part, of the differing degrees of sluggishness of different prices. It is generally assumed that input prices adjust more slowly than product prices. This lag implies that excess demand for money will be a cause of painful short-run losses, whereas excess supply will lead to profit inflation.

A further cause of unevenness of price adjustments is the monetary "transmission mechanism" by which monetary disequilibrium makes its presence felt, not in all markets at once, but first in particular markets from which it slowly spreads to the rest of the economy

(Yeager 1990). Thus, a disequilibrium increase in the money supply on the basis of open-market purchases will first raise the value of government securities and then will affect general interest rates through an increase in the volume of commercial bank loans. From there, the monetary expansion will raise the demand for capital goods and increase wages. Only afterward will it lead to a more general increase in the prices of commodities. And this increase will occur even if prices all along the way are fairly flexible.<sup>5</sup>

Such imperfect price adjustments in response to monetary disequilibrium cannot fail to involve many temporary relative price effects that, by introducing “noise” into price signals, “degrade the information conveyed by individual prices” (Warburton [1946] 1951, p. 374) and provoke unwarranted changes in real activity. A shortage of money will lead to deflation, with reduced sales and production cutbacks in certain sectors of the economy leading to reduced demand for the products of other sectors and finally to general unemployment. An excess supply of money, on the other hand, causes inflation that, because it does not merely imply a uniform increase in prices, can also involve substantial malinvestment of resources.<sup>6</sup>

Responding to the potential dangers from imperfect adjustment of general prices, proposals for stabilizing the price level aim at *minimizing the burden placed on the price system* by maladjustments in the money supply. Adjusting the nominal quantity of money to keep the price level constant in the face of changing demands for real money balances is supposed to achieve this goal in two ways: first by reducing the overall requirement for permanent money-price changes, and second by reducing the extent of temporary, though ultimately unnecessary, relative price changes involved in the monetary transmission mechanism. These changes include disequilibrium movements in interest rates. In the absence of appropriate adjustments of the nominal money stock, both types of price changes must occur to some extent, and each will be a cause of disturbances to real activity. Only the permanent price changes will disturb real activity (apart from “menu-cost” effects) insofar as they fail to occur com-

<sup>5</sup>See also Warburton ([1946] 1951, pp. 298–99). Many contemporary monetarists are skeptical concerning the importance of “first-round effects” of changes in the quantity of money. See the discussion in Friedman and Schwartz (1982, pp. 29–31). Of course, to insist on the importance of such effects is not necessarily to agree with the Keynesian view that long-run effects can be ignored. The position of price-level stabilizationists—and also of proponents of the productivity norm (discussed below)—is essentially a Wicksellian one, which acknowledges both short-run and long-run effects while recognizing the difference between them.

<sup>6</sup>See Leijonhufvud (1984).

pletely and uniformly, whereas relative price changes will disturb real activity to the extent that they occur at all.

Implicit in these arguments for price-level stabilization is the assumption that changes in real money demand or nominal money supply, and consequent needs for general price adjustments, cannot be perfectly anticipated by economic agents. Although long-term tendencies in the movement of the equilibrium price level may come to be anticipated, short-run disturbances are likely to be completely unexpected and, hence, unrecognized for what they are. Knowledge of the pattern or policy of nominal money-supply changes (assuming this knowledge can be had) is not sufficient to avoid surprises; there may also be unexpected changes in real money demand for which scant public information is available.<sup>7</sup> This predicament brings to bear two further arguments for stabilizing the price level. One is that such stabilization reduces the uncertainty encountered by economic agents, allowing them better to capture potential gains from long-term contracts and production processes. The other is that it puts the monetary authorities on a tight leash by committing them to an unambiguous rule, violations of which are easily detected. The last argument is, however, more prominent and valid today than it was earlier in this century when monetary authorities were disciplined by the gold standard. In that context, price-level stabilization represented, at best, the substitution of one kind of monetary rule for another; at worst, it was a stepping stone from reliance upon a rule to reliance upon unrestrained authority.

## The Productivity Norm

### *The Productivity Norm in the History of Thought*

The productivity norm had many proponents before the ascendancy of Keynesian thought.<sup>8</sup> Perhaps its earliest champion was Samuel Bailey in his *Money and Its Vicissitudes in Value* (1837). Later British economists who at one time or another defended the productivity norm included Marshall, Edgeworth, Giffen, Hawtrey, Pigou, and Robertson.<sup>9</sup> In Sweden the norm was defended by David Davidson in a protracted debate with Wicksell (who in the end partially acquiesced), and also by Lindahl and Myrdal. Elsewhere in Europe the norm was embraced by German, Austrian, and Dutch writers of

<sup>7</sup>This fundamental point is overlooked by Grossman (1986) in his critical response to Yeager (1986b).

<sup>8</sup>Selgin (1988) treats the history of the productivity norm in some detail.

<sup>9</sup>Among Robertson's better-known students, Harry Johnson (1972, p. 29) also endorsed the productivity norm.

the neutral money school, including Roepke, Mises, Hayek, Haberler, Machlup, N. G. Pierson, and J. G. Koopmans. New Zealand economist Allen G. B. Fisher (1935) defended the productivity norm at length in the *American Economic Review*. Finally, in the United States the norm was endorsed by Taussig, Laughlin, and Simon Newcomb in the 1890s and by John Williams in the 1930s. Some American champions of a stable price level, including Mints (1950, pp. 132–34) and Warburton ([1946] 1951, p. 308n), also conceded that price-level stability was not necessarily superior to the productivity norm.

In short, by the 1950s the productivity norm had received serious attention from economists of most schools. There was even a period—the first half of the 1930s—when it seemed to rival price-level stabilization as an ideal for monetary policy. Its popularity was short-lived, however, as it and all other prescriptions for macroeconomic stability were eclipsed by the views contained in Keynes's *General Theory*. The (perhaps unintended) consequence of Keynes's contribution was to detract attention from price-level policy altogether. What mattered was the achievement of full employment, regardless of what this required in the way of movements in the price level. In the end, this approach proved to be a recipe for inflation, which eventually drew economists' attention once more to the question of price-level policy. Only by then—in the 1970s—the productivity norm had fallen by the wayside, and price-level stabilization emerged by default as the sole, popular option for price-level policy.

#### *The Rationale of the Productivity Norm in Formal Theory*

The productivity norm rests upon the same tenets that underlie the norm of price-level stability. Both norms take for granted the desirability of a monetary policy that will combat monetary disequilibrium, while rejecting attempts to employ monetary policy to divert the economy from its natural or full-information levels of employment and output. The two norms also hold in common the assumption that the public's expectations may be less than fully correct in that individuals may fail to anticipate fully changes in income, real output, or the price level. More particularly, the norm of price-level stability implicitly assumes that individuals expect the price level to be *stable*—or at least that it is easiest for the public to form correct forecasts of price-level movements when such movements are altogether avoided.

The argument for the productivity norm, as opposed to a stable price-level norm, is that even in a situation where the price level has been kept stable for some time—say from  $t_0$  to  $t_n$ , so that the public

is firmly convinced that the price level will again remain unchanged at  $t_{n+1}$ —deviations from the natural rate of output will be smaller under a policy that allows the public to be surprised by a difference between  $p_{n+1}$  and  $p_n$ , provided the difference reflects a change in aggregate productivity. In this case an unanticipated change in the price level serves to compensate for an unanticipated change in real productivity. A formal demonstration of this is offered by Bean (1983), who models labor-market disturbances in an economy where money wages are set one period in advance and where there is uncertainty as regards both the price level and productivity. The goal of policy is to minimize the difference of output from its full-information level. Output obeys the expression:

$$y_t - y_t^* = \beta[(p_t - {}_{t-1}p_t) + \phi(u_t - {}_{t-1}u_t)]$$

with ( $0 < \beta < 1$ ), where  $y_t$  and  $y_t^*$  are the logs of the actual and expected values of the price level and productivity per worker ( ${}_{t-1}u_t + {}_{t-1}p_t$  thus equals the nominal wage).

If the supply of labor is inelastic with respect to changes in productivity, then  $\phi = 1$  and changes in the price level should be fully proportionate to opposite changes in output. Such a policy is equivalent to one of stabilizing money income— $p_t + y_t$ .

If  $\phi < 1$  (i.e., if the supply of labor is elastic), the price level should adjust *less* than in proportion with changes in output, to allow for changes in the size of the full-information labor force.

In general, the price level should vary so as to stabilize *money income* per laborer— $p_t + y_t - l_t^*$ —where  $l_t^*$  is the size of the full-information labor force. This condition is equivalent to saying that the price level should reflect changes in productivity: A *negative* productivity shock should be offset by a *positive* price-level shock, and a *positive* productivity shock should be offset by a *negative* price-level shock. A policy of stabilizing some measure of *per capita* money income ( $p_t + u_t$ ) represents a practical approximation of this theoretical rule.

If the size of the full-information labor force is unchanging and if the demand for real money balances is unit-elastic with respect to changes in real income (and does not increase or decrease owing to causes not related to any change in real income), then adherence to the productivity norm will require that the nominal quantity of money be held *constant*. Unless otherwise stated, this case is the one considered in the arguments to follow. If, however, the demand for money is elastic with respect to changes in real income, then (other things being equal) an *increase* in productivity will require an *increase* in the nominal quantity of money, and a *decline* in produc-

tivity will require a *reduction* in the nominal quantity of money *to prevent prices from falling or rising more than in proportion to the change in productivity*. In contrast, if the demand for money is inelastic, relative to changes in real income, a productivity norm policy will require that changes in productivity be accompanied by opposite changes in the nominal quantity of money.

Of course, changes in productivity need not always come as a surprise to economic agents. A secular increase in productivity, for example, may be perfectly anticipated in principle. But then the price-level trend (accompanying a productivity-norm policy) would also be perfectly anticipated and would, therefore, be no less desirable than any other fully anticipated price-level trend. Moreover, as will be argued below, a productivity-norm-based trend in prices is likely to be more consistent with the aim of allowing individual, *relative* prices to move in response to changes in productivity where such changes do not occur uniformly and predictably in all industries but are at any moment greater in certain industries than in others.

We now turn to consider how the above arguments hold up against two particular and intuitively appealing arguments for price-level stabilization: (1) that price-stability is needed to preserve debtor-creditor equity, and (2) that it is desirable for avoiding difficulties connected with sluggish price adjustment.

#### *The Productivity-Norm and Debtor-Creditor Equity*

Consider first the matter of debtor-creditor equity, where “debtors” include all persons who have committed themselves to making fixed-money payments in the future, and “creditors” include all persons who have agreed to receive these fixed-money payments. In a stationary economy where productivity is constant, it is generally agreed that debtors will suffer unjustified losses if the price level falls unexpectedly, and that creditors will realize unjustified gains. If, on the other hand, the price level is held constant, neither debtors nor creditors will (on the whole) have any reason to regret their involvement in contracts fixed in money terms.

But if productivity is changing, a stable price level may no longer achieve this desirable result. Assume, for example, that the public expects both the price level and productivity to remain stable. Then, if the price level is kept constant in the face of unexpected improvements in productivity, readily adjusted money incomes—including profits, dividends, and some wage payments—will increase; their recipients will benefit exclusively from the improvements in real output. Creditors, on the other hand, will not be allowed to reap any gains from the same improvements. Although a constant price level

may fulfill their price-level expectations, creditors may still regret their involvement in fixed-money contracts, for they may rightly sense that, had they anticipated the widespread improvement in other persons' real (and, in this case, money) earnings, they could have successfully negotiated better terms. On the other hand, if the price level is allowed unexpectedly to fall to reflect improvements in productivity, creditors will automatically enjoy a share of the gain, while debtors will have no reason to complain: Although the real value of their obligations rises (along with everyone else's), so does their real income. The burden of nominal payments imposed upon them is, however, unchanged. The debtors' only cause for regret is their missed opportunity to enjoy—owing to creditors' lack of perfect foresight—an undeserved windfall at the creditors' expense; their loss, as Haberler (1931, p. 21) put it, is only *lucrum cessans* and not *damnum emergens*.

Some people have objected (e.g., Mints 1950, pp. 132ff, and Haberler 1931, pp. 15–16) that this argument rests entirely on the premise that creditors deserve a share of improvements in productivity, and that no scientific grounds can be given in support of the argument. This objection leads to the conclusion that considerations of equity alone cannot provide any basis for choosing between the productivity norm and a stable price level.

But this conclusion appears to hold only if *improvements* in productivity alone are considered. In his 1889 memorandum to the Committee to Investigate Variations in the Value of the Monetary Standard, Edgeworth (1925, p. 222) observed that those who plead for stabilizing the money value of nominal debts in times of increasing prosperity “might be embarrassed if the principal were extended to the case of declining prosperity.” Indeed, if productivity is falling—as during a negative supply shock—the inequity of a price-level stabilization rule cannot easily be denied, for in this case to keep the price level from rising requires a *contraction* of all nonfixed money incomes. This contraction adds to the burden of payment borne by debtors, increasing the likelihood that some or many of them will be unable to meet their obligations. As Lindahl, the Swedish follower of Davidson, observed, a price-level policy that may encourage parties to engage in unfulfillable agreements cannot be judged as equitable in any reasonable sense of the term (cited in Caplan 1942, p. 210).<sup>10</sup> In such cases it is clear that the productivity norm, rather

<sup>10</sup>Or, as Robertson (quoting Shylock) put it in *Money* ([1922] 1928, p. 121): “‘I’ll have my bond, speak not against my bond’—is that a plea which should be listened to from a debenture-holder or Trade Unionist in a country shivering for lack of fuel or impoverished by chronic warfare?”

than a norm of price stability, best allows debtors and creditors to accomplish their goals and to avoid inequity when relying upon contracts fixed in money terms.

*The Productivity Norm and Price Adjustment*

The question still remains whether the productivity norm is superior to price-level stabilization in preserving short-run macroeconomic equilibrium. It may be recalled that a major advantage claimed for price-level stabilization in this regard is its alleged ability to minimize the burden of general adjustments borne by the price system. Here again, however, the advantage is no longer present when productivity changes, for *both the extent of necessary "permanent" price changes and the extent of temporary, but ultimately unnecessary, price changes are likely to be greater under price-level stabilization than they would be under the productivity norm.*

Suppose, for example, that 1,000 final goods are produced using three distinct factors of production only. A technological improvement causes the output per period of good  $x$ , which formally had a price (included in the price index) of one dollar, to double. Assuming (1) a constant money supply and velocity of circulation of money; (2) that  $x$  has a unitary price elasticity of demand; and (3) that demand for goods other than  $x$  is independent of real purchases of  $x$ , holding nominal income unchanged (thus abstracting from the need for any "secondary" relative-price adjustments), the price of  $x$  will fall to 50 cents. This implies a slight decline in the price index. Prices of all other goods, including the three factors of production, remain unchanged. The new equilibrium price structure requires one price adjustment only and represents an application of the productivity norm.

Now suppose, instead, that the price level is to be held stable under identical circumstances. To accomplish this, the authorities must expand the supply of money to achieve a uniform, though very slight, increase in the prices of 999 goods and of the three factors of production. The sole exception is good  $x$ , the price of which must (as in the previous case) still be allowed to fall, only less than in proportion with the improvement in its rate of output. This approach alone serves to keep the price index stable while also allowing needed adjustments in *relative* prices.

It is possible to construct examples in which the burden of price adjustment (reckoned in terms of the required number of permanent price changes) under price-level stabilization is *less* than what would be required under the productivity norm. This would be true, for instance, if there were a uniform increase in productivity for *all* final

goods, and if the number of different factors of production were less than the number of final goods. But such cases are so exceptional that they may safely be ignored in practice.<sup>11</sup>

Admittedly, arguments such as those made here concerning the burden of price adjustments under various price-level policies are distressingly dependent upon artificial assumptions. One must admit that, in reality, any single relative-price adjustment can be expected to have secondary effects. These effects lead to an all-around adjustment in relative prices and leave no grounds for preferring any one policy as minimizing the total number of required price adjustments. Nevertheless, I have tried to show that, insofar as *any* case can be made (by appropriately stringent assumptions) for a particular price-level policy using the price-adjustment criterion, it is one that favors the productivity norm rather than a stable price level. To the extent that it requires more price adjustments than the productivity norm, price-level stabilization increases the odds of price adjustments being imperfectly accomplished. It, therefore, tends to promote more widespread, undesirable changes in quantities from their full-information levels.

Another difference between price adjustments made necessary by unaccommodated changes in productivity and those made necessary by changes in the flow of money income (as must occur if the price level is to be kept stable in the face of productivity changes) is that the former are brought about through a more direct stimulus than the latter. The stimulus provided by productivity changes to equilibrium price movements is either immediate, as in the case of prices of goods the rate of output of which is altered (where price changes are a direct response to shifting supply schedules), or is of the second order of mediacy, as when changes in output of one group of goods lead to changes in demand for other goods because of the non-unitary price elasticity of demand of goods in the first group.

In contrast, the effects of changes in the flow of money income on equilibrium prices tend to be indirect. These effects involve shifts in demand schedules through a whole series of markets (depending on the precise nature of the monetary transmission mechanism)

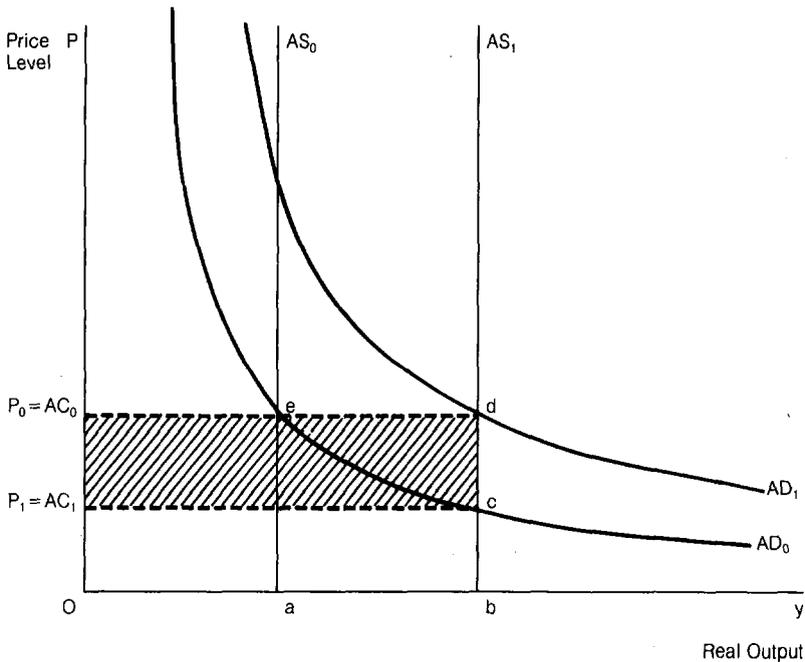
<sup>11</sup>It is regrettable that many macroeconomic models adopt a one-commodity framework, with labor as a sole, distinct factor of production. Such models represent precisely the kind of exceptional circumstance in which a desired pattern of relative prices can be established with the same number of absolute price adjustments (following a change in productivity) regardless of whether a price-level stability or productivity norm is adhered to. To see how different price-level policies may take a different toll on the price system and thereby provide different opportunities for error, one must refer to a multi-commodity framework.

before relative prices and the distribution of demand reach their final, equilibrium levels. As Warburton ([1946] 1951, pp. 298–99) observed, “The first change occurs at the point where the additional money is introduced into or taken out of the economy and is expressed in an increased or decreased demand for the goods and services desired by the persons directly affected by the change in the quantity of money.” Such monetary injection effects are another source of unnecessary and undesirable adjustments in quantities, which will be greater under a policy of price-level stabilization than under a productivity-norm policy. The greater the degree of price and wage-rate rigidity, the more extensive such undesirable quantity adjustments will be.

Besides being relatively direct and few in number, price adjustments in response to changes in productivity are also relatively easy and painless compared to price changes made necessary by changes in effective demand or in the flow of money income. This ease of responding to changes in productivity is still another reason why price adjustments are more likely to occur promptly. The reason is that productivity changes imply changes in unit costs of production. For a product with unitary price elasticity of demand, a change in the product’s selling price equal to a change in its cost of production leaves the producer’s revenues and profits unaffected. Such a change also does not place the producer under any pressure to negotiate new wage rates and salaries or to change the size of his work force. Figure 1 illustrates the case of a *general* increase in productivity caused, for example, by widespread technological innovation. Here, a doubling of real output per period, from “a” to “b,” with a fixed quantity of factors of production and with an unchanged unit-elastic aggregate demand schedule, leads to a halving of the market-clearing price level. This result is consistent with an unchanged stock of money under the standard assumption that the demand for money is unitary elastic with respect to real income. If the elasticity of demand for money relative to real income is greater than or less than unity, the productivity norm requires expansion or contraction of the money supply to keep aggregate demand ( $MV$ , where  $M$  is the nominal money stock and  $V$  its velocity of circulation) from changing. Producers’ aggregate revenues, formerly  $P_0Oae$ , afterwards  $P_1Obc$ , are not affected, and they suffer no losses. Because the reduction of prices required here is painless, there is no reason for producers to resist competitive pressures to undertake it.

A policy of price-level stabilization, in contrast, would require an expansion of money supply to shift aggregate demand to the right, from  $AD_0$  to  $AD_1$ . This shift would make total revenues expand to

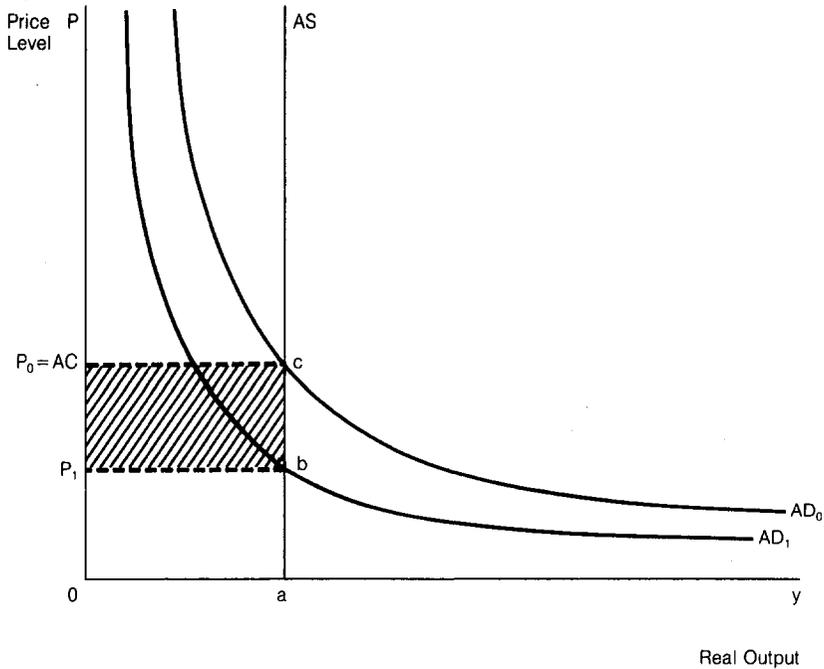
FIGURE 1  
A GENERAL INCREASE IN PRODUCTIVITY WITH UNIT-ELASTIC AGGREGATE DEMAND



$P_0Obd$ , causing profits to swell by the amount  $P_0P_1cd$  until factor costs adjust upward to eliminate the surplus. This upward adjustment of factor costs may be considerably more difficult and painful for producers to allow than the downward adjustment of prices required by the productivity norm. It is one thing to ask producers to pursue a pricing policy that serves merely to protect them from competition without affecting their profits; it is quite another to expect them to submit meekly to parting with extraordinary profits—even if only paper profits—once they have begun to enjoy them.

Figure 2 shows the contrasting case where the market-clearing price level falls by one-half because of an unanticipated decline in aggregate demand, from  $AD_0$  to  $AD_1$ , with constant real output. Here, producers' aggregate revenues also shrink by one-half, from  $P_0Oac$  to  $P_1Oab$ . The loss on current output, represented by the shaded rectangle  $P_0P_1bc$ , will continue until nominal factor costs adjust downward. The process of price adjustment is evidently a painful one in this case. A policy of monetary expansion to keep aggregate

FIGURE 2  
AN UNANTICIPATED DECLINE IN AGGREGATE DEMAND



demand and the price level at their original levels appears clearly preferable to one that would require them to fall.

By way of similar reasoning it can be seen that, although a rise in the price level resulting from expansion of aggregate demand should be avoided, a rise in prices of equal magnitude in response to a fall in productivity should be permitted. The only difference is that, in this case, the increase in prices in accordance with the productivity norm cannot be said to be truly painless, in that it represents a fall in real income and output. Nevertheless, to keep the price level stable under identical circumstances would be even *more* painful and discouraging to producers, because it would cause them to suffer temporary, nominal losses—incurring more than their fair share of the overall burden of reduced production—until laborers and other sellers of inputs are convinced that they must accept (painful) cost in wages and other factor prices.

In further support of these conclusions, we may note that many studies—both theoretical and empirical—of price rigidity incline to the view that product prices are rigid only because factor prices are rigid, and because product prices are often set according to a fixed percentage markup from costs.<sup>12</sup> Although this view accounts for the ill-adjustment of product prices in response to changes in effective demand, it does not predict any ill-adjustment in situations of changing productivity. In the latter case, unit costs of production are themselves changing, so that adjustments in product prices must take place, even as factor prices and the total outlay for factors stay the same, to preserve a constant markup. Implicit contracts between sellers of final goods and sellers of inputs are not necessarily violated when prices change in accordance with the productivity norm.<sup>13</sup>

Until now we have been assuming that changes in the market-clearing price level, whether caused by changes in productivity or by changes in aggregate demand, are completely unanticipated, which adds to the likelihood of needed price adjustments being for a time incomplete. But this assumption is less appropriate for price-level adjustments associated with changes in productivity, for the simple reason that changes in productivity are far less likely to be unanticipated *by price-setting agents in directly affected markets* than changes in aggregate demand. The reason, as Haberler (1931, p. 20) has observed, is that improvements in productivity are often (if not always) consciously aimed at by producers, who pursue the improvements precisely because they seek opportunities to profitably lower their prices compared to their rivals' prices. That downward price adjustments, caused by improvements in productivity, are often sought after by producers and are, therefore, anticipated is another reason for not regarding them as sluggish or incomplete.

All of the above considerations point to the fact that, under the productivity norm, aggregate producer revenues are more likely to keep in line with aggregate producer costs than under a stable price level if productivity is changing. If productivity is increasing, a stable price level requires expansion of money income, which (unless perfectly anticipated by all) must translate into a temporary, general swelling of firm profits. If productivity is falling, a stable price level

<sup>12</sup>This seems to have been Keynes's view in the *General Theory* (1936). See also Okun (1981, *passim*).

<sup>13</sup>On this point, see Okun (1981, pp. 169–70). Contrary to what Okun suggests, this is only one of several reasons accounting for the fact that "prices are much more responsive to changes in costs than to shifts in demand . . . even when demand is pulling in the opposite direction."

requires contraction of nominal income, which (unless anticipated) translates into a temporary, but general, fall in profits.

As Bertil Ohlin (1937, p. 321) once observed, keeping revenues “from getting out of balance” with costs (and especially wages) so as to prevent “abnormally large or low profits and profit expectations” is more crucial to macroeconomic order in the short run than stability of the price level as such. It is in this sense that the productivity norm, and not price-level stabilization, can be said to be truly consistent with the preservation of monetary equilibrium, where the latter requires continuous validation of Say’s Law of markets. Only under the productivity norm will aggregate (effective) demand continue to be just adequate to buy the fruits of industry at prices covering their (money) cost of production, without causing that cost to alter over time except in response to growth in capital and population. In Wicksellian terms, the productivity norm manages, where stability of the price level fails, to keep interest rates at their natural levels.

#### *The Productivity Norm and the Optimal Quantity of Money*

Minimizing departures of relative prices and output from their full-information levels is only one possible objective of monetary policy. Another is to maximize consumers’ welfare from money holdings. In general this calls for allowing prices of final goods to decline at a rate roughly equal to “the” real rate of interest (Friedman 1969). The productivity norm, by allowing the price level to decline secularly as productivity grows, comes closer to this ideal than price-level stabilization. Moreover, if the real rate of interest is equal to the rate of growth of real income (as has been roughly true historically and as is implied by standard models of optimal growth, e.g., Phelps 1961), the rate of deflation that maximizes consumers’ welfare from money holdings will equal the rate of increase in per capita output, and will imply that factor prices are held constant. The productivity norm and the optimal quantity of money norm will then coincide.

#### *The Productivity Norm in Practice*

Though past upholders of the productivity norm agreed that it was tantamount to “stabilization of some average of the prices of the original factors of production” (Hayek [1933] 1984, p. 161), they differed in their views concerning how this stabilization could be achieved in practice.<sup>14</sup> It was generally admitted that a true index of

<sup>14</sup>The goal of stabilizing the “average price of factors of production” is not equivalent to one of stabilizing total money costs of production unless the quantity of productive inputs—of labor and capital—remains fixed: The productivity norm requires that prices fall to reflect *intensive*, but not *extensive*, improvements in output. Monetary expansion or contraction involving expansion or contraction of total money costs is required in connection with population growth and the accumulation of capital.

prices of factors of production could not be constructed, because of the lack of market-price statistics for most factors of production apart from unskilled labor. But such an approach is by no means necessary or even appropriate: A productivity-norm policy can be implemented, or approximately implemented, by directly stabilizing some readily available measure of the flow of money payments or income such as nominal GNP or domestic final demand.<sup>15</sup>

Just how money income should behave if the productivity norm is to be enforced depends on the extent of changes in the quantity of factors of production—including both labor and capital. A common view emerged in the 1930s that money income per capita, rather than aggregate money income, should be stabilized. The stabilization of per capita income was meant to prevent growth in the labor force—assumed to be approximated by growth in population as a whole—from having a depressing effect on nominal wage rates. To this opinion Robertson (1957, p. 39) added that, if capital increases and, therefore, contributes a greater share to total production, then the part of money incomes imputable to rental payments should also increase. Thus, nominal income should grow at a rate sufficient to reflect changes in both the labor force and the capital stock. This would allow prices to fall in proportion to purely *intensive* improvements in output, but less than in proportion to any improvements of a partly extensive nature.

Viewed as a proposal for stabilizing nominal income, the productivity norm resembles a number of recent suggestions for targeting nominal GNP.<sup>16</sup> A major difference, however, is that many of these recent suggestions consider the targeting of nominal GNP as a means for achieving stability of the price level. Indeed, these suggestions have been criticized for being incompatible with price-level stability whenever supply shocks occur (e.g., Barro 1986, p. 26). The productivity norm, in contrast, does not value price-level or real-output stability per se; it seeks merely to avoid those price and output fluctuations that are likely to involve departures of economic activity from its full-information structure. This characteristic also distinguishes the productivity norm from proposals for an elastic price standard, such as those of Hall (1984b, 1986) and Taylor (1980).

<sup>15</sup>Haraf (1986) argues that targeting domestic final demand (DFD) (= GNP less changes in business inventories and net exports) is more advisable than targeting GNP. DFD may well be a superior measure of "consumers' outlay" or aggregate spending.

<sup>16</sup>See, for example, McCallum, (1984, 1985, 1987); Gordon (1985); Hall (1981, 1983); Haraf (1986); Tobin (1980, 1983); and Meade (1978). For critical discussions of some of these proposals, see Bean (1983) and Taylor (1985).

Although our main concern in this essay is not with the practical problems of implementing various price-level policies, it is appropriate to remark here that a nominal income target is no more difficult to implement than any price-index target. On the contrary, as Haraf (1986, p. 659) observes, an income target would probably lead to quicker reaction by the monetary authorities to velocity disturbances than a price-level target, without inviting inappropriate responses to real (productivity) disturbances.

## Conclusion

Theoretical considerations and assumptions identical to those used by proponents of a stable price level lead one to favor the productivity norm over price-level stability and also over other price-level policies as a means for promoting general welfare. The norm would require the monetary authorities to stabilize per capita nominal GNP or domestic final demand or some other measure of per capita money payments, allowing for more rapid growth of money payments when the share of income attributable to capital is increasing.

Some features of a productivity norm—based on nominal income targeting—that should contribute to the norm's overall appeal include the following:

1. The fact that the productivity norm, like other popular policies, allows full monetary accommodation of changes in the velocity of money, with less reaction lag-time than a stable price-level norm and, hence, with reduced velocity-shock related variability of prices.
2. The long-run equivalence of a productivity norm to price-level stabilization under stationary output conditions.
3. The productivity norm's equivalence to a money growth-rate rule if velocity is stable.
4. The productivity norm's emphasis on stability of aggregate demand, which conforms well with natural rate theories of output and employment and with the rational-expectations view that macroeconomic instability is caused mainly by problems of "signal extraction."
5. The fact that the productivity norm is a more moderate policy than a policy of either price-level stabilization or full-employment—that is, the productivity norm avoids extremes of price- or employment-variability possible under these other policies.
6. The greater symmetry of the productivity norm compared with other price-level policies: Those who plead for monetary "accommodation" of adverse supply shocks do not also recom-

mend monetary contraction to counteract the real effects of positive supply shocks.

7. The relative ease of implementing the productivity norm.
8. The coincidence of the productivity norm with the optimum quantity of money norm when the real rate of interest is equal to the rate of growth of real output.
9. The ability of the productivity norm to provide protection from the monetary authorities' abuse of their powers equal to or greater than what could be achieved by other price-level norms.

A proposal for targeting nominal income (rather than any commodity price index) is neither novel nor necessarily controversial. Yet this particular form of the proposal may be controversial for the simple reason that it would allow the price level to *fall* in normal, progressive times. Though this approach was once widely endorsed by economists, it is now practically unheard of. Instead, mild inflation is taken to represent a normal and moderate condition, while price-level stability is regarded as a hard-line extreme.

It must be remembered, however, that policy itself is responsible for these views, because policy created the last four decades of inflation, which everyone now takes for granted. The policy in question was founded on the view that expansion of nominal (effective) demand can eliminate unemployment. We now know that this view is mistaken. Although unemployment may sometimes be due to a deficiency of effective demand, and although expansion of demand may temporarily reduce unemployment even when its ultimate cause is *not* deficient demand, the view that inflation as such reduces unemployment (i.e., that the long-run Phillips curve is negatively sloped) has been discredited. If policymakers are prepared to admit that inflation has no such benefit, then it is incumbent upon them to press beyond the simple analytics of a nonexistent "inflation-unemployment trade-off" in deciding how the price level ought to behave. Price-level stability is one answer; the productivity norm is another, better answer.

## References

- Bailey, Samuel. *Money and Its Vicissitudes in Value*. London: Effingham Wilson, 1837.
- Barro, Robert J. "Rules vs. Discretion." In *Alternative Monetary Regimes*, pp. 16–30. Edited by Colin D. Campbell and William R. Dougan. Baltimore: Johns Hopkins University Press, 1986.
- Bean, C. "Targeting Nominal Income: An Appraisal." *Economic Journal* 93 (December 1983): 806–19.

- Black, Robert P. "A Proposal to Clarify the Fed's Policy Mandate." *Cato Journal* 5 (Winter 1986): 787-95.
- Caplan, Benjamin. "The Wicksellian School—A Critical Study of the Development of Swedish Monetary Theory, 1898-1932." Ph.D. dissertation, University of Chicago, 1942.
- Edgeworth, F. Y. *Papers Relating to Political Economy*. London: The Royal Economic Society, 1925.
- Fisher, Allen G. B. "Does an Increase in Volume of Production Call for a Corresponding Increase in Volume of Money?" *American Economic Review* 25 (June 1935): 197-211.
- Fisher, Irving. *Stabilizing the Dollar*. New York: Macmillan, 1925.
- Friedman, Milton. "The Optimum Quantity of Money." In *The Optimum Quantity of Money and Other Essays*, chap. 1. Chicago: Aldine, 1969.
- Friedman, Milton, and Schwartz, Anna J. *Monetary Trends in the United States and the United Kingdom: Their Relation to Income, Prices, and Interest Rates, 1867-1975*. Chicago: University of Chicago Press, 1982.
- Garner, C. Alan. "Commodity Prices and Monetary Policy Reform." Federal Reserve Bank of Kansas City, *Economic Review* 70 (February 1985): 7-21.
- Gordon, Robert J. "The Conduct of Domestic Monetary Policy." In *Monetary Policy in Our Times*. Edited by A. Ando, et al. Cambridge, Mass.: MIT Press, 1985.
- Grossman, Herschel I. "Money, Real Activity, and Rationality." *Cato Journal* 6 (Fall 1986): 401-8.
- Haberler, Gottfried. "The Different Meanings Attached to the Term 'Fluctuations in the Purchasing Power of Gold' and the Best Instrument or Instruments for Measuring such Fluctuation." Geneva: League of Nations, March 1931.
- Hall, Robert E. "Lowering Inflation and Stimulating Economic Growth." In *Politics and the Oval Office: Toward Presidential Governance*, pp. 207-27. San Francisco: Institute for Contemporary Studies, 1981.
- Hall, Robert E. "Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar." In *Inflation*. Edited by Robert E. Hall. Chicago: University of Chicago Press, 1982.
- Hall, Robert E. "Macroeconomic Policy under Structural Change." In *Industrial Change and Public Policy*. Kansas City: Federal Reserve Bank of Kansas City, 1983.
- Hall, Robert E. "A Free-Market Policy to Stabilize the Purchasing Power of the Dollar." In *Money in Crisis*. Edited by Barry N. Siegel. San Francisco: Pacific Institute, 1984a.
- Hall, Robert E. "Monetary Policy with an Elastic Price Standard." In *Price Stability and Public Policy*, pp. 137-59. Proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City, 1984b.
- Hall, Robert E. "Optimal Monetary Institutions and Policy." In *Alternative Monetary Regimes*, pp. 229-39. Edited by Colin D. Campbell and William R. Dougan. Baltimore: Johns Hopkins University Press, 1986.
- Haraf, William S. "Monetary Velocity and Monetary Rules." *Cato Journal* 6 (Fall 1986): 641-62.
- Hayek, F. A. "On 'Neutral Money.'" 1933. Reprinted in *Money, Capital, and Fluctuations: Early Essays*, pp. 159-62. Chicago: University of Chicago Press, 1984.

- Hetzel, Robert. "A Mandate of Price Stability for the Federal Reserve System." *Contemporary Policy Issues* (1985): 50–67.
- Johnson, Harry G. *Inflation and the Monetarist Controversy*. Amsterdam: North Holland, 1972.
- Keynes, J. M. *The General Theory of Employment, Interest, and Money*. London: Macmillan, 1936.
- Leijonhufvud, Axel. *Information and Coordination*. New York: Oxford University Press, 1981.
- Leijonhufvud, Axel. "Inflation and Economic Performance." In *Money in Crisis*, pp. 19–36. Edited by Barry N. Siegel. San Francisco: Pacific Institute, 1984.
- McCallum, Bennett T. "Monetarist Rules in the Light of Recent Experience." *American Economic Review* 74 (May 1984): 388–91.
- McCallum, Bennett T. "On the Consequences and Criticisms of Monetary Targeting." *Journal of Money, Credit, and Banking* 17 (November 1985): 570–97.
- McCallum, Bennett T. "The Case for Rules in the Conduct of Monetary Policy: A Concrete Example." Federal Reserve Bank of Richmond, *Economic Review* 73 (October 1987): 10–18.
- Meade, J. E. "The Meaning of Internal Balance." *Economic Journal* 88 (September 1978): 423–35.
- Meltzer, Allan H. "Some Evidence on the Comparative Uncertainty Experienced under Different Monetary Regimes." In *Alternative Monetary Regimes*, pp. 122–53. Edited by Colin D. Campbell and William R. Dougan. Baltimore: Johns Hopkins University Press, 1986.
- Mints, Lloyd W. *Monetary Policy for a Competitive Society*. New York: McGraw Hill, 1950.
- Ohlin, Bertil. "Employment Stabilization and Price Stabilization." *Lessons of Monetary Experience*, pp. 318–28. Edited by Arthur D. Gayer. New York: Rinehart & Company, 1937.
- Okun, Arthur. *Prices and Quantities: A Macroeconomic Analysis*. Washington: Brookings Institution, 1981.
- Phelps, Edmond. "The Golden Rule of Accumulation." *American Economic Review* 53 (September 1961): 638–43.
- Reynolds, Alan. "The Trouble with Monetarism." *Policy Review* 21 (Summer 1982): 19–41.
- Robertson, Dennis H. *Money*. Cambridge: Cambridge University Press, 1922; 3rd rev. ed., 1928.
- Robertson, Dennis H. *Lectures on Economic Principles*. London: Staples, 1957.
- Robertson, Dennis H. "A Memorandum Submitted to the Canadian Royal Commission on Banking and Finance." Princeton University, *Essays in International Finance* (May 1963): 241–74.
- Selgin, George A. "The Price Level, Productivity, and Macroeconomic Order." Unpublished manuscript, 1988.
- Taylor, John B. "Output and Price Stability: An International Comparison." *Journal of Economic Dynamics and Control* 2 (February 1980): 109–32.
- Taylor, John B. "What Would Nominal GNP Targeting Do to the Business Cycle?" *Carnegie-Rochester Conference Series on Public Policy* 22 (1985): 61–84.

## MONETARY EQUILIBRIUM

- Tobin, James. "Stabilization Policy after Ten Years." *Brookings Papers on Economic Activity* 1 (1980): 19–72.
- Tobin, James. "Commentary." *Industrial Change and Public Policy*. Federal Reserve Bank of Kansas City, 1983.
- Warburton, Clark. "The Misplaced Emphasis in Contemporary Business-Fluctuation Theory." 1946. Reprinted in American Economic Association, *Readings in Monetary Theory*, pp. 284–318. Homewood, Ill.: Richard D. Irwin, 1951.
- Yeager, Leland B. "Price-Level Stability as the Goal of Monetary Reform." *Cato Journal* 5 (Winter 1986a): 821–24.
- Yeager, Leland B. "The Significance of Monetary Disequilibrium." *Cato Journal* 6 (Fall 1986b): 369–99.
- Yeager, Leland B. "Injection Effects and Monetary Intermediation." Unpublished manuscript, 1990.