Commodity Prices: Useful Intermediate Targets For Monetary Policy?

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Monetary policy seeks to move toward a stable price level by gradually reducing inflation while fostering steady growth in output and employment. Toward those ends, monetary policymakers aim at intermediate targets—goals which have no intrinsic value, but which help policymakers reach their ultimate objectives.

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At different times during the past 20 years, the Federal Reserve has in effect targeted short-term interest rates such as the federal funds rate, and monetary aggregates such as M1, M2, and M3. Each strategy has enjoyed its share of success, but each has revealed significant shortcomings as well. Those shortcomings have led policymakers and economists to explore other, possibly more effective intermediate targets.

Industrial and agricultural commodity prices which are sensitive to changes in the level of economic activity are one suggested alternative. Supporters of commodity price targets argue that by limiting movements in the prices of items

like gold, lumber, and other raw materials, the Fed can better stabilize economic activity. Indeed, one proponent claimed that such a guide would have enabled the U.S. economy to avoid all major recessions since 1915.[1]

Contrary to those claims, the strategy of targeting commodity prices is hardly foolproof. Close scrutiny of the approach and a review of available empirical studies that bear on the issue uncover serious weaknesses. Overall, the case for commodity prices as intermediate targets appears unconvincing based on currently available evidence.

USING INTERMEDIATE TARGETS TO GUIDE POLICY

Several factors in addition to monetary policy influence real economic growth and inflation, and changes in any of them can destabilize the economy. Swings in spending by businesses, consumers, and governments, for example, can cause sizable fluctuations in prices and output. So too can shifts in production costs, like wages and energy prices, which affect the supplies of goods and services. Monetary policy essentially tries to counteract those disturbances so as to keep the economy on an even keel.

Since their aim is to stabilize economic conditions, it would seem natural for policymakers to focus directly on the latest price and output data when making short-run operating decisions. Lags in the policy process, however, make such a strategy impractical and imprudent, and have led the Fed to take a different tack.

Information Lags. Information lags constitute an important practical difficulty facing policymakers. At present, timely data on aggregate prices and output are unavailable. Comprehensive data on overall economic conditions are available only on a quarterly basis: preliminary estimates are released about 20 days after the end of the quarter, and the numbers are subsequently revised at least twice. All told, policymakers must wait almost three months after a quarter ends to get an accurate view of that period's aggregate economic performance.

Policymakers obviously cannot base their decisions solely on three-month-old data or they would be reacting to conditions that have already occurred. By that time, the situation could be totally different, and could require a completely different policy response. In the end, policymakers could actually destabilize rather than stabilize prices and output.

Impact Lags. But even if policymakers could somehow get more timely information on real growth and inflation, they still would shy away from acting solely on that news because it takes time for policy changes to affect the economy. When the Fed seeks to alter economic activity, it must use one of its tools to start a lengthy chain of events that eventually moves the economy in the desired direction. The Fed's actions, such as its conduct of open market operations, most rapidly affect financial markets where they alter interest rates, money supplies, and credit availability. Those financial market developments then lead consumers and businesses to reevaluate their spending decisions. If interest rates rise, for example, consumers will want to purchase fewer cars and houses, and businesses will want to buy fewer new machines than otherwise. And as each group revises its spending plans, businesses will correspondingly adjust production levels. Eventually, perhaps six to nine months after the Fed's initial action, the overall levels of output and employment will change. Inflation also will change, but with an even longer lag; by some estimates, monetary policy actions take between one and two years to influence prices.

Impact lags argue against stressing current economic events in policy decisions. The Fed might quickly develop a policy response which is right for existing conditions. But by the time those actions begin to take effect, the situation and its policy needs could have changed dramatically. The economy could end up receiving a

[1]Robert J. Genetski, "The Benefits of a Price Rule," *The Wall Street Journal* (December 10, 1982).

dose of stimulus when restraint is called for, or vice versa. Once again, policy could lead to less economic stability, not more.

From Final Goals to Intermediate Targets. The dangers of focusing directly on the goal variables are clear, and make a case for using an alternative policymaking approach. Throughout much of the post-war period, that alternative has taken the form of targeting intermediate variables.

Using an intermediate target approach requires the Fed to find a variable on which it can get up-to-date information, which it can closely control, and which has a tight, reliable link to future movements in the goal variables. Once policymakers locate such a variable, they must select its target value, that is, the level or growth rate of the variable which is consistent with steady economic growth and long-term price stability. The Fed then uses one of its tools, such as open market operations, to keep the variable on target. The hope is that by quickly correcting deviations in the chosen variable from its target, the Fed will better achieve ultimate economic goals. "Hitting the intermediate target" has no intrinsic significance; it only has importance insofar as it helps the Fed reach its final objectives.

In theory, intermediate targeting mitigates the difficulties created by lags. Information delays no longer stymie policymakers because they now track a variable on which current data are readily available. The procedure handles impact lags as well, because policymakers rely on something that reliably signals *future* changes in the goal variables. And if the chosen variable's deviations from its target consistently warn of problems far enough in advance, then they will permit corrective policy actions to be taken, to filter through the economy, and eventually to work at the desired time.

Finding the Right Intermediate Target. A significant practical challenge facing policymakers is to find a variable that fits the bill of an intermediate target. The Fed has tried several through the years, most notably nominal interest rates and the M1 measure of money (currency plus checkable deposits). At the conceptual level, each of those variables appears to be a good candidate. Current information on each variable is readily available, and there are solid theoretical arguments suggesting that money and interest rates are linked to future economic conditions. Moreover, each is a financial variable and so is likely to be controllable by the Fed, presuming that depositors and banks behave in relatively stable, predictable ways.

Interest rates and M1 actually have served well as targets during particular periods. Eventually, however, each exhibited shortcomings.[2] The link between these variables and future economic activity ultimately deteriorated and their performance as targets became erratic. Thus, the Fed could no longer rely on them to give clear warnings of coming problems. The Fed currently sets target ranges for the M2 and M3 measures of money, which are broader than M1 and include less liquid items such as savings and time deposits. While M2 and M3 are somewhat useful as intermediate targets, studies suggest that they too have a fairly loose connection with the goal variables.[3] Consequently, the search for more effective intermediate targets continues.

Commodity Prices Are a Possibility. Some analysts recently have recommended targeting sensitive industrial commodity prices—either the price of a single commodity, like gold, or the price of a basket of commodities, including metals, lumber, and oils, among others. The thrust of their proposals is that the Fed should use its policy tools to correct deviations in commodity

[2]Discussions of the usefulness of interest rate and monetary targets are found in Gordon H. Sellon, Jr. and Ronald L. Teigen, "The Choice of Short-Run Targets for Monetary Policy, Parts I and II," Federal Reserve Bank of Kansas City *Economic Review* (April and May 1981), pp.3-16 and pp.3-12. A thorough empirical study of the breakdown in the link between M1 and economic activity is contained in Herbert E. Taylor, "What Has Happened to M1?" Federal Reserve Bank of Philadelphia *Business Review* (September/October 1986) pp.3-14.

[3]See, for example, David E. Lindsey and Paul Spindt, "An Evaluation of Monetary Indexes," Federal Reserve Board of Governors *Special Studies Paper 195,* (March 1986).

prices from a predetermined target level. They argue that doing so will help the Fed achieve stable prices and sustainable economic growth. For example, one proponent has written:

> If monetary policy cannot effectively stabilize prices...by controlling quantities of M, then why not focus directly on some sensitive measure of price? If such prices are falling, that would be a sign...for the Fed to buy bonds, or to lower the discount rate or reserve requirements. If prices start to climb, it is time to tighten....Since broader price indexes are too insensitive, what about narrowing the list to only one commodity—namely, gold—that is notoriously sensitive to every whiff of inflation or deflation?[4]

Another has expressed a similar sentiment:

> Abandon the present concept of monetary targets....In place of the targets the Fed should be permitted a monthly range of discretion regarding the creation of money. The range of discretion should change automatically in response to changes in an index of sensitive commodity prices.[5]

The idea that commodity prices should play some role in monetary policymaking is not a new one. Around the turn of this century, the U.S. monetary system embraced a gold standard, under which the Treasury bought and sold gold so as to peg its price at $20.67 per ounce. Members of Congress and the academic community during that period felt such a scheme would lead to steady growth without inflation. Although the plan had limited success and was ultimately dropped, some individuals, such as Professor Robert Mundell of Columbia University, currently think monetary policy should return to the gold standard.[6]

Policymakers have also used commodity prices through the years as one of their many *indicators* of future economic conditions. That is, policymakers have relied on commodity prices for clues about future trends in goal variables without mechanically responding to movements in those prices, as would happen if commodity prices were targeted. Indeed, Treasury Secretary Baker has recently suggested that paying greater attention to commodity prices can help industrial countries coordinate their monetary and fiscal policies in mutually beneficial ways.[7] Proposals for targeting commodity prices, then, contain elements of procedures that have already been followed.

As with nominal interest rates and money measures, one can enumerate legitimate reasons why sensitive commodity prices might make effective intermediate targets. The case is not ironclad, however. There can be no dispute that current commodity price data are readily available. Newspapers publish information on various commodity prices with a one-day lag, an inconsequential delay for policymakers. But whether the Fed can control those prices, and whether exerting such control leads to desired future economic conditions, is less clear-cut.

CAN THE FED CONTROL COMMODITY PRICES?

Avenues by which the Fed could influence commodity prices certainly exist. Most commodity prices are determined in auction markets where they respond readily to shifts in supply and demand. Monetary policy can do little to change the supplies of commodities. Those depend on factors such as the amount of resource exploration that firms undertake, changes in extraction technologies, changes in the weather, and so forth. Policy can, however, influence the demand for commodities.

Manufacturing activity represents a major source of demand for commodities—the pro-

[4]Alan Reynolds, "The Trouble With Monetarism," *Policy Review* (Summer 1982) pp.38-40.

[5]Robert J. Genetski, "The Benefits of a Price Rule."

[6]Robert Mundell, "The Debt Crisis: Causes and Solutions," *The Wall Street Journal* (January 31, 1983).

[7]Secretary Baker's proposal is discussed in "Baker Suggests Role for Gold in Setting World Economic Policy," *The Wall Street Journal* (October 1, 1987).

duction of finished goods like jewelry, perfumes, and houses entails the use of commodities like gold, oils, and lumber. Because monetary policy influences aggregate spending for goods and services, it can alter the industrial demand for commodities. Commodities are also demanded as investments by individuals and firms who speculate that commodity prices will rise in the future—by buying commodities when they are relatively cheap and selling or using them when they are relatively expensive, individuals obtain a capital gain. Because Fed actions influence both the future path of commodity prices and the level of interest rates (the return on alternative investments), they can lead investors to adjust their speculative demands for commodities.

But while some link between policy actions and commodity price movements exists, chances are small that the Fed can control those movements quickly enough or precisely enough. The fact that policy affects industrial commodity demands only *indirectly* by changing the *overall* level of economic activity suggests control through that channel will be subject to lengthy impact lags. It also suggests control will be inexact. In particular, monetary policy is only one of many factors determining commodity prices. Unanticipated shifts in other factors could make commodity prices quite variable and hard for the Fed to target closely, especially within sufficiently short time spans. Moreover, because the Fed influences industrial commodity demands by affecting overall activity, the relation between commodity prices and policy actions will vary whenever policy's relation to aggregate demand changes. The large variations in M1 velocity that have occurred throughout the 1980s exemplify such changes. Those variations have made it more difficult for policymakers to predict how their actions will affect aggregate demand, and thus commodity prices. To the extent that such instabilities are unforeseen, the Fed's ability to control commodity prices diminishes.

The Fed is not likely to be any more effective in controlling commodity prices through its influence on speculative demands. Like industrial commodity demands, speculative demands respond to a variety of forces in addition to monetary policy. Those other factors include "economic fundamentals" such as the stance of fiscal policy, political developments such as war in the Middle East, and intangibles often termed "investor psychology." As a consequence, speculative commodity demands tend to be quite volatile, and hence hard to control. Moreover, a given change in monetary policy can have very different effects on investors' price expectations, depending upon whether investors believe the policy change is temporary or long-lasting. Thus, the Fed cannot be sure exactly what impact a policy change will have on speculative demands. Ongoing innovation in financial markets also makes the connection between policy changes and commodity price movements unstable. As new financial products are introduced, the speculative demand for commodities might become more or less sensitive to policy-induced interest rate changes. Since the Fed cannot forecast those innovations, and since their impacts on speculative commodity demands are hard to fathom, they make policy's effect on commodity prices more unpredictable.

Available Evidence Finds No Obvious Link. Unfortunately, empirical evidence which bears on the Fed's ability to control commodity prices is sparse and somewhat unsophisticated. Consequently, it cannot be taken as conclusive. But what evidence is available suggests that the Fed would have difficulty controlling commodity prices closely. R. W. Hafer examined the issue by gauging how quickly and reliably commodity prices changed in response to movements in the money stock, his proxy for the Fed's policy instrument.[8] To measure how closely money and commodity prices have moved historically, he calculated the simple correlation coefficient be-

[8]R.W. Hafer, "Monetary Policy and the Price Rule: The Newest Odd Couple," Federal Reserve Bank of St. Louis *Review* (February 1983) pp.5-13.

tween quarterly percent changes in an index of industrial commodities and quarterly percent changes in M1 lagged one quarter. Hafer concluded that the relationship has been very weak. He found the correlation to be statistically significant (different from zero) for the entire 1960:1 to 1983:3 period that he studied, although the magnitude of the correlation is quite small (0.23). Moreover, the link appears very unstable: the correlation is statistically significant in only one of the four subperiods between 1960 and 1982 that he studied. And even in the 1965:1 to 1969:4 period when the link is significant, the size of the correlation is again quite small (0.47).

One limitation of Hafer's study concerns his proxy for the Fed's policy tool. The money stock is not something that the Fed can control directly; rather, the Fed controls variables such as nonborrowed reserves and the federal funds rate. But a simple extension of Hafer's analysis to examine the correlation between those instruments and commodity prices or gold prices leaves his conclusions unaltered.[9] Virtually none of the correlations is statistically significant (different from zero), even allowing a full year for changes in the policy instruments to have an effect. In addition, some correlations which are statistically significant change sign across different time periods, suggesting that those relations are unstable. Similar results emerge when simple regressions are used to examine the links.[10]

Taken together, available evidence and simple extensions reveal no obviously strong connection between commodity prices and the Fed's operating instruments. The results suggest that the Fed cannot quickly bring commodity prices to desired levels, and thus do not support targeting them. It is, of course, possible that more sophisticated statistical techniques might uncover the necessary relation. Moreover, the Fed has never tried to control commodity prices, and perhaps it could find a way to do so successfully. But before trying, policymakers need to know whether commodity price targets will help achieve economic goals. That is, will correcting deviations in commodity prices from a predetermined target level improve the Fed's chances of promoting steady economic growth and stable prices? The answer, as it turns out, is not clear-cut.

CAN CONTROLLING COMMODITY PRICES HELP THE FED ACHIEVE ITS GOALS?

In Some Cases It Might. Controlling commodity prices will help if commodity price increases have a strong positive link to future changes in the goal variables, for instance, if rising commodity prices reliably signal future accelerations in real economic growth and inflation.[11] Then, when the Fed tightens policy to reverse the commodity price increase, it will slow overall economic activity and moderate the coming economic boom. That is exactly the right response given the Fed's desire for steady growth and stable prices.

Such a positive link might exist if commodity

[9]The monetary policy instrument variables used in the calculations are quarterly changes in the federal funds rate and quarterly percent changes in nonborrowed reserves. The commodity price variables used are the quarterly percent changes in the price of gold and in the Business Conditions Digest commodity price index. Each commodity price variable was correlated with the contemporaneous value and four lagged values of each instrument variable. Four time periods were studied: 1959:1 to 1965:2; 1965:3 to 1971:4; 1972:1 to 1978:2; and 1978:3 to 1984:4.

[10]The regressions are of the form:

$$C_t = a_0 + \sum_{i=0}^{7} a_{i+1} P_{t-i} + u_t$$

where C is the percent change either in the price of gold or the BCD index, P is either the percent change in nonborrowed reserves or the simple change in the federal funds rate, t indexes time in quarters, and u is a random error. Equations were estimated for the same four periods as were the correlations (see footnote 9). The conclusions mentioned in the text about the closeness of the relations are based on inspections of the "t" statistic for the sum of the lagged coefficients and of the "F" statistic for the equation as a whole.

[11]For ease of exposition, we focus on cases when commodity prices are rising. However, the discussion applies equally to cases when commodity prices are falling.

price increases are part of a general inflation caused by aggregate spending pressures. Rapidly growing demands for goods and services typically elicit more real output while bidding up prices, including commodity prices, throughout the economy. Those commodity price increases are thought to precede the eventual rise in output and other prices associated with a spending surge. Indeed, the belief that changes in sensitive commodity prices precede changes in real economic activity lies behind the Commerce Department's inclusion of sensitive commodity prices in an index of leading indicators. The logic of the argument is that industrial commodities lie at the source of the production chain. As businesses gear up to meet increasing demands for their products, one of their first tasks is to acquire additional raw materials. Firms, then, start to bid up commodity prices *before* production rates rise dramatically. Commodities, moreover, are bought and sold in auction-type markets, which makes their prices quite flexible and responsive to growing demands. That sensitivity reinforces the tendency of commodity prices to lead increases in production.

Not all prices adjust continuously in auction-type markets as do commodity prices, however. Many are set by long-term supply contracts and other, perhaps implicit, arrangements at the wholesale and retail level. Such prices move gradually, only after those agreements lapse and are renegotiated. The greater flexibility of commodity prices means that they can react more quickly than most other prices to an increase in aggregate demand. They thus could foreshadow accelerations in overall inflation, as well as in real growth.

But There Are No Guarantees. Increases in commodity prices need not always portend faster real output growth and inflation, however. And if they do not, then commodity price targeting will not help achieve policy goals. Restraining commodity price increases when they have no implications for future business conditions will prove inappropriate—the Fed's tightening will induce an economic slowdown when there otherwise would have been none.

Situations in which commodity prices do not have a positive link with the goal variables arise from developments in specific commodity markets.[12] Various market-specific forces, as well as aggregate conditions, alter commodity prices. Adverse weather conditions, for example, can restrict the availability of crops and hence raise their prices. Purposeful actions by suppliers can also affect individual markets, such as when OPEC raises the price of crude oil. Changes in technologies and tastes can move particular prices as well. If consumers suddenly prefer gold jewelry over silver, then the price of gold will rise while the price of silver falls.

Such relative price changes can hold little significance for future real growth and inflation because they generally cause offsetting adjustments in other prices. As in the jewelry example, a run-up in gold prices can go hand in hand with a decline in silver prices. The overall price level, which reflects both, may not change much at all. Neither would overall output: production of gold jewelry will rise while that of silver jewelry will fall.

The Fed might target an *index* of commodity prices to overcome the difficulties caused by changes in the *relative* price of commodities, especially ones like gold and silver which have fairly unstable demands. Use of an index would decrease the likelihood of the Fed mistaking market-specific developments for aggregate ones. But even that strategy has its Achilles' heel. Commodities *as a group* might experience a relative price shift, and hence even the movement in an

[12]When commodity prices change as a result of developments in particular markets, policymakers should adjust the target level of commodity prices, rather than try to hit the original target. The obvious practical difficulty is determining which commodity price changes reflect specific factors and which reflect generalized inflation pressures. An extended discussion of this point is found in Robert E. Hall, "Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar" in *Inflation: Causes and Effects*, Robert E. Hall, ed. (Chicago: The University of Chicago Press 1982) pp.111-122.

index of commodity prices might have no implications for real growth and inflation. For example, commodities on average might become less expensive relative to services. Such a relative price shift occurred in the early 1980s due to the dollar's sharp appreciation. The dollar's appreciation made foreign goods less expensive, and since the U.S. imports many commodities and raw materials, their prices fell. The average or general price level did not fall, however. Relative price changes, moreover, might reverse quickly. Speculators, for instance, can inflate commodity prices only to have their bubble burst soon after.

The theoretical case for commodity price targets appears far from airtight. Conceptually, one cannot know what implications a change in commodity prices has for real growth and inflation, and hence whether reversing that change makes sense. The Fed could try to determine the importance of each change in commodity prices before acting. But the time and effort required for that procedure greatly diminish the potential usefulness of commodity prices as intermediate targets.

Available Evidence Again Finds No Obvious Link. The rationale for controlling commodity prices might become clearer at the empirical level, however. For although a variety of relations between commodity prices and the goal variables can arise, one which is strong, positive, and quantitatively consistent might actually predominate. And if it does, policymakers might feel confident that controlling commodity price fluctuations will help.

Alan Garner provided one piece of evidence on the issue.[13] He computed simple correlations between real GNP and current and lagged values of an index of commodity prices to see if commodity price changes give information about future economic activity. He then made the same calculations using the GNP deflator, a comprehensive price index, to see if commodity price changes contain information about future inflation. Garner studied two time periods and used quarterly percent changes of all the variables involved.

Within Garner's framework, positive and statistically significant correlation coefficients would be evidence in favor of commodity price targeting. Such correlations would indicate that increases in commodity prices eventually and consistently lead to accelerations in real growth and inflation. If they also display similar patterns across the two time periods that Garner examined, that would suggest that relations between commodity prices and the goal variables are stable. Garner found, however, that the correlations were generally small and insignificant in both periods, and thus provide no support for commodity price targets. Applying his approach to a wider range of commodity price measures and time periods also fails to find consistently strong positive correlations.[14]

Correlation coefficients only reveal the connection between commodity price changes in one quarter and changes in goal variables in some other quarter. It may happen, however, that the link between commodity price changes and movements in the goal variables is distributed over several quarters. To investigate that possibility, and hence to obtain a broader view of the link between commodity prices and the goal variables, simple regressions were estimated in which real growth and inflation were permitted to correlate with percent changes in commodity prices over an eight-quarter horizon. Several time periods and several com-

[13]C. Alan Garner, "Commodity Prices and Monetary Reform," Federal Reserve Bank of Kansas City *Economic Review* (February 1985) pp. 7-21.

[14]The goal variables used in the calculations are quarterly percent changes in real GNP and in the GNP price deflator. Each goal variable was correlated with the contemporaneous value and four lagged values of the quarterly percent changes in the price of gold and in the Business Conditions Digest commodity price index. Four time periods were studied: 1959:1 to 1965:2; 1965:3 to 1971:4; 1972:1 to 1978:2; and 1978:3 to 1984:4.

modity price measures were examined.[15] But in no case did a close and reliable link, positive or negative, emerge.

Brian Horrigan studied the connection between commodity prices and goal variables by taking simple regression analysis one step further.[16] Using monthly data, he used a statistical technique call vector autoregression (VAR) which allows one to examine relations among several variables at once. His monthly estimates gauged the linkages between commodity prices, several other factors, and the goal variables. He investigated various commodity price measures and used consumer price inflation and the growth in industrial production to proxy for the goal variables. As with the other results, Horrigan's revealed virtually no relation between changes in commodity prices and changes in either of the goal variables.

One piece of evidence that does suggest a relation between commodity price movements and future changes in inflation was provided by Federal Reserve Board Governor Wayne Angell.[17] Governor Angell discussed evidence that indicated that, over a long historical period a variety of indexes of commodity prices tended to have peaks and troughs that preceded peaks and troughs in consumer price inflation.[18] Governor Angell did not argue, however, that this evidence supported using commodity prices as intermediate targets. In fact, the lags from the turning points in an average of several commodity price indexes to the turning points in consumer price inflation are quite variable, which is not the kind of *tight* link necessary for commodity prices to serve effectively as intermediate targets. Instead, Governor Angell's results were intended to point out the potential value of commodity prices as a *leading indicator* of inflation, and to propose that they could be used to aid the Fed in implementing changes in its monetary targets.

Overall, the usefulness of commodity prices as intermediate targets receives very little support from available empirical evidence. The apparent lack of a significant connection over various time periods found by most studies means that, on average, movements in commodity prices have no consistent link to future macroeconomic developments. In such circumstances, controlling commodity prices, even if the Fed could do so, would not help monetary policymakers reach their objectives.

THE CASE FOR COMMODITY PRICES IS CURRENTLY WEAK

Problems with monetary and interest rate targets have led some analysts to argue that the Fed should control commodity price movements as a way to achieve its policy goals. It is conceivable, but not likely, that commodity prices meet the criteria of an effective intermediate target. Certainly the available evidence, while sparse, argues against it. The need for close control over an intermediate target variable presents a large, perhaps insurmountable, impediment to using commodity prices as a target,

[15]The regressions are of the form:

$$G_t = a_0 + \sum_{i=0}^{7} a_{i+1} C_{t-i} + u_t$$

where G is either the percent change in real GNP or in the GNP price deflator, C is either the percent change of the price of gold or of the BCD index, t indexes time in quarters, and u is a random error. Equations were estimated for the same four periods as were the correlations (see footnote 14). As before, the conclusions mentioned in the text about the closeness of the relations are based on inspections of the "t" statistic for the sum of the lagged coefficients and of the "F" statistic for the equation as a whole.

[16]Brian R. Horrigan, "Monetary Indicators, Commodity Prices, and Inflation," Federal Reserve Bank of Philadelphia Working Paper No. 86-7 (April 1986).

[17]Wayne D. Angell, "A Commodity Price Guide to Monetary Targeting," mimeo prepared for the Lehrman Institute dated December 10, 1987.

[18]The construction of several of these commodity price indexes is described by John Rosine, "Aggregative Measures of Price and Quantity Change in Commodity Markets," Board of Governors of the Federal Reserve System Working Papers Series, No. 81, (December 1987).

given that the Fed can influence them only indirectly. Available empirical evidence underscores the point that the Fed is unlikely to be able to correct deviations from a commodity price target quickly. And while controlling commodity prices could help the Fed achieve its goals in certain circumstances, in other instances controlling commodity prices could push the economy away from the desired outcomes. Here again, the weight of available empirical results argues against commodity price targets because there appears to be no significant, systematic link over time between commodity prices and real output or inflation. Further and more in-depth empirical study might present a stronger case for using commodity prices as intermediate targets. But unless such a case for commodity prices is made, their prospects as intermediate targets are not bright.