Federal Reserve Bank of St. Louis

Review

February 1983
Vol. 65, No. 2

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In This Issue . . .

The first article in this *Review*, by R. W. Hafer, investigates the potential of using some kind of "price rule" to implement short-run monetary policy. In "Monetary Policy and the Price Rule: The Newest Odd Couple," Hafer notes that there is growing support for the adoption of a policy price rule, under which the monetary authority would vary the short-run growth in money in an attempt to stabilize some specific price index.

When Hafer investigates the potential usefulness of a price rule for monetary policy purposes, he finds two results that weaken considerably the intuitive appeal of the price rule concept. First, the various price indexes he investigates do not necessarily move together over *short-run* periods. For example, from I/1960 to IV/1964, quarter-to-quarter movements in the GNP deflator, Consumer Price Index, Producer Price Index and the Raw Industrial Commodities Price Index were uncorrelated with each other; in other words, there was essentially no common movement in these indexes. Moreover, even during periods when there was significant correlation between short-run movements in some of these indexes, there was considerable fluctuation in the strength of the relationship over time. These results indicate that the problem of choosing the appropriate price index for policy actions is not easily solved.

More important, Hafer also found that the presumed link between short-run money growth and movements in these price indexes is nonexistent. When the period from I/1960 to III/1982 is divided into four, roughly equal subperiods, the correlation between quarter-to-quarter changes in the four price indexes studied and the previous quarter's money growth was *zero* in virtually all cases.

When Hafer investigated the longer-run relationship between money growth and movements in the various price indexes, he found that money growth is correlated positively and significantly with inflation, however measured. Thus, his results indicate that, while attempts to achieve short-run price stability via a price rule for money growth would be unsuccessful, price stability in the long run can be achieved through appropriate monetary policy actions.

In the second article in this *Review*, "Outlook for Agriculture in 1983," Michael T. Belongia summarizes the USDA's estimates for agricultural production and prices for 1983 and analyzes the major agricultural problem area — low grain prices and large grain surpluses.

The USDA's forecasts indicate that farm incomes will remain at low levels in 1983 for the fourth consecutive year. The primary reason for the relatively poor farm income levels is the grain surplus problem that continues to depress grain prices and farm income.

In analyzing the sources of the continuing grain problem, Belongia finds that it has been produced chiefly by conflicting incentives in U.S. agricultural programs. In most cases, the intent of the programs has been to raise the relatively low levels of farm prices and income by decreasing production and surpluses. On average,

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however, the net impact of commodity programs has been characterized by increased production and surpluses, and still lower prices and income.

Belongia examines the recent attempts to solve the grain problem, for example, the Farmer-Owned Reserve (FOR) and the Payment-in-Kind program (PIK), and concludes that neither is likely to be successful. FOR's effects on grain price stability have actually been contrary to its stated objectives; PIK's success in raising grain prices even marginally above their support levels requires farmer participation rates that seem overly optimistic.

Monetary Policy and the Price Rule: The Newest Odd Couple

R. W. HAFER

MONETARY policy is not formulated in a vacuum; it always follows *some* guideline. Over the years, monetary policy guidelines have taken many forms: controlling the quantity of money as a set ratio to the stock of gold, pegging a specific interest rate and, currently, targeting directly on the growth of one or more monetary aggregates.

During the past few years, detractors of the monetary targeting approach have called for alternative control procedures. Some have argued for the use of broader measures of money and credit.[1] Others have urged that "real" interest rate targets be used in formulating monetary policy.[2] Still others have called for the re-introduction of a gold-standard type of policy.[3]

Another recommendation gaining popularity is for monetary policymakers to vary the stock of money to offset short-run changes in some measure of prices. Advocates of such a short-run "price rule" maintain that the procedure ensures a better control over inflation and concomitantly decreases the public's uncertainty about the future direction of monetary policy.[4] Although the alleged benefits of this proposal have been discussed in the popular press, its disadvantages have not been examined in any great detail. The purpose of this article is to examine the current feasibility of a short-run price rule for monetary policy.

WHAT IS A PRICE RULE?

In essence, a price rule requires that the monetary authority attempt to maintain a chosen price index at a particular level by varying the stock of money. In other words, the sole function of policy is to prevent the price index from deviating substantially from a predetermined level. This is equivalent to keeping the relevant inflation rate at zero.

The theoretical attraction of this approach is that, if successful, it would maintain the purchasing power of the dollar. Consider, for example, the decade of the 1970s in which prices rose considerably. If we compare the purchasing power of today's dollar with the 1972 dollar, today's dollar buys less than half of the goods and services that one dollar bought at 1972 prices. For instance, the GNP deflator — a broad measure of prices — stood at 208.51 in III/1982, compared with its level of 100 in 1972 (the base year). This means that a dollar today buys only 48 cents worth (100 ÷ 208.51) of goods and services compared to what it bought in 1972.

The desirability of knowing the dollar's future purchasing power is obvious. This knowledge would simplify activities such as planning an investment strategy or contracting. Stable prices also would result in lower market rates of interest; the cost of borrowing against future income is reduced when there is less uncertainty about future prices.

There are two approaches to maintaining the level of prices. The major difference between the two is the time frame used to implement policy. One approach emphasizes the importance of controlling and reducing the trend or long-run money growth in order to reduce the trend or long-run rate of inflation to zero. This

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[1]See the recent arguments of Benjamin Friedman, "Time to Reexamine the Monetary Targets Framework," *New England Economic Review* (March/April 1982), pp. 15–23, and Benjamin Friedman, "A Two-Target Strategy for Monetary Policy," *Wall Street Journal*, January 27, 1983.

[2]For a discussion of this issue, see G. J. Santoni and Courtenay C. Stone, "The Fed and the Real Rate of Interest," this *Review* (December 1982), pp. 8–18.

[3]For a look at the arguments, see *Report to the Congress of the Commission on the Role of Gold in the Domestic and International Monetary Systems* (U.S. Government Printing Office, March 1982). For a useful retrospect of the commission and its report, see Anna J. Schwartz, "Reflections on the Gold Commission *Report*," *Journal of Money, Credit and Banking* (November 1982, pt. 1), pp. 538–51.

[4]Recent arguments favoring this form of price rule are found in Robert Genetski, "The Benefits of a Price Rule," *Wall Street Journal*, December 10, 1982; "Unraveling?" *Wall Street Journal*, January 21, 1983; Robert Mundell, "The Debt Crisis: Causes and Solutions," *Wall Street Journal*, January 31, 1983; and Alan Reynolds, "The Trouble with Monetarism," *Policy Review* (Summer 1982), pp. 19–42.

Table 1

Selected Price Indexes and Their Major Components[1]

GNP	CPI	PPI	RICP
Personal Consumption Expenditures	Food and Beverages	Farm Products and Processed	Copper Scrap
Durable	Food	Foods and Feeds	Lead Scrap
Nondurable	Food at Home	Textile Products and Apparel	Steel Scrap
Services	Food Away from Home	Hides, Skins, Leathers and	Tin
Fixed Investment	Alcoholic Beverages	Related Products	Zinc
Nonresidential	Housing	Fuels and Related Products	Burlap
Structures	Shelter	and Power	Cotton
Producers Durable Equipment	Fuel and Other Utilities	Chemicals and Allied Products	Print Cloth
Residential	Household Furnishings	Rubber and Plastic Products	Wool Taps
Nonfarm Structures	and Operations	Pulp, Paper and Allied Products	Cow Hides
Farm Structures	Apparel and Upkeep	Metals and Metal Products	Rosin, Window
Producers Durable Equipment	Transportation	Machinery and Equipment	Glass
Exports	Private	Furniture and Household	Rubber
Imports	Public	Durables	Tallow
Government Purchases of Goods and	Medical Care	Nonmetallic Mineral Products	
Services	Medical Care Commodities	Transportation Equipment	
Federal	Medical Care Services	Miscellaneous Equipment	
National Defense	Entertainment		
Nondefense	Entertainment Commodities		
State and Local	Entertainment Services		
	Tobacco Products		
	Personal Care		
	Personal Care and Educational		
	Expenses		

[1]GNP represents the GNP deflator; CPI is the Consumer Price Index; PPI is the Producer Price Index, and RICP is the Raw Industrial Commodity Price Index.

approach — essentially that advocated by monetarists — is presumed to underlie current monetary policy actions.

The other approach emphasizes varying the stock of money to offset short-term price changes (e.g., less than a year). The problems inherent in this latter approach are the focus of this article.

THE PROBLEM OF CHOOSING AN INDEX

Before one can establish a price rule for monetary policy, one must determine which price index to use as a guide. This selection can be quite difficult because it involves answering the following questions: How broad should the index be? Should it include only final goods? Intermediate goods? Raw materials? How closely should changes in the index parallel changes in the money stock? Over what time period should the comparisons be made?

There Are a Wide Variety of Indexes. . .

Numerous price indexes currently are calculated for the U.S. economy. They range from the broadly inclusive and widely used GNP deflator to the highly specialized Raw Industrial Commodity Price (RICP) index. Somewhere between these two in coverage are the Consumer Price Index (CPI) and the Producer Price Index (PPI). Table 1 provides a breakdown of each index into its major components.

As seen in table 1, the coverage of the indexes does not always overlap. Some indexes, like the CPI, represent prices for final goods — that is, goods that have completed the production process — and include noncommodity items like services, rent, interest charges and entertainment. The RICP index, however, measures prices during or before the production process. Consequently, this index represents the prices charged to producers of goods and services which, when sold to the final consumer, will appear in the CPI.

. . .That Behave Differently. . .

Table 2, which presents the simple correlation among growth rates for each index over a variety of time periods, shows just how closely the different

Table 2
Simple Correlations Between Growth Rates of Price Indexes

Index Pairing[1]	Period				
	I/1960–III/1982	I/1960–IV/1964	I/1965–IV/1969	I/1970–IV/1974	I/1975–III/1982
GNP-CPI	0.90[2]	−0.18	0.81[2]	0.90[2]	0.76[2]
GNP-PPI	0.65[2]	−0.02	0.28	0.62[2]	0.46[2]
GNP-RICP	0.07	0.18	0.44	−0.11	−0.11
CPI-PPI	0.73[2]	0.40	0.39	0.71[2]	0.67[2]
CPI-RICP	0.16	−0.16	0.45[2]	0.09	0.12
PPI-RICP	0.46[2]	−0.04	0.68[2]	0.43	0.49[2]

[1]GNP denotes the GNP deflator, CPI is the Consumer Price Index, PPI is the Producer Price Index and RICP is the Raw Industrial Commodities Price Index. All growth rates are compounded annual rates of change.
[2]Statistically different from zero at the 95 percent level of significance.

indexes move together.[5] Looking first at the left-hand column, which shows the correlation coefficients for the I/1960–III/1982 period, we see that the size of the correlations declines as the disparate nature of the indexes increases. For example, over the full period, the simple correlation between the GNP deflator and the CPI is 0.90. This drops to 0.65 for the GNP deflator-PPI comparison and to 0.07 — a value not statistically different from zero — when we compare the deflator's movements to those of the RICP index. Not unexpectedly, the correlations reveal a closer relationship between movements in the PPI and the RICP (0.46), because the coverage of these two measures is more similar. Thus, as a rule, the more closely the two indexes are defined, the greater the correlation between them.

The most interesting aspect of table 2 is the variety of correlations over the shorter time spans. For instance, the correlation between the GNP deflator and the CPI ranges from −0.18 to 0.90. Similarly, the correlation between the GNP deflator and the RICP index varies from a high of 0.44 to a low of −0.11. The correlations over shorter periods are quite volatile and, in many instances, not statistically different from zero. This indicates that, except perhaps for the GNP-CPI link since 1965, no easily discernible relationship whatsoever exists between the indexes shown. This result arises, in part, because the indexes differ in their coverage of goods and services.

[5]The correlation coefficient captures the degree of closeness in the movements of two series. It ranges from −1.0 to 1.0, indicating, respectively, perfectly opposing and perfectly coordinated movements. Thus, if the two series are unrelated, the correlation coefficient will be close to zero. For a description of the statistic, see Paul G. Hoel, *Introduction to Mathematical Statistics* (John G. Wiley & Sons, Inc., 1962), pp. 163–68.

. . .Because Different "Weights" Are Used. . .

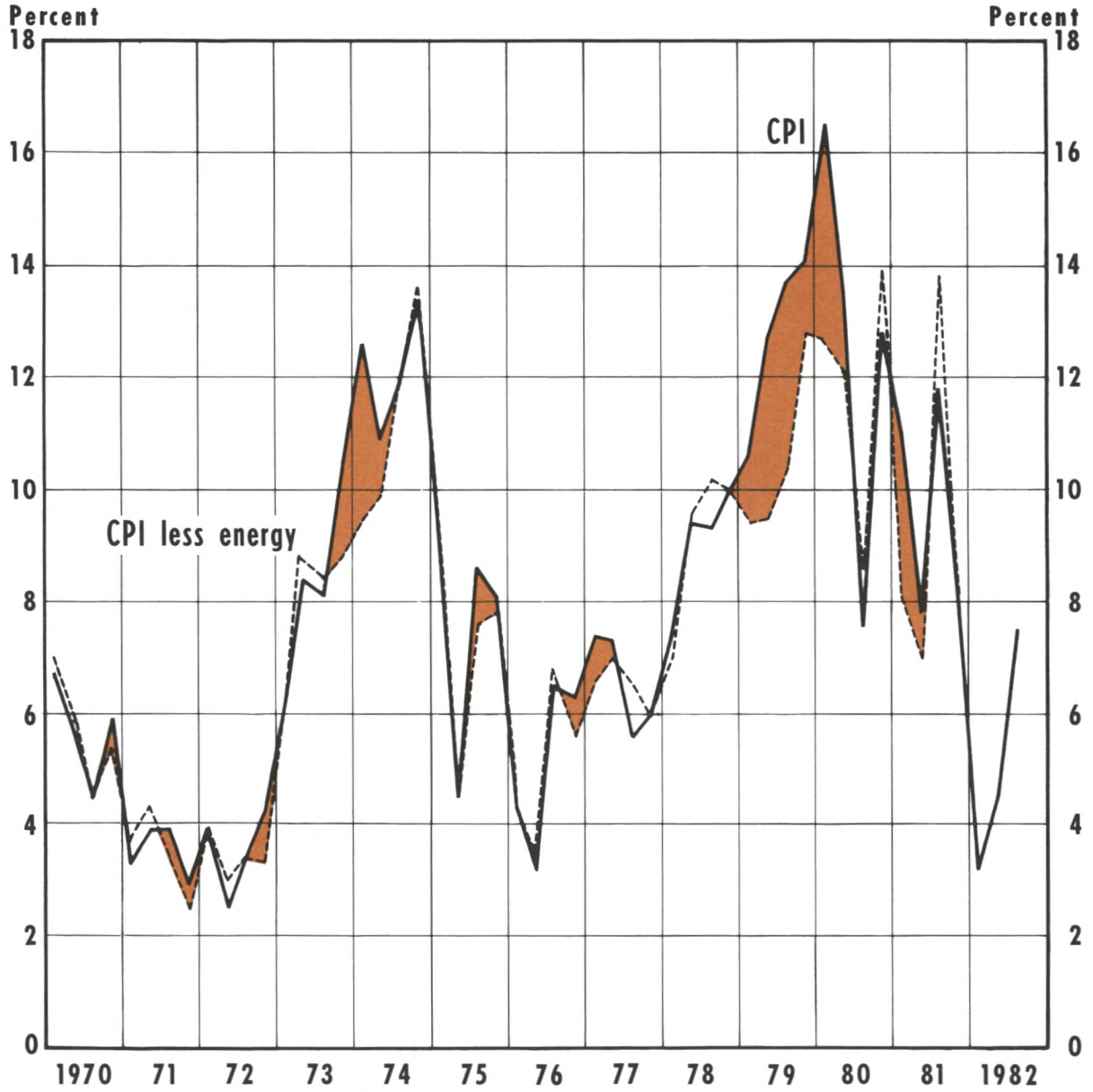
We have seen that the coverage of the indexes is different. At the same time, their construction necessitates that the various components be assigned some "weight." This weight helps to determine the relative importance of the item in the "basket" of goods and services represented by the index. This differential treatment of components can produce a dilemma for policymakers if movements in the overall index are dominated, temporarily at least, by fluctuations in one or two component prices. For example, if one component increases sharply *and* it has a relatively large weight, the index will increase even though other prices have not changed. This effect — called a relative price shock — will cause the index to increase rapidly, giving the appearance of a general increase in prices.[6]

To illustrate this, chart 1 plots the rate of inflation measured two ways: one by the CPI, the other by the CPI minus energy prices. Notice how different the two inflation rate series are during periods when energy prices increased more rapidly than other prices in the CPI. During the oil price shocks of 1974 and 1979, the CPI inflation rate is noticeably higher when energy prices are included than when they are excluded.

[6]Analyses of the impact of "relative price shocks" on measured price indexes are provided in Alan S. Blinder, "The Consumer Price Index and the Measurement of Recent Inflation," *Brookings Papers on Economic Activity* (2: 1980), pp. 539–65; Stanley Fischer, "Relative Shocks, Relative Price Variability, and Inflation," *Brookings Papers on Economic Activity* (2: 1981), pp. 381–431; and Lawrence S. Davidson, "Inflation Misinformation and Monetary Policy," this *Review* (June/July 1982), pp. 15–26.

Chart 1

Inflation Rates of the CPI and the CPI Less Energy Prices [1]



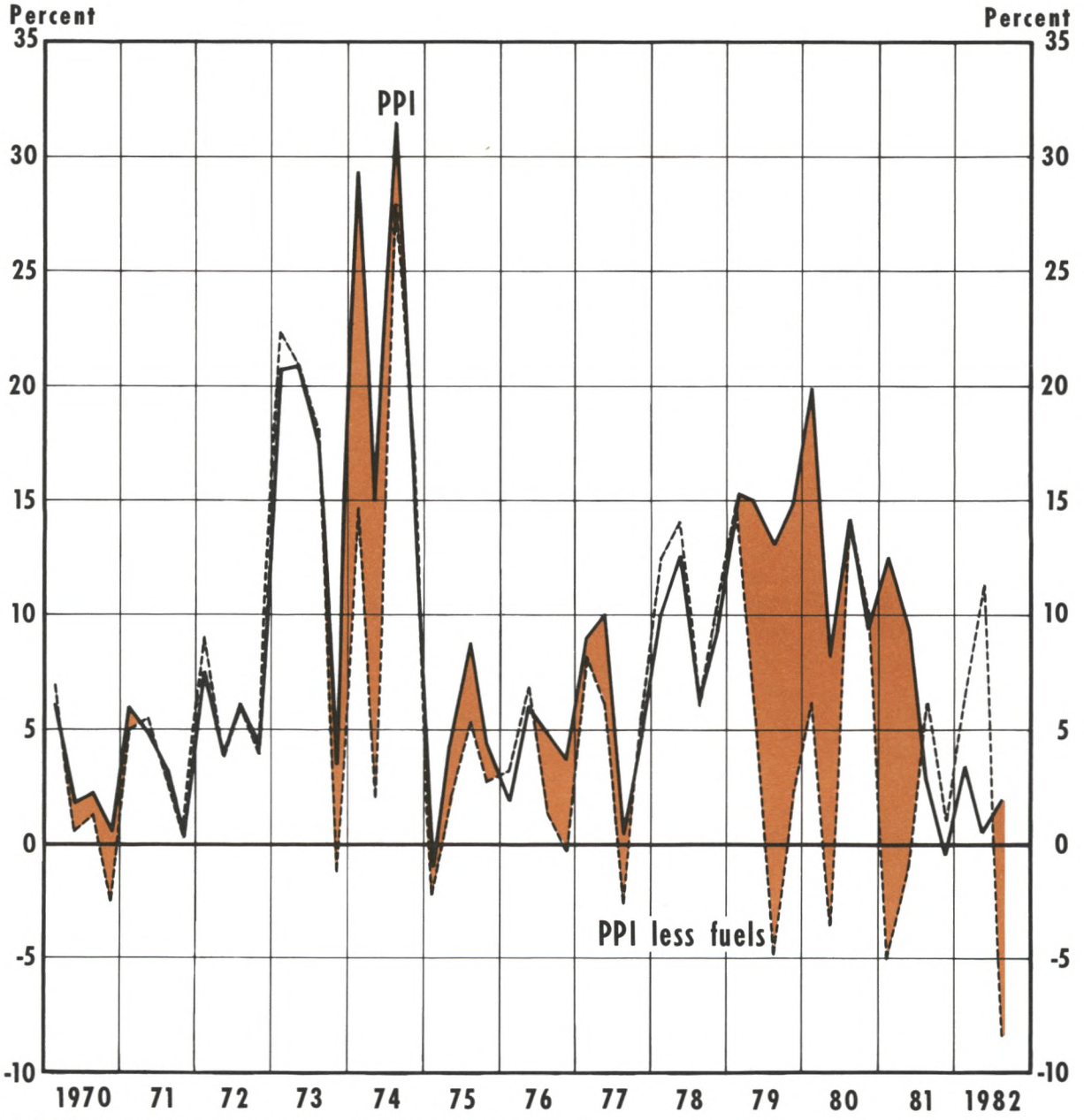
[1] Inflation rates are compounded annual rates of change.
Shaded areas represent periods when the CPI exceeded the CPI less energy.

To further demonstrate the impact that changes in the price of one important commodity group can have on an index, chart 2 plots the inflation rates of the PPI and the PPI minus fuels and related products and power. Again, there is a noticeable difference in the two series during periods of rapidly rising energy prices.

To illustrate the problem that this data might pose for policy, suppose the monetary authority used the PPI on which to base its decision about future money

Chart 2

Inflation Rates of the PPI and the PPI Less Fuels and Related Products and Power [1]



[1] Inflation rates are compounded annual rates of change.
Shaded areas represent periods when the PPI exceeded the PPI less fuels and related products and power.

growth. In I/1980, it would have faced an inflation rate during the preceding year of over 16 percent. Under a short-term price rule, this clearly would call for a drastic reduction in money growth. If the authority instead used the PPI "minus energy" as its yardstick of price change, the average rate of increase during the preceding year would have been only 2 percent. This would call for a totally different monetary policy response.

Table 3

Simple Correlations Between Inflation Measures and Money Growth[1]

Price Index[2]	Period				
	I/1960–III/1982	I/1960–IV/1964	I/1965–IV/1969	I/1970–IV/1974	I/1975–III/1982
LONG-RUN					
GNP	0.83[3]	−0.07	0.76[3]	0.49[3]	0.59[3]
CPI	0.82[3]	0.30	0.89[3]	0.62[3]	0.68[3]
PPI	0.64[3]	−0.02	0.35	0.65[3]	0.63[3]
RICP	0.26[3]	0.77[3]	0.43	0.62[3]	0.13
SHORT-RUN					
GNP	0.40[3]	−0.11	0.33	−0.38	0.15
CPI	0.45[3]	0.37	0.39	−0.38	0.32
PPI	0.32[3]	0.01	0.46[3]	−0.05	0.15
RICP	0.23[3]	0.35	0.47[3]	0.28	0.09

[1]Long-run money growth is measured as a 12-quarter moving average of M1 growth. Short-run money growth is the money growth rate lagged one quarter relative to prices.

[2]See notes accompanying table 2 for definition of price indexes.

[3]Statistically different from zero at the 95 percent level of significance.

Thus, relative price shocks — the source of which often lies beyond the power of monetary policymakers to influence — have direct implications for policy actions. Determining the source, magnitude and duration of such aberrations — clearly no small task — would be necessary under a short-run price rule.

. . .Which Produces a Problem for Policymakers

The point of the previous exercise is to illustrate the difficulty in selecting a price index to guide monetary policy actions. How should policymakers react to relative price shocks that change the measured rate of inflation? Should money growth be reduced in the face of an increase in the price index when, in fact, the increase can be traced directly to relative movements in one component of the index?

Evidence presented elsewhere indicates that relative price shocks are of short duration in their effect on the overall inflation rate.[7] Thus, if monetary policy attempts to quell observed increases in a price index caused by non-monetary relative price shocks, it will serve only to exacerbate the problem of price stability once the effects of the relative price shock abate.

In summary, the adoption of a price rule for monetary policy must first address the thorny issue of selecting a specific price index. This selection is complicated for several reasons. First, there are a variety of indexes from which to choose; each has a different coverage and a different pattern of behavior. Second, they are all subject to temporary movements that represent the effect of some relative price change; thus, policymakers must distinguish those movements in the index to which they should respond from those movements they should ignore.

MONEY GROWTH AND INFLATION

A necessary condition for a short-run price rule to function properly is that the chosen price index respond quickly and reliably to changes in the money stock. This is, after all, the very heart of the suggested procedure. Because a price rule assumes that the underlying cause of inflation is a change in the growth of the money stock, it is important to examine just how quickly movements in the price indexes respond to money growth.

Table 3 presents evidence on the relationship between the growth in money (M1) and four measures of inflation.[8] A simple correlation between inflation and

[7]Ibid.

[8]Empirical support for the proposition that inflation reflects changes in the growth of money is provided in Denis S. Karnosky, "The Link Between Money and Prices — 1971–76," this *Review*

M1 growth is used to capture the association. The "long-term" rate of M1 growth used to examine this association is measured as a 12-quarter moving average. These correlations appear in the upper half of table 3. Correlations between the various inflation measures and "short-term" M1 growth, represented by the one-quarter lagged growth rate, are used to assess the short-run impact of M1 growth on inflation. These are shown in the lower half of table 3. The correlations are calculated for the same time periods used in table 2.[9]

A comparison of the results reveals that inflation generally exhibits a closer relationship to longer-term movements in M1 than to its short-term changes. The full-period results (I/1960–III/1982) indicate that the correlation between inflation and M1 growth is about twice as great using long-term relative to short-term money growth. This suggests that prices are more responsive to the changes in M1 that have occurred during the preceding three-year period than to the changes in the previous quarter. Thus, altering the growth of M1 in response to current changes in a price index — changes that are actually the result of policy actions during the past three years — aggravates the volatility of prices over the long run.

For shorter time periods, the money-price link is quite variable. Except for the RICP index and the PPI, the correlation between long-term money growth and inflation drops noticeably during the 1970–74 period. This is due primarily to the non-monetary factors — for example, the imposition and removal of wage and price controls and the OPEC oil price increases — that affected some prices relatively more than others during this era.

For a short-run price rule to work effectively, prices must respond quickly and reliably to changes in the money stock. The evidence in table 3 demonstrates that this is not the case. The correlation between price changes and short-run money growth is extremely variable across different time periods: in some periods, there is a positive relationship, while in others it is negative. Indeed, this is true regardless of the index used. More important, only 2 out of 16 subperiod correlations reported in table 3 are statistically different from zero at the 95 percent level of confidence for the short-run correlations. In contrast, 10 out of 16 subperiod correlations are significantly different from zero for the long-run correlations.

Thus, the evidence indicates that the various price indexes do not respond to changes in short-run M1 growth in a sufficiently reliable manner to make a price rule practical for short-term policy horizons. The correlations do reveal, however, the existence of a reliable long-run connection between price changes and money growth.

A PRICE-RULE MONETARY POLICY AND VARIABLE MONEY GROWTH

Variable money growth can affect real economic activity in the short run. As noted previously, in the long run, changes in money growth are reflected in price changes. During the short run, however, changes in money growth first affect spending and production decisions. If money growth declines far enough and long enough from its established trend, it then leads to a downturn in real economic activity.

To illustrate this point, chart 3 plots the trend rate of M1 growth, measured as a 20-quarter moving average, and its short-run growth, depicted by a 2-quarter moving average. Recessions are designated by shaded areas.

Chart 3 depicts the common relationship during the past two decades between sharp reductions in short-run M1 growth relative to its trend and real economic activity.[10] Prior to each recession, substantial reductions in short-run M1 growth relative to trend occurred. For example, short-run M1 growth fell from

(June 1976), pp. 17–23; Keith M. Carlson, "The Lag from Money to Prices," this *Review* (October 1980), pp. 3–10; and John A. Tatom, "Energy Prices and Short-Run Economic Performance," this *Review* (January 1981), pp. 3–17. It is this type of evidence on which the argument for reducing the long-term rate of inflation by reducing the trend rate of money growth is based.

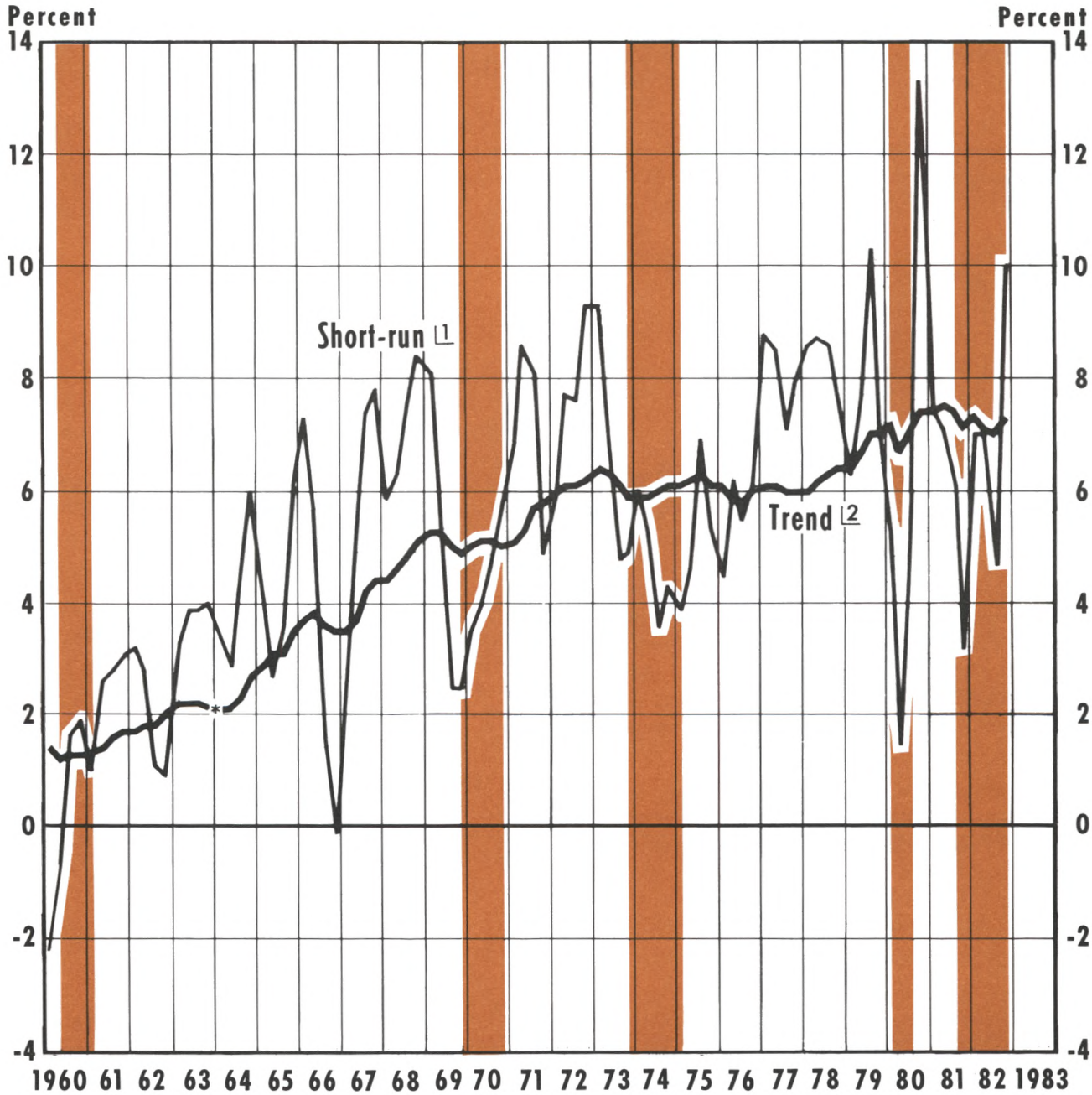
An alternative view is represented in George L. Perry, "Inflation in Theory and Practice," *Brookings Papers on Economic Activity* (1: 1980), pp. 207–41.

[9]The analysis also was done using a 20-quarter moving average of M1 growth as the long-run measure. This change did not alter the conclusions reached in the text.

[10]Clark Warburton was a pioneer in this type of analysis. See his "Bank Reserves and Business Fluctuations," *Journal of the American Statistical Association* (December 1948), pp. 547–58, reprinted in *Depression, Inflation, and Monetary Policy: Selected Papers 1945–1953* (The Johns Hopkins Press, 1966). Similar analyses are presented by Milton Friedman and Anna J. Schwartz, "Money and Business Cycles," *Review of Economics and Statistics* (February 1963), pp. 32–78; William Poole, "The Relationship of Monetary Decelerations to Business Cycle Peaks: Another Look at the Evidence," *Journal of Finance* (June 1975), pp. 697–712; and Dallas S. Batten and R. W. Hafer, "Short-Run Money Growth Fluctuations and Real Economic Activity: Some Implications for Monetary Targeting," this *Review* (May 1982), pp. 15–20. An analysis using a 12-quarter moving average of money growth did not alter the findings reported in the text.

Chart 3

Rates of Change of Money Stock (M1)



[1] Two-quarter rate of change.

[2] Twenty-quarter rate of change; data prior to 1st quarter 1964 are M1 on the old basis.

Shaded areas represent periods of business recessions.

about 2 percentage points above its trend to about 5 percentage points below trend within several quarters prior to the II/1980–III/1980 recession. A similar pattern of rapid deceleration in M1 growth relative to trend precedes the most recent recessionary episode during 1981 and 1982.[11]

The implementation of monetary policy using a short-run price rule necessitates varying the growth of the money stock in response to changes in some price index. Consequently, it is likely that the growth of the money stock would be more variable under a price rule than it would be under a monetary targeting rule. The prospect of increased variability of money growth is an additional factor that argues against the adoption of a short-run price rule.

CONCLUSION

Advocates of a short-run price rule approach to monetary policy argue that it is superior to current policy actions. While the arguments supporting a short-run price rule might seem appealing at first glance, the facts suggest that this approach is unlikely to achieve its promised goal of price stability in either the short- or the long-run.

There are a variety of problems that beset the short-run price rule for monetary policy: Which price index should be chosen? What should be done about relative price change effects on the observed index? What will the policymaker's response be if variations in the money stock to achieve short-run price stability threaten to impede economic activity?

The evidence presented in this article indicates that these problems are critical in discussing the adoption of a price rule for monetary policy. Perhaps the most damaging of all the evidence is the finding that short-run money growth has widely different effects on the various price indexes investigated in this article. In fact, there does not appear to be a simple stable relationship between short-run movements in the money stock and the different price indexes that is necessary for the success of a price-rule monetary policy.

Finally, a price rule calls for varying the short-run growth of money in an attempt to achieve and maintain a zero rate of inflation. The evidence suggests that such variation in monetary growth could well lead to lower growth in real economic activity and could even produce frequent recessions if the variations in M1 growth were sufficiently drastic and prolonged.

[11]Indeed, the dramatic slowing in short-run M1 growth relative to its trend and the increase in its volatility (i.e., short-run M1 growth that is far above *and* below trend) during the past two years have been associated with substantial reductions in real economic activity. From IV/1979 to IV/1982, real output decreased at a 0.4 percent rate. The standard deviation of money growth during this period was 5.91 percent. In comparison, the standard deviation of money growth from IV/1976 to III/1979 was 1.45 percent.

Outlook for Agriculture in 1983

MICHAEL T. BELONGIA

EARLY forecasts for 1983 indicate that it will be the fourth consecutive year of low income for farmers. Speaking at the U.S. Department of Agriculture's (USDA) recent Outlook Conference, government and industry analysts alike agreed that the combination of large carryover stocks, declining exports and limited reductions in output will not promote significant increases in depressed grain prices, which are important determinants of net farm income. The relatively low price and reduced farm income outlook for grains is expected to be offset somewhat by modest increases in livestock prices. The retail price of food, as measured by the food component of the Consumer Price Index (CPI), is expected to increase by 3 percent to 6 percent in 1983.

This article is divided into two parts. The first section reviews and summarizes the data presented at the Outlook Conference, and discusses price and production figures for 1982 and forecasts for 1983 in primary commodity groupings. The second section analyzes the grain surplus problem that continues to keep prices and farm income at relatively low levels. The discussion indicates that current policies designed to increase farm prices while limiting surplus accumulation provide conflicting incentives that inhibit the accomplishment of either objective. Finally, provisions of the payment-in-kind (PIK) program are evaluated as a means of resolving conflicts among existing policies.

OUTLOOK SUMMARY

Retail Food Prices

The rate of increase in retail food prices, as measured by the CPI, is expected to be toward the low end of the 3 percent to 6 percent range in 1983.[1] Data released in January revealed that food prices increased about 4 percent in 1982, the smallest rate of increase since 1976. Generally smaller increases in marketing costs — associated with the reduction in the rate of inflation — and relatively large supplies of most major commodities were cited as the factors behind this dampening of food price increases. Poor weather, larger-than-expected (export or domestic) demand or an unexpected acceleration of general inflation, however, could increase the growth rate of retail food prices to the upper end of the 3 percent to 6 percent forecast range. Historical and forecast data for food prices are listed in table 1.

Financial Conditions

Most financial indicators for the farm sector declined in 1982 and are not expected to show significant improvement in 1983. Although complete farm income data and forecasts were not available at the Outlook Conference, estimates released in January place 1982 net farm income at $20.4 billion with forecasts for 1983 in the $16 billion to $20 billion range. Direct government payments to farmers were about $3.5 billion. As chart 1 shows, real net farm income is about one-third of its 1972 level and is expected to decline again in 1983. Particularly important to farm income in 1983 will be the strength of export demand and the success of programs aimed at achieving reductions in grain stocks and production.[2]

Actual returns to farmers in 1982 would have been even less had it not been for government price support and subsidy payments. As chart 2 indicates, commodity prices below the target prices of support programs led to a three-fold increase in the level of Commodity Credit Corporation (CCC) payments for price supports

[1]Paul C. Wescott, "The 1983 Outlook for Food Prices and Consumption," *Outlook '83*, Proceedings of the Agricultural Outlook Conference, Washington, D.C., December 1, 1982 (United States Department of Agriculture), pp. 639–50.

[2]Ronald L. Meekhof, "Agricultural Finance Outlook," *Outlook '83*, Proceedings of the Agricultural Outlook Conference, Washington, D.C., December 1, 1982 (United States Department of Agriculture), pp. 469–81.

Table 1

Changes in Consumer Price Indexes (1980–83)

Food Category	1980	1981	1982	1983[1]
All Food	8.6%	7.9%	2.5%	3 - 6%
Food away from home	9.9	9.0	4.9	4 - 6
Food at home	8.0	7.3	1.5	3 - 6
Meats	2.9	3.6	5.6	3 - 6
Beef and veal	5.7	0.9	0.7	2 - 5
Pork	−3.4	0.8	15.9	4 - 7
Poultry	5.1	4.1	−1.5	2 - 5
Eggs	−1.8	8.3	−8.7	−3 - 0
Dairy products	9.8	7.1	1.5	2 - 5
Fish and seafood	9.2	8.3	0.9	2 - 5
Fruits and vegetables	7.3	12.0	−6.3	1 - 4
Sugar and sweets	22.9	7.9	2.7	3 - 6
Cereals and bakery products	11.9	10.0	2.9	2 - 5
Fats and oils	6.6	10.7	0.9	2 - 5
Nonalcoholic beverages	10.6	4.2	3.0	3 - 6
Other prepared foods	10.8	10.3	3.0	3 - 6

[1]Forecast.

SOURCE: Historical data from Department of Labor; forecasts by U.S. Department of Agriculture, Economic Research Service.

and other income transfers (e.g., storage subsidies).[3] In fiscal year 1982, the cost of government programs rose to almost $12 billion with about $2 billion for the dairy program and $10 billion in loans and subsidies for grains, cotton and some 20 other supported commodities. Unless target prices are frozen at 1982 levels or output reductions increase market prices, budget officials have estimated that the cost of price support programs could exceed $15 billion in fiscal year 1983.[4]

Contributing positively to the income outlook of farmers in 1983 are projections of continued reductions in interest rates and the prices of primary inputs relative to output prices. Although interest rates fell in 1982, the declines probably occurred too late in the year — after contracts for seed and fertilizer were written — to have reduced costs significantly. The world oil glut and lower input prices, however, did reduce costs in 1982 and are expected to reduce them further in 1983. If declining interest rates and farm input costs materialize in 1983, net farm income could be improved even in the absence of output price increases. According to the USDA, however, any major improvements in net farm income will have to come from higher prices for farm products resulting from large increases in aggregate demand — especially export demand.

Corn and Wheat

The dilemma facing grain producers in 1983 is, at least in part, the result of policy actions taken in 1982.[5] After the record harvests of 1981, wheat and corn producers were encouraged to participate in the reduced acreage program (RAP). In return for idling a portion of their base acreage, farmers were eligible to participate in the Farmer-Owned Reserve (FOR) and to receive both price support loans and deficiency payments. The objective of these programs was to increase grain prices by reducing grain output.[6]

[3]"Target prices" are established by law. If market prices for a supported commodity fall below the target price, farmers meeting eligibility requirements receive a "deficiency payment" based on the difference between the target level and market price.

[4]See Seth S. King, "Farm Price Props Expected to Rise Above '82 Record," *New York Times* (January 23, 1983).

[5]Other contributing factors to the current situation of low prices and large surpluses were the 1980 Soviet export embargo, record yields, the appreciation of the dollar and export subsidies for French and Canadian wheat.

[6]An important change in the 1981 farm bill is the shift from "set-aside" programs to the RAP. Under a set-aside, farmers were asked to idle a certain percentage of their acreage *without* stipulations concerning what was grown on remaining land. Thus, if the reason for a set-aside was to increase wheat prices, the program may have been totally ineffective if the 10 percent of acreage idled was formerly planted in oats and wheat plantings were unchanged. The RAP attempts to overcome this problem by using *crop-specific* acreage reductions; that is, a wheat RAP now calls for a reduction in the acreage historically planted in wheat.

Chart 1
Agricultural Income

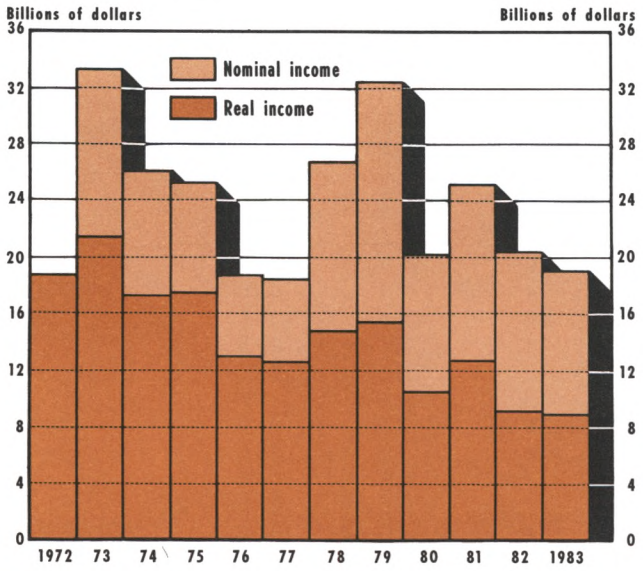
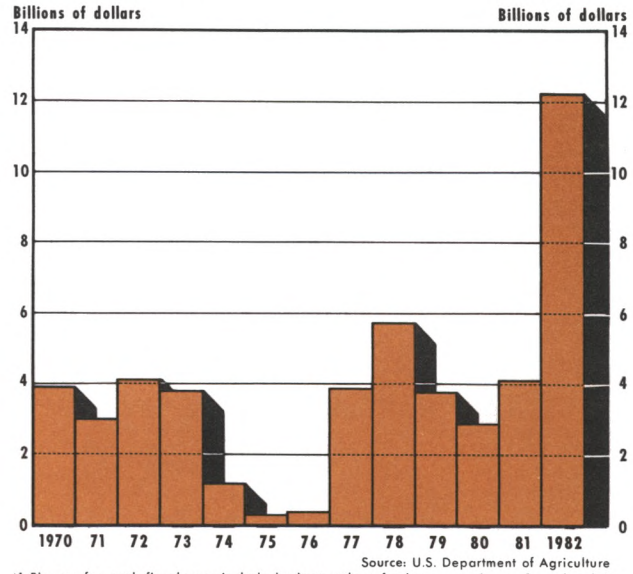


Chart 2
Farm Price Supports [1]



Source: U.S. Department of Agriculture

[1] Figures for each fiscal year include budget outlays for loans, purchase of surplus dairy products, subsidies, storage and transportation costs.

The programs, however, did not achieve the desired level of output reductions. Provisions of the wheat program were announced after much of the winter wheat crop had been planted. As such, the 48 percent overall participation rate in the wheat program was an unbalanced mix of low participation by producers of winter wheat and high participation by producers of spring wheat. The corn program was even less successful with about a 24 percent participation rate.

Output reductions achieved by the programs were more than offset, however, by ideal growing weather and record yields. The 2 percent reduction in corn acreage was countered by a 4 percent increase in yields to an average of 114 bushels per acre. The picture for wheat was somewhat different. The 48 percent participation rate in the acreage reduction program achieved a 1 percent decline in the total wheat crop from the level of 1981's record harvest.

The volume of wheat and corn production in the 1982 crop year had some important consequences. As the data in table 2 indicate, the United States now holds about 76 percent of world corn stocks and 39 percent of world wheat stocks; these figures are expected to increase to 85 percent and 44 percent, respectively, in 1983. These data also indicate that the United States is expected to produce almost one-half of all corn and one-sixth of all wheat grown in the world during this crop year. Although the volume of corn exports is expected to increase about 9 percent to almost 55 million metric tons, the price of corn, currently at a 10 year low, may actually decrease the value of corn exports. The volume of wheat exports is expected to decline about 8 percent to 45 million metric tons.[7]

Although both the wheat and corn programs have added a paid diversion as an extra incentive to program participation in 1983, the predominant view among analysts appears to be that acreage reduction alone will not increase prices significantly.[8] One estimate concluded that if the corn program achieved 70 percent compliance among eligible producers (almost triple the 24 percent compliance rate of 1982), the price in the Eastern corn belt will reach only $2.80 per bushel, about equal to the target price. The same analysts, however, cautioned that a compliance rate this high is unlikely; little new storage space is being built and many producers likely will withdraw from the programs if market prices begin to strengthen. None of these analyses, however, considered the effects of the PIK program that officially was announced after the

[7] One metric ton is equivalent to about 37 bushels of wheat or 39 bushels of corn.

[8] Under a paid diversion — unlike a voluntary set-aside — producers are given a payment for not producing on a portion of their land. For example, under 1983 corn program rules, producers will be paid $1.50 per bushel on the 10 percent of their base acreage and yield that constitutes the diversion. This is in contrast to the 10 percent of their land which constitutes the voluntary acreage reduction and receives no direct payments. A possible reason for low compliance with the 1982 program is that no direct payments were made to producers for laying idle a portion of their land.

Table 2
World and U.S. Summaries for Corn and Wheat (millions of metric tons)

	Crop Years		
	1980–81	1981–82	1982–83
CORN			
World			
Production	404.4	436.0	443.4
Utilization	412.7	406.5	418.8
Ending Stocks	49.1	78.7	103.2
Stocks/Utilization (%)	11.9	19.4	24.6
Trade	78.2	71.5	68.8
United States			
Production	168.8	208.3	211.6
Utilization	123.8	124.5	129.5
Exports (October/September)	59.8	50.0	54.6
Ending Stocks	26.3	60.1	87.6
U.S. Stocks/World Stocks (%)	53.6	76.4	84.9
WHEAT			
World			
Production	439.3	445.8	461.6
Utilization	444.8	438.2	453.5
Ending Stocks	74.6	82.3	90.4
Stocks/Utilization (%)	16.8	18.8	19.9
Trade	96.5	105.8	103.0
United States			
Production	64.6	76.0	76.5
Utilization	21.1	23.1	23.5
Exports (July/June)	41.9	49.1	45.0
Ending Stocks	26.9	31.7	39.8
U.S. Stocks/World Stocks (%)	36.1	38.5	44.0

SOURCE: Historical data and forecasts by U.S. Department of Agriculture, Economic Research Service.

Outlook Conference. The probable impact of the PIK program is discussed later in this article.

Livestock, Poultry and Dairy

Red Meats — Despite low feed grain prices, financial considerations likely will result in a second consecutive year of lower red meat production.[9] Cash flow problems have forced producers to reduce their debt and to generate internal capital. To accomplish this, producers have liquidated herds and retained a smaller than average number of animals for breeding purposes. The reduced breeding herds imply a decline in red meat production in 1983.

[9]Ronald A. Gustafson and Leland W. Southard, "Red Meats Outlook," *Outlook '83*, Proceedings of the Agricultural Outlook Conference, Washington, D.C., November 30, 1982 (United States Department of Agriculture), pp. 319–28.

Some price increases for beef and pork are likely to result from the reduction in aggregate red meat supplies. Analysts are expecting a 1 percent decline in commercial beef production, which is expected to increase cattle prices by 3 percent in 1983. Prices for choice Omaha steers are expected to reach $66.25 per hundred weight (cwt.), up from $64.25 per cwt. in 1982. Commercial production is expected to be 22.3 billion pounds in 1983, down from about 22.4 last year. Average prices for barrows and gilts are expected to rise 5 percent to $58.50 per cwt. in 1983 based on an expected 6 percent drop in production.

Beef and pork producers' incomes likely will be strengthened further by reductions in production costs, most notably in feed costs and interest rates. For instance, feed costs for hogs declined $5–$7 per 100

pounds of weight gain in 1982 while feed costs for cattle declined by about $10 per 100 pounds of gain. With the likelihood of continued low grain prices and further reductions in interest rates in 1983, producers again should face a favorable cost picture.

Poultry and Eggs — Broiler production is expected to increase slightly in 1983. This, together with slow growth in demand, is expected to moderate price increases. Growth in aggregate demand will continue at low rates as a result of the slow economic recovery and a substantial reduction in the level of exports, down 30 percent in 1982 from the previous year's levels. In addition, demand has failed to increase in response to relatively high red meat prices.[10]

After poor returns in 1980 and 1981, lower feed costs increased the incomes of egg producers in 1982. Production figures for 1983 are expected to approximate 1982 levels. Some cutbacks in the number of replacement pullets will tend to limit production gains. Even with egg production at 1982 levels, however, prices in 1983 should remain near their 1982 average level of about 70 cents per dozen; a substantial drop in foreign demand is expected to offset the effects of stable production figures.

Dairy — Milk production is expected to be 135.8 billion pounds in 1982, 2 percent above year-earlier levels. Although producer reaction to the 50-cent deductions imposed by the Secretary of Agriculture is still uncertain, production is expected to increase another 1.9 percent in 1983. These increases in production will occur despite reductions in average prices from 1981 levels. Prices declined an average of 1.8 percent in 1982 due to a "roll-back" in the level of price support to $13.10 per cwt. and continued surplus production.[11] The effects of output price declines on producers' incomes, however, were offset somewhat by reductions in feed costs paid by producers.

The dairy outlook necessarily reflects the assumptions about specific policy provisions that will be in effect during 1983. If the support price remains at $13.10 per cwt. and the Secretary of Agriculture imposes both of the authorized 50-cent deductions, the following results are likely this year.[12] Production will increase by 1.9 percent and USDA purchases of surplus products will increase by 8.8 percent (milk equivalent).[13] The average price received for all milk will decline by 1.8 percent, but cash receipts (including direct payments) will increase by 9.7 percent. The number of cows used in production will increase by 1.0 percent.

PROBLEM AREAS FOR 1983

The 1982 price and production estimates presented at the USDA Outlook Conference indicate that low relative prices and large grain surpluses continue to be the primary sources of conflict in agricultural policy. The following discussion argues that conflicting incentives in U.S. agricultural programs, on balance, have promoted expansions in grain production that increased surpluses and lowered relative prices and farm income. Though many programs are similar in design, only corn and wheat are discussed in detail.

To understand the current structure of grain policies and the results they have fostered, it is necessary to know something about the price and production history of the major commodities, corn and wheat. Until the mid-1970s, it commonly was agreed that ongoing technological improvements and a slow transition of excess labor from agriculture created an environment in which "chronic surpluses," low or declining relative prices and lower farm incomes were the norm. Since the 1930s, when price support programs were established, government's response to this situation has been to legislate "fair" prices for farm products and to purchase surplus production at these prices.

In the mid-1970s, however, there was a perceptible change in expectations. For a variety of reasons — the beginning of the first Russian grain sales in 1972, price support programs that idled one-fifth of U.S. cropland, and large increases in total export demand — real farm income reached a record high in 1973 and remained above historical levels in 1974 and 1975. Many analysts and farmers believed that these events signalled an end to the era of low prices and commodity surpluses;

[10]Allen Baker, "Poultry and Egg Outlook," *Outlook '83*, Proceedings of the Agricultural Outlook Conference, Washington, D.C., November 30, 1982 (United States Department of Agriculture), pp. 329–33.

[11]The support had been raised to $13.49 per cwt. — 75 percent of parity — on October 1, 1981. Special legislation enacted on October 20, 1981, "rolled back" the support level to $13.10. When the 1981 Food and Agriculture Act was adopted in December 1981, the $13.10 figure was maintained for the remainder of the 1981–82 marketing year. The Farm Bill also scheduled an increase to $13.25 per cwt. for the 1982–83 marketing year. However, with production surpluses continuing, special legislation enacted in September 1982 held the support price at $13.10 until October 1, 1984. The new support then will be set at the level of parity $13.10 represented on October 1, 1983.

[12]Clifford M. Carman, "United States Outlook for Dairy," *Outlook '83*, Proceedings of the Agricultural Outlook Conference, Washington, D.C., November 30, 1982 (United States Department of Agriculture), pp. 436–41.

[13]U.S. Department of Agriculture purchases surplus products in several forms: butter, American cheese, nonfat dry milk and evaporated milk.

the prevailing opinion was that a combination of many factors finally had solved the agricultural "problem":

> "The secular income problem in agriculture is now largely behind us. The emerging equilibrium in the labor market is of major significance in this respect. When this equilibrium is combined with the decline in the rate of productivity growth, the release of most of the idled land back to production, and the shift to the right in the demand for agricultural products as a result of devaluation, the result is an almost total disappearance of the excess capacity that existed at prevailing price ratios for such a long time."[14]

This view has led some analysts recently to argue that unabated increases in world food demand and limitations on U.S. productive capacity likely are to make the 1980s a decade of commodity shortages and rising food prices.[15] Within this view, a major development in agricultural policy during the 1980s will be "[t]he declining role of price and income supports and production adjustment programs."[16]

Although this brief history gives short shrift to the political and economic complexities that have shaped agricultural policies, it does provide a flavor for the attitudes that have led to the current policy mix. On the one hand, legislators have persisted in their belief that minimum levels of some commodity prices should be established by law to provide a "fair" return to producers of those products. On the other hand, the crop shortages and volatile prices of the early 1970s have spawned new grain storage programs that simultaneously attempt to stabilize prices and provide an adequate reserve stock in the event of further shortages. This policy mix, general macroeconomic activity and random events in nature have produced the current production and price situation in agriculture.

As 1983 begins, three sets of major grain programs are in place: the reduced acreage program (RAP), price support programs and the Farmer-Owned Reserve (FOR). Each program attempts to manage the supply of grains to achieve either stable prices above some minimum level or adequate reserve stocks in the event of new commodity shortages.[17] Because these goals are not always compatible, however, existing policies often work against each other; the results are thus often contrary to stated objectives.

MAJOR GRAIN PROGRAMS[18]

Acreage Reduction Programs

Farmers are encouraged to reduce production through two types of programs. One is the reduced acreage program (RAP) in which a farmer "voluntarily" agrees to idle a portion of his acreage; the actual amount is based on the acreage planted in the past (called the historical base acreage). A farmer has an economic incentive to comply, however, only if the benefits of compliance exceed their costs. Typically, these benefits include eligibility for price support loans, income support payments and participation in the FOR; the cost of not complying is the income foregone by not producing on the idled land. A paid diversion, which represents a portion of the RAP, provides a cash payment for farmers who idle the required percentage of their base acreage.[19]

Price Supports

Grain prices are supported primarily by loan rates while income is supported by target prices. Under provisions of the price support loan-rate program, producers who comply with grain program requirements (for instance, reduced acreage) are eligible for a nonrecourse loan. Producers then have two options: they can hold their grain and market it at their discretion or they can obtain a loan. The value of a loan is determined by the loan rate multiplied by the number of bushels

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[14]See G. Edward Schuh, "The New Macroeconomics of Agriculture," *American Journal of Agricultural Economics* (December 1976), pp. 802–11.

[15]See, for example, Ann Crittenden, "Can the World Feed Itself?" an interview with Howard Hjort, *New York Times*, February 14, 1982; J. B. Penn, "Economic Developments in U.S. Agriculture During the 1970s" and John A. Schnittker, "A Framework for Food and Agricultural Policy for the 1980s," both included in *Food and Agricultural Policy for the 1980s*, D. Gale Johnson, ed., American Enterprise Institute, Washington, D.C., 1981. An opposing view is presented by Don Paarlberg, "The Scarcity Syndrome," *American Journal of Agricultural Economics* (February 1982), pp. 110–14, and Michael V. Martin and Ray F. Brokken, "The Scarcity Syndrome: Comment," *American Journal of Agricultural Economics* (February 1983), pp. 158–59.

[16]Schnittker "A Framework for Food," p. 210.

[17]These programs focus on supply strategies because previous attempts to increase private demand for food have had limited impact on food prices. See, for example, M. Belongia, "Domestic Food Programs and Their Related Impact on Food Prices," *American Journal of Agricultural Economics* (May 1979), pp. 358–62.

[18]A more detailed discussion of these programs and their impacts on economic activity can be found in Bruce L. Gardner, *The Governing of Agriculture*, The Regents Press of Kansas, Lawrence, Kansas, 1981.

[19]The 1983 corn and wheat RAP both require a 20 percent reduction in base acreage. The corn program includes a 10 percent paid diversion; 5 percent of the wheat program is a paid diversion.

placed in storage. The loan rate is a legislatively determined price per bushel that serves, essentially, as a price floor.

The loan is in effect for less than one year. If market prices do not rise to levels substantially above the loan rate over the period of the loan, farmers can forfeit their grain to the CCC as full payment for the loan. Forfeiture of grain in this manner contributes to CCC grain stocks — government stocks separate from those in the FOR. In contrast, if market prices should rise above loan rates, farmers may elect to repay the loan, remove their grain from storage and sell it.

Producer income is supported directly by target prices and deficiency payments. If market prices are below the target price established by law, farmers receive a transfer payment from the government for the size of the price differential. An advantage to this program is that deficiency payments effectively raise farmers' incomes without generating higher prices to consumers or the purchase of large surplus stocks by the government. A disadvantage is that deficiency payments can become very expensive to the government — and taxpayers — if large quantities of grain are eligible for the maximum payment.

To illustrate how the program works, consider the 1982 wheat crop when the June-October average wheat price was $3.34 per bushel, the target price was $4.05 per bushel and the loan rate was $3.55 per bushel. The deficiency payment is calculated as the difference between the target price and the higher of the loan rate or average market price for the first five months of the marketing year (June-October). Because market prices were below the loan rate — the effective price floor — deficiency payments last year were based instead on the difference between the target price and loan rate ($4.05 − $3.55 = $.50). The 48 percent of wheat producers who complied with acreage reduction provisions then were eligible for a 50-cent per bushel income support or deficiency payment. These producers received $475 million in deficiency payments for the 1982 wheat crop.

The Farmer-Owned Reserve (FOR)

The FOR was established in 1977 to promote grain price stability. In principle, the FOR stabilizes prices by releasing stored grain to the market when prices are high and removing grain when prices are low. In one sense, it is an additional element of the CCC loan program described earlier.

The initial CCC loan has a typical duration of nine months at which time the participant must either repay the loan or forfeit his grain to the CCC. Under the FOR a farmer has a third option. He can receive a prepaid subsidy (26.5 cents per bushel annual payment) to store his grain for a longer period and extend the length of his loan at below-market interest rates; the interest rate for the last two years of the loan is zero. Loan extensions typically have covered three years; thus, a participant must keep his grain off the market for a three-year period unless market prices increase to a predetermined level; by repaying the loan, farmers then can remove grain from the FOR and sell it. A farmer must repay storage costs and other penalties if the loan is redeemed under conditions that do not satisfy the requirements established by program formulae.

GRAIN PROGRAMS AND ECONOMIC ACTIVITY

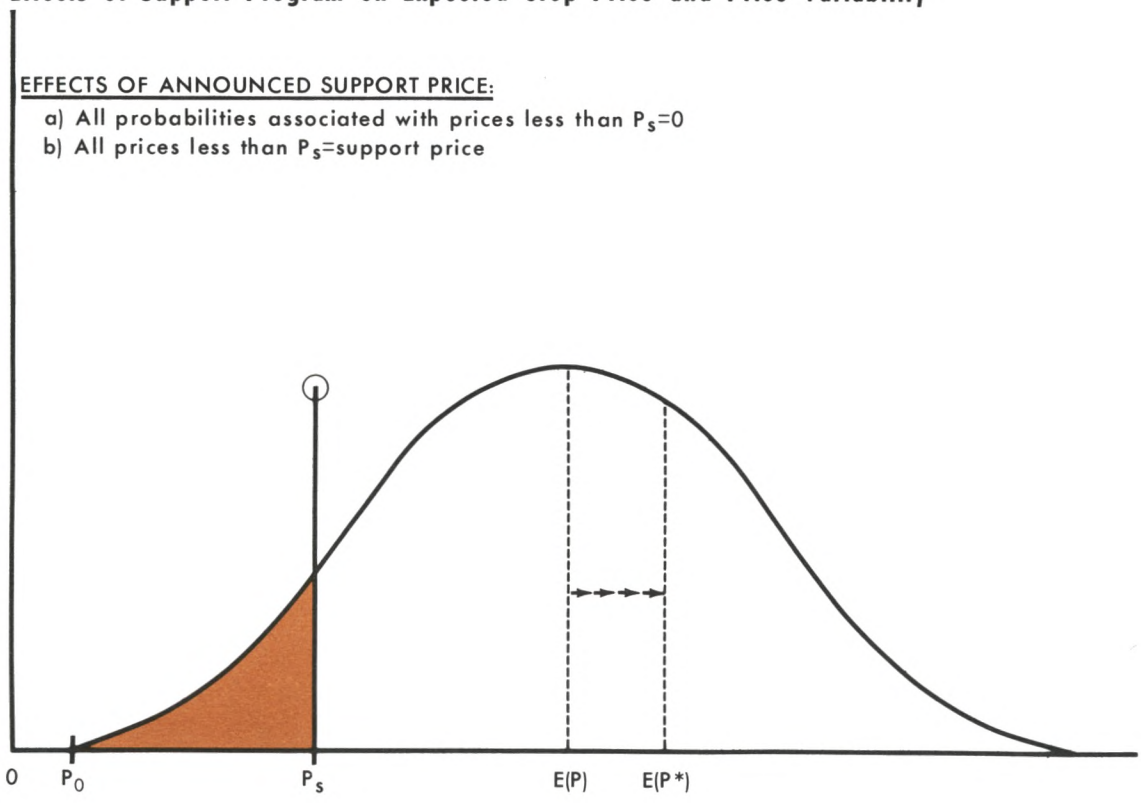
The major grain programs have had a substantial effect on economic behavior. On a purely descriptive level, the data show that grain prices have persisted at relatively low levels and real farm income has fallen to historic lows; at the same time, the costs of government support programs have reached record highs. On a more analytic level, however, it is interesting to investigate the economic incentives that have produced these results. Thus, rather than attribute the low prices and income to unusually good weather or other random events, as many analysts have done, one should examine the program's incentives to see if they reveal conflicts that could account for the observed results, especially those that seem contrary to the stated objectives of the programs.

Programs That Increase *Production*

Farmers will increase their grain production if they expect grain prices to increase, if they expect their costs to decline or both. Although grain programs do reduce costs of farmers through free crop insurance and the interest subsidies mentioned earlier, their most important influence is on the distribution of expected output prices.[20] By increasing the average

[20]Government programs affect farmers' costs in a variety of ways. In the longer run, USDA research produces technological innovations (e.g., disease resistant crops) and information (e.g., outlook reports, budgeting and business methods) that help lower costs. Conversely, price support programs tend to increase costs because increases in expected output prices will tend to cause increases in the prices of inputs, especially land. The net effect of government programs on farmers' costs would be difficult to determine.

Figure 1
Effects of Support Program on Expected Crop Price and Price Variability



(mean) price expected by producers and reducing the variability of expected market prices, programs that establish a price floor tend to encourage farmers to increase production.[21]

Figure 1 shows how. For simplicity, grain prices are assumed to be distributed normally around some average value, E(P), with a given variance, σ^2, in the absence of government programs. The mean price represents the "best guess" of what actual prices will be at harvest; it is the price upon which production decisions will be based. In practice, E(P) could be the cash price at the time of planting or the futures price dated for end-of-season delivery minus the cost of storage.

The effects of a price support program also are shown in figure 1.[22] First, an effective support must be set at a level greater than P_o to affect economic activity. If no one believes that prices will be less than P_o, a support

[21]The same general argument applies to target prices and direct income transfers made via deficiency payments. That is, eligible producers are guaranteed at planting a minimum harvest price equal to the market price *plus* a direct payment equal to the minimum of the difference between the target price and either the loan rate or market price.

[22]Without a price support program, the expected price would be calculated as:

$$E(P) = \int_0^\infty P\,\Psi(P)dP.$$

After a price support program is imposed, however, the left-hand tail of the distribution is reallocated over the area to the right of P_s. The most basic representation of this change is to "stack" the shaded area at P_s; the expected price would then be calculated as:

$$E(P^*) = P_s \int_0^{P_s} \Psi(P)dP + \int_{P_s}^\infty P\,\Psi(P)dP.$$

A more mathematical analysis of this example and simulation results can be found in Michael Boehlje and Steven Griffin, "Financial Impacts of Government Support Price Programs," *American Journal of Agricultural Economics* (May 1979), pp. 285–96.

at P_o or below would be viewed as irrelevant. But, an effective price support, at say, P_s, increases the expected price from E(P) to E(P*). The shaded area of the price distribution to the left of P_s represents the portion of the old price distribution that is now eliminated; the probabilities attached to this range of prices are now "reassigned" to P_s. This shift in the expected price distribution must increase E(P) which, ceteris paribus, will tend to increase production.[23]

This reshaping of the expected price distribution by a price support may have an even greater impact on production through its impact on the *variability* of expected prices.[24] If the new price distribution facing farmers has a lower variance, farmers face less price risk than they did before.[25] Farmers' output decisions will be based on a higher expected price and lower risk of price fluctuations. If farmers are generally risk-averse, the reduced price risk also will generate greater production.

Programs That Decrease *Production*

As the foregoing suggests, programs designed to increase commodity prices also tend to increase production. The unfortunate side effect of this reponse is that increased production tends to *decrease* prices. In recognition of this, price support programs often require compliance with a reduction of the number of acres planted under programs of the form described earlier.

But, will the reduction in the number of acres planted necessarily support prices at levels desired by the legislation? It is unlikely unless more acreage is idled than is typically the case, for the following reasons. First, because farmers can select the land they idle, they will designate the poorest quality land for participation in the RAP. Thus, the reduction in quantity produced will be proportionately smaller than that suggested by the number of acres idled. Second, depending upon individual circumstances, farmers also may attempt to raise yields on the remaining land by using fertilizer and pesticides more intensively. Existing evidence suggests that these practices can offset about one-half of the impact of an acreage reduction.[26]

Most important, however, is the recognition that grain is an internationally traded good and, hence, grain prices are determined in the *world* market.[27] Therefore, in the absence of tariffs or quotas, attempts to reduce U.S. production will have to increase the *world* price of grain in order to raise grain prices for U.S. farmers. Because *world* grain supplies affect grain prices in the United States and abroad, far more acreage must be idled in the United States than would be necessary if U.S. grain supplies alone affected the U.S. grain price. For example, if the U.S. elasticity of demand for grain were -0.2 but the elasticity of total (U.S. domestic plus export) demand were -1.5, the influence of a world market would require the idling of over 600 percent more land to achieve a 10 percent increase in grain prices.[28] Without cooperative agreements for output reductions by other countries, U.S. attempts to increase grain prices by idling acreage are likely to be unsuccessful.[29]

Storage Programs

Because price supports encourage increased production and current acreage reduction programs are insufficient to offset this effect, "surplus" stocks are likely to accumulate in government storage. Historically, the CCC loan program has acquired this surplus

[23]This example represents a partial analysis. The distribution itself will shift to the left if the support program increased production. Higher expected output would lower the probabilities of obtaining relatively high prices and offset some of the increase in the expected price.

[24]This argument has been made for a number of years, dating back at least to Holbrook Working, "Price Supports and the Effectiveness of Hedging," *Journal of Farm Economics* (December 1953), pp. 811–18.

[25]Under reasonable assumptions, truncating the lower tail of the distribution at P_s also will reduce its variance.

[26]Federal Reserve Bank of Chicago, *Agricultural Letter*, No. 1595 (January 21, 1983).

[27]In many years, U.S. policy has ignored this fact and set loan rates above world prices. Because the loan rate is a floor for U.S. prices, minimum U.S. prices were maintained above the world price. Such a policy, however, effectively removed the United States from international trade unless other producing nations could not fully satisfy world demand, thereby making the United States the "supplier of the last resort." That is, U.S. grain was not traded internationally because U.S. producers could receive returns higher than the world price by selling grain domestically or placing it under CCC loan. Conversely, importers would buy U.S. grain only if all other trading partners could not supply it at the lower world price.

[28]This example and a more detailed analysis can be found in Gardner, *Governing of Agriculture*, p. 38–9. His example shows that a 10 percent increase in price can be achieved by a 2 percent output reduction if the elasticity of demand is -0.2. If it is -1.5, however, the same 10 percent increase in price requires a 15 percent reduction in output. The approximate difference between these output reductions is 600 percent.

[29]In fact, the lack of such an agreement has allowed other producing nations to be "free-riders" with respect to U.S. grain programs. That is, other countries benefit from U.S. price support and storage programs without paying any direct costs. This is partially why the U.S. will hold 85 percent of the world's corn stocks and 44 percent of its wheat stocks in 1983.

production. More recently, however, the FOR has been introduced to build even greater reserve stocks. The stated intention of the program is to promote greater price stability by increasing and manipulating the mean level of reserve stocks. To be successful, then, the FOR must accomplish two objectives: First, it must increase the level of reserve stocks. Second, this increase in stock levels and the handling of the reserve itself must dampen the variability of grain prices. The evidence to date, however, suggests that neither objective has been achieved.

With respect to stock levels, the most current estimate is that each additional bushel of grain in the FOR represents only a 0.2 to 0.4 bushel addition to total, privately owned stocks.[30] The closer this estimate is to zero, the more strongly it suggests that farmers have viewed the publicly-controlled FOR as a subsidized alternative to private storage. That is, rather than paying to keep grain in private storage, eligible farmers can place grain in the FOR, receive a 26.5 cent per bushel prepaid storage subsidy and pay no interest on the last two years of a three-year loan. The substitution estimate of 0.2 to 0.4 might be closer to zero if participation in the FOR did not require a three-year contract during which the grain cannot be sold unless market prices rise to a specified multiple of the loan rate. As one analyst has remarked, however, "It is not clear that the FOR program has added significantly more to either corn or wheat stocks than would have been achieved by the CCC loan program without it."[31]

Evidence to date also suggests that the FOR's effects on price stability have been contrary to the program's presumed objectives. Frequent changes in program rules — especially changes in trigger prices and other factors that affect the release of FOR grain to the market — have increased the uncertainty associated with participation in the FOR. This uncertainty, it is argued, also tends to increase the variability of market prices.[32] In a study of daily wheat and corn prices before and after the establishment of the FOR, Gardner found that the program, in fact, was associated with increased variability of grain prices. Another study using monthly data yields results consistent with Gardner's.[33] This evidence suggests that the FOR has been more successful in transferring income to farmers through storage subsidies than it has in increasing stocks or stabilizing grain prices.

The Payment-in-Kind Program (PIK)

In an effort to reconcile the results produced under conflicting incentives, the USDA has implemented the PIK program for 1983. Under its provisions, producers who have reduced acreage by the 20 percent of base stipulated by the RAP may idle up to an additional 30 percent of base acreage under PIK; in some cases, farmers may bid to idle their entire acreage. Participating corn producers will be given corn from CCC or FOR reserves in an amount equal to 80 percent of the normal yield on the number of acres idled.[34]

Because wheat producers already have planted their winter crop, they will be given 95 percent of normal yield if they plow it under to participate. Participating farmers are then free to sell the grain they receive or feed it to livestock. While participants will avoid the costs of planting and harvesting acreage declared to PIK, they probably will have to plant some cover on this land to prevent erosion.

The motivation behind PIK is twofold. On one hand, it attempts to remove more land from production than has been possible under existing programs. On the other hand, the distribution of reserve grain to farmers will reduce surplus stocks. It is hoped this payment-in-kind will reduce the costs of support programs — now at record highs — and reduce the depressing effects that large surplus stocks exert on market prices.

WILL PIK WORK?

Preliminary estimates by the USDA indicated that PIK would idle about 23 million acres of land over and above land already taken from production by other programs. Other estimates ranged as high as 50 million acres.[35] The actual figures exceeded both estimates, however, showing that over 69 million acres had been committed to the program; this acreage is in addition to the 13.2 million acres idled by the RAP alone.

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[30]A range of estimates is presented in Jerry A. Sharples, *An Evaluation of U.S. Grain Reserve Policy, 1977–80.* U.S. Department of Agriculture, Agriculture Economic Report No. 481, March 1982.

[31]Bruce L. Gardner, "Consequences of Farm Policies During the 1970s," in *Food and Agricultural Policy for the 1980s,* D. Gale Johnson, ed., American Enterprise Institute, Washington, D.C., 1981.

[32]See Sharples "An Evaluation of U.S. Grain Reserve Policy," and Gardner, "Consequences of Farm Policies."

[33]Michael T. Belongia, "Factors Affecting Placements of Corn and Wheat in The Farmer-Owned Reserve," processed, February 1983.

[34]Farmers currently without grain in CCC or FOR stocks must put their current crop under CCC loan to participate in PIK.

[35]William Robbins, "Farm Officials Stump for Plan to Reduce Planting of Crops," *New York Times* (January 22, 1983).

Although the 82.3 million acres to be idled this year are spread across seven crops, corn and wheat are expected to show the largest reductions.[36] In fact, about 87 percent of all acreage idled has a base in corn or wheat. But, because some uncertainty still exists about the overall quality of land planted and growing season weather, yields may reinforce or offset the effects of a reduction in acres planted. Based on reasonable assumptions about increases in yields, however, it appears as if 1983 programs will cause output reductions on the order of 20 percent for wheat and 30 percent for corn.

The effects of 1983 crop programs on commodity prices can be estimated by using cash prices at the time PIK was announced and the total elasticity of demand cited in an earlier example. That is, in January, when PIK was announced as a new program option, cash prices for corn and wheat were $2.58 and $4.08 per bushel, respectively. The estimated total elasticity of demand of −1.5 also suggests that a 1 percent decline in production will raise prices by 0.67 percent. Therefore, for these estimates, a 30 percent reduction in corn production implies a 20 percent increase in price. Based on a January price of $2.58, this simple analysis suggests corn prices, at time of harvest, will be near $3.12 per bushel. A similar analysis for wheat shows prices reaching $4.60 per bushel. These prices compare to 1983 target prices of $2.86 for corn and $4.30 for wheat.

SUMMARY AND CONCLUSIONS

Programs to manage farm production and prices have been in existence since the 1930s. An analysis of current programs intended to limit surplus accumulation and raise farm prices indicates, however, that they have failed to achieve either objective. Specifically, supply reductions resulting from some programs targeted at output reductions have been offset by incentives to increase production contained in other programs. The result has been a continuation of the "farm problem": chronic surpluses and relatively low prices.

The PIK program, the latest effort to reconcile these conflicts, could increase corn and wheat prices marginally above their support levels only if the most optimistic estimates of farmer participation are realized. Estimates based on USDA projections, however, indicate that surplus removal under PIK will not increase corn or wheat prices substantially above their target prices. With surplus conditions prevailing for at least two more years, the 1980s are unlikely to become the decade of increasing commodity shortages and rising relative prices that many analysts forecast just a few years ago.

[36]The PIK program covers corn, wheat, sorghum, cotton and rice. Barley and oats are not included in PIK.