

# How Federal Farm Spending Distorts Measures of Economic Activity

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**D**URING the 1980s, federal purchases of farm products by the Commodity Credit Corporation (CCC) have exhibited relatively large quarterly swings that have significantly affected how we interpret economic developments.<sup>1</sup> Although these purchases increase the government's inventory of farm products, they are treated as final sales to the government, instead of inventory transactions, in the National Income and Product Accounts (NIPA). As a result, a CCC purchase increases federal purchases and final sales in the economy and reduces measured investment in farm inventory. Similar private sector transactions, which redistribute farm products from one owner to another, result in offsetting changes in farm and business inventory; these transactions affect neither business inventory investment nor final sales.

This article explains the impact of CCC purchases and examines the distortions that they can produce in quarter-to-quarter movements of some important NIPA measures. It shows that adjusting for the effect of CCC purchases can alter conclusions about the short-term performance and outlook for federal purchases, the farm sector and aggregate production and employment. The largest swings in CCC purchases on record were recorded at the end of 1985 and early this year; hence, these recent swings have had the greatest impact on measures of inventory investment, federal purchases and overall final sales. A more useful perspective on NIPA measures can be obtained by adjusting these measures during quarters when large changes in CCC purchases occur.

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<sup>1</sup>The significance of such swings, especially as a major source of changes in federal purchases, was first noted by the Bureau of Economic Analysis (1982).

## CCC PURCHASES, SALES AND INVENTORY CHANGES

The Commodity Credit Corporation, established in 1933 as part of the Department of Agriculture, carries out the federal government's price support programs.<sup>2</sup> These programs include both "nonrecourse loans" and direct purchases of farm products. The former are called nonrecourse loans because the farmer is free to deliver the pledged crop, which serves as collateral, in order to settle the loan.<sup>3</sup> The price of the commodity at which the loan is advanced is called the loan rate; it establishes a minimum price for the commodity. When the government makes such a loan, the transaction is treated in the NIPA as a purchase of farm products. As a result, these loans increase federal purchases and reduce farm inventory holdings. Repayment of the loan reverses these accounting entries.<sup>4</sup>

Direct purchases of farm products are treated in the

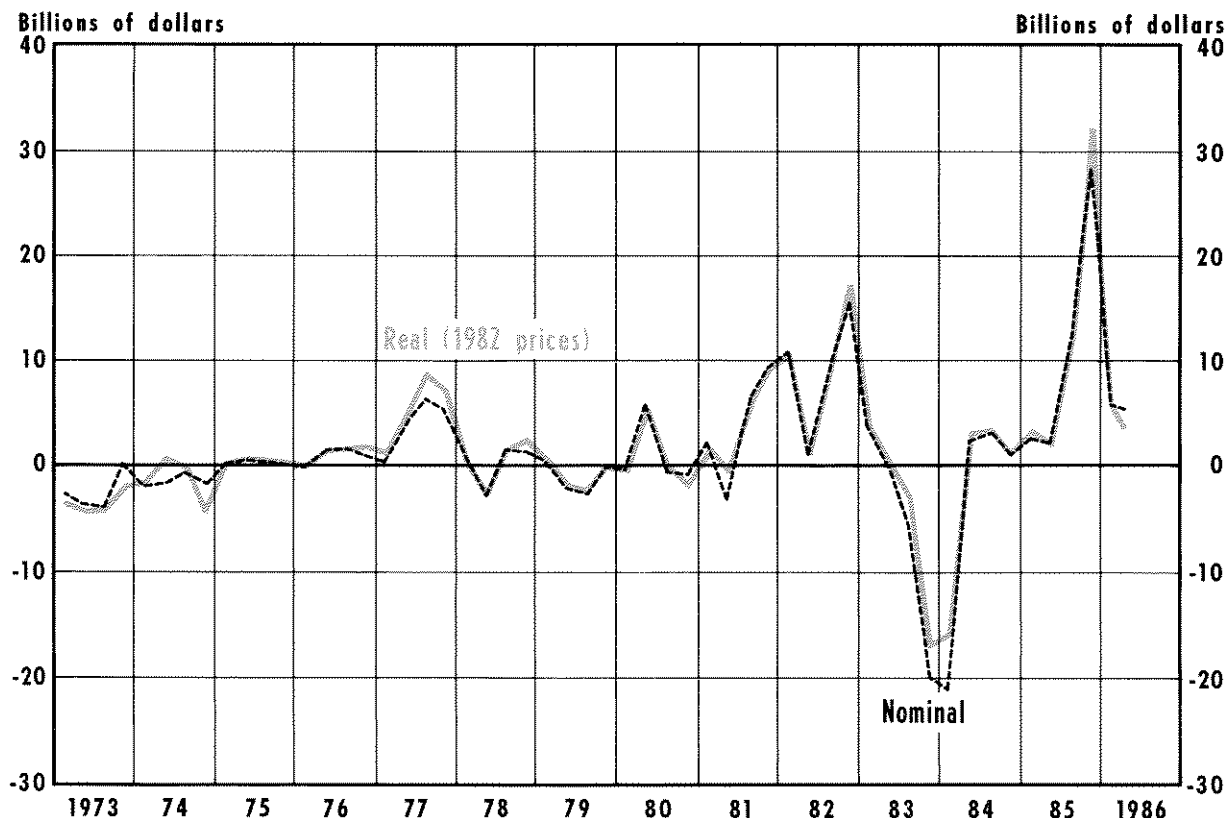
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<sup>2</sup>More extensive discussion of the CCC can be found in the Council of Economic Advisers (1986), Herman (1978), Bureau of Economic Analysis (1982) and Wakefield (1986). The former also details other features of U.S. agricultural policy.

<sup>3</sup>Nonrecourse loans to farmers are based on the government-set loan rate for each farm product and the amount of the current or past product pledged against the loan as collateral. If the producer-borrower cannot sell his product for more than the loan rate plus the accumulated storage costs and interest on the loan, the farmer forfeits the pledged crop and the loan obligation is discharged. The farm products that are covered by the loan program include wheat, corn, barley, oats, rice, cotton, honey, peanuts, sorghum, soybeans, rye, tobacco and sugar.

<sup>4</sup>Even when the farmer pays off the loan, he reaps a benefit in the form of a short-term credit subsidy, since the interest rate on such loans is less than market rates. The CCC also supports prices of farm products by directly purchasing certain products at official support prices when such prices exceed market levels. Chief among these are such dairy products as cheese, butter and dry milk.

Chart 1  
**CCC Purchases**



exact same way in the NIPA. Thus, commodity loans and direct commodity purchases by the federal government result in offsetting changes in federal purchases of goods and services and business (farm) inventory investment. GNP is unaffected by the transactions because they result in no change in production.<sup>5</sup>

Chart 1 shows both nominal and real (1982 prices) CCC inventory purchases from 1973 to the second quarter of 1986. Although the nominal purchases appear small relative to current GNP of over \$4 trillion,

the quarter-to-quarter swings are sometimes quite large in comparison to GNP movements. For example, in the fourth quarter of 1985, such purchases rose \$20.8 billion, or 36.5 percent of the total increase in GNP during the same quarter. It is also evident from the chart that movements in CCC purchases have become substantially larger in the 1980s, with the biggest swings occurring at the end of 1985 and in early 1986. In part, these increased fluctuations reflect the growing role of federal farm programs.

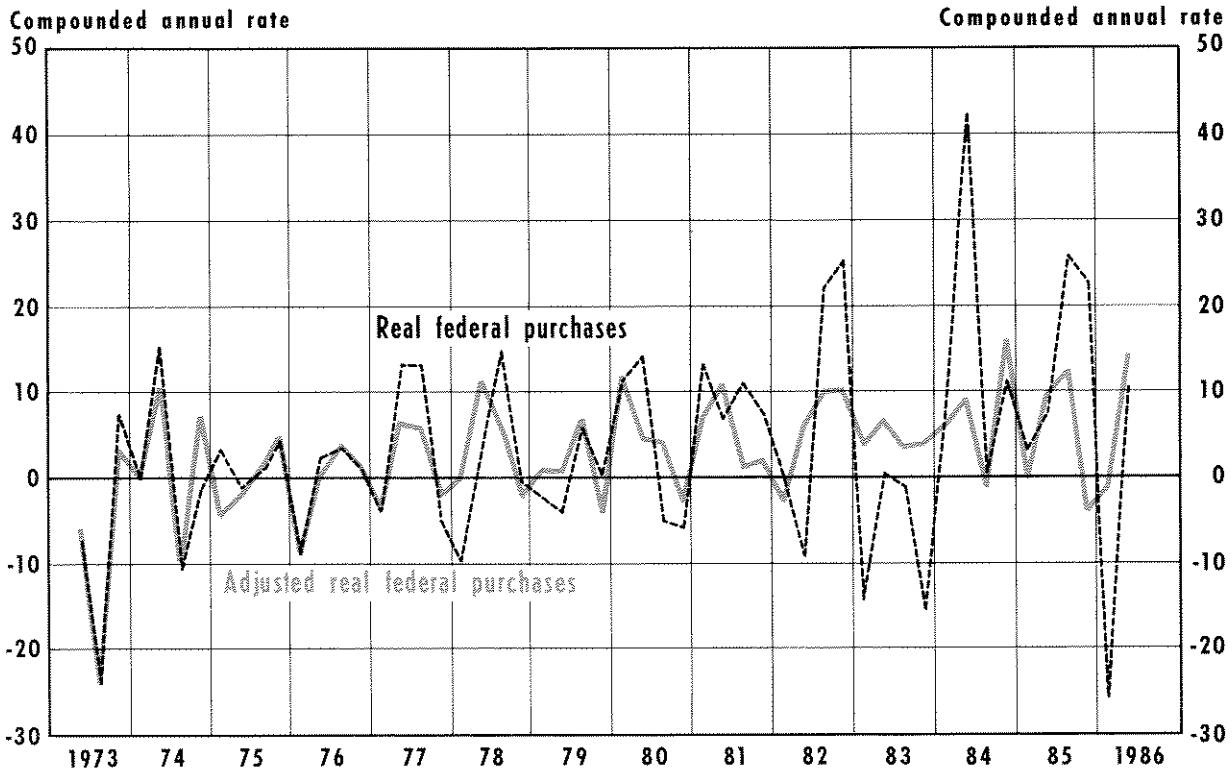
### CCC AND FEDERAL PURCHASES OF GOODS AND SERVICES

Quarterly movements in CCC purchases have had a sizable impact on the pattern of growth of federal purchases during some quarters in the 1980s. Chart 2 shows the growth rates of real federal purchases and adjusted real federal purchases (which exclude CCC

<sup>5</sup>The independence of GNP from CCC purchases is based on two assumptions: (1) that the coverage, timing and seasonal adjustment of changes in farm inventory and CCC purchases are consistent and (2) that farmers, in general, cannot or do not respond to CCC purchases within the quarter by altering production. The former point has been made by the Bureau of Economic Analysis (1982). These second-order considerations are ignored below in order to focus solely on the measurement principles involved.

Chart 2

## The Growth Rate of Real Federal Purchases with and without CCC Purchases



purchases) since 1973.<sup>6</sup> In the 1980s, the difference in the growth rates often has been quite large and more variable. Since 1980, the federal government generally has been accumulating inventory of farm products, but in 1983 and early 1984, the Payment-In-Kind (PIK) program led to large sales for four quarters.<sup>7</sup> These swings in CCC purchases had a major impact on the growth rate of federal purchases, generally depressing it in 1983 and early 1984 and subsequently raising it. These swings make it difficult for analysts to interpret trends in federal spending.

Another coincidental effect of CCC purchases in recent years has been to raise the growth rate of

federal purchases during recession periods, while depressing the growth of federal purchases during the initial stages of expansions. This effect has resulted in the appearance of a negative relationship between GNP and federal purchases, a relationship that disappears when federal purchases are adjusted for CCC purchases. For example, from I/1980 to II/1986, the correlation between the growth rate of real federal purchases of goods and services including CCC purchases and of real GNP is negative (-0.15); when real CCC purchases are omitted from government purchases, however, the correlation is positive (0.04). While neither correlation is statistically significant, distortions caused by volatile CCC purchases can bias statistical tests of fiscal policy's general effectiveness.

<sup>6</sup>Since nominal and real CCC inventory changes are not substantially different over the period since 1973, attention throughout this article is focused on real measures. Movements in the nominal counterparts of real measures provide no additional insight and so are ignored here.

<sup>7</sup>A description and analysis of the PIK program that was in effect in 1983 and early 1984 can be found in Belongia (1983) and Rosine (1984).

### CCC PURCHASES AND CHANGES IN FARM INVENTORY

Federal purchases of farm products are offset in the

**Table 1**  
**The Change in Farm Inventory and CCC Purchases (billions of dollars, 1982 prices)**

	CCC purchases	Change in farm inventory	Annual mean/standard deviation	Change in farm inventory and CCC	Annual mean/standard deviation
I/1980	\$ -0.3	\$ -5.0		\$ -5.3	
II	5.5	-7.0	\$ -4.7	-1.5	\$ -3.9
III	-0.2	-10.5	6.09	-10.7	5.37
IV	-2.0	3.8		1.8	
I/1981	1.6	4.6		6.2	
II	-0.8	11.2	4.9	10.4	8.7
III	5.5	5.0	5.11	10.5	2.09
IV	9.1	-1.3		7.8	
I/1982	10.8	-4.1		6.7	
II	0.7	4.0	-1.5	4.7	7.7
III	7.9	3.2	6.16	11.1	2.71
IV	17.2	-8.9		8.3	
I/1983	3.8	-9.1		-5.3	
II	-0.1	-6.9	-6.3	-7.0	-10.5
III	-3.1	-15.7	9.32	-18.8	6.01
IV	-17.2	6.5		-10.7	
I/1984	-15.9	16.4		0.5	
II	3.1	1.8	4.9	4.9	2.7
III	3.4	1.3	7.72	4.7	2.4
IV	0.8	0.0		0.8	
I/1985	3.2	6.4		9.6	
II	2.0	7.8	-2.0	9.8	10.3
III	11.5	-0.7	13.43	10.8	0.7
IV	32.3	-21.3		11.0	
I/1986	6.4	2.9		9.3	
II	4.5	4.1	—	8.6	—

GNP accounts by reductions in farm inventory.<sup>8</sup> Thus, CCC purchases can distort the short-run interpretation of changes in farm and business inventory. When the CCC purchases (sells) farm goods, farm and business inventory investment falls (rises), giving the appearance of an inventory change. Of course, such an appearance is deceptive; in fact, inventory holdings have simply moved from private to federal government ownership, or vice versa.

<sup>8</sup>An inverse relationship between business inventory investment and government purchases of goods has been noted by Weidenbaum (1959) and (1961). His analysis emphasizes the time pattern of production and delivery and the NIPA accounting of such programs. The implied lack of a contemporaneous relationship of GNP and such spending was first pointed out in these articles.

Table 1 shows quarterly real CCC purchases and changes in both real farm inventory and real farm inventory plus real CCC purchases since 1979.<sup>9</sup> The mean and standard deviation of each series also are shown for each year. The pattern of changes in the overall measure of farm inventory is much smoother when CCC purchases are included than when they are not. This is especially true when relatively large changes in CCC purchases occur. At these times, farm inventory investment swings widely in the opposite direction, such as in IV/1982, IV/1983, I/1984 and the

<sup>9</sup>For the period shown in table 1, the correlation between changes in CCC purchases (1982 prices) and changes in farm inventory investment is  $-0.56$ , which is statistically significant at the 1 percent level.

end of 1985. The standard deviation for farm inventory investment each year is sharply higher than that for the total farm product inventory change. This occurs because the movements of CCC purchases are offset by opposite movements in farm inventory purchases. Of course, this smoothing effect also occurs for the overall change in inventory — the sum of business (non-farm and farm) inventory change and CCC purchases.

### CCC PURCHASES AND FINAL SALES

While federal purchases of farm products do not affect GNP — the value of final goods and services produced in the economy — they do affect the measurement of final sales, which equals GNP less the change in business inventory.<sup>10</sup> Analysts often focus on final sales in order to assess the strength and outlook for income, output and employment. Assessments of final sales are important both because inventory and production decisions are based on expectations of such sales and because unexpected changes in sales are absorbed by inventory fluctuations. Thus, movements in final sales relative to production provide information on future production changes and can give rise to an inventory cycle.<sup>11</sup> When sales are less than production, for example, the unsold products increase inventory. If the rise in inventory is undesired and unplanned, it will be eliminated by reducing production growth temporarily relative to that of expected sales. Moreover, if movements in GNP reflect temporary changes in production to adjust inventory, final sales can be a more useful gauge of the outlook than current production or GNP.

CCC purchases have substantial quarter-to-quarter effects on the measurement of final sales. This occurs

because such purchases affect the change in business inventory but leave GNP unaffected. When CCC purchases increase, for example, measured final sales tend to rise because business (farm) inventory declines. Yet such purchases simply represent another way of holding farm inventory, not a significant increase in overall spending on goods and services that will likely lead to increased production. Thus, if the change in business inventory is adjusted to include CCC purchases, the adjusted final sales measure obtained can more closely gauge the actual final purchases of goods and services by consumers, business, government and foreign purchasers. Chart 3 shows real final sales growth both without an adjustment and with CCC purchases subtracted from final sales.

The largest differences in the growth of final sales, adjusted for CCC purchases, occur after 1981. In the second half of 1982, relatively large CCC purchases contributed to final sales growth. From the second to the fourth quarter of 1982, real final sales expanded at a 2.1 percent rate, higher than the 1.1 percent rate for adjusted real final sales. Subsequent reductions in the government's holding of farm product inventory through the PIK program led to an understatement of final sales growth. From the fourth quarter of 1982 to the fourth quarter of 1983, real final sales expanded at a 3.7 percent rate, but this was below the 4.8 percent rate of adjusted real final sales growth. In effect, the transfer of farm product inventory from the government to the private sector appeared only as a net business inventory change, which understated the growth of final sales. Of course, these periods match the end of the 1981–82 recession and early part of the current expansion. Thus, the cyclical swing in measured final sales growth understates the actual acceleration in adjusted final sales that took place.

The most recent CCC purchases, especially in the fourth quarter of 1985, are the largest on record. In the second quarter of 1985 and the second quarter of 1986, real CCC purchases were \$2 billion and \$4.5 billion, respectively. Thus, in each quarter, the final sales measure was little affected by CCC purchases; over the whole year, real final sales and real final sales adjusted for CCC purchases rose 2.7 and 2.6 percent, respectively. Moreover, the pace of overall inventory investment was about the same in each quarter, so that real GNP grew at about the same rate over the year.

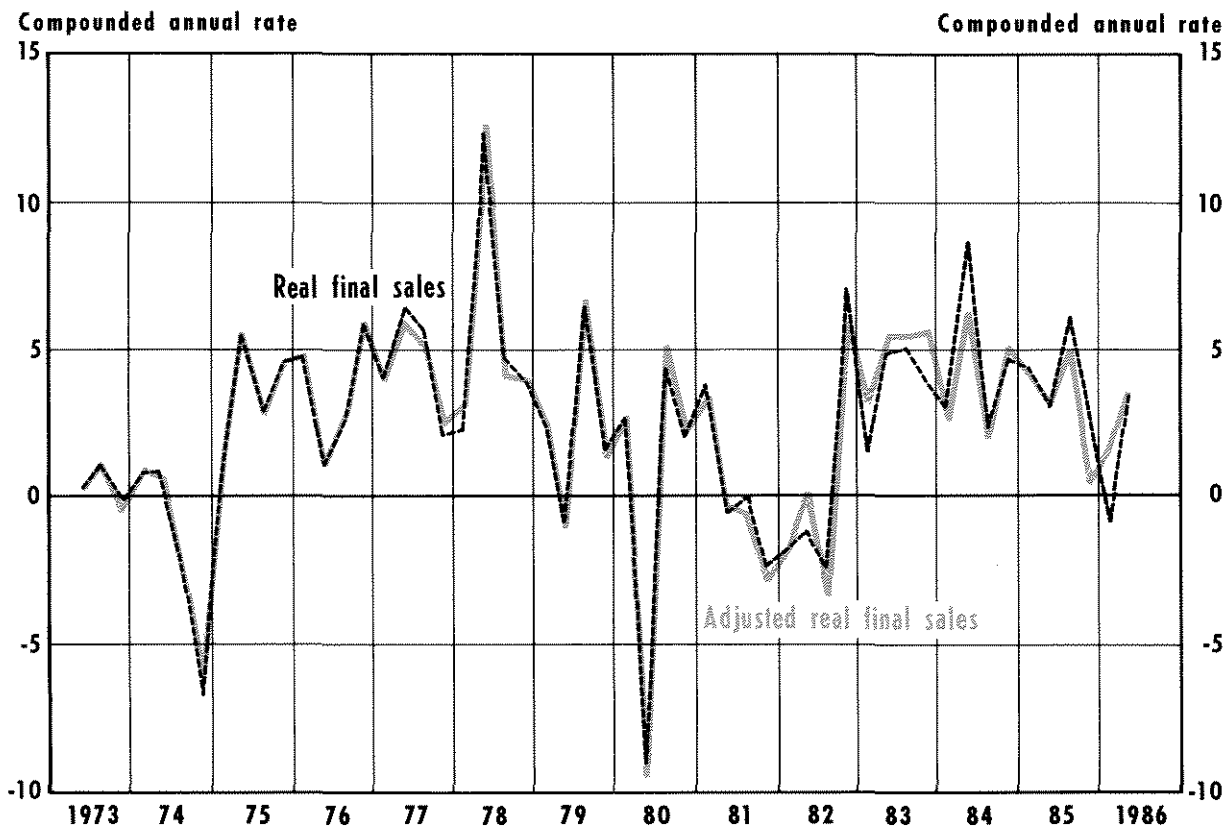
But the patterns of real GNP, real final sales and adjusted real final sales were quite different during the year. Table 2 shows these growth rates. Both final sales series show that production grew faster than sales in

<sup>10</sup>While the assumed independence of CCC purchases and farm output *within the quarter* seems satisfactory, it might be argued that such purchases contribute to higher farm output than would otherwise occur. To test these views, "Granger-causality" tests were conducted on the quarterly change in farm sector output and the change in CCC purchases, both in 1982 prices, for the period II/1973 to II/1986. Optimal lags on the lagged dependent variable were chosen via sequential F-tests. The results indicate "bidirectional causality": past CCC purchases negatively and significantly affect farm output; past changes in farm output positively and significantly raise CCC purchases. When the contemporaneous value of the change in CCC purchases is included in the farm output equation, there is no significant past CCC effect and the contemporaneous CCC term is not significant for lags on the change in CCC purchases up to 10 quarters earlier.

<sup>11</sup>The inventory cycle and its significance in U.S. business cycles from 1948 to 1976 is discussed in Tatom (1977).

Chart 3

### CCC Purchases and Real Final Sales Growth



the last quarter of 1985 and first quarter of 1986. So, not surprisingly, production growth slowed temporarily in the second quarter of 1986 to eliminate excess inventory. Both final sales series also show that sales growth accelerated in the second quarter of 1986.

The principal differences in table 2 are that sales growth in 1986 was stronger according to the adjusted series and that it accelerated for two quarters rather than one. The stronger sales growth on an adjusted basis suggests stronger growth in aggregate demand and more incentive for firms to increase production and employment than the unadjusted data indicate. Also, the second quarter acceleration in final sales appears less likely to be a fluke using the adjusted series. The acceleration simply reinforces the pattern set in the previous quarter, instead of appearing to be the first sign of positive sales growth since the end of 1985, as indicated in the unadjusted data.

#### SUMMARY

While movements in CCC purchases can be relatively large, they have had no major effects on final sales and other NIPA measures until the past few years. During recent years, the pattern of CCC purchases has had relatively large effects on measured inventory change, federal purchases and expenditures, and final sales. In 1982 and 1983, the effect was to raise the growth of both federal spending and final sales during the last two quarters of the recession and to lower their growth in the first five quarters of the subsequent expansion. More recently, record net purchases by the CCC in the last half of 1985 have given rise to a distorted pattern of sales growth, suggesting generally weaker sales than the adjusted data indicate. Analysts who focus on unadjusted data, accordingly, would understate the recent strength of aggregate demand and the short-run prospects for growth.

**Table 2**  
**Growth Rates of GNP and Final Sales over the Previous Year**

Quarter ending	Real GNP	Real final sales	Final sales less CCC purchases
III/1985	4.1%	6.1%	5.0%
IV/1985	2.1	2.7	0.4
I/1986	3.8	-1.3	1.6
II/1986	0.6	3.4	3.6
II/1985-II/1986	2.6	2.7	2.6

For policy purposes, fluctuations in CCC purchases can distort quarter-to-quarter movements in important NIPA measures, providing a misleading indication of the strength or weakness of federal spending, farm inventory investment and final sales. Faced with such distortions, analysts will find it useful to take more care in accounting for these quarterly movements in CCC purchases and their effects on key measures of economic performance.

## REFERENCES

- Belongia, Michael T. "Outlook for Agriculture in 1983," this *Review* (February 1983), pp. 14-24.
- Bureau of Economic Analysis, U.S. Department of Commerce. "Special Note — The Commodity Credit Corporation in the National Income and Product Accounts," *Survey of Current Business* (January 1982), pp. 6-7.
- Council of Economic Advisers. *Economic Report of the President* (U.S. Government Printing Office, February 1986), pp. 129-58.
- Herman, Shelby W. "The Farm Sector," Bureau of Economic Analysis, U.S. Department of Commerce, *Survey of Current Business* (November 1978), pp. 18-26.
- Rosine, John. "The Farm Sector and GNP," paper presented to the Federal Reserve Committee on Agriculture and Rural Development, Board of Governors of the Federal Reserve System, June 1, 1984, processed.
- Tatom, John A. "Inventory Investment in the Recent Recession and Recovery," this *Review* (April 1977), pp. 2-9.
- Wakefield, Joseph C. "Federal Farm Programs in 1986-90," Bureau of Economic Analysis, U.S. Department of Commerce, *Survey of Current Business* (April 1986), pp. 31-35.
- Weidenbaum, Murray L. "The Timing of The Economic Impact of Government Spending," *National Tax Journal* (March 1959), pp. 79-85.
- \_\_\_\_\_. "The Government Spending Process and Economic Activity," *The American Journal of Economics and Sociology* (January 1961), pp. 169-79.