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PERFORMANCE OF RURAL BANKS AND CHANGES IN BANK STRUCTURE IN OHIO

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A considerable amount of discussion has been focused on the type of banking structure that would be the most appropriate to facilitate an ample flow of bank credit to the rural sector of the economy. Arguments have been advanced to the effect that branch banks or subsidiary banks of multi-bank holding companies are potentially in a better position to provide an improved flow of credit to the rural sector because they are often able to make larger individual loans¹ and have access to more highly specialized personnel. Furthermore, branch or group banking systems are better able to shift funds to communities facing greater credit needs or to tap national money markets for additional funds than small unit banks.² Others have suggested that branch or holding company banking systems

¹Individual loan limits of National and State banks in Ohio are generally restricted to 10 percent of capital and surplus. For a small bank, this restriction can severely limit the bank's effectiveness in servicing large loans.

²See Emanuel Melichar and Raymond J. Doll, *Capital and Credit Requirements of Agriculture, and Proposals to Increase Availability of Bank Credit*, Report to the Steering Committee for the Fundamental Reappraisal of the Discount Mechanism, (Washington, D. C.: Board of Governors of the Federal Reserve System, November 1969).

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might not increase lending in rural areas. Branch bank systems sometimes lose close personal contact with the local community. Additionally, it has been asserted that funds are likely to be shifted out of rural areas to larger cities where the head office or lead bank is located and where a higher rate of return on loanable funds may exist.³

Questions relating to the flow of bank credit to the rural sector are important in Ohio because agriculture is a major industry in the State and the structure of banking has been undergoing change. Acquisitions of banks by multi-bank holding companies have recently been occurring at a rapid pace, and "within county" bank merger activity has remained strong. This study was undertaken in an attempt to provide some additional information about the effects of changes in bank structure in non-metropolitan areas of Ohio on the flows of bank credit.

Results of the study indicate that "within county" changes in bank structure in Ohio did not significantly alter the flow of bank funds to rural areas. Compared with other banks, those that underwent a change in ownership experienced a slight—but not significant—decline in overall lending to farmers, but their overall aggressiveness in providing credit to local communities remained essentially unchanged. The type of flow of funds between banks was significantly altered at banks changing ownership, but the distribution of the flow between rural banks and large city banks appeared to remain the same.

³For a more detailed discussion of this issue, see John A. Hopkin and Thomas L. Frey, "Problems Faced by Commercial Banks of Illinois in Meeting the Financing Requirements of a Dynamic Agriculture," *Agriculture Economic Research Report 99*, (Urbana, Illinois: University of Illinois, April 1969) and Robert J. Lawrence, *The Performance of Bank Holding Companies*, (Washington, D. C.: Board of Governors of the Federal Reserve System, June 1967).

IMPORTANCE OF AGRICULTURE IN OHIO

Ohio's agricultural sector makes a significant contribution to the overall economy of the state. In 1970, Ohio farmers received an estimated \$1.6 billion in gross receipts from sales of farm products and spent nearly \$1.2 billion for production inputs. During the past decade, gross farm income has increased 32 percent while farm production expenses rose almost 35 percent. More significantly, gross receipts per farm increased over \$6,000 (\$7,978 to \$14,050) during the decade, but realized net income per farm rose only about \$1,400 (\$2,099 to \$3,502) as a result of a substantial \$4,670 increase in production expenses per farm.

The rapid growth in farm production expenses has caused a greater reliance by farmers on debt financing and heavy credit demands on the institutions that finance this debt, such as commercial banks, the Farm Credit System, and life insurance companies. The volume of farm debt outstanding at major lending institutions in Ohio increased from \$511 million in January 1961 to over \$985 million in January 1971. It is expected that the demand for farm credit will continue to increase at a fast pace.⁴ In addition, the demand for credit by "agri-business" firms to finance their farm customers and their own operations should remain strong.

Commercial banks have played a major, though declining, role in financing agriculture in Ohio, as in the United States. Between 1960-1970, bank loans to farmers in Ohio were up by a 6.1 percent average annual rate, but slipped from 44.5 percent to 41.7 percent of total loans to farmers outstanding at major lending institutions (Table I).

⁴Melichar and Doll, *Capital and Credit Requirements of Agriculture*.

TABLE I

Agricultural Loans Outstanding at Major Lending Institutions in Ohio

Lending Institution	January 1, 1961		January 1, 1971	
	Volume	Percent of Total	Volume	Percent of Total
Commercial banks	\$227,144	44.5%	\$410,773	41.7%
Farm Credit System				
Production Credit Association	79,308	15.5	177,901	18.0
Federal Land Banks	87,333	17.1	215,252	21.8
Federal Intermediate Credit Banks	2,017	0.4	1,771	0.2
Banks for Cooperatives*	17,886	3.5	38,681	3.9
Farm Credit System Total	186,544	36.5	433,605	44.0
Farmers Home Administration†	14,063	2.8	37,523	3.8
Life Insurance Companies	82,780	16.2	103,864	10.5
Total	\$510,531	100.0%	\$985,765	100.0%

* Loans outstanding to farmer-owned cooperatives.

† Loans outstanding for farm ownership and farm operating expenses.

Source: American Bankers Association

Much of this decline reflects the difficulty of rural banks in adapting to the changing credit needs of farmers. Specifically, farm consolidation and specialization resulting from rapid technological changes have caused a demand for large loans serviced by agricultural specialists. In many areas, deposit growth at rural unit banks has been outstripped by an even larger growth in the demand for farm loans. This fact, combined with restrictions on individual loan size at many of the smaller banks, has given the highly specialized Farm Credit System a competitive edge in many areas.

HOLDING COMPANY AND MERGER ACTIVITY IN OHIO

The commercial banking system in Ohio, as in many other states, has been undergoing a structural change as a result of bank mergers, branching, and bank holding company activities. Two types of activity affecting structure—multi-bank holding company acquisitions and

mergers—were considered in this study of “within county” bank performance in non-metropolitan areas.

Bank Holding Companies. The proliferation of multi-bank holding company activity in Ohio is a relatively recent phenomenon.⁵ Only one large multi-bank holding company was continuously active in the State prior to 1965. Four other multi-bank holding companies with over \$100 million deposits were formed in 1958, 1966, 1968, and 1970. However, the second subsidiary bank (other than the lead bank) of each holding company was not purchased until 1965, 1967, 1968, and 1970, respectively. In 1970, there were seven multi-bank companies with 55 subsidiary banks. Table II shows the trend of acquisitions in Ohio between 1955 and 1970.

Because a bank acquired by a bank holding company retains its identity and frequently is not

⁵See “Registered Bank Holding Company Activity in Ohio, 1964-1969,” *Economic Review*, Federal Reserve Bank of Cleveland, September 1970.

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TABLE II

Registered Multi-Bank Holding Company
Acquisitions and Bank Mergers
Consummated in Ohio
1955-1970

Year	Total Acquisitions	Total Mergers	Acquisitions in Non-Metropolitan Areas	Mergers in Non-Metropolitan Areas
1955		10		7
1956		10		5
1957		7		3
1958	2	10	1	6
1959		17		9
1960		6		3
1961		11		10
1962		13		7
1963		13		5
1964		4		2
1965	2	11	2	10
1966	3	5	2	1
1967	2	6	2	5
1968	3	6	2	4
1969	5	5	4	5
1970	18	7	16	7

Source: Federal Reserve Bank of Cleveland

subject to immediate changes in management, changes in the performance of newly acquired banks would seem likely to occur slowly. Therefore, the short period of time that has elapsed since some of the acquisitions in Ohio limits the observations that can be made on implementation of changes in bank lending practices, or the implementation process itself.

Bank Mergers. Bank mergers in Ohio have been more numerous and more evenly distributed over time than have bank holding company acquisitions. Ohio banking laws stipulate that the banks involved in a merger must be located within the same county; thus, statewide branching is prohibited.⁶ During the 1955-1967 period, approxi-

mately 124 bank mergers in 50 of the 88 counties in Ohio were consummated. Table II shows the number of bank mergers, by year, that have occurred in Ohio during this period and also indicates those mergers that have occurred in non-metropolitan areas.

In a merger, the smaller bank usually assumes the identity of the larger bank, and the relationship between the two facilities is frequently set up on more of a head office-branch office basis. Because of the more complete fusing of management that occurs when banks merge, behavioral adjustments of merged banks can be expected to occur more rapidly than with holding company affiliates.

METHODOLOGY

Banks included in the sample for this study were selected on the basis of two criteria: (1) the holding company acquisition or the merger took place in a predominately rural county and (2) no other holding company acquisitions or mergers occurred in the county within three years prior to or after the change in the sample bank's structure. The year 1967 was used as a cutoff to permit time for observation after the ownership change. Twenty-one bank mergers and five multi-bank holding company acquisitions, which met the above two requirements, occurred in Ohio between 1960 and 1967. All of these were selected for analysis in this study.

End-of-year call reports (submitted to regulatory agencies by banks) were used as the source of data on the banks' performance. Data were collected for the December prior to the year of the bank merger or holding company acquisition and for December of the year three years following the bank merger or holding company acquisition. In the case of bank mergers, data for the two banks prior to the merger were combined. Data, of

⁶In some cases, a bank in Ohio may be permitted to branch in more than one county if its head office is located in a city which extends into two or more counties.

course, were available for only one institution after the merger.

Twelve performance measures were calculated to detect differences in performance that may have occurred in the merged and acquired banks compared with other banks in their respective counties during the three-year analysis period. It was assumed that the county represents the relevant competitive market of the bank undergoing a change in corporate structure. Although the banking markets of many of the larger metropolitan areas encompass an area larger than a single county, the banks in the study are located only in non-metropolitan counties. The county, therefore, should serve as a close approximation of the relevant competitive market for these banks.

The study's analytical framework required the comparison of the sample banks with all other banks in their respective counties to minimize the possible effects of changes in the overall demand for bank loans, deposits, and other services on a given performance measure. Variations in local economic conditions would presumably affect the acquired bank and its competitors in a similar manner. For example, an increase (decline) in loan demand or deposits resulting from the opening (closing) of a large industry in a county would have a beneficial (adverse) effect on many surrounding banks. By considering a bank's changes in performance relative to other banks in the same county, a change in local conditions would be less likely to bias the changes at the sample banks.

A statistical "t-test" was used in the study that assumes an actual difference, if any, between the performance of the banks that underwent a change in their corporate structure, compared with other banks in the same counties, can be attributed to the fact that the one group of banks underwent

changes in ownership. Other factors, however, could also influence the banks' performance. To determine the extent of these other influences, the sample banks were classified as to: (1) type of change in corporate structure—holding company acquisition or merger, (2) size of bank—greater or less than \$15 million in deposits at the time of acquisition,⁷ (3) date of a change—before or after December 1964, and (4) percent agricultural loans of total loans—greater or less than 14 percent. These comparisons should show possible effects of the other factors on bank performance.

It should be emphasized, however, that there are other factors that could have caused the underestimation of the significance of the changes. In the case of bank mergers, there were several instances in which a relatively large bank merged with a very small bank. Since data were available only for one bank after the merger, data for both banks were combined for the "before merger" observation. Any variations in the smaller bank's behavior as a result of the merger could have been partially disguised in the aggregate. Furthermore, as indicated earlier, changes in banks acquired by holding companies often occur slowly; three years might not, therefore, be a sufficient period of time to identify all of the changes that eventually result from a new ownership structure.

The twelve measures of bank performance can be classified into three groups. (They are discussed in more detail in the following three sections of this article.) The first group of measures (A) was included as indicators of a change in emphasis, if any, placed on agricultural lending as a result of new management attitudes toward the risk and profitability of agricultural loans at the sample banks in relation to other banks in their immediate

⁷Size of the purchased bank in the case of a merger.

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market area. The second group of measures (B) served as proxies for changes in the aggressiveness of management at the sample banks in providing additional bank credit in their local communities. The third group (C) was included to measure changes in the flow of funds between banks (in most cases in this study, flows between larger city banks and rural banks) because of a change in the corporate structure of the bank.

FARM LENDING PRACTICES

Four performance measures were used to measure changes in emphasis on farm lending:

A1—The ratio of farm loans at sample banks to the total of farm loans at all other banks in the same county.

A2—Ratio of farm loans to total loans. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

A3—Ratio of farm real estate loans to total real estate loans. Ratio for sample bank was compared with average of the same ratio for all other banks in the same county.

A4—Ratio of farm nonreal estate loans to total nonreal estate loans. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

The results of the phase of the analysis indicate that banks undergoing changes in ownership structure experienced a slight reduction in farm lending, compared with competing banks in their respective counties. Although this reduction is evidenced by each of the above four ratios, none of the differences in farm lending between the two

groups of banks is significant in a statistical sense.⁸

While the total volume of farm loans during the observation periods generally increased at both groups of banks, the ratio of farm loans at the sample banks to farm loans at banks that were not involved in a change in ownership (A1) declined from an average of .72 to an average of .64 (Table III). This decline, however, was not characteristic of all the banks involved in mergers or holding company acquisitions; in thirteen counties, or one-half of the number covered, the acquired banks experienced an increase in total agricultural lending compared with other banks in the county. A relatively large decline at a few banks appeared to account for the slight overall decline in farm lending that occurred. The decline also appeared to be more pronounced at banks acquired by holding companies than at merging banks and at larger banks acquired later in the period, although the differences were not statistically significant (see Appendix Table I).⁹

Farm loans declined relative to total loans at both the sample banks and the other banks in the study (Ratio A2), but the decline, which was concentrated in farm real estate loans, appeared to be slightly more apparent at the merged or acquired banks. Farm production loans relative to total nonreal estate loans (A4) declined nearly the

⁸In this study, a result, as measured by the t-statistic, is considered "significant" if hypothesis being tested (that there is no change in performance between the sample banks and other banks in their respective counties) can be rejected at the 10 percent (or 5 percent) level of significance. In such a case, one can be 90 percent (or 95 percent) confident that the difference in performance between the two groups of banks was not the result of random variation.

⁹A negative sign in Appendix Table I implies that a particular ratio increased at the acquired banks compared with other banks in their respective counties. A positive sign indicates the opposite occurrence.

TABLE III

Means of Performance Measures at Sample Banks and Their Competitors Before and After Ownership Change

Ratios*	Sample Banks											
	All Sample Banks			Merged Banks			Holding Company Subsidiaries			All Other Banks in County		
	Before	After	Change	Before	After	Change	Before	After	Change	Before	After	Change
A1—Farm loans at sample banks to the total farm loans at all other banks in the same county.†	.718	.639	-.079	.607	.570	-.037	1.074	.717	-.367			
A2—Farm loans to total loans.	.142	.125	-.017	.150	.142	-.008	.103	.077	-.026	.127	.115	-.012
A3—Farm real estate loans to total real estate loans.	.189	.177	-.012	.196	.190	-.006	.159	.123	-.036	.159	.156	-.003
A4—Farm nonreal estate loans to total nonreal estate loans.	.108	.090	-.018	.121	.102	-.019	.046	.036	-.010	.113	.096	-.017
B1—Total loans to total deposits.	.541	.587	.046	.542	.586	.044	.538	.591	.053	.541	.567	.026
B2—Commercial and industrial loans to total loans.	.150	.152	.002	.153	.144	-.009	.136	.187	.051	.142	.149	.007
B3—Total deposits at the sample bank to total deposits of all other banks in the same county.†	.660	.671	.011	.676	.688	.012	.444	.449	.005			
B4—Time and savings deposits to total deposits.	.516	.565	.049	.479	.536	.057	.674	.685	.011	.520	.572	.052
B5—U. S. Government security holdings to total investments.	.700	.609	-.091	.677	.632	-.045	.739	.505	-.234	.719	.600	.119
C1—Demand deposits and other deposits of other banks to total deposits.	.005	.002	-.003	.006	.002	-.004	.000	.000	.000	.001	.001	.000
C2—Demand deposits and other deposits held with other banks to total deposits.	.065	.062	-.003	.065	.066	.001	.066	.045	-.021	.072	.059	-.013
C3—Federal funds sold, repurchase agreements, and loans to other banks to total deposits.	.003	.012	.009	.004	.008	.004	.000	.023	.023	.003	.016	.013

NOTE: Ranges of performance measures are shown in Appendix Table II.

* Each county carries the same weight in the average, regardless of the volume of loans or deposits at banks in that county.

† Ratios A1 and B3 are farm loans and deposits of the sample banks compared directly with total farm loans and deposits at all other banks in their respective counties.

Source: Federal Reserve Bank of Cleveland

same percentage at both the sample and other banks in the study, but large acquired banks and banks acquired after 1964 placed a greater emphasis on these loans (Appendix Table I). Prior to the merger or acquisition, the average ratio of farm real estate loans to total real estate loans (A3) was much higher at the banks that later underwent a change in their corporate structure

than at their competitors (18.9 percent vs. 15.9 percent, respectively). The larger decline of these loans at the merged or acquired banks could reflect an attempt to boost other types of loans and become more closely aligned with competing banks. Again, however, the differences in the changes were relatively small and not statistically significant.

INDICATIONS OF AGGRESSIVENESS

Five measures were included in the analysis to indicate changes in aggressiveness of management as a result of an ownership change in providing additional funds to local communities:

B1—Ratio of total loans to total deposits.

Ratio for sample bank was compared with the average loan-deposit ratio for all other banks in the same county.

B2—Ratio of commercial and industrial loans to total loans. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

B3—Ratio of total deposits at the sample bank to total deposits of all other banks in the same county.

B4—Ratio of time and savings deposits to total deposits. Ratio for sample banks was compared with the average of the same ratio for all other banks in the same county.

B5—Ratio of U. S. Government security holdings to total investments. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

The banks that underwent a merger or were purchased by holding companies appeared to become more aggressive according to two measures—B1 and B3—when compared with other banks in their respective counties; but ratios B2 and B5 indicated somewhat less aggressive behavior by the banks changing ownership relative to their competitors.

Merged and acquired banks were able to increase their loan-deposit ratios (B1) relative to their competitors (Table III). Although none of the relative changes is statistically significant, this

ratio was negative for all four categories, and some values were relatively large. This would imply that the acquired banks became more aggressive in their overall lending policies as a result of the ownership change, although it is not known how much of the increase in loans resulted from loan participations initiated by larger banks in metropolitan areas.

The banks involved in ownership changes were, overall, also able to increase slightly their share of total deposits in their respective counties (B3), although the t-values shown in Appendix Table I are generally small and the change is certainly not general. One-half of the acquired banks did not hold their share of deposits (Table IV). The banks that did not retain their share of deposits appeared to be the larger banks acquired after 1964 (Appendix Table I). In contrast, the smaller banks acquired earlier in the period were able to increase slightly their share of total deposits.

The ratio of business loans to total loans (B2), somewhat surprisingly, rose less rapidly at the banks changing ownership than at their competitors (Table III). The decline was significantly greater (statistically) at banks involved in mergers compared with their competitors. Conversely, banks acquired by holding companies showed an increase in the ratio of business loans to total loans compared with other competing banks. It is not clear why this difference in behavior occurred, but three explanations are plausible. Often, lead banks of multi-bank holding companies will initiate large business loans and participate in these loans with smaller affiliates. This would, of course, increase the smaller banks' holding of business loans. The reverse of this example can also occur. The smaller bank might, as a result of the affiliation, initiate a large loan in excess of its loan limit and participate in this loan with the lead bank or other affiliate banks of the

TABLE IV

Distribution of Increases and Decreases
in the Performance Ratios

Ratios	Number of Merged or Acquired Banks	
	Ratio Increased Relative to Other Banks	Ratio Decreased Relative to Other Banks
A1—Farm loans at sample banks to the total farm loans at all other banks in the same county.	13	13
A2—Farm loans to total loans.	14	12
A3—Farm real estate loans to total real estate loans.	12	13
A4—Farm nonreal estate loans to total nonreal estate loans.	12	14
B1—Total loans to total deposits.	17	9
B2—Commercial and industrial loans to total loans.	9	17
B3—Total deposits at the sample bank to total deposits of all other banks in the same county.	13	13
B4—Time and savings deposits to total deposits.	15	11
B5—U. S. Government security holdings to total investments.	14	12
C1—Demand deposits and other deposits of other banks to total deposits.	4	13
C2—Demand deposits and other deposits held with other banks to total deposits.	15	11
C3—Federal funds sold, repurchase agreements, and loans to other banks to total deposits.	4	13

Source: Federal Reserve Bank of Cleveland

holding company. Although this same arrangement could be made through correspondent banks, the transaction would be more easily accomplished through a holding company, without fear of losing a customer to the other participating bank. Finally, after a merger, the management of the resulting bank can implement changes rather quickly. Thus, the central management of merged banks could have rechanneled funds into more profitable, consumer instalment loans.

With respect to investments, both the sample banks and their competitors substantially reduced holdings of government securities relative to total investments during the three-year observation periods. Again, however, there was a large contrast between the behavior of merged banks and those banks purchased by a bank holding company as measured by Ratio B5 (Table III). Although the relative differences were not statistically significant, the ratio of government securities to total investments declined less at merged banks compared with their competitors, but declined much more at banks acquired by a bank holding company compared with their competitors. In only one county did a holding company affiliate reduce its holding of government securities less than its competitors. This would imply that holding company banks became somewhat more aggressive in seeking municipal securities than their competitors. This means that a larger volume of bank credit could have been kept in the local community or the State in the form of state and local securities, rather than being transferred elsewhere. The opposite was true of merged banks.

Time and savings deposits became proportionately a more important source of funds for both the sample banks and their competitors. On average, these deposits increased less (although not by a statistically significant amount) in relation to demand deposits at the sample banks than at their competitors. The timing of the change in ownership structure, however, appeared to have a significant impact on the behavior of the merged or acquired banks. The ratio of time and savings deposits to total deposits (B4) at banks purchased before 1965 increased compared with their competitors (Appendix Table I). This same ratio decreased significantly at banks purchased during or after 1965. Much of this divergence of behavior,

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however, stemmed from differences in the deposit compositions of the four groups of banks before the acquisitions occurred. For example, Ratio B4 (observation before the banks were purchased) for the group of banks acquired before 1965 was 3.3 percent below that of their competitors (46.0 percent compared with 49.3 percent). In contrast, this ratio for the group of banks purchased during or after 1965 was 4.2 percent above that of their competitors (60.9 percent and 56.7 percent, respectively). Thus, the differential changes probably reflected an aligning of the deposit composition at the purchased banks with that of other banks in their respective counties.

FLOW OF FUNDS BETWEEN BANKS

A third group of ratios was adopted to observe the effects of changes in bank structure on the flow of funds between banks:

C1—Ratio of demand and other deposits of other banks to total deposits. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

C2—Ratio of demand and other deposits held with other banks to total deposits. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

C3—Ratio of Federal funds sold, repurchase agreements, and loans to other banks to total deposits. Ratio for sample bank was compared with the average of the same ratio for all other banks in the same county.

In general, the overall flow of funds between banks was not significantly altered as a result of structural changes in ownership. Thus bank mergers or holding company acquisitions did not appear to serve as a method of attracting

additional funds to rural areas, according to the measures used in this study. However, neither did funds appear to be shifted out of rural areas.

Although the overall direction of the flow of funds was not significantly altered, several significant differences in the components of this flow were detected. A large majority of banks that underwent a merger reduced the ratio of their holdings of deposits of other banks to total deposits (C1) compared with their competitors (Table III). This was especially true of banks with a smaller proportion of agricultural loans in their portfolio. Banks acquired by holding companies, on the other hand, slightly increased their holdings of deposits of other banks compared with their competitors, but this difference was not statistically significant.

In contrast, the ratio of deposit balances kept with other banks to total deposits (C2) declined at both the sample banks and their competitors, but the decline was much larger at the sample banks' competitors. Again, however, banks acquired by merger behaved differently than banks acquired by holding companies. Ratio C2 actually increased slightly at merged banks compared with a large decline at banks acquired by holding companies. This occurrence at merged banks was somewhat surprising because it was thought that after becoming in effect a single, larger institution, these banks would have less need for correspondent services and participation loan arrangements. They would, therefore, be in a position to reduce correspondent balances. Apparently, this did not happen. The results could imply that merged banks became somewhat more aggressive in seeking larger loans and retained the need for participation arrangements and correspondent balances. The relative decline of deposits held with other banks at banks purchased by a multi-bank

holding company was expected. The lead bank of the holding company is often able to supply many of the services offered by correspondent banks, thereby reducing the need for these balances at other banks.

An upward trend in the volume of Federal funds sold, repurchase agreements, and loans to other banks at both the sample banks and their competitors was apparent from Ratio C3 (Table III). Overall, the volume of these funds, as a percentage of total deposits, increased significantly less at banks that underwent a change in corporate structure than at their competitors. This was especially true of merging banks. Although the data show a larger increase in the volume of these funds at banks acquired by holding companies, the increase was primarily the result of a large change at one sample bank. Thus, a significant majority of banks that underwent an ownership change experienced a decline in sales of Federal funds, repurchase agreements, and loans to other banks, compared with competing banks.

With respect to the overall flow of funds between banks, the sample banks—especially the merged banks—tended to shift their emphasis from selling Federal funds and making loans to other banks to maintaining demand and time deposits, perhaps as correspondent balances, with other banks. Furthermore, the acquired and merged banks, relative to other banks in the respective counties, reduced their holdings of balances of other banks. The effect of changes in banking structure on the overall total flow of funds, therefore, was apparently insignificant because of

the increase in flows of deposits to other banks and the offsetting reduction of Federal funds sold and loans to other banks. Hence, the ownership change neither significantly improved nor lessened the overall flow of these interbank funds to rural areas.

CONCLUSION

In general, results of this study indicate that “within county” changes in bank structure in Ohio in recent years, whether through a holding company acquisition or a merger of two banks within the same county, did not materially alter the supply of bank credit to rural areas.

Statistical tests indicate that changes in agricultural lending by banks that changed ownership compared to other banks were not significant. However, there appeared to be a slight drop in loans to farmers at the merged and acquired banks compared with other banks. The banks that experienced a structural ownership change appeared to become somewhat more aggressive by increasing their loan-deposit ratios compared with other banks, but evidence of this overall aggressiveness was not apparent in the other ratios. Banks acquired by multi-bank holding companies appeared to increase the proportion of business loans to total loans and to reduce holdings of United States Government securities. Merged banks, on the other hand, significantly reduced the proportion of business loans to total loans, compared with their competitors. The type of flow of funds among banks was altered by the structural change, but the overall direction of the flow was essentially unchanged.

STATISTICAL APPENDIX

Statistical Tests of Differences. Tests of significance were performed to determine if the banks undergoing a change in corporate structure perform differently when compared with all other banks in their counties. More specifically, for all ratios except A1 and B3, a t-test was used to test the null hypothesis:

$$H_0: (S_{iBB} - S_{iBA}) - (S_{iOB} - S_{iOA}) = 0$$

where:

S_{iBB} = Mean of ratio i at Bank before change in ownership, $i = 1-10$

S_{iBA} = Mean of ratio i at Bank three years after change in ownership, $i = 1-10$

S_{iOB} = Mean of ratio i at all other banks in the county before Bank's change in ownership, $i = 1-10$

S_{iOA} = Mean of ratio i at all other banks in the county after Bank's change in ownership, $i = 1-10$

A significant t coefficient would indicate that, at that level of significance, the banks undergoing a change in corporate structure performed differently during the three years after the change than the other banks in their respective counties;

i.e., the two sets of banks came from different populations. For ratios A1 and B3, the t-test was used to test the null hypothesis:

$$H_0: \frac{S_{kBB}}{S_{kOB}} - \frac{S_{kBA}}{S_{kOA}} = 0$$

where:

k is a portfolio component rather than a ratio, $k = 1, 2$

A significant t coefficient in this case would indicate that, with a given level of certainty, the ratio of the considered portfolio component at the banks changing ownership to other banks in the county was significantly different in the year before the change in ownership from three years after the change.

A second test, the sign test, was used to complement the t-test. This test is a nonparametric test of differences between means on the basis of the number of banks experiencing a change in a given direction. The t-test can be greatly affected by a large change at one or two banks or counties in the sample. The sign test, which weights all the changes equally, would not be as strongly influenced by a few large changes.

APPENDIX TABLE I

Tests of Significance of Change in Various Performance Ratios
as Affected by a Change in Bank Structure

Ratios	Overall t Values*	Classed According to Structure Change		Classed According to Date of Change		Classed According to Bank Size†		Classed According to Percent Agricultural Loans in Portfolio‡	
		Merger	Holding Company	Before 1965	1965 and After	Small	Large	Less Than 14 Percent	14 Percent and Over
A1—Farm loans at sample banks to the total farm loans at all other banks in the same county.	1.28	0.35	1.33	-0.83	1.82	0.73	1.23	0.47	1.19
A2—Farm loans to total loans.	-0.07	-0.01	0.10	0.14	-0.14	-0.34	-1.02	-0.88	-0.20
A3—Farm real estate loans to total real estate loans.	0.58	0.27	0.81	0.35	0.50	0.37	0.77	0.28	0.53
A4—Farm nonreal estate loans to total nonreal estate loans.	0.25	0.24	0.07	0.99	-1.08	1.45	-1.15	0.39	0.02
B1—Total loans to total deposits.	-1.07	-0.60	-0.97	-0.53	-0.97	-0.99	-0.41	-0.72	-0.77
B2—Commercial and industrial loans to total loans.	0.36	1.89#**	-0.78	1.13	0.12	-0.15	1.42	1.48	-0.10
B3—Total deposits at the sample bank to total deposits of all other banks in the same county.	-0.15	-0.14	-0.18	-0.79	1.05	-1.02	1.46	-0.14	-0.03
B4—Time and savings deposits to total deposits.	0.35	0.13	0.39	-2.46§	2.32§	-0.66	1.14	0.52	-0.19
B5—U. S. Government security holdings to total investments.	-0.77	-1.59	1.54	-0.28	-0.77	-0.79	-0.17	0.23	-1.21
C1—Demand deposits and other deposits of other banks to total deposits.	1.17**	1.24**	-1.00	0.10	0.63	1.05	0.94	1.79#	0.89
C2—Demand deposits and other deposits held with other banks to total deposits.	-1.33	-1.62	0.69	0.14	-2.20#	-0.07	-1.69	-2.28§	0.59
C3—Federal funds sold, repurchase agreements, and loans to other banks to total deposits.	1.31**	2.29#**	-0.72	0.97	0.87	0.19	1.42**	1.48**	0.24
Critical Values									
5%	± 2.06	2.09	2.78	2.13	2.26	2.20	2.16	2.18	2.18
10%	± 1.71	1.73	2.13	1.75	1.83	1.80	1.77	1.78	1.78

* A negative sign implies that a particular ratio increased at the acquired bank compared with other banks in their respective counties. A positive sign indicates the opposite occurrence.

† Small: \$15 million deposits or less before structure change; large: more than \$15.1 million deposits before structure change.

‡ Classed according to distribution of loan portfolio before structure change.

§ Significant at the 5 percent level of probability.

Significant at the 10 percent level of probability.

** The sign test was significant at the 5 percent level of probability for the occurrence of increases or decreases associated with these ratios.

Source: Federal Reserve Bank of Cleveland

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APPENDIX TABLE II

Range of Performance Measures at Sample Banks and Their Competitors
Before and After Ownership Change

Ratios	Sample Banks				All Other Banks in County	
	Merged Banks		Holding Company Acquisitions		Before	After
	Before	After	Before	After		
A1—Farm loans at sample banks to the total farm loans at all other banks in the same county.	.03 – 2.58	.09 – 2.76	.10 – 2.07	.09 – 1.48		
A2—Farm loans to total loans.	.01 – .35	.01 – .46	.03 – .15	.02 – .11	.01 – .34	.01 – .32
A3—Farm real estate loans to total real estate loans.	.01 – .45	.01 – .61	.05 – .26	.04 – .22	.01 – .44	.01 – .44
A4—Farm nonreal estate loans to total nonreal estate loans.	.01 – .31	.00 – .28	.00 – .13	.01 – .10	.00 – .34	.00 – .31
B1—Total loans to total deposits.	.36 – .70	.42 – .71	.40 – .65	.47 – .73	.43 – .67	.41 – .71
B2—Commercial and industrial loans to total loans.	.05 – .29	.00 – .29	.05 – .18	.13 – .29	.09 – .27	.08 – .32
B3—Total deposits at the sample bank to total deposits of all other banks in the same county.	.14 – 2.04	.12 – 1.95	.05 – 1.08	.13 – .99		
B4—Time and savings deposits to total deposits.	.17 – .67	.28 – .77	.57 – .78	.64 – .79	.23 – .71	.26 – .74
B5—U. S. Government security holdings to total investments.	.38 – .91	.27 – .93	.61 – .94	.21 – .63	.55 – .89	.35 – .93
C1—Demand deposits and other deposits of other banks to total deposits.	.00 – .07	.00 – .01	.00 – .00	.00 – .01	.00 – .01	.00 – .01
C2—Demand deposits and other deposits held with other banks to total deposits.	.01 – .10	.02 – .13	.04 – .10	.01 – .09	.02 – .12	.02 – .13
C3—Federal funds sold, repurchase agreements, and loans to other banks to total deposits.	.00 – .07	.00 – .09	.00 – .00	.00 – .09	.00 – .02	.00 – .06

Source: Federal Reserve Bank of Cleveland



INVENTORY INVESTMENT AND ECONOMIC ACTIVITY

James L. Pate

Business inventory investment is one of the most volatile components of total spending. As a result, fluctuations in business inventories have an important influence on overall economic activity. The purposes of this article are to describe the various inventory concepts and to review the typical behavior patterns of inventory investment during economic contractions and expansions and the somewhat atypical behavior of inventories in the most recent economic contraction and the current recovery.

Significantly, the behavior of inventories was an important factor in both the moderate decline in output during the economic contraction from November 1969 through November 1970 and in the sluggish recovery, now in progress.¹ The absence of a sharp or prolonged reduction in stocks, which usually accompanies an economic contraction, cushioned the recent decline in overall activity and apparently lessened the need for any substantial rebuilding of inventories, which normally occurs during the early phase of an economic recovery.

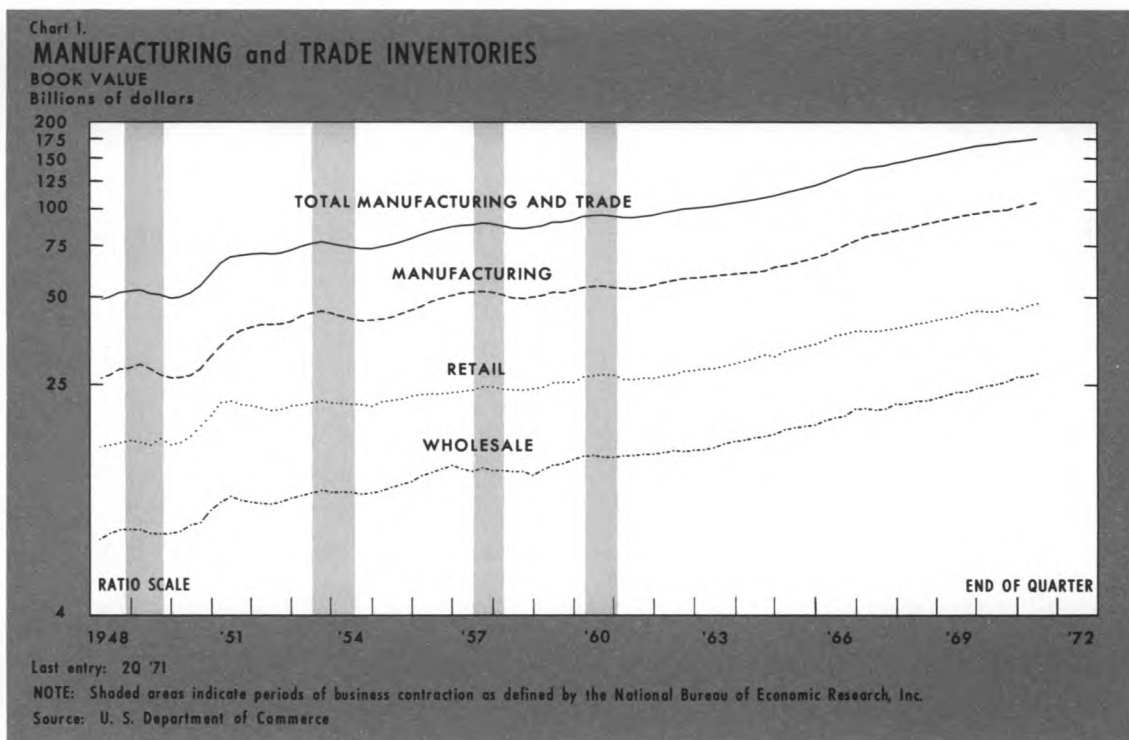
BUSINESS INVENTORIES AND INVENTORY BEHAVIOR

Quarterly data on business inventories are based largely on the book values (generally valued at cost) of stocks held at the end of a period by manufacturers, retailers, and merchant wholesalers.² The general patterns of growth and fluctuations in business inventories during the post-World War II period are illustrated in Chart 1. The most notable aspects of inventory behavior in this period are the recurring fluctuations in manufacturing inventories from 1948 to 1961 and the rapid, but generally stable, growth since 1961, despite the inventory adjustment that occurred during the 1966-1967 business slowdown.

Five major periods of inventory fluctuations occurred during the 1948-1961 period, and four of these—1948-1949, 1953-1954, 1957-1958, and 1960-1961—were associated with contractions and expansions in overall economic activity. The fifth period of inventory adjustment, which took place

²For a more complete and detailed definition of business inventories, see U. S. Department of Commerce, *National Income, A Supplement to the Survey of Current Business*, 1954 edition, (Washington, D. C.: Government Printing Office, 1954), pp. 135-138, or U. S. Congress, Joint Economic Committee, *1967 Supplement to Economic Indicators*, Joint Committee Print, (Washington, D. C.: Government Printing Office, 1967), pp. 76-84.

¹The National Bureau of Economic Research has designated November 1969 and November 1970 as the tentative beginning and ending of the latest economic contraction. *National Bureau Report Supplement No. 8*, National Bureau of Economic Research, May 1971.



in 1950-1951, was not associated with any contraction or expansion in overall economic activity and extended beyond manufacturing to retail and wholesale stocks. This widespread increase in inventories reflected the rising needs of defense programs, the final phase of a substantial stockpiling that began with the outbreak of the Korean Conflict, and some involuntary inventory accumulations resulting from a slowdown in consumer spending after mid-1950. Despite reductions in inventories during the second half of 1951, stock-sales ratios for most consumer goods manufacturing industries and many categories of retailing were still higher at the end of 1951 than the average level of the ratios during the 1948-1949 period.

The historical volatility of business inventories, especially in manufacturing, has led to a substan-

tial number of economic studies that attempt to identify and explain so-called "inventory cycles" or "subcycles."³ The rationale underlying the concept of inventory cycles involves three essential notions:⁴

³See, for example, L. A. Metzler, "The Nature and Stability of Inventory Cycles," *Review of Economic Statistics* Vol. 23, No. 3 (August 1941), pp. 113-129; M. Abramovitz, *Inventories and Business Cycles with Special Reference to Manufacturing Inventories* (New York: National Bureau of Economic Research, 1950); Ruth A. Mack, "Notes on Subcycles in Theory and Practice," *American Economic Review* Vol. 47, No. 2, (May 1957), pp. 161-174, and discussion by Edwin B. George, *et. al.*, pp. 175-186; and L. M. Stanback, Jr., *Postwar Cycles in Manufacturers' Inventories*, (Princeton, New Jersey: National Bureau of Economic Research, 1961).

⁴For a discussion of these ideas, see J. P. Lewis and R. C. Turner, *Business Conditions Analysis*, (2nd ed.; New York: McGraw-Hill Book Company, 1967), pp. 508-510.

1. Firms make buying and production decisions with an aim toward maintaining a relatively constant or desired inventory-shipments (or sales) relationship.
2. In those industries where firms make sales primarily out of finished inventories, production lags behind sales in such a way that unexpected increases in sales are limited by the availability of inventories.
3. When a majority of sellers have inventories that are too high or too low, simultaneous efforts to replenish or reduce their inventories will be partly self-defeating, because a concerted effort by firms to rebuild (or liquidate) stocks will stimulate (or reduce) sales of the firms supplying the inventories and, therefore, in the aggregate, cancel out part of the progress toward reestablishing the desired relationship between inventories and sales.

Thus, according to this concept, once the desired inventory-sales relationship is disturbed, an adjustment in inventory investment behavior takes place. All that is apparently required to set the inventory adjustment in motion is a substantial disparity between actual and desired inventories. Such a disparity may be the result of either a widespread unexpected change in sales or a revision in what a large number of firms consider to be a desirable inventory-sales relationship.

The empirical evidence in support of inventory cycles—particularly prior to the 1960's—is extensive, but the concept does not provide a complete or entirely realistic basis for explaining the complex behavior of inventories. Recent research studies, while drawing on the findings of some of the earlier research on aggregate inventory

behavior and the inventory cycle,⁵ have focused on other determinants of inventory investment such as prices, interest rates, and expectations. The results of the research are inconclusive.⁶ However, any reasonably satisfactory explanation of inventory behavior must first distinguish between different groups of inventories—manufacturing, wholesale, and retail—and the stages of fabrication—finished goods, work in process, and materials and supplies—and give recognition to the different motives for holding inventories.

Some stocks are held for transactions purposes and are influenced primarily by current sales. Also, some stocks are held for precautionary reasons—to guard against the possibilities of losing sales

⁵The research of L. A. Metzler, for example, remains as one of the classic theoretical articles on the subject of inventories. See Metzler, "Inventory Cycles."

⁶For example, Klein found a positive relationship between inventory investment and changes in the price level and Lovell found a negative relationship. See L. R. Klein, "A Postwar Model: Descriptions and Applications," *Models of Income Determination*, A Report of the National Bureau of Economic Research (Princeton, New Jersey: Princeton University Press, 1964), and M. Lovell, "Sales Anticipations, Planned Inventory Investment, and Realizations," *Determinants of Investment Behavior*, A Conference of the Universities—National Bureau for Economic Research, (New York: Columbia University Press, 1967). With respect to financial variables, Clark found some relationship between inventory investment and deviations in demand and time deposits from a linear trend. See Colin Clark, "A System of Equations Explaining the United States Trade Cycle 1921 and 1941," *Econometrica*, Vol. 17, No. 2 (April 1949). Robinson found no statistically significant relationship between department store inventories and the rate of interest on prime commercial paper. See N. Y. Robinson, "The Acceleration Principle: Department Store Inventories, 1920-1956," *American Economic Review*, Vol. 49 (June 1959), pp. 348-358. For a recent analysis of some of the major determinants of inventory investment, see Barry Bosworth, "Analyzing Inventory Investment," *Brookings Papers on Economic Activity 2*, (Washington, D. C.: The Brookings Institution, 1970), pp. 207-234.

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Change in Business Inventories 1967-1970 (Billions of Dollars, Seasonally Adjusted)

Year	Change in Book Value of Manufacturing and Trade Inventories				± Change in Book Value All Other Inventories	= Change in Book Value Nonfarm Inventories	± Inventory Valuation Adjustment	± Change in Farm Inventories	= Change in Business Inventories
	Manufacturing	Retail	Wholesale	Total					
1967	\$4.7	\$1.0	\$1.4	\$ 7.1	\$1.9	\$ 9.0	\$0.7	-\$1.4	\$8.2
1968	6.1	2.6	1.4	10.1	1.0	11.0	0.1	-4.1	7.1
1969	6.5	2.9	2.3	11.7	2.0	13.6	0.1	-6.4	7.4
1970	3.7	-0-	2.7	6.4	1.3	7.7	0.3	-5.2	2.8

Sources: U. S. Department of Commerce and Federal Reserve Bank of Cleveland

because of inadequate stocks—and are mainly influenced by expected sales and errors in past sales forecasts. Finally, it appears that some stocks are held for speculative reasons and are probably influenced by such factors as the prospects of work stoppages and price changes.⁷ This is by no means an exhaustive list of factors that can influence inventory decisions. The factors mentioned appear to be the major variables that have influenced inventory behavior in recent years and thus have affected, to some extent, overall economic activity.

CHANGE IN BUSINESS INVENTORIES

To relate inventories to overall economic activity, it is necessary to convert book values of inventories into physical volume of stocks valued at current and constant prices. Book values of stocks are generally based on accounting methods that are inappropriate for national income and product accounts and must therefore be adjusted. The first step in the computation of business inventories is to add the level of manufacturing

and trade inventories to the book value of other nonfarm inventories (such as those in mining, contract construction, transportation, communications, and electrical, gas, and sanitary services). Further, the change in total nonfarm inventories must be computed by calculating the net increase (or decrease) between the sum of book values of manufacturing, trade, and other nonfarm inventories at the end of one period and the end of a previous period—usually expressed as an annual rate (see table).

The most complex step in the computation of business inventories involves reevaluation of book values of nonfarm stocks. Changes in book values of nonfarm inventories must be increased or reduced by the amount of the "inventory valuation adjustment" (IVA). Book values are inadequate because, for example, the replacement of stocks as they are consumed may, and usually are, made at prices quite different from those of the item removed from stock. As a result, book values include changes in value that represent the difference between acquisition and replacement prices, as well as changes in the physical volume of inventories. In effect, because the IVA measures the excess in the *change in the physical volume* of nonfarm business inventories, valued at average prices during the period, over the *change in the*

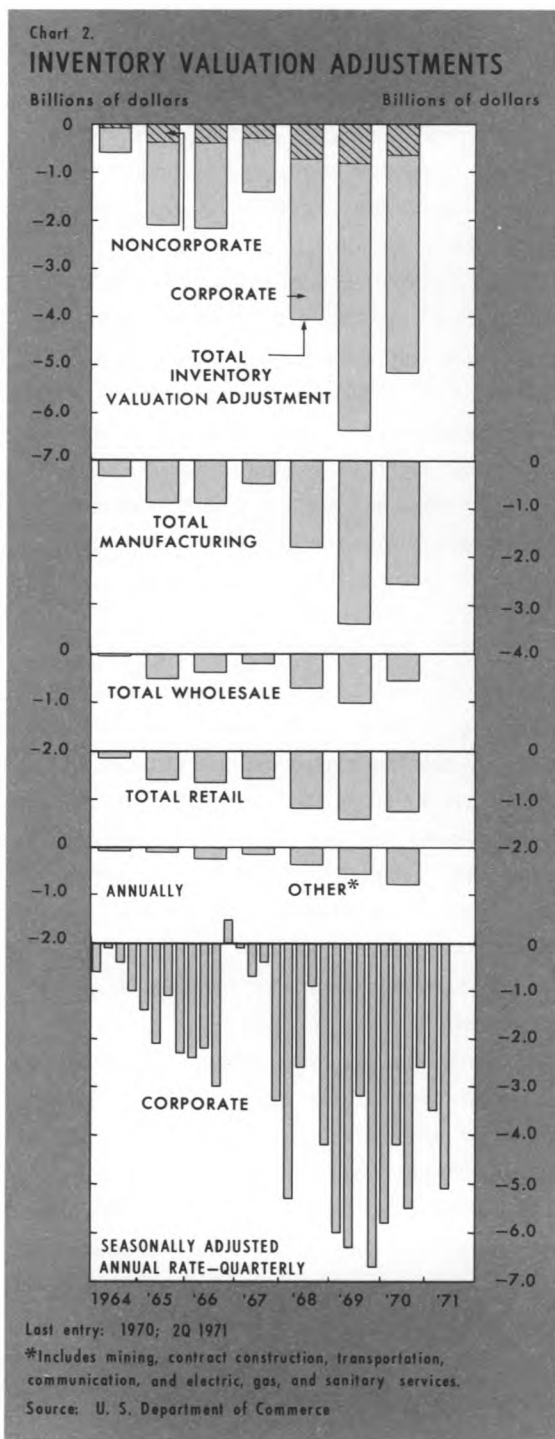
⁷For a somewhat different list of motives, see Robert Eisner and Robert H. Strotz, "Research Study Two: Determinants of Business Investment," *Impacts of Monetary Policy, A Series of Research Studies* prepared for The Commission on Money and Credit, (Englewood Cliffs, New Jersey: Prentice-Hall, 1963), pp. 105-108.

book value of nonfarm inventories, it excludes that part of the change in book value of stocks that occurred because of changes in prices. This adjustment procedure is made to both corporate and unincorporated business profits to remove the inventory profit or loss that occurred in business accounting when the book cost of goods removed from inventories differs from the replacement cost. The reason for this complex series of adjustments, which is made separately for a large number of industries, is that only the change in physical volume of stocks is counted as current output in the estimates of gross national product (GNP).⁸ No valuation adjustment is required for farm inventories because farm income, in contrast to corporate profits and income of unincorporated enterprises, is measured exclusive of inventory profits.

The result of these steps is an estimate of the "change in business inventories," and it is this value that is entered into the calculation of the level of GNP. Positive changes in business inventories represent inventory investment and add to the level of GNP; conversely, negative changes would tend to reduce GNP.

Conceptually, the behavior of the inventory valuation adjustment is directly reflected in the calculations and resulting values of the change in business inventories and changes in inventory investment. As illustrated in Chart 2, the size of the IVA has tended to grow rapidly since the mid-1960's. For example, in 1969, more than \$6 billion was subtracted from the book value of inventories in determining the change in business inventories. The IVA was about \$1 billion lower in 1970 than in 1969, but still amounted to more

⁸For a more complete description of the inventory valuation adjustment, see *National Income*, 1954 edition, pp. 44 and 59.



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than \$5 billion. In 1970, reductions in the size of the IVA occurred in manufacturing, wholesale, and retail levels. However, in the category termed "other"—which includes mining, contract construction, transportation, communications, and electric, gas, and sanitary services—the IVA continued to increase.

The corporate component of IVA accounted for nearly 90 percent of the total and is the only component published on a quarterly basis. Thus, the corporate IVA provides some insights into recent developments. Although the corporate IVA on a quarterly basis fluctuates considerably, the general trend since 1969 indicates some possible further reduction in the total IVA for 1971.

CHANGES IN INVENTORY INVESTMENT AND ECONOMIC ACTIVITY

The magnitude of fluctuations in overall economic activity is frequently measured by quarterly changes in gross national product. In this context, it is neither the level of the book values of inventories nor the change in business inventories that is directly related to the behavior of economic activity. Rather, it is the difference in inventory investment between two periods (or the change in the change in business inventories) that influences the change in GNP.

In general, inventory investment declines during economic contractions and rises during the early stages of economic expansions. In each of four major economic contractions between 1948 and 1961, the decline in inventory investment exceeded the decline in GNP. For example, in the 1960-1961 recession, inventory investment declined \$7.4 billion while GNP declined \$1.1 billion. During the first two quarters of each of the economic expansions between 1948 and 1961, increases in inventory investment accounted for

about one-third of the total rise in GNP. For example, during the first two quarters following the trough of the 1960-1961 recession, inventory investment rose \$7.3 billion while GNP rose \$20.6 billion. In fact, one study indicates that if 75 percent of the fluctuations in inventory investment could have been controlled, the economy would not have experienced the four post-World War II recessions that occurred in 1948-1949, 1953-1954, 1957-1958, and 1960-1961.⁹ The relationships between changes in inventory investment and changes in GNP during the four previous and the current post-war economic contractions and expansions are illustrated in Chart 3.

RECENT DEVELOPMENTS

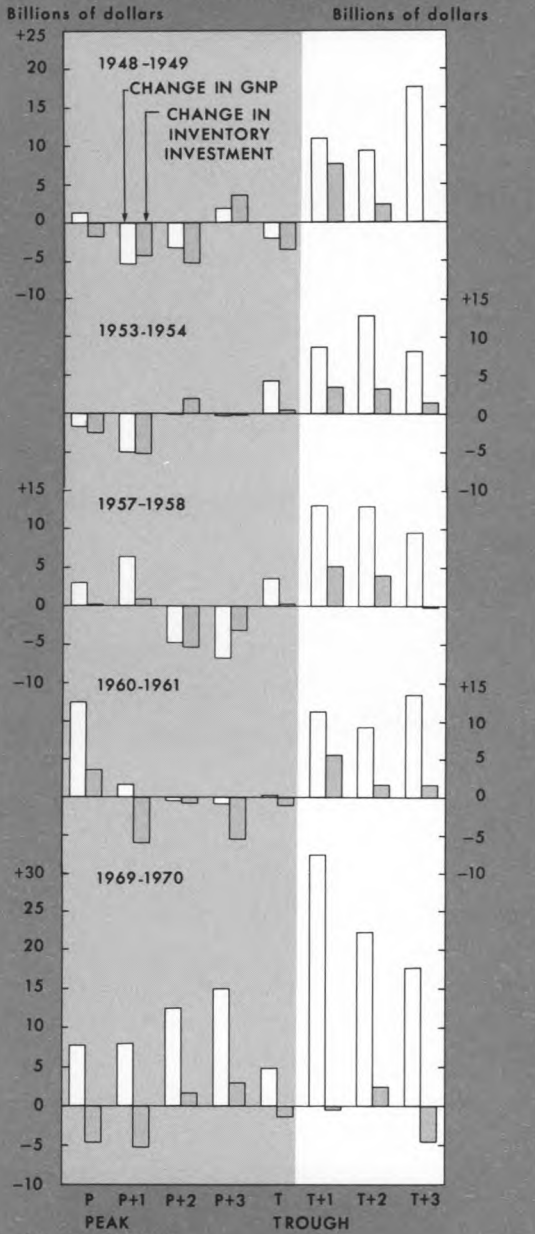
The behavior of inventory investment during the most recent recession and recovery is in marked contrast to the experiences of the four previous contractions and expansions. During the 1969-1970 economic contraction, inventory investment declined only \$2.0 billion while GNP rose \$40 billion. Furthermore, almost all of the decline in inventory investment occurred during the first two quarters of the contraction. On the other hand, during the four contractions in overall economic activity prior to the 1969-1970 recession, total reductions in inventory investment averaged \$7.1 billion, while GNP declined an average of \$4.3 billion.

The same contrasts are apparent between the current recovery and the early stages of previous

⁹See U. S., Congress, Joint Economic Committee, "An Econometric Analysis of the Postwar Relationship Between Inventory Fluctuations and Changes in Aggregate Economic Activity," by Lawrence E. Klein and Joel Popkin, printed for Joint Economic Committee in *Inventory Fluctuations and Economic Stabilization*, Part III, (Washington, D. C.: Government Printing Office, 1961), pp. 71-86.

Chart 3.

CHANGES IN BUSINESS INVENTORY INVESTMENT AND GROSS NATIONAL PRODUCT DURING BUSINESS CONTRACTIONS AND EXPANSIONS



recoveries. During the first two quarters of the current expansion, the total increase in inventory investment amounted to only \$2.0 billion (compared with an average of \$8.6 billion in previous recoveries and accounted for less than 4 percent of the total increase in GNP. Unlike previous recoveries) inventory investment actually declined during the first quarter following the trough of the most recent contraction.

The results of the somewhat unusual behavior of inventory investment during the most recent recession and the current recovery have been to cushion economic activity during the contraction and to moderate the pace of the economic expansion. The relatively moderate overall reduction in inventory investment, which reflected some increases in the two quarters preceding the low point of the recession, prevented a more severe contraction. In fact, the behavior of inventory investment contributed to making the 1969-1970 contraction, in general, the most moderate recession in the post-World War II period. Similarly, the unusually small increase in inventory investment that has occurred so far during the recovery has contributed to the sluggish pace of the current expansion. The modest increase in inventory investment in recent months is, of course, partially due to the increases in inventory investment that occurred during the late stages of the recent contraction and the generally sluggish growth of business sales.¹⁰ In addition,

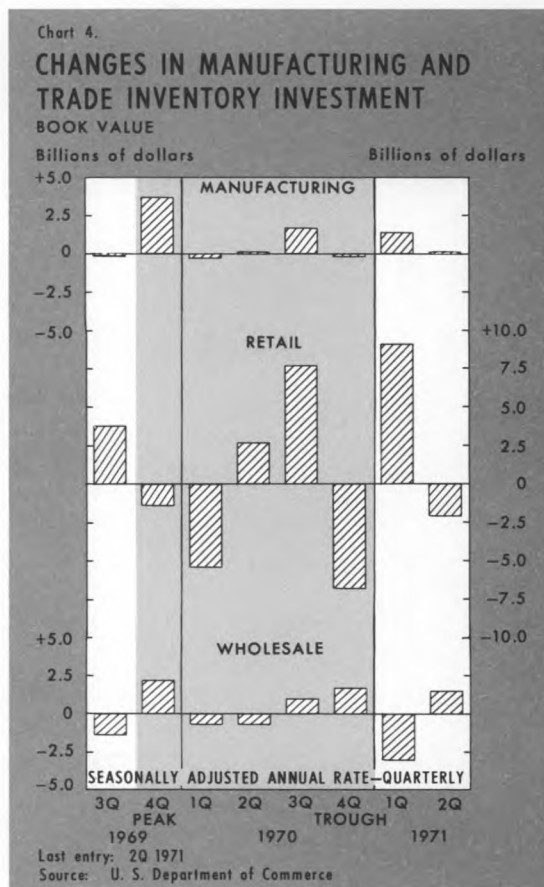
¹⁰From the trough of the most recent contraction through the second quarter of 1971, total manufacturing and trade sales increased 8 percent, which is about in line with the average increase during comparable periods following the four previous recessions. However, the measurement of the rate of increase in business sales following the most recent recession is influenced by the depressed level of business sales in the fourth quarter of 1970, which partly reflected the effects of the work stoppage in the automotive industry.

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the recent behavior of inventory investment appears to have also been influenced by other factors, including work stoppages, anticipated work stoppages, and price expectations.

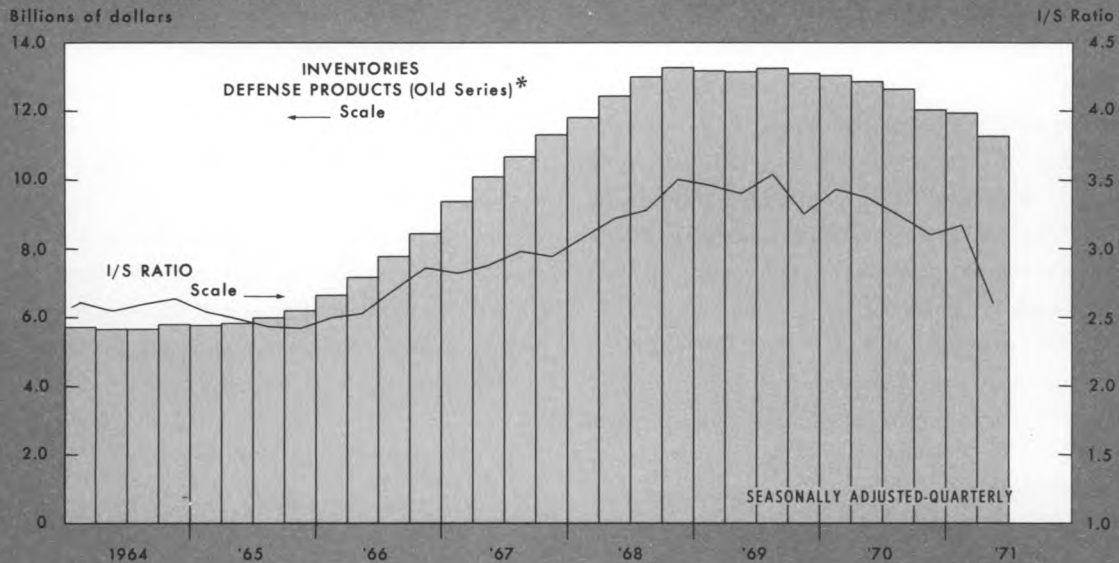
Inventory Developments in Manufacturing and Trade. The increases in inventory investment in the second and third quarters of 1970, which were important factors cushioning the recent economic contraction, occurred principally in retailing and were largely the result of a build-up of auto inventories prior to the work stoppage in the automobile industry and the sluggishness of consumer spending (see Chart 4). Inventory investment in manufacturing and wholesale showed little change throughout the contraction. Subsequent to the trough in overall economic activity in the fourth quarter of 1971, however, it appears that the behavior of wholesale and, particularly, manufacturing inventory investment has been largely responsible for holding down the increase in total inventory investment.

The recent weakness in inventory investment in the manufacturing sector has been largely in the durable goods industries, mainly reflecting reductions in stocks at the "work in process" stage of fabrication. In terms of specific industry groups, sizable reductions in inventory investment in recent months have occurred in electrical and nonelectrical machinery, blast furnaces and steel mills, and—during the first quarter of 1971—in motor vehicles and parts. However, the reduction in inventory investment in motor vehicles and parts in the first quarter of 1971 was, to some extent, a reflection of the end of the post-strike adjustment. The somewhat disappointing rebound in post-strike domestic auto sales and the resulting buildup of dealer inventories caused some cutbacks in production schedules. The almost continuous decline in inventory investment in



machinery through 1970 and so far in 1971 undoubtedly reflects, to a large extent, the weakening trend of capital spending that began in late 1969. In steel, the sharp decline in inventory investment reflects the reduction in stocks that began last spring. These reductions were largely the results of increased steel shipments to auto makers to support post-strike auto production, stockpiling that was prompted by announcements of future price increases, and the prospect of a steel strike at the end of July.

Chart 5.
DEFENSE INVENTORIES AND DEFENSE INVENTORIES-SHIPMENTS RATIO



* In August 1958, the Commerce Department began publishing a "new series" for defense products. The "new series" differs from the "old series" in that it includes defense activity in shipbuilding and excludes nondefense work in ordnance, communications, complete aircraft, and aircraft parts industries. Therefore, the "new series" more accurately represents the levels of defense activity. However, both series reflect the same general trends. The "old series" is used here to illustrate developments prior to 1968. For a more complete description of both the old and the new series, see, U. S. Department of Commerce, Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders," Current Industrial Reports, Series M3-1 (68)-8, October 12, 1968, p. 2 and footnote in Table 3.

Last entry: 2Q 1971

Source: U. S. Department of Commerce

DEFENSE INVENTORIES

A factor—other than current and expected sales, work stoppages, and inflationary expectations—that has had an important influence on the behavior of inventories in recent years is defense activity. The level of defense stocks more than doubled during the 1965-1968 period (see Chart 5). However, defense inventories were reduced by nearly 15 percent between the third quarter of 1969 and the second quarter of 1971, in response to a generally declining trend in new orders for defense products and commercial aircraft and a substantial reduction in defense

spending. Although defense stocks represent only a small portion of total business inventories, they have contributed to the recent weaknesses in inventory investment. For example, the decline in inventory investment in the defense products industries was larger than the decline in total inventory investment in the fourth quarter of 1970 and amounted to more than \$2 billion in the second quarter of 1971.

SUMMARY AND IMPLICATIONS

The moderate nature of the 1969-1970 contraction and the rather slow pace of the recovery

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so far this year were, in large part, the result of small adjustments in business inventories. During the most recent contraction, the buildup in retail stocks supported inventory investment and, therefore, cushioned the decline in overall economic activity until the fourth quarter of 1970. However, the lack of any significant liquidation in total inventories during the contraction has lessened the need to rebuild stocks during the recovery. Therefore, the current expansion has not been bolstered by inventory investment to the same extent as in previous recoveries. In fact, inventory investment declined more than \$4 billion in the third quarter of 1971, reflecting a sharp reduction in steel stocks.

Although the liquidation of strike-hedged steel stocks is not yet complete¹¹ and no major labor

contract expirations—which might result in significant hedging of inventories—are pending in the near term, other developments point toward at least a moderate increase in inventory investment in the months ahead. In particular, there is some evidence that the sharp decline in defense spending is bottoming out; therefore, the decline in defense inventories can reasonably be expected to taper off in the near future. However, the strength of inventory investment in the months ahead will depend primarily on the pace of the expansion in overall economic activity and the growth of business sales and new orders for capital goods.

¹¹ It is estimated that in August, steel users cut 4 million tons of steel from the 12 1/2 million tons they were reported to have stockpiled as a strike hedge. *Survey of Current Business*, September 1971, p. 2.



ANNUAL INDEX TO ECONOMIC REVIEW—1971

<u>MONTH</u>	<u>ARTICLE TITLE</u>
JANUARY	Diffusion Indexes and Economic Activity Federal Laws Regulating Bank Mergers and the Acquisition of Banks by Registered Bank Holding Companies
FEBRUARY	Bank Credit Proxy Changes in Banks, Branches, and Banking Offices in the Fourth District, 1965-1970
MARCH*	Experience With Special Drawing Rights Direct Foreign Investment of the United States
APRIL*	Average Functional Cost and Revenue for Banks in Three Size Categories, 1966-1969
MAY*	Eurobonds and the Eurobond Market The 1972 Federal Budget and Economic Activity
JUNE*	Capital Spending in Major Metropolitan Areas of the Fourth District Consumer Income, Spending, and Saving, 1960-1970
JULY	Some Characteristics of Fourth District FCA Banks: A Comparison With the Other Member Banks The Secondary Mortgage Market
AUGUST	U. S. Government Bonds As Capital Market Instruments Characteristics of Banks Acquired by Multiple Bank Holding Companies in Ohio
SEPTEMBER	Interpreting Short-run Price Developments
OCTOBER	Defining Money: Problems and Issues The Travel and Transportation Components of the United States Balance of Payments
NOVEMBER— DECEMBER	Performance of Rural Banks and Changes in Bank Structure in Ohio Inventory Investment and Economic Activity

* Out of print.