Federal Reserve Bank of Cleveland

ISSN 0013-0281

Economic Review

Winter 1983

Economic Review is published quarterly by the Research Department of the Federal Reserve Bank of Cleveland, P.O. Box 6387, Cleveland, Ohio 44101. Telephone: (216) 579-2000. Editor: Pat Wren. Graphics: Mike Whipkey. Typesetting: Sally Chunat.

Opinions stated in the *Economic Review* are those of the authors and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.

Material may be reprinted provided that the source is credited. Please send copies of reprinted materials to the editor.

Winter 1983
Federal Reserve Bank of Cleveland
Economic Review

Contents

Location and Reinvestment: The Youngstown Steel District **2**

Steel production has been declining nationwide since 1973. This decline has necessitated partial, and often complete, plant shutdowns to bring steel-making capacity in line with actual production levels. The Youngstown steel district has been heavily hit by industry-wide cutbacks. Indeed, adjustments in the Youngstown district to declining demand began long before the steel industry reached its productive peak in 1973. Competitive disadvantages, such as inadequate water transportation, below average productivity, and low profitability, have contributed to weak investment in the district. Nevertheless, economist Robert Schnorbus contends that the Youngstown steel district remains viable and will continue to be an important steel-producing center in the years ahead.

Thrifts and the Competitive Analysis of Bank Mergers **13**

Results of a random survey of over 500 small Ohio businesses indicate that the volume of financial services acquired from commercial banks was significantly affected by the presence of S&Ls in the market. Small firms purchased fewer services from banks in markets where S&Ls held a larger share of market deposits. If and when S&Ls become active suppliers of loans and checking accounts to commercial customers, regulatory agencies eventually will consider thrift institutions as full competitors of commercial banks in evaluating the competitive effects of bank mergers. Currently, however, the Board of Governors of the Federal Reserve System considers thrift competition to a subjective degree by implicitly shading the share of deposits held by commercial banks in the market. Economist Paul Watro utilizes the survey data to present an alternative method of including thrifts in the competitive analysis of bank mergers.

Working Paper Review: Stability in a Model of Staggered-Reserve Accounting **23**

In a working paper summarized here, Michael L. Bagshaw and William T. Gavin use a simple reduced-form model of the money-supply process to investigate the nature of the dynamic process implied by staggered-reserve accounting. Classical stability algorithms are used to find the range of parameters for which the model is stable.

Location and Reinvestment: The Youngstown Steel District

by Robert H. Schnorbus

Steel production in the Youngstown steel district has declined over most of the post-World War II period, compared with production in the neighboring districts of Cleveland and Pittsburgh and in the industry as a whole.[1] The district's decline as a major steel-producing center accelerated after the domestic steel industry peaked in 1973, resulting in extensive closings of old, inefficient steel plants since 1977 (see chart 1). However, because steel production in Youngstown began to decline earlier and became more severe as the industry declined nationally, the implication is that Youngstown's deteriorating competitive position is more deeply rooted in locational disadvantages than in problems affecting the steel industry in general. The most conspicuous locational disadvantages of the Youngstown district are inadequate water transportation and distance from major expanding steel markets.[2]

The viability of any steel-producing district ultimately depends on the profitability of its plants and the share of industry investment allocated to those plants (see Engle 1974). The profitability of a district can be approximated by subtracting materials and payroll costs from the value of steel shipments (or revenues). Since firms usually allocate investment to maximize profits, districts that generate higher profits over time generally receive a larger share of industry investment than districts with lower profits. Differences in costs among districts depend on transportation costs, wage rates, and worker productivity (the latter in turn reflects the age of the capital stock). Differences in revenues depend to a large extent on product mix. Analyzing the components of costs and revenues adds insight to the variation in profitability among districts and, therefore, Youngstown's share of industry investment compared with neighboring districts.

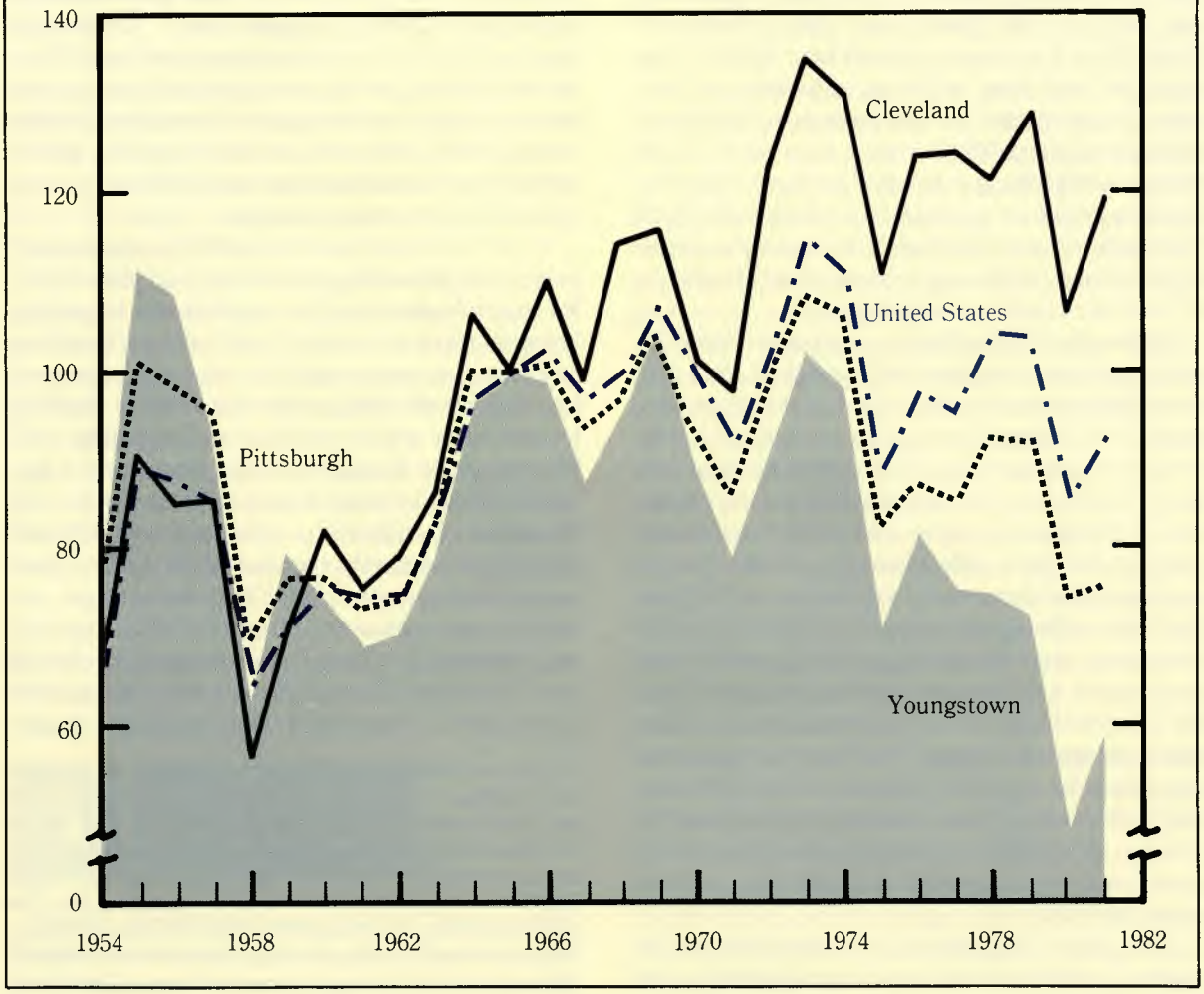
1. The Youngstown district, as defined by the American Iron and Steel Institute (AISI), includes the Youngstown standard metropolitan statistical area (SMSA), or Mahoning and Trumbull counties in Ohio, Stark County in Ohio, and Mercer County in Pennsylvania. The Cleveland district includes the Cleveland SMSA (Cuyahoga, Lake, Geauga, and Medina counties) and Lorain County. The Pittsburgh district includes the Pittsburgh SMSA (Beaver, Allegheny, Westmoreland, and Washington counties) plus major production facilities in Jefferson and Cambria counties in Pennsylvania and Hancock County in West Virginia.

Because Census of Manufacturing data are collected primarily by SMSA, they are not easily reorganized by steel-district boundaries. As a result, census data utilized in this study are restricted to the primary SMSAs within the three steel districts. The use of SMSAs as proxies for steel districts requires some description of what was omitted. For example, excluded from the Cleveland district was a U.S. Steel plant in Lorain County with a 3-million ton capacity. Omitted from the Pittsburgh district were a Bethlehem Steel plant in Cambria County with a 2.4-million ton capacity, a Wheeling-Pittsburgh Steel plant in Jefferson County with a 2.8-million ton capacity, and a National Steel plant in Hancock County with a capacity of 4.0 million tons. The Youngstown district contained the largest omission (over one-third of its steel employment), with representation limited to Trumbull and Mahoning counties. Excluded were Sharon Steel in Mercer County, Timken Company in Stark County, and Republic Steel's Massillon and Canton Works facilities, also in Stark County. Since the unrepresented plants in the Youngstown district tended to be efficient and profitable, their exclusion might have biased the inter-district comparison against Youngstown.

Robert Schnorbus is an economist with the Federal Reserve Bank of Cleveland. *John Erceg and Roger Hinderliter provided helpful comments throughout the preparation of this article, and Joanne Bronish provided research assistance.*

2. These reasons were cited by steel executives in a study by the Ohio Municipal Advisory Council (1977). However, over 30 years ago researchers cited the locational disadvantages of the Youngstown district, especially the lack of water transportation; see, for example, Isard and Capron 1949.

Chart 1 Steel Production
Index 1965 = 100



Youngstown's decline as a major steel-producing center can be explained in part by the economic determinants of investment. Differences in costs and profitability do not seem to account for all of the variability in investment, however, especially in comparing Youngstown and Pittsburgh. Highly profitable steel firms have continued to invest heavily in their Youngstown district facilities, especially in Stark and Mercer counties, while other steel firms have chosen to close their Youngstown facilities. This article seeks to explain why some steel plants in the Youngstown district have operated successfully, while others have been phased out.

I. Transportation Costs and Industry Location

Because transportation costs among steel districts generally exceed labor and other production costs, investment decisions in the steel industry are heavily weighted by transportation costs (see Isard and Cumberland 1950). Histori-

cally, steel plants developed near the resources necessary for steel production—coke and iron ore—and two secondary materials—limestone and scrap; such plants are called *resource-based.* Iron ore was converted into molten iron and then into steel at the same location to conserve heating fuel in the furnaces. Similarly, coke usually was produced at or near the iron works so that the gas by-product from coke production could be used in blast furnaces. Both Youngstown and Pittsburgh, for example, developed as steel-producing centers, largely because of their proximity to coking coal.

Although transportation costs are critical in the investment decision, technological advances over time gradually are shifting the focus away from raw-materials shipping costs to finished-product shipping costs. More efficient blast furnaces, basic oxygen and electric arc furnaces, and continuous casting are technological advances that have contributed to a reduction in consumption of raw materials per ton of finished steel throughout the post-World War II period. Because scrap is increasingly being substituted for iron ore and because coal is being used less for steel-making, the procurement-cost advantages of resource-based sites are no longer as important to the steel industry. The Chicago-Gary steel district has emerged as the nation's largest steel district, mainly because of its proximity to expanding markets (or *market-based* advantage).[3]

Slow growth in the costs of transportation in general seems also to have contributed to the decline of the Youngstown district, by weakening the importance of transportation costs relative to production costs. From 1969 through 1977, for example, transportation costs (as measured by the railroad freight price index) have increased at a slower pace than the price of steel.[4] Ultimately, slow growth in transportation costs would encourage firms having multi-site locations to consolidate their steel-making at the site having the lowest production costs or the greatest variety in capital stock to achieve the most efficient coordination of production schedules.

Water has been used extensively to transport raw materials in the steel industry.[5] Cleveland, for example, developed as a steel center largely by being a trans-shipment point, where handling and shipping costs could be reduced by converting iron ore to steel at the dock rather than by transferring ore to rail cars and shipping it to Pittsburgh or Youngstown for processing. Likewise, Chicago emerged as a steel center during the major *greenfield* expansion of the post-World War II period partly because of its direct water access to raw materials.[6] With water transportation costs (measured by constant-dollar operating revenues per ton of steel shipped) declining over 50 percent since 1965, lack of a water outlet to the Great Lakes ore carriers has been a major

3. Hekman (1978) studied the locational shift in steel production to the Chicago-Gary area, using value added in manufacturing (excluding the iron and steel industry) as an index of demand and prices of labor, capital, steel scrap, iron ore, and coke in the estimated cost function. He found that cost changes between 1921 and 1972 were insufficient to explain the shift of production, while the demand variable would explain 76 percent of the excess growth rate of Illinois-Indiana (which is dominated by the Chicago-Gary district) compared with Pennsylvania. Other studies provide theoretical and empirical evidence indicating that the optimum location for steel production is almost entirely a matter of market proximity (see Craig 1957).

4. Between 1969 and 1977, the price index for railroad freight (Class 1 railroads) increased from 100 to 199, while the price index of finished steel products rose from 107 to 229. Since 1977, however, freight prices on average have been rising slightly faster than steel prices, with the freight price index rising to 328 and the steel price index to 336. The steel price index was obtained from the AISI *Annual Report,* 1981; the railroad freight price index was obtained from the *Survey of Current Business.* For a discussion of the freight index, see Fehd 1975.

5. Water transportation of finished steel products is a significant factor in steel importation, an issue not pursued in this article. There is a parallel between Youngstown's decline as a steel center and the steel industry's declining share of the domestic market. A recent study cited three prominent reasons for the domestic industry's competitive disadvantages—decline of raw-materials prices for foreign producers, new technologies, and shipping costs. The cost of shipping iron ore from Brazil to Japan, for example, declined 60 percent from 1957 to 1968. As in the case of Youngstown, lower shipping costs facilitated exporting to distant markets, where production costs were higher (see Crandall 1981, p. 23).

6. *Greenfield* refers to the construction of a new plant on a new site, as opposed to a refurbished plant or new facility on an existing site, or *brownfield.*

contributing factor to Youngstown's weakening competitive position.[7] Even Pittsburgh long held an advantage over Youngstown because of its access to the Ohio, Allegheny, and Monongahela rivers, making raw materials relatively inexpensive to ship. Lacking access to water transportation, Youngstown was forced to rely on a deteriorating railroad network into and between its plants, making it expensive to move raw materials and molten iron (see Institute for Iron and Steel Studies 1976).

The decline of the Youngstown district perhaps was accelerated by the increased cost of shipping finished steel by truck relative to rail. Even though rail transportation costs have declined nationwide by roughly one-third since 1950, Youngstown might not have been able to expand its markets, because trucking costs over the same period doubled (mostly since 1975). Youngstown probably experienced increased competition for the local markets that it serviced via trucks from other districts that gained access to those local markets via railroads; thus, the size of the market most efficiently served by the Youngstown district was reduced.

II. Variations in Production Costs

Lower production costs in the Youngstown district on average have not offset higher transportation costs. To be sure, some of the variation in production costs among districts reflects transportation costs, because procurement costs are included in the cost-of-materials measure; variations also result from regional differences in labor-related costs, product mix, and age of capital stock. A comparison of production costs by district should adjust for differences in product mix and age of capital stock. A product mix consisting primarily of low-volume, customized or specialty-alloy steels, for example, would incur higher production costs, *ceteris paribus,* than high-volume basic steel products. Unfortunately, quantifiable data on product mix for the districts are lacking, although Youngstown seems to have shifted its product mix over the period studied from basic to specialty steels. Similarly, data on the age of capital stock that could help explain differences in production costs through productivity are sparse.[8]

Three components of production costs—cost of materials, wages of production workers, and administrative salaries—are shown by district in table 1, using man-hours per year as the standard unit of labor input. Although there has been an industry-wide upward trend in materials costs at least since 1963, the cost of materials per man-hour in the Youngstown district generally has been above the industry average. Since cost of materials includes freight charges as well as the cost of items consumed in production, the above-average costs appear partly to reflect differences in transportation costs.

Materials costs for Youngstown were consistently below those for Pittsburgh, with the gap exceeding $2.00 per man-hour in 1972. The differences perhaps resulted from price changes in raw materials, such as the cost of scrap relative to that of ore, or from other contractual changes with the raw-materials suppliers. Differences among districts also could occur if multi-plant steel companies had different accounting techniques for allocating the cost of materials among each of their plants, especially where a steel company itself owned both the raw materials and shipping facilities. Thus, materials costs generally might have been lower in the Youngstown district because of more favorable con-

7. Estimates of water, railroad, and trucking costs were obtained from operating revenues per ton for motor carriers and operating revenues per ton-mile for rails, deflated by the price index of industrial commodities (Department of Commerce, *Business Statistics,* 1979). Analysis of transportation costs is difficult because of a plethora of disorganized data, complicated by the volume of regulations and tariffs imposed on shipping rates (see Birch 1980).

8. According to a 1973 survey, manufacturing facilities in the Youngstown SMSA might be expected to have had higher production costs relative to Cleveland, because Youngstown had the highest degree of obsolescence in Ohio, while Cleveland's facilities were slightly below the state average (see L'Esperance and King 1975).

Table 1 Comparative Production Costs
Census years 1954 to 1977; constant dollars

	Cost of materials per man-hour, dollars	Wages per man-hour, dollars	Administrative salaries per man-hour, dollars
United States			
1954	NA	3.16	0.98
1958	10.27	3.32	1.05
1963	9.80	3.79	1.08
1967	13.01	3.98	1.20
1972	14.55	4.41	1.33
1977	17.52	4.12	1.33
Cleveland			
1954	NA	3.41	0.71
1958	NA	3.51	1.02
1963	NA	3.88	0.96
1967	14.63	4.00	1.20
1972	13.05	4.38	1.13
1977	15.71	4.30	1.20
Pittsburgh			
1954	NA	3.18	0.83
1958	NA	3.32	1.09
1963	NA	3.71	1.06
1967	15.19	3.95	1.15
1972	18.42	4.39	1.18
1977	19.35	4.27	1.11
Youngstown			
1954	NA	3.18	0.58
1958	NA	3.47	0.81
1963	NA	3.80	0.84
1967	13.55	3.57	1.02
1972	16.22	4.37	1.15
1977	19.08	4.37	1.13

NOTE: NA denotes gaps in the census data; such gaps occurred where there was a legal obligation not to release data that could be traced to a single establishment.

SOURCE: *Census of Manufacturing,* Department of Commerce.

tracts with suppliers or a substantially different proportion of scrap usage.

Average wage rates of production workers (a key processing cost in the steel industry) exhibited relatively less variation among districts and represented a much smaller percentage of production costs than the procurement costs of raw materials. This lack of greater variation in average wage rates is not unusual given the prevalence of strong national unions. Large multi-plant steel companies dominate steel employment in all three districts and are heavily unionized. Even specialized single-plant steel companies tend to be unionized, especially when located near multi-plant companies. Nevertheless, differences in overtime, productivity, and product mix can produce differences in average wages per man-hour.

Administrative costs, an even smaller portion of production costs, generally were below the industry averages in all three districts. Administrative salaries per man-hour (the only available data on administrative or overhead costs) include salaries of nonproduction workers (payroll less wages) distributed over the total number of hours worked by production workers. High administrative costs usually are associated with activities at corporate headquarters rather than routine paper work at production sites. There are very few corporate headquarters located in the Youngstown district, which perhaps contributes to its low average administrative costs. Indeed, perhaps the higher administrative costs for Pittsburgh and Cleveland have resulted from their greater concentration of corporate headquarters. The ratio of nonproduction to production workers and the salary levels of nonproduction workers are determined by other factors as well. Perhaps the salary structures have been below-average in all three districts, because service-related industries have been growing at a slower rate in these districts than nationally; thus, the demand for nonproduction workers could have been less strong.

The composite variation of all three production costs indicates that of the three districts only Cleveland offered an advantage in production costs, and much of that advantage was in transportation costs. For example, Cleveland was the only district that was below the industry average for the last three census years ($–0.61 per man-hour on average), most of which ($0.57) could be traced to the average difference in costs of materials. In contrast, not only was Youngstown above the industry average ($1.01 per man-hour), but that gap was narrower than the materials costs difference ($1.25) because of the tendency for wage rates and administrative salaries to

conform to industry standards. Pittsburgh experienced the highest average production costs differential for the data available ($2.52), again because of its above-average materials costs ($2.62). Unfortunately, little is known about product mix to explain costs related to the mix of raw materials used and the amount of waste generated in the production process. Cleveland had a clear cost advantage in attracting investment, but Youngstown also should have had some relative advantage over Pittsburgh.

III. Allocation of Investment among Districts

The allocation of investment in general confirms the expectation that greater investment occurs where production costs are lower.[9] However, a careful comparison of surplus value added and productivity with investment is required to reconcile differences in investment among districts (see table 2). Not surprisingly, investment per man-hour in the Youngstown district was consistently below the industry average, while investment in the Cleveland district was generally above the industry average. Except for 1958, investment in Pittsburgh was also consistently below average. However, de-

Table 2 Productivity, Investment, and Return to Investment by Steel District

Census years 1954 to 1977

	Steel production per man-hour, net tons	Surplus value added per man-hour, constant dollars	New capital expenditures per man-hour, constant dollars
United States			
1954	0.105	3.98	0.93
1958	0.111	3.96	1.18
1963	0.138	3.08	1.13
1967	0.150	5.36	1.96
1972	0.180	4.95	1.00
1977	0.156	4.45	1.32
Cleveland			
1954	0.131	5.20	1.36
1958	0.109	4.80	1.76
1963	0.144	6.38	1.87
1967	0.165	8.16	3.81
1972	0.206	6.88	0.64
1977	0.224	8.84	0.71
Pittsburgh			
1954	0.087–0.107	2.42	0.59
1958	0.087–0.109	3.09	1.27
1963	0.104–0.132	3.97	0.88
1967	0.112–0.142	5.48	1.51
1972	0.140–0.182	3.24	0.78
1977	0.117–0.154	3.95	0.85
Youngstown			
1954	NA	2.44	0.35
1958	NA	3.21	0.85
1963	0.114	4.54	0.71
1967	0.118	4.06	0.52
1972	0.142	5.03	0.10
1977	0.138	3.19	0.46

SOURCES: *Census of Manufacturing,* Department of Commerce; and American Iron and Steel Institute.

9. Since investment decisions are based on *expected* returns, current production costs and profit performance often do not reflect a district's investment potential. Investment in durable capital goods necessarily incorporates expectations in costs and revenues for long periods into the future that are difficult to forecast and can differ substantially from past trends. For example, the Bethlehem Steel plant at Sparrows Point (near Baltimore, Maryland) had been targeted for a major reinvestment program (until declining demand in recent years caused industry-wide cutbacks), despite being less efficient than alternative sites within the same company. However, future investment in the site was expected to be bright, according to one steel executive, because ". . . there the opportunity to become modernized, and thus more competitive, is truly within reach" (see Chavey 1982).

The assumption of profit maximization might not be wholly consistent with how location decision-makers actually reason. Location decisions, more than most other managerial decisions, can be more accurately described by a "satisficing" model, where limited competition allows decision-makers to select a safe location that assures at least a minimum return on investment, thereby insuring the survival of the firm. Richardson (1973) discusses the responsiveness of regional differences in rates of return on investment. One study found some evidence to suggest that as early as the 1940s, for example, U.S. Steel Corp. was retarding the development of its Birmingham, Alabama, facilities (considered to be a natural low-cost steel site) in an apparent attempt to maintain the profitability of its operations at Pittsburgh and other sites (see Isard and Capron 1949).

spite Youngstown's slightly lower production costs, Pittsburgh's investment per man-hour on average ($0.98) was nearly twice that of Youngstown's. Less favorable product mix or market access might account for some of the lower investment in Youngstown, as might a lesser commitment to Youngstown by multi-site firms. Yet, even Cleveland's share of the industry's investment began to fall sharply during the 1970s. The decline in industry production may have resulted in industry-wide cutbacks in investment that were disproportionately concentrated in Ohio and Pennsylvania, where market growth has been slower and capital stock is older than in other areas.

Differences in labor productivity accounted for some of the additional variance in investment among districts, especially between Pittsburgh and Youngstown.[10] High productivity can compensate for high wage rates by reducing the number of hours required to produce the same tonnage of steel. To be sure, a worker's value to a firm and its ability to pay higher wages are determined by the worker's productivity, which in turn depends on skill level, investment to improve skill, and the size and age of the capital stock. Yet, where wages tend to be standardized by industry-wide union contracts, plant-by-plant differences in productivity can play a major role in affecting production costs and investment. Wage costs per man-hour were above average in the Cleveland district, and steel production per man-hour also was above average. While Youngstown's productivity was almost 20 percent below the industry average, wage rates were lower than in Cleveland; in 1967 and 1972, they were also below the industry average. Pittsburgh remained an exception, with productivity at best slightly below average and probably closer to Youngstown's productivity.

The search for an explanation of investment in Youngstown relative to Pittsburgh must be extended to a consideration of surplus value added in the two districts. The term *surplus value added* (value added less payroll costs, or labor's contribution) essentially represents the share of value generated in the steel-making process that is retained by the firm. In addition to labor costs, the value added during the production process includes return on investment, capital recovery, economic profits, and overhead costs (such as interest on debt and taxes). Assuming overhead costs are not significant factors in investment decisions, the removal of payroll costs reduces value added to capital's share of value added plus economic profit to the firm. To the extent that surplus value added represents return on investment, firms are expected to invest more heavily where surplus value added is greater. Again, since Cleveland's surplus value added per man-hour is consistently above average, investment per man-hour should be above average. When Pittsburgh's investment per man-hour reached its highest rate in 1967, surplus value added was one-third higher than in Youngstown. The patterns of investment and surplus value added among the three districts were in general positively correlated, with two important qualifications.

10. Youngstown's labor productivity was estimated from steel production data from the American Iron and Steel Institute and census data on man-hours for the two counties outside the Youngstown SMSA—Stark and Mercer; however, census data were not available for all counties in the Cleveland and Pittsburgh districts. To estimate man-hours on a district-wide basis, average man-hours per production worker first were computed for the SMSA. Estimates of production workers in the missing counties were obtained from total employment data in *County Business Patterns* (CBP), by assuming that 80 percent of industry employment was in production (the actual average for the six census years was 81 percent for the industry, 82 percent for the Cleveland district, and 83 percent for the Pittsburgh district). In the case of the Cleveland district, where data for one county (Lorain) were missing, CBP data provided a range of employment from 5,000 to 10,000. Using 80 percent as the average percentage of production workers to total industry employment, employment for the Cleveland steel district was increased by 8,000 and multiplied by man-hours per worker for the SMSA to estimate total man-hours in the steel district, which then was divided into steel output to compute the lowest estimate of district productivity. In the Pittsburgh district employment in four counties had to be estimated from CBP data. A range of 16,000 to 40,000 was used to estimate the number of excluded production workers, because Youngstown's productivity falls between the resulting range of Pittsburgh's productivity. Thus, the highest and lowest estimates for Pittsburgh's productivity are shown in the table. The actual productivity measure, of course, is somewhere in between.

Although a simple rank-order correlation among the three districts between investment per man-hour and surplus value added per man-hour was positive over the six census years, the correlation was statistically significant only over the first four census years.[11] Investment in the Cleveland district dropped sharply in 1972 and 1977, despite a sustained high surplus value added, which accounted for the lack of a statistically significant correlation over the entire sample. Investment in the Cleveland district may have been atypically low for those two census years. Exceptionally heavy investment in 1967 could have been part of a major expansion program that, once completed, resulted in a temporary lull in investment. The fact that all three districts experienced declines in investment during a period of rising excess capacity supports the assumption that adjustments to industry-wide over-capacity were in part directed toward all three districts because of their lack of growing markets. Youngstown's adjustments took the form of plant closings, while Pittsburgh and Cleveland reduced investment relative to other districts.

A second qualification is also troublesome. Surplus value added in the Cleveland district was much greater than in Youngstown (which averaged 30 percent lower than Cleveland over the six census years); yet, investment per man-hour was also predictably higher in Cleveland. In sharp contrast, however, Pittsburgh's surplus value added on average was actually slightly lower than Youngstown's, even though its investment per man-hour on average was twice Youngstown's. In such years as 1967 and 1977, surplus value added was substantially higher in Pittsburgh than in Youngstown, but the reverse was true in 1963 and 1972. Again, some of the differences in surplus value added might have been offset by productivity. For example, productivity might have been at the higher end of Pittsburgh's range in 1967 and 1977, when production declines were stronger in Youngstown than Pittsburgh and therefore contributed to higher surplus value added than in Youngstown. Changing demand for steel products and differences in product mix between the two districts also might have resulted in Pittsburgh's averaging higher prices for its products, while Youngstown's prices were relatively higher in 1972.[12]

IV. Steel Producers and Investment in Youngstown

A comparison of supplemental information about various steel producers in the Youngstown district suggests that much of the difficulty in the district's investment was with specific firms. The fact that investment in the Youngstown district has been below the industry average implies that the district's steel firms are unprofitable but ignores the diversity of performance among individual firms. To be sure, the allocation of investment among the four

11. The Spearman rank-order correlation coefficient of 0.84 for the first four census years was significant at the 0.95 confidence level with 11 degrees of freedom. The six-year correlation coefficient at 0.40 indicated a positive correlation, but lacked statistical significance at the 0.90 confidence level with 17 degrees of freedom.

12. Data that would allow comparison of product mix at the district level are not available. The fact that product mix and price are important to district investment, however, can be illustrated by computing an average "price" of steel for each district from the cost and productivity data shown in the tables. That is, surplus value added equals total revenue minus costs of materials, labor, and administration. Revenue equals price times output. Converting to surplus value added per man-hour, the only unknown in the equation is "price" (or average price of the district's product mix). The computed price may differ from the actual price in a district. Not all costs have been controlled for, and the data have been adjusted by a price index; the resulting measure is actually an average price divided by the price index for finished steel. Nevertheless, the relative differences in average computed price suggest that Pittsburgh's product mix averaged higher prices in 1967 and 1977, but not in 1972. For example, using the upper range of Pittsburgh's productivity, the lowest average price in 1967 would be $189, compared with $188 in Youngstown. In 1972, Pittsburgh's average price dropped to as low as $158, compared with $188 in Youngstown. While both Youngstown's and Pittsburgh's prices were above the industry average, Cleveland had below-average prices, perhaps reflecting its higher productivity and lower cost advantage, which may have been passed on in the form of relatively lower prices.

counties that constitute the Youngstown district seems consistent with profit performance of the steel firms within these counties. Surplus value added in Mahoning and Trumbull counties has tended to be lower than in Stark or Mercer counties, where highly profitable firms operate. Although investment data by county exhibited no positive correlation with surplus value added, lack of complete data and the problem of lumpiness in available data at such low levels of aggregation make comparisons difficult. Much of the difficulty in investment occurred in Mahoning County, the site of most of the plant closings, whereas the other three counties have competed successfully with other steel districts.

Comparing announced capital-spending programs of individual firms in recent years shows a pattern that is consistent with surplus value added among the four counties. In terms of investment, Sharon Steel Corporation in Mercer County finished a $52-million expansion program in 1967, doubling its capacity; in 1972 Sharon Steel began installation of a $10-million basic oxygen furnace.[13] In Stark County, Republic Steel announced a $250-million modernization and expansion program in 1977, and Timken began a $500-million expansion in the spring of 1982 (see Reiss 1981; Wasnak 1981). Copperweld, another highly profitable firm in Trumbull County, has spent $64 million since 1970 in revamping and expanding facilities.[14] In contrast, U.S. Steel, Lykes-Youngstown Sheet & Tube, and Republic Steel all have closed facilities in Mahoning County.

Profitable steel producers in the Youngstown district seem to have at least four features in common—low materials costs, narrow product lines, concentration on high-margin specialty steels, and single-plant locations (see table 3). Low materials costs can result from higher usage of scrap by some producers, especially Copperweld and Timken, which, along with Sharon Steel, are high-profit, single-plant firms. Copperweld produces alloy bars of all types for markets in the energy, capital equipment, and automotive industries. Timken makes silicon steel (used in electrical products) and other specialty alloy steels in bar, rod, and seamless-tube forms. Sharon Steel produces flat-rolled specialty steels for aircraft, appliances, and automobiles and forging-quality steel for the capital-equipment industry.

The Youngstown district steel companies showing lower profitability, such as U.S. Steel and Lykes-Youngstown Sheet & Tube, have tended to produce more basic steel products, which are usually lower-priced than specialty steel products. More important, they have had a greater opportunity to invest in newer or larger facilities in other districts. Lykes-Youngstown Sheet & Tube, which closed most of its Mahoning County operations in 1979 and sold the remainder to area firms, built a basic oxygen furnace at its Indiana Harbor Works during the 1960s; by contrast, the newest facility of any company in Mahoning County was built in the early 1920s. Among the multi-site producers, only Republic Steel has attempted to lessen the competitive disadvantages in the cost of assembling raw materials by introducing continuous casting in the Youngstown district. Yet, even Republic consolidated its operations by shifting its raw steel-making in Mahoning County to its finishing plant in Trumbull County.

V. Conclusion

Although the overall weakness of the domestic steel industry has exacerbated the Youngstown steel district's problems, the poor competitive position of individual steel producers has been an important factor in the district's failure to attract investment. The transportation cost advantages on which the district's steel indus-

13. Sharon Steel announced plans to invest about $260 million in the 1980s, in addition to about $130 million spent in the 1970s, with the intention of increasing its share of the high-margin, high-profit growth of steel products. See "Sharon Steel Capital Spending for 10 Years," p. 34.

14. See "Steel Turns Loose Capital Spending Projects Worth $5 Billion," p. MP-15.

Table 3 Major Steel Producers in the Youngstown District[a]
As of 1980

Plant and location	Products
Copperweld Steel Company	
Trumbull	Alloy and carbon bars, billets, and blooms
Jones & Laughlin Steel Corp.	
Stark	Stainless steel finishing; finishing coil and sheet
Trumbull	Electrical metallic tubing
Mahoning	Cold-rolled strip steel—carbon, alloy, and stainless
Lykes-Youngstown Sheet & Tube Co.	
Mahoning (closed 1977–79)	Flat-rolled and corrugated sheet, plate, tinplate, etc.
Republic Steel Corporation	
Trumbull	Hot- and cold-rolled sheet and strip; silicon sheet and coated products
Mahoning (closed 1967)	Pipes
Stark	Basic steel products
Sharon Steel Corp.	
Trumbull	Electrogalvanized strip and sheet steel
Mercer	High carbon and alloy; flat-rolled steel
Timken Company	
Stark	Hot-rolled and cold-finished bars; wire rods; tube rounds; seamless pipe and tubing; tool steel and forgings
U.S. Steel Corp.	
Mahoning (closed 1979)	Iron; steel ingots; semi-finished steel products; strip bar products

a. This listing contains only firms operating steel-making furnaces, but several other firms lacking steel furnaces deserve mention. Jones & Laughlin has operated annealing furnaces in Stark and Mahoning counties and has announced plans to renovate its Youngstown plant. Thomas Steel Strip Corp. in Trumbull County operates the largest cold-rolled strip steel and preplating facility in the country. Others, such as McDonald Steel (a partial reopening of Lykes-Youngstown's McDonald Works) and Hunt Steel, are comparatively new.

SOURCES: *Ohio Manufacturing Directory,* 1981; *Pennsylvania Industrial Directory,* 1981; and *Moody's Industrial Manual,* 1978, 1979, 1980; *Directory of Iron and Steel Works of United States and Canada,* American Iron and Steel Institute.

try were built have been eroded by technological advances in steel-making and the westward shift of steel markets. The district's materials costs have tended to be high compared with the industry average, reflecting the costs of shipping raw materials and steel products from a land-locked location. Although the data could not control for product mix or age of capital, supplementary evidence indicates that liquidations among the district's capital stock were concentrated among old facilities with low-margin product lines. Yet, steel producers in the district have made necessary adjustments and even prospered by developing smaller-scale operations, incorporating the most modern technologies and specialized product lines. While the failure of investment in the Youngstown district to compare more favorably with Pittsburgh remains partially unexplained, other economic reasons may be responsible. The fact that plant closings are concentrated in a single county suggests that the age of the facilities and other special factors may have warranted their closing regardless of location. Because of the proximity of the Youngs-

town and Pittsburgh districts, maintaining operations in both districts and reducing investment proportionately might be considered less efficient or desirable than for a firm simply to withdraw its operations from one of the districts. Pittsburgh has the advantage over Youngstown of having greater capital stock and a greater number of corporate headquarters, perhaps creating a stronger commitment to the area.

In the years ahead inefficient facilities will be phased out in Youngstown, as they will be elsewhere. Yet, the district's locational disadvantages are surmountable. Multi-site firms, such as Republic Steel, are operating successfully in the Youngstown district, and specialty-steel producers, such as Timken and Copperweld, are modernizing and expanding. The Youngstown steel district will be a viable and important steel-producing center, but on a smaller scale than in the past.

References

Birch, David L. "Regional Differences in Factor Costs: Labor, Land, Capital, and Transportation," in Victor L. Arnold, Ed., *Alternatives to Confrontation*. Lexington, Mass.: D.C. Heath and Company, 1980.

Chavey, Lydia. "The Year the Bottom Fell Out for Steel," *New York Times,* June 20, 1982.

Craig, Paul G. "Location Factors in the Development of Steel Centers," *Regional Science Association Papers and Proceedings,* vol. 3 (1957), pp. 249–65.

Crandall, Robert W. *The U.S. Steel Industry in Recurrent Crisis*. Washington D.C.: Brookings Institution, 1981.

Engle, Robert F. "A Disequilibrium Model of Regional Investment," *Journal of Regional Science,* vol. 14, no. 3 (December 1974), pp. 367–76.

Fehd, Carolyn S. "Introducing Price Indexes for Railroad Freight," *Monthly Labor Review,* vol. 98, no. 6 (June 1975), pp. 19–24.

Hekman, John S. "An Analysis of the Changing Location of Iron and Steel Production in the Twentieth Century," *American Economic Review,* vol. 68, no. 1 (March 1978), pp. 123– 33.

Hoover, Edgar M. *The Location of Economic Activity*. New York: McGraw-Hill Book Company, 1948.

Institute for Iron and Steel Studies. "Mahoning River Valley Steel from Yesterday to Tomorrow?," *Commentary,* vol. 10 (October 1976).

Isard, Walter. *Methods of Regional Analysis: An Introduction to Regional Science*. Cambridge, Mass.: M.I.T. Press, 1960.

———, and William M. Capron. "The Future Locational Patterns of Iron and Steel Production in the United States," *Journal of Political Economy,* vol. 57 (April 1949), pp. 118–33.

———, and John H. Cumberland. "New England as a Possible Location for an Integrated Iron and Steel Works," *Economic Geography,* vol. 26 (October 1950), pp. 245–59.

L'Esperance, Wilford, and Arthur E. King. "The Age Distribution of Ohio's Manufacturing Plant and Equipment, Part II," *Bulletin of Business Research,* vol. 50, no.6 (May 1975).

Ohio Municipal Advisory Council. *The Steel Industry's Financial Impact on the Mahoning Valley*. Report no. 316-77, November 15, 1977.

Reiss, George R. "Republic Valley Program Update is Hinged on Continuous Caster," *Youngstown Vindicator,* May 31, 1981.

Richardson, Harry W. *Regional Growth Theory*. London: Macmillan Press Ltd., 1973.

"Sharon Steel Capital Spending for 10 Years," *Northern Ohio Business Journal,* vol. 4, no. 1 (January 7, 1980), p. 34.

"Steel Turns Loose Capital Spending Projects Worth $5 Billion," *Iron Age,* vol. 224, no. 25 (September 7, 1981), pp. 7–31.

Wasnak, Lynn. "Timken Company: Joint Effort Leads to $500 Million Decision," *Northern Ohio Business Journal,* vol. 5, no. 24 (November 23, 1981), p. 1.

Thrifts and the Competitive Analysis of Bank Mergers

by Paul R. Watro

The U.S. Supreme Court first applied antitrust laws to commercial banking in 1963. In the landmark decision *United States* v. *Philadelphia National Bank,* the court articulated the need for bank mergers to meet the antitrust standards established by Section 7 of the Clayton Antitrust Act. A merger would be prohibited "where the effect may be to substantially lessen competition or tend to create a monopoly in any line of commerce" in any section of the country. To assess the competitive effects of proposed mergers and acquisitions, the court defined commercial banking as a separate and distinct line of commerce. Because of this legal precedent, the banking regulatory agencies focus their competitive assessments primarily on commercial banks.

After delineating the relevant line of commerce and the geographical market in the 1963 Philadelphia case, the Supreme Court relied on a structural test to evaluate the anti-competitive effects of a proposed merger. The court stated that

> a merger which produces a firm controlling an undue percentage share of the relevant market, and results in a significant increase in the concentration of firms in that market, is so inherently likely to lessen competition substantially that it must be enjoined in the absence of evidence clearly showing that the merger is not likely to have such anti-competitive effects (374 US at 363).

The author is an economist with the Federal Reserve Bank of Cleveland. *Marcia Fortunato provided excellent research and computer assistance for this study.*

The Justice Department has established guidelines for rejecting mergers based on the percentage of business held by competing firms. In banking, market shares generally are calculated using deposits held by competing commercial banks. Mergers involving banks with sizable market shares, particularly in highly concentrated areas, are considered anti-competitive according to Justice Department guidelines.[1] While other factors also are considered before approving or denying a merger, the competitive analysis focuses primarily on a merger's overall impact in a given market. Although the Federal Reserve Board has not adopted the Justice Department's guidelines, the Federal Reserve occasionally has referred to the guidelines to support certain decisions.

During the past few years, the Board of Governors of the Federal Reserve System has considered nonbank competition in a subjective manner in merger analysis. The board evaluates the competitive effects of thrift institutions by *shading,* or discounting, the share of deposits held by commercial banks in the relevant market areas. In June 1980, the Board of Governors formally instructed the individual Reserve Banks on how to weigh the competition of thrift insti-

1. In June 1982 the Justice Department issued new guidelines for its enforcement policy concerning mergers and acquisitions to replace previously issued guidelines. The new guidelines use the Herfindahl-Hirschman index (HHI) rather than the four-firm concentration ratio to measure concentration in a market. The guidelines apply to a wide range of industries and rely on a structure-performance framework.

tutions in the assessment of bank mergers and acquisitions.[2] The board prefers that competitive analyses include not only commercial banks but also supplementary data on thrift institutions when thrifts are important. Since July 1980, thrift competition has been a critical factor in many applications submitted to the Federal Reserve System. The Board of Governors has approved proposals that otherwise might be denied when the possible anti-competitive effects of the acquisitions would be mitigated by the presence of thrifts in the markets. The Comptroller of the Currency also considers nonbank competition in approving bank mergers, but the specific weight given to thrift competition is not explicit.[3]

This study examines the competitive importance of thrift institutions in supplying financial services to local commercial customers. Part I briefly reviews the legal and economic framework of the line-of-commerce issue in banking. Part II profiles the types of financial services used by over 500 small business firms in Ohio, the financial institutions that provide these services, and the geographical areas in which competition takes place for these services. The share of individual services captured by savings and loan associations (S&Ls) is examined to determine the types of services in which firms consider S&Ls as effective alternatives to commercial banks.[4] Part III discusses factors that affect the volume of services purchased from banks by commercial customers. Using multiple regression analysis, Part IV isolates the impact of S&L competition on services acquired from banks. Based on these empirical findings, a method is presented in Part V to adjust the market share of commercial banks according to the percent of deposits held by S&Ls. The results indicate that in some market areas greater weight could be given to thrift competition when evaluating the effects of bank mergers and acquisitions.

I. The 'Line-of-Commerce' Issue

The principles of antitrust law have been somewhat more difficult to apply to banking because of problems in defining the relevant product line. The Supreme Court's 1963 definition of commercial banking as a separate and distinct line of commerce stems from the view that commercial banks provide local customers with a unique cluster of services that are not available from other depository institutions. The 1963 decision was reaffirmed in later cases and refined in 1974 in the Connecticut National Bank decision.[5] In the Connecticut case the Supreme Court agreed with a lower court that mutual "savings banks and commercial banks are fierce competitors" in certain service markets. Yet, the Supreme Court concluded that commercial banks still provide a unique cluster of services to commercial enterprises, primarily because, at the time of the decision, mutual savings banks did not offer demand deposits to commercial customers; mutual savings banks also made very few busi-

2. See Board of Governors of the Federal Reserve System, Letter BHC-198, June 25, 1980.

3. See, for example, the following merger decisions: National Bank and Trust Company of Norwich, Norwich, NY, to merge with the First National Bank of Sidney, Sidney, NY, Comptroller's *Annual Report,* 1978, p. 101; BancOhio National Bank, Columbus, OH, to merge with Citizens Bank of Shelby, Shelby, OH, Comptroller's *Annual Report,* 1980, p. 15; National Bank of Defiance, Defiance, OH, to merge with National Bank of Paulding, Paulding, OH, Comptroller's *Annual Report,* 1980, pp. 53–56; Crawford County National Bank, Bucyrus, OH, to consolidate with The Bucyrus City Bank, Bucyrus, OH, *Quarterly Journal,* Comptroller of the Currency, Administrator of National Banks, vol. 1, no. 2 (1981), p. 34; First National Bank of Cicero, IL, to merge with Cicero State Bank, Cicero, IL, *Quarterly Journal,* Comptroller of the Currency, Administrator of National Banks, vol. 1, no. 3 (1981), p. 49; Atlantic National Bank of Florida, Jacksonville, FL, to merge with Bank of Brevard, Rockledge, FL, *Quarterly Journal,* Comptroller of the Currency, Administrator of National Banks, vol. 1, no. 3 (1981), p. 50; and The Third National Bank and Trust Company, Dayton, OH, to merge with the New Lebanon Bank, New Lebanon, OH, Comptroller of the Currency, Administrator of National Banks, vol. 1, no. 3 (1981), p. 61.

4. No mutual savings banks operate in Ohio.

5. *United States* v. *Phillipsburg National Bank and Trust Company,* 399 U.S. 350 (1970); and *United States* v. *Connecticut National Bank,* 418 U.S. 666 (1974).

ness loans, and they did not offer other banking services, such as credit-card programs and trust services. However, the court stated that

> at some stage in the development of savings banks it will be unrealistic to distinquish them from commercial banks for purposes of the Clayton Act. In Connecticut, that point may well be reached when and if savings banks become significant participants in the marketing of bank services to commercial enterprises. But . . . we hold that such a point has not yet been reached (418 US at 666).

Delineating the relevant product line requires examination of both supply and demand factors. Commercial banks provide many products and services, and their ability to raise the profit margin on any given item depends largely on the number of alternative suppliers of a product or service. Other things being equal, banks would enjoy greater market power for such services as business checking accounts and unsecured business loans, since they traditionally have been the sole suppliers of such services. This unique position has provided an economic rationale for commercial banks to sell their services in clusters.

On the demand side of the market, buyers have a financial incentive to purchase several services at a single commercial bank if the convenience of one-stop banking is not offset by greater benefits elsewhere. The presumed time savings of one-stop banking seems to have diminished. In the past decade, branch offices have been opened in many new locations.[6]

High interest rates have encouraged individuals and businesses to minimize non-interest-bearing money balances and to maximize returns on savings. The introduction of telephone transfer accounts has enabled customers to transfer funds from savings accounts to checking accounts within banks and from institution to institution. In addition, recent legislation has expanded the powers of thrifts. The Depository Institutions Deregulation and Monetary Control Act of 1980 authorizes thrifts to offer transaction accounts, credit cards, trusts, and other services. Regulation Q, which is being phased out because of the Monetary Control Act, permits S&Ls to pay 0.25 percent more than banks for some types of time and savings deposits. Interest-rate ceilings on time and savings deposits eventually will be eliminated; thrift institutions thus are losing their interest-rate advantage. In addition, the Garn-St Germain Depository Institutions Act of 1982 allows thrifts to extend business loans and provide checking accounts to loan customers. The net effect of such legislation is likely to make S&Ls more competitive with banks for services used by commercial customers.

II. Service Profile

Data for this study were derived from a survey of small businesses that was conducted in the spring of 1981.[7] The firms were selected randomly from the *1981 Ohio Industrial Directory* and the yellow pages of Ohio telephone directories. Nearly two-thirds of the 528 survey respondents reported assets of less than $500,000, and nearly one-half had sales of less than $500,000. The respondents were located in 78 of the 88 counties in Ohio. Three out of four respondents had been in business for over ten years, and four out of five respondents were corporations. Many firms reported being involved in more than one type of business, such as retail and wholesale; the most common type was manufacturing, followed by retail.

The survey respondents acquired an average of 5.2 services from financial institutions, such as checking accounts, time and savings accounts, secured and unsecured loans, night depository, coin and currency, and credit cards (see table 1). Although commercial banks were the predomi-

6. Between 1970 and 1981, the number of S&L offices in the United States increased by over 12,000, or 138 percent, while the number of banking offices increased by over 20,000, or 57 percent.

7. A small business is defined as a firm with less than $5 million in total assets. For additional information on the survey sample and an overview of the results, see Paul R. Watro, "Financial Services and Small Businesses," *Economic Commentary,* Federal Reserve Bank of Cleveland, January 11, 1982.

Table 1 Financial Services and Market Share

Financial services	Services used by respondents			Market share, percent[a]			
	Total	Average	Reported sources[b]	Banks	S&Ls	Finance companies	Other institutions[c]
Total services[d]	2,771	5.25	2,750	87.9	7.8	2.3	2.0
Deposit accounts	1,140	2.15	1,135	84.7	14.3	0.2	0.8
Demand	600	1.14	598	98.8	1.2	0	0
Savings	348	0.66	346	68.5	29.8	0.3	1.4
Time (CDs)	191	0.36	161	70.0	27.4	0.5	2.1
Loans[e]	676	1.28	665	90.1	5.9	2.4	1.8
Unsecured short-term	182	0.34	180	97.8	1.7	0.6	0
Unsecured term	97	0.18	95	92.6	3.2	2.1	2.1
Secured short-term	136	0.25	132	94.7	0.8	3.8	0.8
Secured term	170	0.32	168	83.9	8.3	4.2	3.6
Construction	91	0.17	90	76.7	18.9	1.1	3.3
Other services	955	1.81	950	90.1	1.6	4.8	3.5
Coin and currency	254	0.48	253	98.0	1.6	0	0.4
Credit card	196	0.37	195	88.7	1.5	4.1	5.6
Night depository	181	0.34	180	98.9	1.1	0	0
Lock box	128	0.24	124	97.6	2.4	0	0
Equipment leasing	97	0.18	96	52.1	0	38.5	9.4
Trust	40	0.08	40	95.0	2.5	0	2.5
Cash management	26	0.05	26	65.4	0	3.8	30.8
Miscellaneous[f]	33	0.06	33	84.8	3.0	3.0	9.1

a. Market share is based on the number of financial services reported for which a source was identified.
b. The number of services reported for which a source was identified.
c. Includes such institutions as brokers, insurance companies, and leasing companies.
d. Data based on 528 respondents.
e. Loans do not include credit from noninstitutional sources, such as suppliers, customers, and owners.
f. Includes payroll services, repurchase agreements, and safe deposit boxes.

nant suppliers of many services, S&Ls and commercial finance companies provided an alternative source of several services.[8]

At the time of the survey, nearly one out of every four respondents purchased services from S&Ls. While almost every firm maintained a checking account with a bank, many business customers also held time and savings accounts with S&Ls. In fact, S&Ls captured 27 percent of the time deposit accounts (certificates of deposit) and 30 percent of the savings accounts reported by the respondents. Because of their noticeable presence in the savings market, S&Ls accounted for about 15 percent of the respondents' total deposit accounts.

S&Ls also competed with banks for loans, but to a lesser degree. S&Ls captured almost 20 percent of the construction loans and 10 percent of the secured loans written for more than one year. In addition to S&L competition, commercial finance companies extended about 5 percent of the secured loans and nearly 40 percent of the equipment leases made to the sample of small business customers.

8. These survey findings are generally consistent with the results of a similar survey of small businesses in Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee (see Whitehead 1982, pp. 44-45). The latter survey was conducted by the Federal Reserve Bank of Atlanta. The survey findings showed that S&Ls captured 10 percent of the total secured loans and 6 percent of the total loans acquired from institutional lenders by responding firms. Finance companies held 4 percent of the secured loans and 3 percent of the total loans. The survey did not elicit information about time and savings deposits.

Convenience is an important factor when purchasing financial services. The respondents acquired over 80 percent of their services from financial institutions within their local communities and within five miles of their operations. If respondents became dissatisfied with their current financial institutions, nearly two-thirds would consider obtaining services at banking offices outside their local communities. Firms operating in suburban counties generally had a greater propensity to use, as well as consider using, institutions located outside and at greater distances from their local communities. Consequently, a county in a rural area or a standard metropolitan statistical area (SMSA) in an urban area appears to be a reasonable approximation for a geographical market for the financial services used by small business customers.

III. Factors Affecting Services

The survey data clearly indicate that S&Ls provide financial services to small business customers. It is questionable, however, whether the presence of S&Ls significantly alters the volume of services acquired from commercial banks when other factors are taken into account. The following model was constructed to isolate the impact of S&L competition on the number of services and the percent of debt acquired from banks:

$$S_i = f\ (SLMD,\ CR3,\ FS,\ BT,\ OS,\ BS,\ MG,\ MS,\ FO),$$

where

S_1 = number of financial services acquired from banks,
S_2 = number of deposit accounts and loans obtained from banks,
S_3 = number of deposit accounts held at banks,
S_4 = number of loans acquired from banks,
S_5 = percent of total debt outstanding held by banks,
$SLMD$ = percent of total deposits held by S&Ls in the market,
$CR3$ = percent of banking deposits held by three largest banking organizations in the market,
FS = firm's assets at year-end 1980,
BT = business type dummy (nonmanufacturer = 1; manufacturer = 0),
BS = deposit size of average bank in the market,
OS = organizational structure dummy (noncorporation = 1; corporation = 0),
MG = percent change in personal income in the market between 1974 and 1979,
MS = total deposits held by banks and S&Ls in the market,
FO = number of finance company offices in the market/number of banking offices in the market.

Because of the uncertainty of the importance of different types of services, the number of services is specified in several groups, as listed in S_1 to S_4, along with the percent of debt acquired from banks (S_5). The survey findings indicate that the respondents acquired an average of 4.6 financial services from commercial banks. Among these services the number of deposit accounts and loans was 3.0; deposit accounts, 1.8; and loans, 1.2. The firms that had debt outstanding held 38.7 percent of their total debt with commercial banks.

Many factors influence the volume of services used by small business customers. In light of the hypothesis investigated in this study, the measure of S&L presence in a market is particularly important among the independent variables. The percent of deposits held by S&Ls in a market is used as a measure for S&L competition. If, in fact, S&Ls compete with banks for small business customers, then the number of services that a sample of businesses derives from banks should be negatively related to this measure of S&L competition.

Characteristics of the business firms and financial markets other than the presence of S&Ls also would alter the demand and use of banking services. In addition to the S&L share of deposits in the market, a number of measures are employed as independent variables to control for the effects of other factors that influence the cluster of services used by business firms.

Table 2 Regression Results for Services Acquired from Commercial Banks[a]

Coefficients of independent variables (*t*-values in parentheses)

Variables	Financial services	Deposit accounts and loans	Deposit accounts	Loans	Percent of bank debt
Deposits held by S&Ls in market, percent	-0.02680* (1.86)	-0.02164* (2.27)	-0.01302** (2.40)	-0.00862 (1.19)	-0.42829* (1.87)
Three-bank concentration ratio	0.01114 (1.25)	0.00131 (0.22)	0.00297 (0.89)	-0.00166 (0.37)	-0.07003 (0.49)
Firm size	0.00001^{-2}** (3.71)	0.00001^{-2}** (3.70)	0.00001^{-2}** (3.06)	0.00001^{-2}** (2.58)	0.00001** (2.82)
Nonmanufacturer[b]	0.83954** (3.86)	0.09478 (0.57)	0.05631 (0.60)	0.03847 (0.31)	-8.84297** (2.17)
Noncorporation[b]	-0.52975 (1.62)	-0.45308* (2.10)	-0.16083 (1.31)	-0.29225* (1.78)	-7.94046 (1.46)
Market growth	-0.01573 (0.66)	0.01678 (1.06)	-0.01038 (1.15)	-0.00640 (0.53)	0.31492 (0.83)
Average bank size	-0.00519* (1.74)	-0.00338* (1.72)	-0.00199* (1.77)	-0.00139 (0.93)	-0.01493 (0.31)
Market size	0.00005 (0.74)	0.00003 (0.63)	0.00003 (1.31)	-0.00000 (0.15)	-0.00002 (0.00)
Finance offices/banking offices	-0.58418 (0.57)	-0.28577 (0.42)	-0.19473 (0.50)	-0.09103 (0.18)	-18.98509 (1.15)
Constant	7.53222	6.75660	3.92427	2.83232	23.16579
F-statistic	5.51**	4.91**	3.03**	2.98**	4.02**
Adjusted R^2	0.08	0.07	0.04	0.04	0.08

* Significant at the 5 percent level.
** Significant at the 1 percent level.
a. The regression results were based on 492 observations for financial services; percent of bank debt was based on 342 observations.
b. A two-tail *t*-test was used for the dummy variable; a one-tail *t*-test was used for the other variables.

Economic theory suggests that when a few firms control a large portion of total sales in a market, prices tend to be higher and output lower. Regardless of S&L competition, the volume of services sold by commercial banks would be expected to be negatively related to the bank-concentration ratio. The percent of deposits held by the three or four largest banking organizations in a market is generally a workable measure for the competitiveness in a market.

Firm size is likely to affect the behavior of firms in their use and source of financial services. In this study firm size is measured by total assets at year-end 1980. The sample is limited to firms with less than $5 million in total assets, presuming that larger firms acquired a significant portion of their financial services from banks outside local markets. It was expected that firm size would be directly related to the volume of financial services purchased from commercial banks.

Whether a firm is a manufacturer, retailer, corporation, or proprietor could influence the type and volume of financial services that it purchases. In this study dummy variables were used to indicate the type and the organizational structure of a business. Since many respondents

reported being involved in more than one type of business, the dummy variable was constructed to separate nonmanufacturers from manufacturers. A dummy variable for organizational structure also was used to isolate the effects of being an unincorporated firm on the number of services acquired from banks.

There is no *a priori* reason to expect that retailers would hold more deposit accounts or acquire more loans than manufacturers. However, because retailers are presumed to have a greater demand for services such as coin, currency, and night depository, it follows that they would acquire more total services from commercial banks.

Proprietors and partners might behave relatively more like consumers than firms that are incorporated. Having unlimited liabilities, proprietors would have less incentive to separate their business and personal accounts. If noncorporations consolidate their accounts, they would be less likely to purchase all of their services from commercial banks, given that deposit accounts generally can earn higher interest at S&Ls.

Market growth, which is measured by the percent change in personal income in a market over the past five years, usually influences the volume of services demanded and used by firms. Firms are more likely to expand output in high-growth areas, particularly if they sell most of their products locally. Expanding firms should have greater demand for financial services; therefore, firms in high-growth areas would be expected to acquire a larger number of services from banks than those in low-growth areas.

Bank size is used as a control variable. The volume of financial services acquired from commercial banks is anticipated to be negatively related to the size of the average bank in the market. The cost structures and asset preferences of small banks generally differ from those of larger banks. A recent nationwide survey of bankers indicated that smaller banks devoted a greater portion of their assets to small business lending than did larger banks (see Glassman and Struck 1982). Loan size also was found to be directly related to bank size.

Another control variable is market size. Firms operating in larger market areas might acquire more services, simply because they have a broader base from which to select services. The total amount of deposits held by banks and S&Ls in a given market is utilized as an indicator of market size.

The survey findings show that some firms acquired services from commercial finance companies. It is presumed that firms would use finance companies to a greater degree in market areas that have a greater number of finance company offices. The ratio of finance-company offices to banking offices in a market is used to measure the impact of finance companies on the number of services acquired from commercial banks.

IV. Tests and Results

Multivariate cross-sectional regressions were used to examine the sample of small business firms in Ohio (see table 2). These firms operated in 57 of the state's 66 banking markets, approximated by SMSAs and non-urban counties. The explanatory power of the estimated equations, as indicated by the adjusted R^2, is low; yet, the F-statistic is always significant at the 1 percent level. Most of the variables behave as expected in relation to the number of financial services used by small business firms.

The variable for S&L competition had the anticipated sign, and it was significant in four of the five equations. The percent of S&L deposits in the market noticeably affected the volume of services that small commercial customers obtained from banks, regardless of the type of services. Firms acquired fewer financial services from banks in markets where there was a greater amount of S&L competition.

The number of loans was not significantly influenced by the presence of S&Ls. While firms operating in markets with more S&L competition tended to have fewer bank loans, the coefficient was not significant. Despite this finding, borrowing firms had a lower percentage of their total debt with banks in markets where S&Ls held a larger share of the deposits. The findings

thus suggest that small business customers rely less on commercial banks in market areas where S&Ls hold a greater percent of the deposits.

Four of the eight other variables were significant for some of the service categories. As expected, the size of the average bank in the market was negatively related to the volume of services acquired by firms. Larger firms bought a greater number of all types of banking services and held a larger percentage of bank debt. Although nonmanufacturing firms acquired more services from banks, the ones with debt held a smaller percentage of bank debt than did manufacturing concerns. In addition, noncorporations obtained fewer deposit and credit services from banks.

Table 3 Savings and Loan Presence and Financial Services

Deposits held by S&Ls in market,[a] percent	Bank debt, percent	Estimated number of services acquired from banks[b]: Deposit accounts and loans	Deposit accounts	Total
0	56.4079	3.8538	2.3580	5.6743
10	52.1250	3.6374	2.2278	5.4063
20	47.8421	3.4210	2.0976	5.1383
30	43.5592	3.2046	1.9674	4.8703
40	39.2763	2.9882	1.8372	4.6023
50	34.9934	2.7718	1.7070	4.3343
60	30.7105	2.5554	1.5768	4.0663
70	26.4276	2.3390	1.4466	3.7983
80	22.1447	2.1226	1.3164	3.5303
90	17.8618	1.9062	1.1862	3.2623

a. Hypothetical values.
b. The loan group was not included, because the percent of deposits held by S&Ls in the market did not significantly affect the number of loans acquired from banks. Expected changes in the number of services and the percent of debt acquired from commercial banks are based on the empirical relationships found in the regressions. The mean values were 41.239 for deposits held by S&Ls in the market; 4.5691 for all financial services; 2.9614 for deposit accounts and loans; 1.8211 for deposit accounts; and 38.7456 for percent of bank debt. The relationship was assumed to be linear.

V. Policy Implications

The market-shading approach used by the Board of Governors is certainly preferable to complete exclusion of thrift institutions from the competitive analysis of proposed bank mergers. Such an approach, however, imposes additional regulatory costs on potential merger candidates by making it more difficult to judge which transactions would meet antitrust standards. Some economists and bankers argue that giving limited weight to thrift competition could lead to inaccurate conclusions about the actual competitive conditions in a given marketplace. As a result, some expansion opportunities for banking organizations could be foreclosed, which might not be in the best interests of the public.

S&Ls are becoming increasingly important suppliers of financial services as they have begun to utilize their expanded powers to serve commercial customers. Even before being authorized to make unsecured business loans and provide commercial checking accounts, S&Ls were alternative sources for time and savings accounts and construction loans. More importantly, the volume of services that small firms acquired from commercial banks was significantly affected by the presence of S&Ls in the market. Small firms purchased fewer services from banks if they operated in markets with a larger percent of market deposits held by S&Ls. These findings support the premise that in some market areas thrift competition could be given more weight in the competitive analysis of bank acquisitions and mergers.

The results of this study suggest one method by which the board's subjective market-shading technique could be made more objective. Such objectivity could be achieved by discounting the share of deposits held by banks by a specified amount, based on evidence such as that reported here.[9] The share of total deposits held

9. The empirical work reported for Ohio in this study admittedly should be supported by comparable studies of market areas in other states. For an alternative approach, see Dunham (1982).

Table 4 Adjusting Banks' Market Share for Savings and Loan Competition

Deposits held by S&Ls in market, percent	Percent reduction in market share held by banks[a]			
	Total	Deposit accounts and loans	Deposit accounts	Bank debt
10	4.7	5.6	5.5	7.6
20	9.4	11.2	11.0	15.2
30	14.2	16.8	16.6	22.8
40	18.9	22.5	22.1	30.4
50	23.6	28.1	27.6	38.0
60	28.3	33.7	33.1	45.6
70	33.1	39.3	38.7	53.1
80	37.8	44.9	44.2	60.7
90	42.5	50.5	49.7	68.3

a. These values are based on the expected percent reduction in the number of financial services and the percent of debt acquired from banks, as listed in table 3. Although the relationship was assumed to be linear, market share reductions do not necessarily change proportionally because numbers are rounded to one decimal place.

by S&Ls in Ohio's banking markets ranged between 0 percent and 57.2 percent, or an average of 41.2 percent. On average, small firms bought 4.6 total financial services, held 3.0 deposit accounts and loans and 1.8 deposit accounts, and maintained 38.7 percent of their debt with commercial banks. If no S&Ls operated in a particular market, commercial customers would be expected to acquire an average of 5.7 financial services, 3.9 deposits and loans, 2.4 deposit accounts, and 56.4 percent of their total debt from banks. The number of services and percent of debt acquired from banks would be expected to change according to the percent of market deposits maintained by S&Ls (see table 3). The absolute changes in the number of services or percent of bank debt can be transformed to percent changes and utilized as a basis for discounting market share of banks for evaluating the competitive effects of bank mergers and acquisitions (see table 4).

Let us assume that seven banking organizations operate in a given banking market, and these banks hold deposits (in millions of dollars) of $40, $20, $15, $10, $8, $4, and $3 in the market. Since deposits in the market total $100 million, the dollar volume of deposits of each bank is equivalent to its market share. Let us also assume that S&Ls operate in the market and hold deposits of $100 million. Among the banks in this market, only three possible mergers would meet the Justice Department's guidelines.[10] The smallest bank could merge with either the second or third smallest bank; or, the second and third smallest banks could merge. While other mergers could be challenged by the Justice Department, banking regulatory agencies would not necessarily deny these mergers if other competitive factors, such as thrift competition, were considered.

It was estimated that small firms would acquire between 24 percent and 38 percent less services from commercial banks (depending on the type of service) if S&Ls held 50 percent of the total deposits of banks and S&Ls in the market. Using deposits and loans as a basis for adjustment, each bank's market share would be reduced by 28 percent to account for competitive effects of S&Ls. Consequently, the adjusted market shares for the seven banks would be 28.8, 14.4, 10.8, 7.2, 5.8, 2.9, and 2.2 percent, respectively.[11] Given these lower

10. The Justice Department's guidelines depend on the post-merger value of the Herfindahl-Hirschman index (HHI), which is calculated using the market shares of the banks operating in the market. The post-merger HHI equals

$$\sum_{i=1}^{n} MS_i^2 + 2\, MS_a MS_b ,$$

where MS_i is the market share of bank$_i$ in the market, n is the number of banks in the market, and $MS_a MS_b$ is the market share of the merging banks. Mergers violate the guidelines and might be challenged when the HHI changes by 100 or more in moderately concentrated markets (HHI between 1,000 and 1,800) or by 50 or more in concentrated markets (HHI greater than 1,800). It also should be noted that the Justice Department analyzes bank competition at both the retail and wholesale levels. At the retail level S&Ls are included as full competitors of commercial banks, whereas at the wholesale level S&Ls are generally not considered. However, a proposed merger will be denied if it is expected to have a substantially anti-competitive effect in either the wholesale or retail sector.

11. Of course, the sum of the shares would not equal 100 percent, but only 100 percent minus the discount factor, in this case 72.1 percent.

shares, four additional mergers would meet the Justice Department's guidelines and probably would be approved by banking regulators.

Making the market-shading process more explicit would tend to increase the number of potential bank mergers that would meet the Justice Department's merger guidelines. Such a policy change could foster more mergers among competing banks, but these acquisitions generally would be in markets where S&Ls have a greater percentage of deposits. Mergers between banks in the same market are not necessarily anti-competitive. If a merger would form an institution that could reduce its operating costs, the merger actually could be pro-competitive, particularly if there were a large number of strong competitors in that market.[12]

The Board of Governors and other regulatory agencies probably will consider thrift institutions as full competitors of commercial banks when and if these institutions become actively involved with commercial lending and business checking accounts. Until that time, it would seem appropriate to give partial weight to thrift institutions according to the share of deposits that they hold in the marketplace.

12. The empirical studies on economies of scale, however, indicate the lowest average cost per unit is generally reached at deposits of $25 million.

References

Benston, George J., Gerald A. Hanweck, and David B. Humphrey. "Operating Costs in Commercial Banking," *Economic Review,* Federal Reserve Bank of Atlanta, November 1982, pp. 6-21.

Bleier, Michael E., and Robert A. Eisenbeis. "Commercial Banking as the 'Line of Commerce' and the Role of Thrifts," *Banking Law Journal,* vol. 98, no. 4 (April 1981), pp. 374-86.

Cummings, F. Jay. "Commercial Banking as a Line of Commerce: Time for Change?," *Economic Review,* Federal Reserve Bank of Dallas, September 1982, pp. 11-20.

Dunham, Constance. "Thrift Institutions and Commercial Bank Mergers," *New England Economic Review,* Federal Reserve Bank of Boston, Nov./Dec. 1982, pp. 45-62.

Eisenbeis, Robert A. "Regulatory Agencies' Approaches to the 'Line of Commerce'," *Economic Review,* Federal Reserve Bank of Atlanta, April 1982, pp. 20-27.

Glassman, Cynthia A., and Peter L. Struck. "Survey of Commercial Bank Lending to Small Business," in *Studies of Small Business Finance,* Interagency Task Force on Small Business Finance, January 1982.

King, B. Frank. "Review of Empirical Literature," *Economic Review,* Federal Reserve Bank of Atlanta, April 1982, pp. 35-40.

United States v. *Connecticut National Bank,* 418 U.S. 656 (1974).

United States v. *Philadelphia National Bank,* 374 U.S. 321 (1963).

United States v. *Phillipsburg National Bank and Trust Company,* 399 U.S. 350 (1970).

Whitehead, David D. "The Sixth District Survey of Small Business Credit," *Economic Review,* Federal Reserve Bank of Atlanta, April 1982, pp. 42-48.

Whitehead, David D., III, and Wen-Fu P. Shih. "A Sixth District Survey of Small Business Credit: Empirical Evidence on the 'Line of Commerce' Controversy," *Proceedings of a Conference on Bank Structure and Competition,* Federal Reserve Bank of Chicago, April 12-14, 1982, pp. 166-80.

Working Paper Review

Michael L. Bagshaw and William T. Gavin, **Stability in a Model of Staggered-Reserve Accounting,** Working Paper 8202, August 1982, 27 pp. Bibliography.

Critics of staggered-reserve accounting have used simple models to show that a disturbance to deposits with no change in total reserves sets in motion an undamped cycle in which deposits oscillate above and below the equilibrium implied by the total reserve target. In this paper a simple reduced-form model of the money-supply process is used to investigate the nature of the dynamic process implied by staggered-reserve accounting, as follows:

$$(1)\quad M_t = M_{t-1} - pn(RRN_{t-1} - ARN_{t-1}) - d(M_{t-1} - 1/q\ TR) - e_t .$$

$$(2)\quad ARS_t = q/n \sum_{i=0}^{n-1} M_{t-i} - \sum_{i=1}^{n-1} ARN_{t-1}.$$

$$(3)\quad ARN_t = (TR - ARS_t)/(n - 1).$$

where

- M = the money supply
- TR = total reserves
- RRN = required reserves of a typical non-settling group
- ARN = actual reserves of a typical non-settling group
- ARS = actual reserves of the settling banks
- e = exogenous shocks
- p = proportion of reserve imbalance that banks try to make up in one period
- d = adjustment by banks to a deviation of the money supply from target
- q = required reserve ratio
- n = number of banking groups and number of weeks in the reserve accounting period.

The parameters in the model include the number of banking groups in the staggered regime, the reserve requirement, the response of banks to their own reserve position, and the response of banks to a deviation of the money supply from target.

Classical stability algorithms are used to find the range of parameters for which the model is stable. In this paper, the model is considered to be stable if the reduced-form difference equation for the money supply represents a converging process.

The results confirm the presence of a perpetual cycle found by others. This perpetual cycle depends on two special conditions: the first is that there are only two groups of banks in the staggering arrangement; the second is that banks ignore information about the money supply and Federal Reserve policy in making their asset portfolio decisions. When the model is extended to include more than two banking groups, or when banks are allowed to react to aggregate information, the money supply converges to the target level following a disturbance to equilibrium.

Copies of the working paper are available from the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, OH 44101.

Economic Commentary

The Federal Reserve Bank of Cleveland publishes an informative research periodical called *Economic Commentary*. Following is a list of titles published since January 1982. If you are interested in receiving this publication on a regular basis, or if you are interested in a specific issue, please contact our Public Information Center, Federal Reserve Bank of Cleveland, P.O. Box 6387, Cleveland, OH 44101.

Title	Author(s)	Date
Financial Services and Small Businesses	Paul R. Watro	1/11/82
Methods of Cash Management	John B. Carlson	4/05/82
Unemployment Insurance: An Old Lesson for the New Federalism?	Michael F. Bryan	4/19/82
Bank Holding Companies' Participation in Credit Insurance Underwriting	Paul R. Watro	5/03/82
The Steel Trigger Price Mechanism	Gerald H. Anderson	5/17/82
The Problem of Seasonally Adjusting Money	John B. Carlson	5/31/82
Performance of Ohio's Independent Banks	Gary Whalen	6/14/82
Union Wage Concessions	Daniel A. Littman	6/28/82
Anatomy of a Price-Fix	Michael F. Bryan	7/12/82
The Strength of Consumer Balance Sheets	K.J. Kowalewski	7/26/82
Safe-Harbor Leasing: Separating the Wheat from the Chaff	Amy L. Kerka and Owen F. Humpage	10/04/82
The Shift to Western Coal	Gerald H. Anderson	10/18/82
Do Deficits Cause Inflation?	Owen F. Humpage	11/01/82
Social Security: Issues and Options	Amy Kerka	1/10/83
Soil Conservation: Market Failure and Program Performance	Paul Gary Wyckoff	1/24/83
Issues in the 1983 Auto-Sales Outlook	Michael F. Bryan	3/07/83

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

BULK RATE
U.S. Postage Paid
Cleveland, OH
Permit No. 385

Address Correction Requested: Please send corrected mailing label to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, Ohio 44101.