

A TIME SERIES ANALYSIS OF BUSINESS LOANS AT LARGE COMMERCIAL BANKS

In the normal course of operations, businesses are often required to supplement their internally generated cash flows with borrowed funds, making them significant participants in the short-term credit markets. Such short-term business credit is generally sought to help meet current expenses associated with the production process—so-called production credit—although at times it may be used as a substitute for long-term debt. During periods when it is difficult or expensive to raise capital through the sale of stocks and bonds, for example, short-term debt may be incurred to help finance investments in plant and equipment. These various requirements for short-term financing are satisfied with the help of a number of specialized financial organizations, including commercial finance companies, factors, commercial paper dealers, and commercial banks. Of first importance among these different types of financial organizations, however, are the commercial banks. They have supplied approximately a third of all new debt raised by nonfinancial business corporations since 1970 in the form of short-term loans.

Commercial banking has a traditional orientation toward business lending, and in fact its origins are closely associated with the development of trade and commerce. Even though commercial banking as we know it today is a diversified industry organized to engage in a wide variety of financial services, the traditional orientation remains strong. Expertise in business lending is, without a doubt, most highly developed within the banking industry, and business loans constitute the single most important use of bank funds. In mid-1974, for example, commercial and industrial loans at all U. S. commercial banks accounted for 35.9 percent of total loans and 20.0 percent of total assets. Inclusion of short-term construction loans secured by real estate would further increase the significance of these figures on business lending at commercial banks.

Business loans constitute an important part of total bank credit, which in turn is recognized as an important factor affecting real economic activity. Since the ultimate policy goals of the Federal Reserve relate to real economic activity, it is quite natural for the System to be concerned with movements in bank credit in general and bank business credit in particular. Furthermore, bank credit is a variable over

which the Federal Reserve can exercise a certain degree of control, and it has been recognized as an explicit target of policy since 1966. Broadly speaking, bank credit and the money supply are the aggregates that receive primary attention in System policy deliberations. It is through these aggregates, and through financial market conditions, that monetary policy is transmitted to the real sector of the nation's economy. Private business economists are also interested in bank business credit because of what it can reveal about real economic activity and about the effects of monetary stabilization policy. Businessmen and bankers pay close attention to movements in bank business credit in order that they may gain a better understanding of the market conditions that have a direct impact upon their affairs as borrowers and lenders.

In short, due to their significance as a large component of bank credit and because of their direct connection with the production process, bank business loans attract wide attention as an economic indicator. Their availability in a useful statistical form is a matter of general interest.

One of the most widely used series on bank business loans is derived from the weekly report of condition as filed by a national sample of large commercial banks. This is the commercial and industrial (C&I) loan series, which includes all business loans as defined in Schedule A Item 5 of the regular Report of Condition.¹ The weekly sample can be disaggregated to yield C&I loan data for fourteen sub-groups of banks, one for each of the Federal Reserve Districts and one each for reporting banks in New York City and Chicago. Although these data, in various forms, are accumulated and reported in several places, in actual practice the focus of attention for many observers is the immediately available unadjusted data.² This is particularly true in the

¹ Included are all loans made by banks for commercial and industrial purposes, secured or unsecured, except those secured by real estate. As such, they may include open lines of credit, transaction loans, working capital loans, revolving credits and term loans.

² Complete condition statements for reporting banks in New York City, reporting banks outside New York City, and all reporting banks are published with a one-month lag in the *Federal Reserve Bulletin*. Figures are given for each week of the month, each week of the prior month, and each week of the like month a year earlier. Seasonally adjusted monthly averages of C&I loans outstanding for all reporting banks are published as lagging indicator 72 in the *Business Conditions Digest*; seasonally adjusted monthly averages of net changes in C&I loans at all reporting banks are published as leading indicator 112.

case of data for the twelve reporting banks in New York City. The unadjusted New York City data are considered by many to be a bellwether for nationwide conditions in C&I loans and are often used, especially in the business community, as a basis for judgments about credit market conditions generally. Unfortunately, this C&I loan series may at times be misleading. Its widespread usage suggests that the basic differences between the behavior of C&I loan portfolios at New York City banks and portfolios at other banks is not clearly understood.³

This article compares C&I loans outstanding over time for two groups of banks which together constitute the entire sample of large reporting banks: the twelve New York City reporters (NYC banks) and all reporting banks exclusive of those in New York City (all other banks). Its purpose is to describe the nature of differences in business lending between these two groups of banks and to determine the extent of such differences. Differences in business lending activity between money center and regional banking organizations will be revealed, and an indication will be provided as to whether or not the NYC banks provide a useful proxy for such lending activity in other areas of the country.

The analysis considers monthly average data for the period 1966-1974, a relatively short span by time series standards but remarkably long given the frequency of changes in the large reporting bank sample. The traditional method of analysis of economic time series, which separates the influences on data movements into four distinct components—irregular, seasonal, trend, and cyclical—is employed. After modifying the irregular or random data values and determining the seasonal component, which is accomplished using the ratio to moving average technique, the data are fitted to a function approximating their long-run trend. This process yields a set of residual values that represent the cyclical component of the data. A comparison is made of the seasonal, trend, and cyclical elements in the data between the two groups of banks.⁴

³A recent example of such misunderstanding occurred in the summer of 1974, when prevailing thinking in the investment community centered analytical attention on the C&I loan data of weekly reporting New York banks. The stock market developed an acute sensitivity to these data, even though they were not truly representative of conditions at all banks. For a discussion of this situation and its implications, see Richard A. Debs, "On Fed Watching," *Monthly Review*, Federal Reserve Bank of New York, Vol. 56, No. 10, October 1974, 243-47.

⁴Although not discussed in this article, a parallel analysis has been conducted using weekly data observations over the 1966-1974 period. These data, which consist of 470 observations for each group of banks, are seasonally adjusted using an interpolative procedure that relies upon the monthly average seasonally adjusted data for benchmarks. The regression results obtained in the trend-cycle part of the study are almost identical to those obtained using monthly data. The detailed results of this parallel analysis, including weekly seasonal factors, are available to the interested reader upon request.

Before undertaking this statistical analysis, however, a background examination of the information source upon which this article is based is in order.

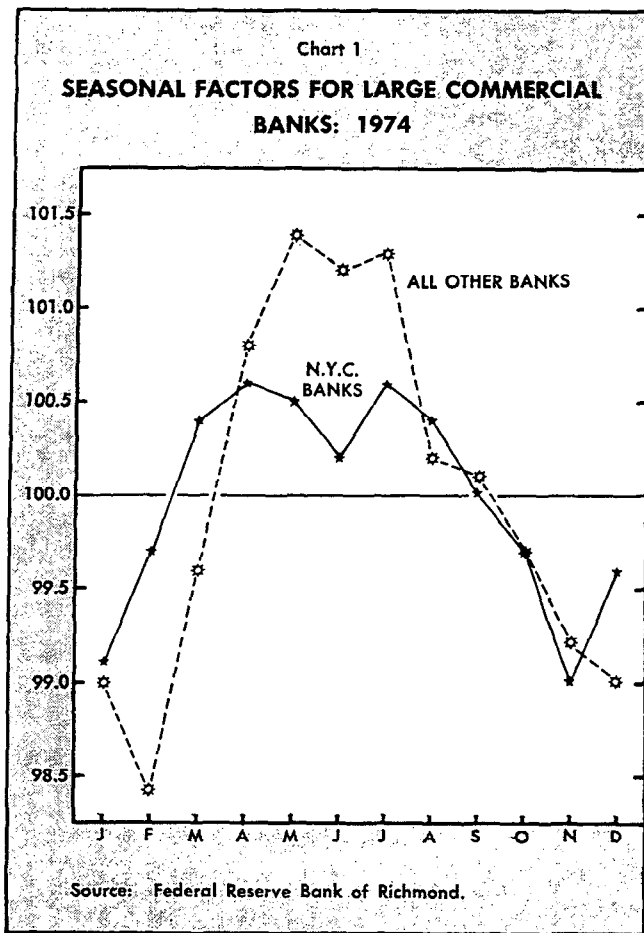
THE LARGE COMMERCIAL BANK WEEKLY CONDITION REPORT

The weekly condition report is completed, on a voluntary participation basis, by approximately 335 banks around the nation, twelve of which are located in New York City.⁵ Although small in number, compared with the approximately 14,500 banks that operate in the U. S., these sample institutions include most of the nation's largest banks and together they account for about 60 percent of total banking resources. The weekly condition report, which is completed as of the close of business each Wednesday, is patterned after the mid-year and year-end Report of Condition, and individual items are defined in the same way on both statements. After being completed by the respondent banks, the reports are mailed to the Federal Reserve Banks with intended arrival not later than the following Tuesday; there the information is edited, consolidated and forwarded to the Board of Governors. Aggregate national data and District breakdowns are published by the Board with one week's delay in the H.4.2 release.

Special handling procedures in effect for the reporting banks in New York City and Chicago allow their data to be released on the Thursday following the statement date. The respective Reserve Banks release this information with only one day's delay, as does the Board in its H.4.3 release.

The origins of the large commercial bank reporting series reach back to 1917, when the Federal Reserve first began collecting selected balance sheet information from certain member banks on a weekly basis. As would naturally be expected, a number of revisions have occurred since the inception of the sample, affecting both the composition of reporting banks and the basic report format. Such revisions have damaged the time series continuity of the data, and their existence demands that careful attention be given to considerations of data comparability. A major change in sample composition was effected in December 1965 that places a constraint on any time series study of C&I loan data. At year-end 1965, the sample of weekly reporting banks was redrawn to include all commercial banks (member and non-

⁵Included in the twelve are: Amalgamated Bank of New York, The Bank of New York, Bankers Trust Company, The Chase Manhattan Bank N.A., Chemical Bank, First National City Bank, Irving Trust Company, Manufacturers Hanover Trust Company, Marine Midland Bank-New York, Morgan Guaranty Trust Company, Sterling National Bank, and U. S. Trust Company.



member) with deposits of \$100 million or more as of December 31, 1965.⁶ Although a minority of banks in this classification declined to participate in the reporting series, the change in sample composition did broaden the scope of coverage to a considerable degree.

In mid-1969 another substantive change occurred, this time affecting reporting format.⁷ Fortunately for the present study, C&I loans were not significantly affected by this change, which was designed to bring the weekly condition report into conformity with alterations made to the official Report of Condition. Thus, the C&I loan data can be considered free of any major disturbances due to official action back through 1966.

There remains, however, another potential source of error that could render the C&I loan data inconsistent over the 1966-1974 period. This concerns uncontrollable changes in the sample due to (infrequent) withdrawals from the survey by participating

banks or, more commonly, to mergers and spin-offs involving participants. A procedure called "adjustment bank" is used to help maintain intra-year data comparability and to document and correct for the effects of such sample changes over time. This procedure, which is described in detail in Appendix I, has effectively preserved the comparability of C&I loan data since 1966.

SEASONALITY IN COMMERCIAL AND INDUSTRIAL LOANS

Seasonal variation is a periodic movement that repeats itself regularly in a time series within yearly periods. In the case of C&I loans, such variation has its origin in the most basic determinants of business credit demand. More specifically, the short-term credit needs of business are affected by the influence of the seasons on the production process (especially in agri-business), and in some industries the need for credit is very responsive to seasonal changes in final product demand. In order to account for the influence of seasonal patterns on C&I loans, the original data, consisting of 109 monthly observations for each group of banks under study, are seasonally adjusted using the U. S. Bureau of the Census' X-11 Variant of Census Method II adjustment program. In the process, irregular or randomly occurring values are eliminated and replaced by less erratic modified values. The X-11 program, a ratio to moving average method of seasonal adjustment, is widely used to determine the effects of seasonality on economic time series.⁸

The adjustment process yields a set of seasonal factors, one for each data observation, stated in terms of a neutral factor of unity, or 100.0. Dividing each original data value by its seasonal factor yields a corresponding adjusted data value. Factors that fall below the 100.0 neutral value reflect months of seasonally depressed loan volume; their effect is to increase the original data observations by the amount necessary to compensate for this depressing effect. Conversely, those factors that are above 100.0 reflect months of seasonally inflated loan volume; their effect is to compensate for this expansionary influence by reducing the level of the original data observation to one in which the seasonality is neutralized. Thus, factor values below 100.0 correct for negative seasonality while those above 100.0 correct for positive seasonality. Seasonal patterns for any given data series may change over time, and in fact the factors

⁶ "Revision of Weekly Reporting Member Bank Series," *Federal Reserve Bulletin*, Vol. 52, No. 8, August 1966, 1137-40.

⁷ "Revision of Weekly Series for Commercial Banks," *Federal Reserve Bulletin*, Vol. 55, Part 2, No. 8, August 1969, 642-46.

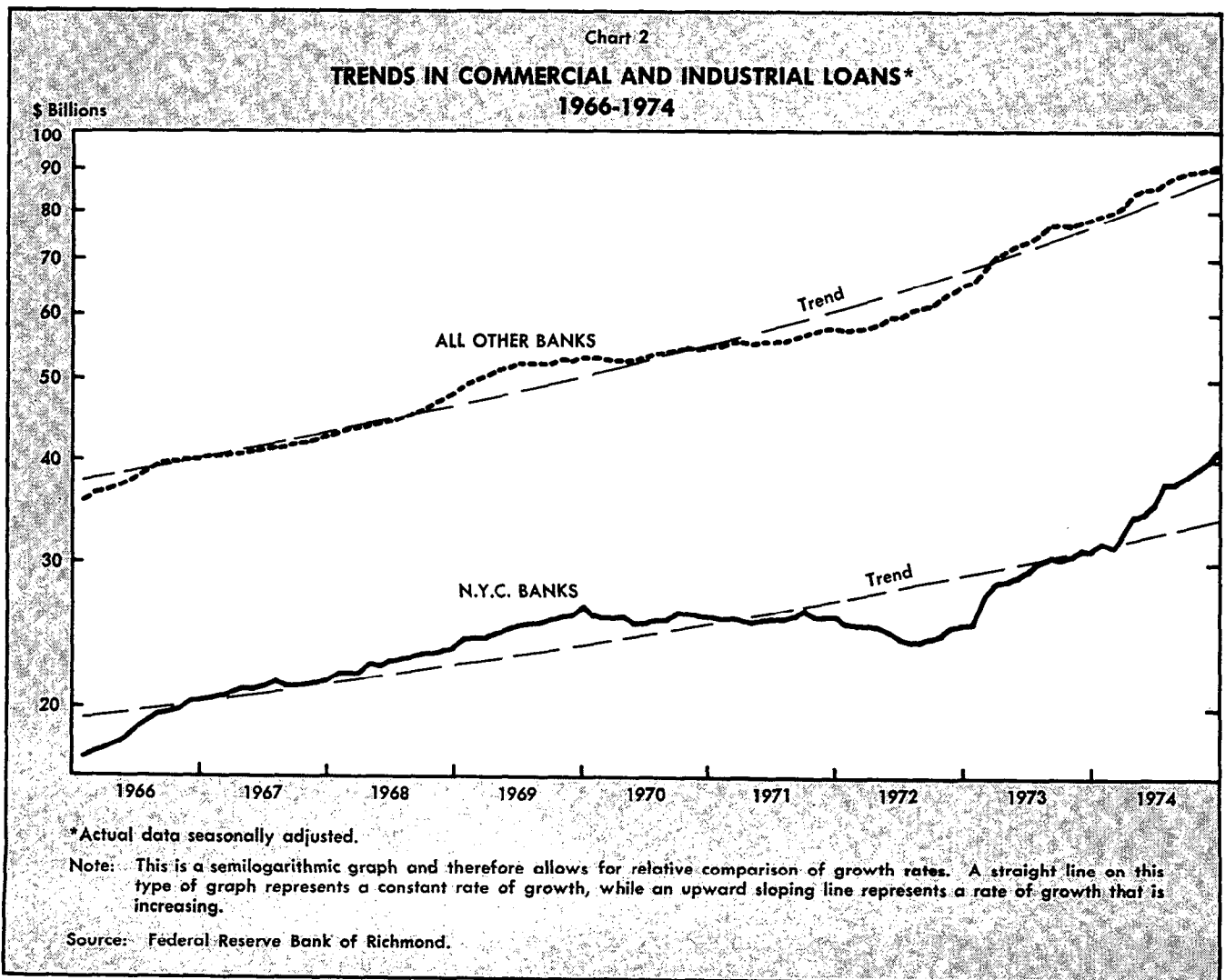
⁸ The ratio to moving average principle underlying the X-11 method of seasonal adjustment is described in William E. Cullison, "A Seasonally Adjusted World—The Census Seasonal Adjustment Technique," *Monthly Review*, Federal Reserve Bank of Richmond, August 1970, pp. 2-8.

that apply to the early years of the C&I loan data are different from those that apply to later years. Current seasonal patterns are of primary interest here, so the monthly factors for 1974 will be examined in detail.

Chart 1 displays the 1974 monthly seasonal factors for NYC banks and all other banks. It is evident that in most months the gap between monthly factors is rather large. This is especially true in February, March, May, June, July, and December. The gap is most pronounced in February, when the net difference between seasonal factors reaches 1.3. The net differences in seasonal factors are most prevalent during the summer months, when the New York City banks show consistently less positive seasonality than the other banks.

The monthly factors for each group of banks do, however, generally share the same relation to the 100.0 neutral position. Both groups of banks follow the same basic seasonal pattern that is common to

business lending at most commercial banks. Loan volume is seasonally depressed beginning in the fall and this situation continues into the spring, with some increased activity possible during December. In late spring, loan demand intensifies, with volume reaching its seasonal peak in the summer. From this point it tapers off into the slack fall period, beginning another seasonal cycle. In only two months, March and September, does the seasonal effect result in opposing corrections at banks within and outside of New York City. Since the pace of seasonal activity quickens faster at the New York City banks as spring approaches, their loan volume requires a correction for positive seasonality in March, while the same correction for all other banks is delayed until April. Again, when lending activity slackens in the fall, the New York City banks reach in September a point where the influence of positive seasonality is lost, but all other banks do not reach this point until October.



Perhaps of greatest concern when interpreting the meaning of unadjusted C&I loan data, as far as the seasonal data component is concerned, are differences in the direction of seasonal changes between different groups of banks. Such differences occur in Chart 1 in the periods January-February, April-May, and November-December. In each of these periods the data observations for one group of banks will display exactly the opposite seasonal movement that exists for the other group. To take the January-February period as an example and assuming, for purposes of simplification, that the seasonal effect predominates over trend and cycle influences, exclusive reliance on C&I loan data for NYC banks would indicate that loan demands were increasing. This indication would certainly not apply to banks outside New York City, where the seasonal decline from peak summer demand periods had not yet turned around.

Although the seasonal factors discussed above may seem small insofar as their adjustment impact is concerned, it should be remembered that their application is to levels of loans outstanding. The level adjustment that occurs may be quite large in relation to changes in levels between periods.⁹

TRENDS IN COMMERCIAL AND INDUSTRIAL LOANS

Correction for seasonal influences results in a set of deseasonalized data that retain only trend and cycle characteristics. These data, for NYC banks and all other banks, are represented by the uneven but rising lines in Chart 2. The trend for each group of banks is computed from these data by arriving at a specific functional relationship that best explains the smooth long-term growth pattern in C&I loans (the dependent variable) in terms of time (the independent variable).

Examination of the deseasonalized data plotted in Chart 2 suggests that both groups of banks have been growing over time, and furthermore that both have been experiencing growth at an increasing rate. This indicates a possible hyperbolic relationship in which the earlier data values are increasing at a slower rate than the later data values. Such a relationship is expressed by the equation

$$Y = \frac{1}{a+bX},$$

where $Y =$ C&I loans and $X =$ time. Trend lines

⁹ The analytical results based on weekly data, mentioned in footnote 4, show that 28.4 percent of the average amount of change between weeks for the NYC banks is due to seasonal variation. For all other banks 21.0 percent of the average change between weeks is seasonal in nature. Within any given year, of course, seasonal influences are expected not to change the average level of the data; that is, the seasonal factors for any given year should average to 100.0.

fitted to the deseasonalized data using this functional relationship are also shown in Chart 2.¹⁰

Perusal of the trend lines in Chart 2 makes it clear that, since 1966, the twelve banks in New York City have not expanded their business loan volume nearly as fast as the other banks. In fact, based on the fitted data in the trends, the NYC banks have experienced C&I loan growth at a compounded annual rate of 6.49 percent versus 9.96 percent for all other banks. This growth differential has been recognized in recent years and is most often attributed to the emergence of a number of large regional banking organizations that are quite aggressive in their efforts to do business on a nationwide basis. Their success and increasing importance as suppliers of short-term credit to business, which has been at least partly at the expense of financial center banking organizations, is clearly illustrated in Chart 2. This success is due in part to the competitive loan terms offered by regional banks. Another factor at work is the effort made by many large companies to diversify their banking relationships, thus creating a buffer during periods of tight credit.¹¹

These underlying trends in the data have acted to make C&I loan behavior at NYC banks a downwardly biased estimator of national conditions, at least since 1966. To the extent that the conditions which have retarded C&I loan growth at NYC banks persist and intensify, this downward bias can be expected to continue.

CYCLES IN COMMERCIAL AND INDUSTRIAL LOANS

The regression equations used to fit the trend lines illustrated in Chart 2 also yield a set of residual terms, one for each original observation, that represent the cyclical component in the data. These residual terms are equal to the difference between the

¹⁰ The regressions were run using the transformed equation

$$\frac{1}{Y} = a + bX,$$

with the following results:

$$(1) \frac{1}{\text{NYC C\&I}} = \frac{52.00}{(96.13)} + \frac{(-0.20)X}{(-24.52)}$$

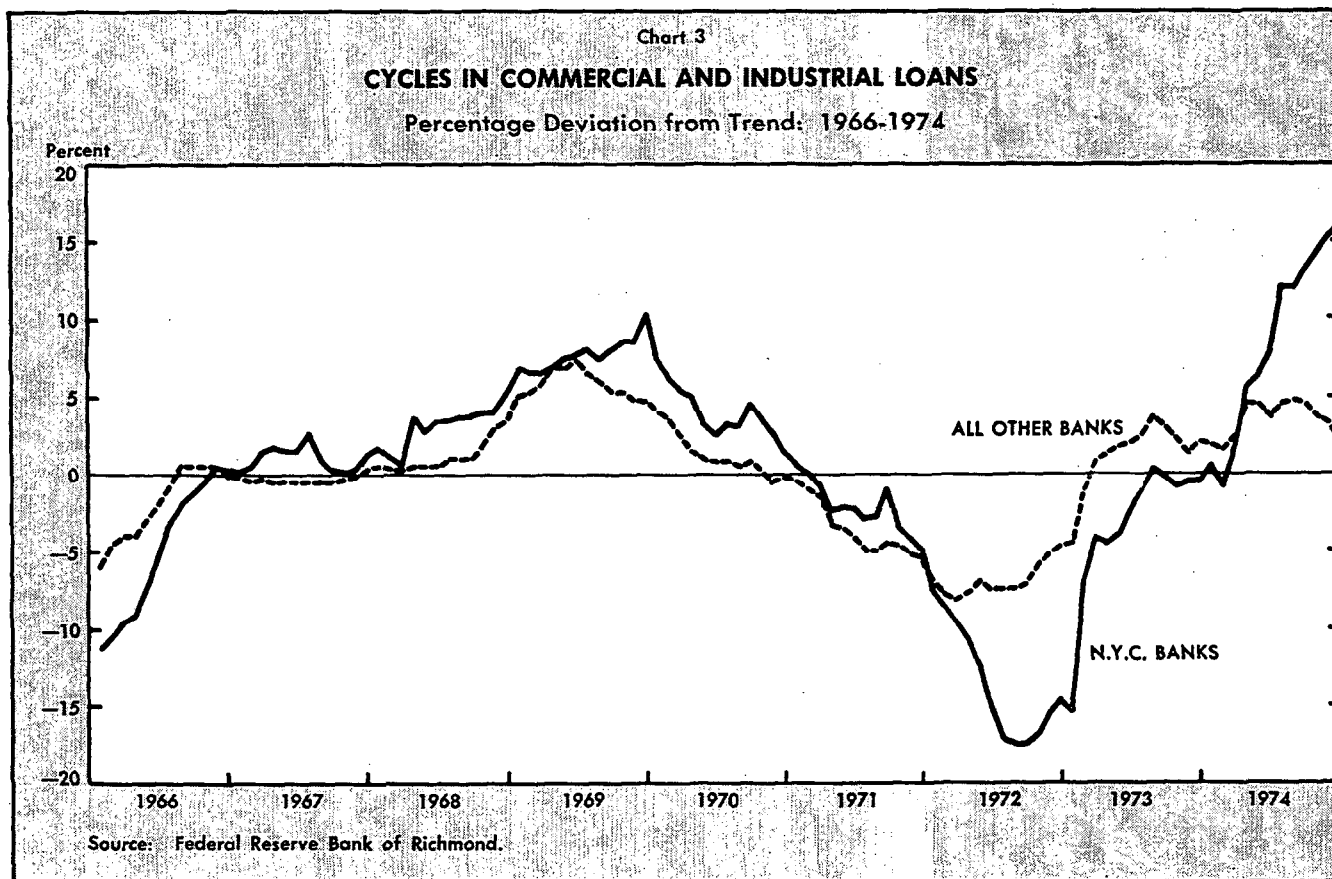
$$\frac{-2}{r} = 0.84 \quad SE = 2.75 \quad DW = 0.04$$

$$(2) \frac{1}{\text{all other C\&I}} = \frac{26.79}{(196.70)} + \frac{(-0.14)X}{(-66.52)}$$

$$\frac{-2}{r} = 0.97 \quad SE = 0.69 \quad DW = 0.03$$

Note that the high autocorrelation in the residual terms is an expected result, indicating clear cyclical patterns in the series. Since one objective of this study is to capture and examine the cyclical patterns, any attempt to improve the Durbin-Watson statistic would be counterproductive. Use of these equations for forecasting would require application of the autocorrelative correction factor, rho.

¹¹ These issues are covered in Ronald E. Wooley, "What Has Happened to Business Loans," *The Bankers Magazine*, Vol. 156, No. 1, Winter 1973, 22-25.



fitted, or trend values, and the actual data, and are visible as deviations from trend in Chart 2. The residuals are plotted in Chart 3 as percentage deviations from trend. This form of expression permits relative comparisons of the cycles at NYC banks and the other banks.

Chart 3 calls into question the usefulness of the NYC C&I loan series as a generalized economic indicator. Although the chart shows that the direction of cyclical movements in C&I loans at NYC banks and all other banks is similar, it also shows that the relative magnitude of the cycle is much greater at banks in the New York City group.¹² A possible explanation for the greater cyclical sensitivity at NYC banks is that their loans are not as broadly based across industry groups as those at regional institutions. In addition, during the period covered, cyclical turning points at banks outside New York City have tended to lead cyclical turning points at the NYC banks. This later characteristic indicates that the regional loan data provide a better advance index than do New York City loan data.

¹² This is also suggested by the relatively large standard error of the regression for equation (1) in footnote 10.

SUMMARY AND CONCLUSIONS

Commercial banks represent the single most important source of supply of short-term business credit, and commercial and industrial loans are closely monitored by researchers and businessmen. The most timely source of data on commercial and industrial loans is derived from the weekly report of condition of large commercial banks. In actual practice this data is often used in unadjusted form, and the twelve reporting banks in New York City are considered by many to serve as a good indicator of national market conditions for business loans. This article conducts a time series analysis of commercial and industrial loans for two groups of banks that constitute the large commercial bank weekly sample: the twelve banks located in New York City and those in other areas of the nation. In the process, the influences that determine the time path of commercial and industrial loans are defined and analyzed, and differences in business lending between money center and regional banks are portrayed.

Although patterns of business lending between New York City banks and other banks around the country are similar in many respects, their differences are significant enough to cause misunderstanding

when exclusive reliance is placed upon movements in commercial and industrial loans in New York City. The differences in business lending between groups of banks can be viewed as being of three types, one corresponding to each of the statistical components that account for major data movements over time.

In two months, March and September, the seasonal influences affecting loan volume result in a different relation to the neutral factor at the two groups of banks. Furthermore, in the periods January-February, April-May, and November-December, the direction of seasonal movements is reversed for the two groups. These seasonal influences have a fairly large impact on the data: it is estimated that seasonality accounts for over 20 percent of week-to-week changes in commercial and industrial loans.

Since 1966, the New York City banks have increased their commercial and industrial loan volume

at a trend rate of only 6.49 percent, considerably below the 9.96 percent rate at other banks. This disparity in trend rates is attributed to the development of large and aggressive regional banking organizations and to the efforts of many companies to diversify their banking relationships.

Cyclical patterns in lending are similar for both groups of banks except that (1) the relative magnitude of the cycle is much greater for banks in New York City and (2) cyclical turning points in loan activity at NYC banks tend to lag behind those of loans at banks outside New York City.

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APPENDIX I

ADJUSTMENT BANK PROCEDURES

The reporting panel for the survey of large commercial banks changes from time to time, principally because of mergers, and these changes affect the comparability of the data derived from the survey. The "adjustment bank" procedure is applied when such sample changes occur. It is designed to help maintain intra-year data comparability and to correct the effects that these types of sample changes have on the data over time.

Adjustment figures (negative for mergers and positive for spin-offs and withdrawals) are noted when they occur and are applied to subsequently reported weekly figures for the balance of the year. These adjustment figures are accumulated through the year and are applied with a reverse sign at the beginning of the year following the one in which they occur, causing a level change at the beginning of each new year. The procedure thus causes accumulated disturbances of random magnitude and direction at regular yearly intervals.

The beginning of year accumulated adjustments can be positive (if the merger effect predominates) or negative (if the spin-off or withdrawal effects predominate). Since 1966, such level changes for C&I loans at the two groups of banks examined in this article have not been significant enough to seriously disrupt statistical analysis.

It should be noted that the adjustment bank procedure does not fully neutralize the residual growth effects that accompany uncontrollable sample changes. For example, in the event of a merger, the as of date reduction figure remains constant throughout the year. Any growth attributable to the enlarged sample base is not (and cannot be) counter-balanced. As a result, the earlier in the year a merger occurs, the greater is the inaccuracy of subsequent figures due to the growth effect. This distorting effect on the data, which is certainly minimal, has its primary impact on the trend and cycle components in the C&I loan data.