DEMAND DEPOSITS: A COMPARISON OF THE BEHAVIOR OF HOUSEHOLD AND BUSINESS BALANCES

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Demand deposits held by households and nonfinancial businesses account for nearly 70 percent of all demand balances and about one-quarter of the commercial banking system's total deposits. Since they represent an important source of bank funds, an understanding of the behavior of these two categories of demand deposits is of great operational significance to liabilities managers. Short-run variation in these balances must be accommodated by adjusting the secondary reserve position of a bank or by engaging in offsetting transactions in the market for purchased funds. Moreover, applying knowledge about the underlying trends in demand deposits of different ownership classes can aid in forecasting future balance sheet changes.

Privately held demand deposits also represent a large part of the money supply. If there are significant differences in the behavior of balances owned by households and businesses, then understanding these differences could help in interpreting money supply changes. Financial analysts interested in explaining money stock movements, therefore, also have reason to compare the behavior of household and business demand balances.

The purpose of this article is to describe and explain some of the major types of variation in demand deposit balances. It will be shown that there are significant differences in both the short- and long-run behavior of demand balances owned by households and businesses, and that these differences have implications for the efficiency with which commercial bank liabilities are managed.[1]

The article is organized in four sections. The first section briefly reviews changes in the composition of the banking system's liabilities since the late 1940's. Section two describes the survey data that provide information on private demand deposits by ownership class. Section three analyzes sources of long- and short-run variation in household and nonfinancial business demand balances over the period 1971-1978. Specific topics addressed in this section include the trend-cycle behavior of demand deposits, differences in deposit behavior by bank size, and the influence of seasonality. The final section summarizes the article's main conclusions.

HISTORICAL CHANGES IN BANK LIABILITIES

Table I summarizes secular changes in commercial bank liabilities starting in the late 1940's and extending through 1978. Over this period, net total deposits of all commercial banks, defined as total demand and time deposits exclusive of deposits due to other commercial banks, increased from $132.4 billion to $918.9 billion, or at a compounded annual rate of 7.16 percent. This growth rate, while substantial, nonetheless failed to match the compounded annual increase in total assets of 7.64 percent. Consequently, total deposits as a percent of total assets fell from nearly 86 percent in 1950 to about 76 percent in 1978, as is shown in column 2 of Table I. This erosion in the deposit share of total bank liabilities was made up with nondeposit sources of funds, e.g., Eurodollars, Federal funds purchases and repurchase agreements, and the like. These nondeposit sources of funds do not generally come under the Regulation Q limitations placed on interest payments.

While total deposits were declining in importance on the banking system's balance sheet, the composition of deposit liabilities was also undergoing dramatic change. This trend is reflected in columns 3 and 4 of Table I, which show, respectively, the dollar amount of IPC (individuals, partnerships, and corporations) demand deposits and such deposits as a percent of net total demand and time deposits. Private demand deposits declined from almost 61 percent of net total deposits in 1950 to just over 30

[1] This analysis of demand deposits complements other recent work [3, 4] dealing with the behavior of various categories of bank and thrift institution time deposit liabilities.

Table I

SECULAR CHANGES IN COMMERCIAL BANK LIABILITIES

Period	(1) Net Total Deposits[1] Billions of dollars[2]	(2) Net Total Deposits[1] Percent of total assets	(3) IPC Demand Deposits Billions of dollars[2]	(4) IPC Demand Deposits Percent of net total deposits	(5) Household Demand Deposits[3] Billions of dollars	(6) Household Demand Deposits[3] Percent of IPC demand deposits	(7) Nonfinancial Business Demand Deposits[3] Billions of dollars	(8) Nonfinancial Business Demand Deposits[3] Percent of IPC demand deposits
1947-49	—	—	—	—	—	27.5	—	57.3
1950	132.4	85.6	80.7	60.9	—	—	—	—
1952-55	—	—	—	—	—	28.6	—	55.1
1955	168.3	85.2	98.9	58.8	—	—	—	—
1957-60	—	—	—	—	—	29.6	—	53.6
1960	201.7	82.9	110.6	54.8	—	—	—	—
1961	—	—	—	—	—	29.7	—	53.4
1965	298.6	83.8	125.6	42.1	—	—	—	—
1970	413.4	77.3	165.4	40.0	49.0	29.6	85.3	51.6
1971	474.6	79.1	176.8	37.2	56.2	31.8	89.6	50.7
1972	526.4	78.8	189.6	36.0	60.5	31.9	97.6	51.5
1973	599.0	77.7	206.4	34.4	67.3	32.6	106.6	51.6
1974	668.3	75.5	216.3	32.4	71.4	33.0	112.1	51.8
1975	711.8	76.4	232.1	32.6	74.8	33.2	115.1	49.6
1976	744.6	77.2	236.6	31.8	78.8	33.3	121.2	51.2
1977	818.1	76.1	252.9	30.9	84.1	33.3	129.2	51.1
1978	918.9	75.6	279.8	30.4	92.9	33.2	137.7	49.2

[1] Total deposits net of funds due to banks.

[2] The data are for all commercial banks as of the mid-year call report.

[3] The data for the years 1947 through 1961 are estimates derived from surveys that measured deposit ownership distribution on a single day in late January of each year. Multi-year periods are averages of these data. Data for the years 1970-78 are estimates derived from the current DDOS and are daily averages of figures for June of each year. Percentages for the periods 1947-49, 1952-55, 1957-60, and 1961 are from the **Federal Reserve Bulletin**, (June 1971), p. 459.

Sources: **Federal Reserve Bulletin; FDIC, Assets and Liabilities.**

percent in 1978. This large drop in the ratio of private demand deposits to net total deposits reflects a major shift in public preferences from noninterest-earning demand balances to time balances. Growth in other types of demand deposits, primarily government deposits, did not increase over this period. While not shown here, the ratio of private demand deposits to total demand deposits net of interbank balances remained fairly constant at around 80 to 83 percent between 1950 and 1978.

The increase in IPC demand deposits in column 3 of Table I from $80.7 billion to $279.8 billion represents a compound annual rate of increase of only 4.54 percent, versus 9.39 percent for total time deposits. It should be noted that total time deposits include all time deposits, ranging from regular savings to negotiable certificates of deposit (CD's). The growth rates on these different types of time deposits have varied depending, among other things, on market interest rates relative to Regulation Q interest rate ceilings and bank innovations in the deposit area. For example, the negotiable CD became a major source of bank funds only in the early 1960's, when an active secondary market opened for such instruments. This institutional change helps explain the acceleration in the rate of decline in the share of private demand to total deposits that occurred between the decade of the 1950's and the decade of the 1960's. The IPC demand deposit share declined by only 6.1 percentage points in the 1950's but then by 14.8 percentage points during the 1960's. Also, Regulation Q deposit rate ceilings were increased by steps beginning in the early 1970's [4], further helping explain the continued, although somewhat slower, erosion in the demand deposit share. The IPC demand deposit share declined 9.6 percentage points during the eight-year period 1970-78.

Ownership of private demand deposit balances at commercial banks is dominated by two groups, households and nonfinancial businesses. Together, they accounted for about $230 billion or 82 percent of total private demand deposit balances in 1978. The last four columns of Table I summarize the behavior of household and nonfinancial business balances from 1947-49 through 1978. A consistent data series on demand deposits by ownership class is available only

from 1970. These data are shown in columns 5 and 7 for households and nonfinancial businesses, respectively. Households account for roughly one-third of total private demand deposits, while nonfinancial businesses account for roughly one-half. The remaining proportion of total private demand deposits, something between 15 and 20 percent, is owned by various other groups, e.g., financial businesses and foreigners.

The shares of private demand deposits owned by households and nonfinancial businesses, shown in columns 6 and 8 of Table I, have not been steady over time. Household deposits have been growing relatively faster than business deposits for a number of years. In fact, the compound annual rate of growth of household demand deposits over the eight-year period 1970-78 is 8.32 percent, about a third greater than the 6.17 percent rate for nonfinancial business deposits. In the last three years of this period, however, the growth rate of household demand deposits decelerated to 7.49 percent while the nonfinancial business demand deposit growth rate remained steady. This change in relative growth rates is reflected in the stabilization of the household share of IPC demand deposits at about 33.2 to 33.3 percent starting in 1975.

THE DEMAND DEPOSIT OWNERSHIP SURVEY

Detailed information on the classification of privately owned commercial bank deposits is, with one exception, not available from the regular reports required of all banks. Schedule F of the Consolidated Report of Condition requires separate reporting of savings balances owned by "individuals and nonprofit organizations" and "corporations and other profit organizations." Separate reporting of demand and time deposits by ownership classification is not required. In the case of time deposits, however, deposits greater than $100,000 in size are listed on the face of the report in a memorandum item. This allows separation of time balances into small and large deposit categories, a division which probably reflects the distinction between individual versus corporate and governmental ownership fairly accurately. In the case of demand deposits, however, no such distinctions are possible.

Table I suggested that the behavior of private demand deposits varies significantly by ownership class. One source of information, namely the Demand Deposit Ownership Survey (DDOS), allows analysis of private demand deposits by ownership classification. This section will briefly describe the survey and its relationship to published money stock data.[2]

The DDOS, begun in June 1970, is based on a nationwide sample of banks stratified by size. These sample data are used to develop estimates of demand deposits by ownership class. Large weekly reporting banks report daily data for each month, while the smaller banks report daily data for the last month of each quarter. Using these reports, it is possible to make daily average estimates of monthly IPC deposit ownership at large banks, and daily average estimates for the last month of each quarter of IPC deposit ownership at all banks. These estimates are published in the *Federal Reserve Bulletin*. It has been noted [6] that the first 6 months of data collected under the survey may be unreliable due to start-up reporting and editing problems.

DDOS reporting banks classify IPC demand deposits into five ownership categories: financial businesses, nonfinancial businesses, consumer, foreign, and all other domestic depositors. The nonfinancial business and consumer data for June of each year are listed in Table I. These two categories are the largest of the five. The nonfinancial business category includes both industrial and professional accounts. The consumer category includes individual and family accounts, as well as personal trust accounts not under the control of bank trust departments.

DDOS data differ from published money stock data in three important respects. First, M_1 includes not only demand deposits but also currency. Second, the demand deposit component of M_1 includes not only IPC deposits but several other categories as well, e.g., state and local government demand deposits and demand deposits of foreign banks. Finally, and most important, the demand deposit component of M_1 is adjusted to exclude cash items in process of collection (CIPC) and Federal Reserve float. DDOS deposit data include CIPC and float. After taking these various differences into account, it is possible to arrive at a close reconciliation of DDOS private demand deposit data and the private demand deposit component of M_1. It has been shown that total IPC demand deposits, as estimated quarterly from the DDOS, differ from an estimate of gross IPC deposits derived from M_1 by an average of only .4 percent over the period starting in the third quarter of 1970 and ending in the first quarter of 1976 [6].

[2] This summary is based on two articles prepared by the staff of the Federal Reserve Board [6, 11].

ANALYSIS OF VARIATION IN PRIVATE DEMAND DEPOSITS

Very little analytical use has been made of the DDOS, probably because of the relatively short history of the data series. Now, however, several years of data covering the 1970's are available for analysis. This section of the article examines and compares the behavior of household and nonfinancial business demand deposits using DDOS data.

Explaining Changes in Demand Deposits The composition of the banking system's balance sheet largely reflects the preferences of individuals and businesses for incurring certain types of financial liabilities (bank loans) and holding certain types of financial assets (bank deposits). One type of financial asset held with the banking system, namely demand deposits, accounts for about three-quarters of M_1, which is the narrowly defined money stock. It is useful, therefore, to relate changes in private demand deposits to some of the key factors that are considered important in explaining the demand for money. These factors include real income, the average price level, the opportunity cost of holding money (demand deposits), and institutional arrangements in the financial system. While the significance of the various economic factors is clear, institutional arrangements require a bit more description.

Institutional arrangements influencing the public's holdings of demand deposits include the regulations under which suppliers of demand deposits operate and the availability of money substitutes. The most significant regulation is Regulation Q, which governs the amount of interest that can be paid on various categories of bank deposits. Under Regulation Q, interest payments on demand deposit balances are expressly prohibited. This feature of the institutional background to money demand has been unchanged since 1933. Other aspects of the institutional environment, however, are changing rapidly. In particular, recent years have witnessed the introduction of a number of financial innovations that are either close substitutes for demand deposits or that allow the public to economize on demand deposit balances. Examples pertaining to households include NOW accounts, which are direct substitutes for demand deposits, and automatic transfer services, which permit the convenient and low cost transfer of funds into and out of demand accounts.[3] In the case of businesses, cash management and short-term investment services are often used to reduce average demand balances.[4] The net effect of such financial innovations is to reduce the public's need for demand deposit balances.

Table II

ANNUAL RATE OF CHANGE IN DEMAND DEPOSIT BALANCES MINUS ANNUAL RATE OF CHANGE IN NOMINAL GNP[1]

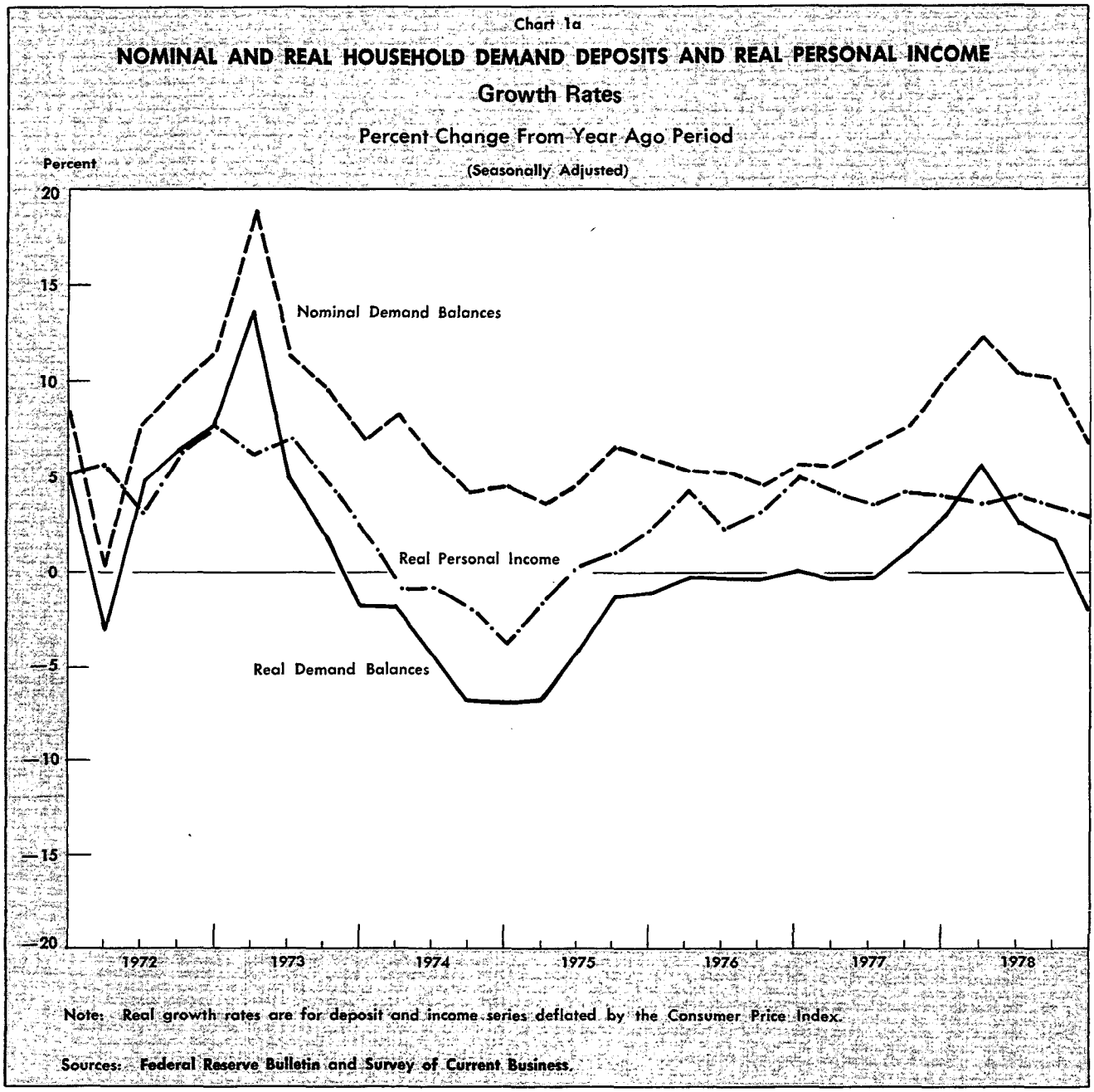
Period	Households	Nonfinancial Businesses
1971 IV	0.03	− 3.07
1972 I	− 7.79	− 0.99
II	− 1.40	− 0.14
III	0.00	0.99
IV	0.31	0.62
1973 I	6.61	− 1.33
II	− 0.63	− 2.72
III	− 2.23	− 5.36
IV	− 4.56	− 5.63
1974 I	− 0.43	− 3.45
II	− 2.10	− 3.11
III	− 3.71	− 3.04
IV	− 1.83	− 4.09
1975 I	− 0.69	− 1.66
II	0.59	− 1.59
III	− 3.91	− 6.24
IV	− 5.76	− 6.24
1976 I	−10.92	−11.38
II	−11.55	−11.68
III	− 4.94	− 6.39
IV	− 3.78	− 5.40
1977 I	− 3.99	− 2.67
II	− 4.05	− 4.25
III	− 3.83	− 6.84
IV	− 1.87	− 2.14
1978 I	2.30	− 5.14
II	− 1.37	− 5.29
III	− 1.17	− 0.46
IV	− 5.91	− 6.05

[1] Percentage change from the same quarter one year ago.

The combined effects of these economic and institutional factors on demand deposits can be calculated approximately using the concept of deposit velocity. There are two variations of the concept of velocity, namely income velocity and transactions velocity. Income velocity is calculated by dividing the stock of demand deposits into nominal income, while transactions velocity is proxied by dividing average de-

[3] See [1] for a discussion of the background to and implications of automatic transfer services. The U. S. Circuit Court for the District of Columbia ruled on April 20, 1979 that automatic transfer services are not authorized under current law, but gave until January 1, 1980 for banks to comply with the order.

[4] See [5] for a comprehensive discussion of the cash management techniques currently available to businesses. It is clear from reading Garvy and Blyn [7] that corporate cash management opportunities have been developing for many years.



mand deposit balances into total debits against demand deposit accounts for a specified period. Both variations measure essentially the same thing, i.e., the efficiency with which demand deposits are used. An increase in velocity, for instance, signifies that nominal income and/or transactions are increasing faster than nominal demand deposit balances. The income and transactions velocity of demand deposits are highly correlated and have been increasing steadily in the period since World War II [7]. This upward trend in velocity likely reflects the increased opportunity costs of holding money as well as the increased availability of close substitutes for demand deposits. Later in this article, the concept of velocity will be used to interpret the significance of differences between household and business demand deposit and income growth rates.

Trends and Cycles in Demand Deposits The data reviewed in Table I indicated that private demand deposits have grown constantly over the past three decades, but that this growth has fallen short of

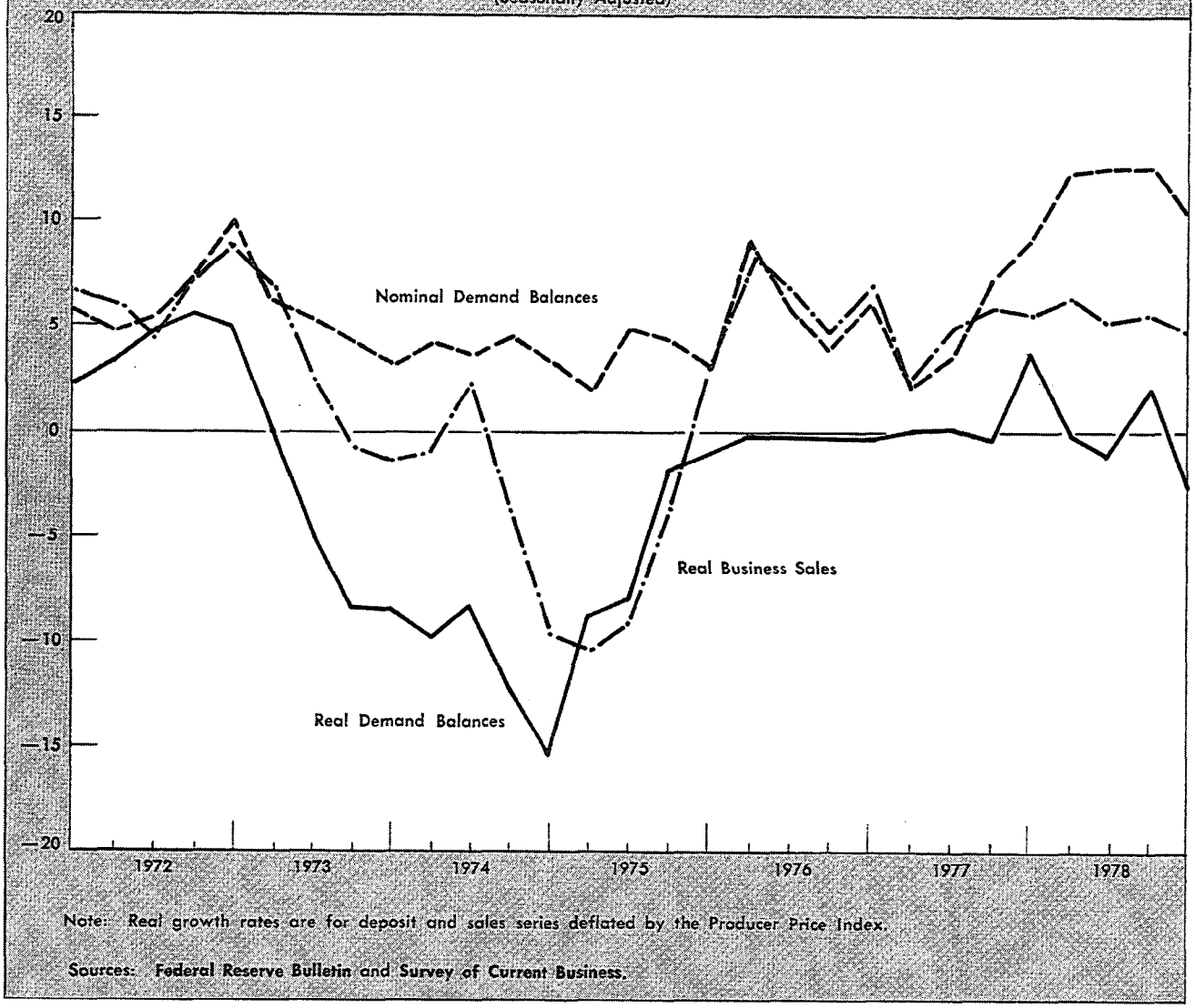
Chart 1b

NOMINAL AND REAL NONFINANCIAL BUSINESS DEMAND DEPOSITS AND REAL BUSINESS SALES

Growth Rates

Percent Change From Year Ago Period

(Seasonally Adjusted)



Note: Real growth rates are for deposit and sales series deflated by the Producer Price Index.

Sources: Federal Reserve Bulletin and Survey of Current Business.

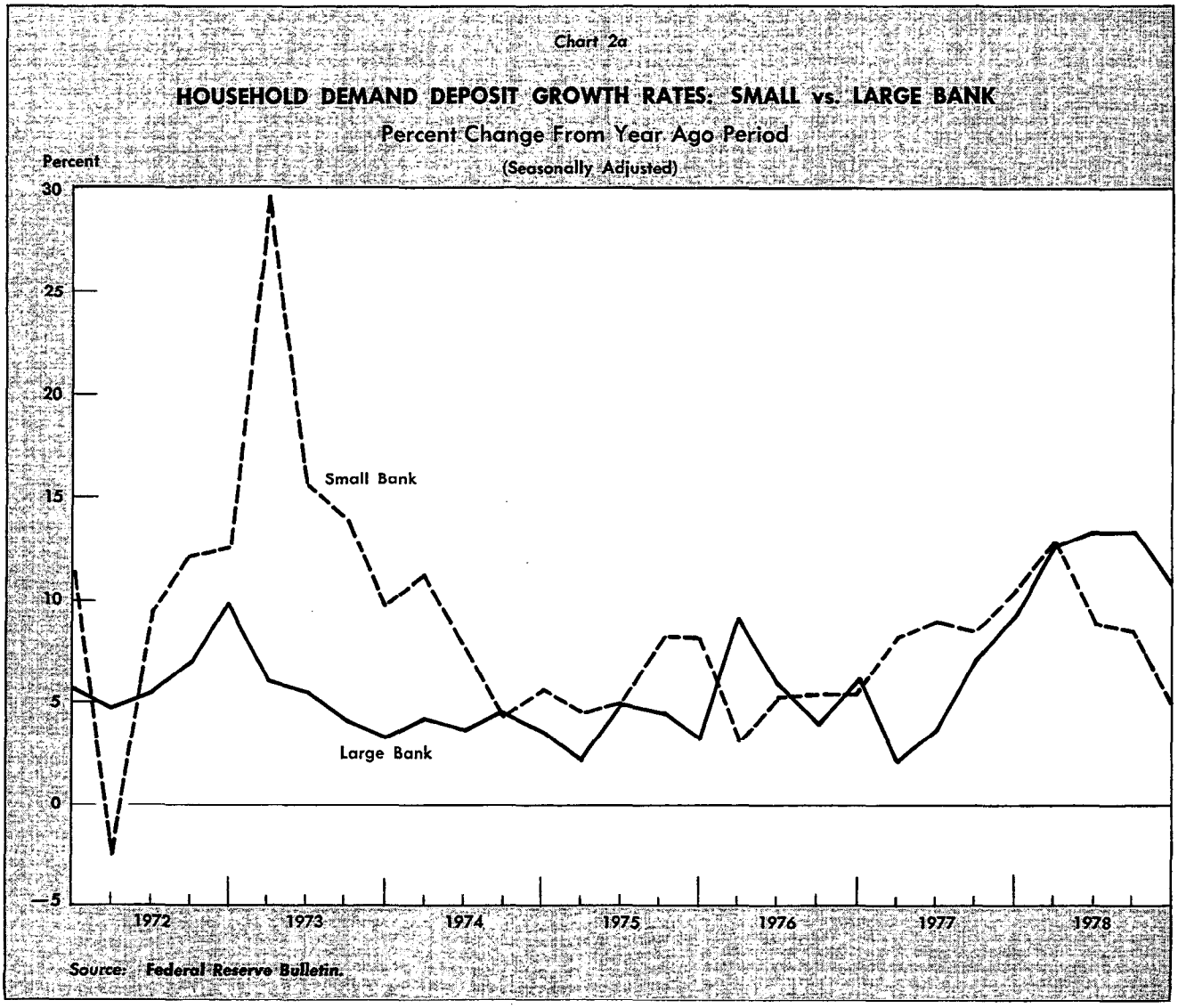
the growth in time deposits. Moreover, the data indicated that trend growth has differed for household and nonfinancial business demand deposit balances.

As mentioned earlier, real income and the average price level are two key economic factors explaining the public's desired holdings of demand deposits. These factors are separate components of nominal, or current dollar income. The real component of nominal income explains real changes in purchasing power, while the price component explains changes due simply to inflation. The information in Table II is intended to help show the influence of nominal income changes on demand deposits. Table II lists the difference between the annual rates of change, measured as the percent change from the same quarterly level one year ago, between (1) household demand deposits and nominal GNP and (2) nonfinancial business demand deposits and nominal GNP. The period covered is 1971 IV through 1978 IV and the deposit and nominal GNP data used to compute the growth rates are seasonally adjusted. The growth

rates for nominal GNP and both household and nonfinancial business demand deposits are all positive over this period.

If demand deposit balances were growing at roughly the same rate as nominal income, then the values of the differences in deposit and nominal GNP growth rates listed in Table II would all fall around zero. Clearly, this is not the case. With only several exceptions, most of which are clustered in the early 1970's, the differences are negative. This shows that both household and nonfinancial business demand deposit balances have been growing at rates below those for nominal GNP. The average shortfall from nominal GNP growth is 2.71 percentage points for household balances and 3.96 percentage points for nonfinancial business balances. The implication of this information for liabilities managers is that prospective changes in nominal income can provide a guide to the outlook for demand deposits. Moreover, the larger shortfall for business balances suggests that the factors explaining demand deposit growth have influenced the business sector differently than the household sector. In view of these differences, it would be interesting to examine the behavior of these two major sectors more closely.

Charts 1a and 1b each plot two series of quarterly demand deposit growth rates for households and nonfinancial businesses, respectively. These series are for nominal deposits and real deposits, or nominal balances deflated by a price index. In addition, Chart 1a shows a plot of the annual growth rate in real personal income while Chart 1b shows a plot of the growth rate in real business sales. The real income and sales series are assumed to be good



proxies for the volume of transactions entered into by the household and nonfinancial business sectors, respectively. The price deflator used for households is the Consumer Price Index, and that used for businesses is the Producer Price Index. These charts are useful for separating the effects of price level changes from real factors on public decisions about the quantity of demand balances held.

Assuming that demand deposits are held to finance transactions, the demand for such balances can be related to the volume of transactions and the average price per transaction. Other things being equal, a rise in the average price level would require a proportionate rise in checking balances if a steady volume of real transactions is to be maintained. Likewise, an increase in the volume of real transactions would also require a proportionate rise in checking balances held, all other things being equal. Compare first the nominal demand deposit growth rates with the real demand deposit growth rates for households on Chart 1a and the nominal demand deposit growth rates with the real demand deposit growth rates for nonfinancial businesses on Chart 1b. The real deposit growth rates are almost always lower than the nominal growth rates for both households and businesses. These comparisons show that inflation is an important factor explaining growth in the public's transactions balances. To what extent, however, do changes in real income and transactions explain changes in price deflated demand deposit balances?

Compare now the real demand deposit growth rates with the real income growth rates for households on Chart 1a and the real demand deposit growth rates with the real sales growth rates for nonfinancial businesses on Chart 1b. With only one exception in the period starting 1973 II, the growth rates for real personal income in Chart 1a exceed the growth rates for household real demand balances (the exception is 1978 I). With only three exceptions in the period starting 1972 III, the growth rates for real business sales in Chart 1b exceed the growth rates for nonfinancial business real demand balances (the exceptions are 1975 I-III). Thus, it appears that, since at least mid-1973 in the case of households and the end of 1972 in the case of nonfinancial businesses, growth in real demand deposit balances has been less than growth in the volume of real transactions. The amount by which real demand deposit growth has fallen short of growth in real transactions, moreover, has been substantial. Since

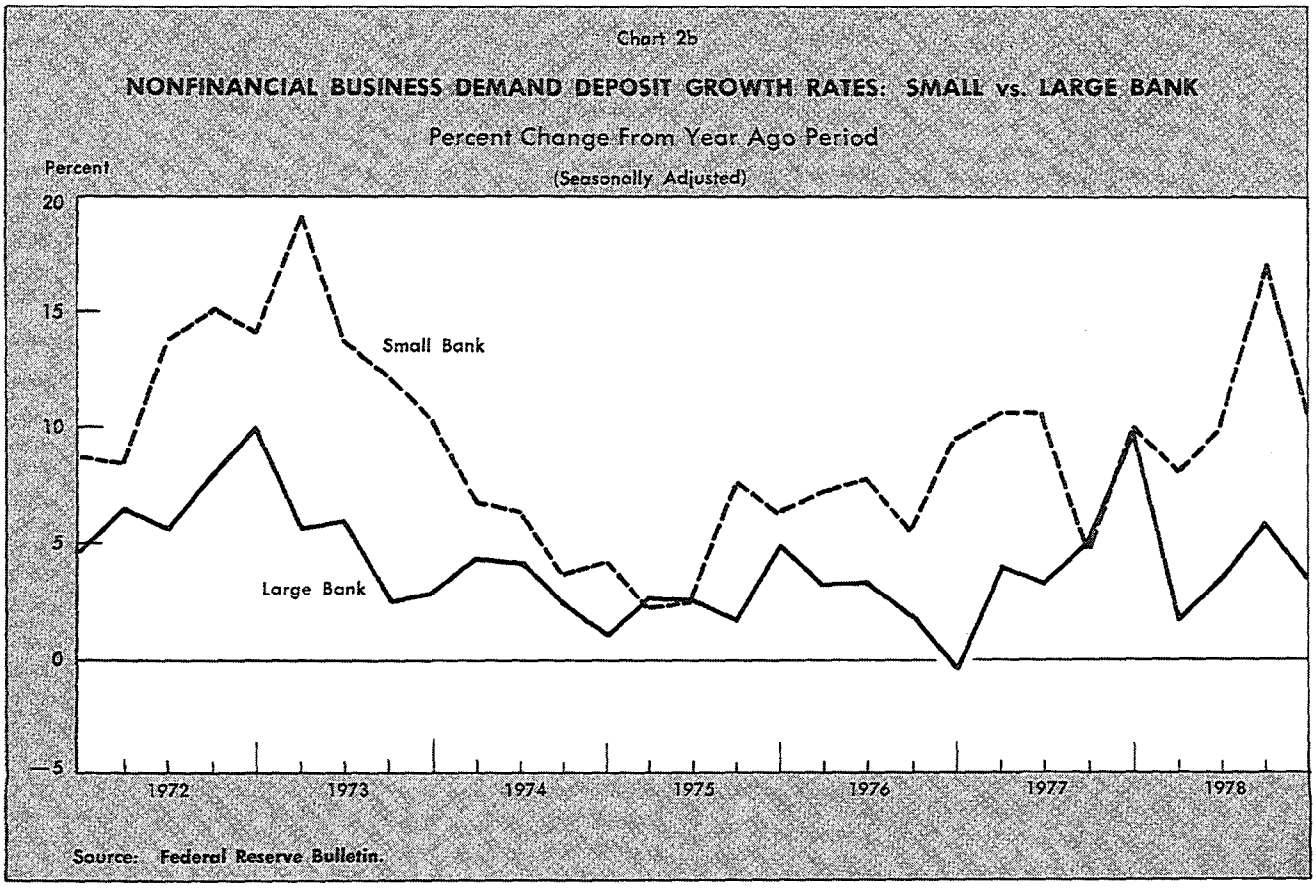


Table III

DEMAND DEPOSIT STABILITY AT SMALL AND LARGE BANKS

DEMAND DEPOSITS OF HOUSEHOLDS

	$\bar{R}^2$	SER/Mean of dependent variable
Small bank	.962	.0102
Large bank	.967	.0070

DEMAND DEPOSITS OF NONFINANCIAL BUSINESSES

	$\bar{R}^2$	SER/Mean of dependent variable
Small bank	.975	.0081
Large bank	.966	.0042

These results are for quarterly time series regressions covering the period 1970 IV through 1978 IV using seasonally adjusted DDOS data. The regressions are of the form

$$\ln Y = a + b X,$$

where Y = seasonally adjusted demand deposits and X = time.

1973 II, household real demand deposit growth has on average been about 3 percentage points below real income growth, while since 1972 III nonfinancial business real demand deposit growth has been on average about 5 percentage points below real sales growth.

These findings imply that demand deposit velocity has risen since the early 1970's, or stated another way that money balances have been used more efficiently. More efficient use of demand deposits is consistent with the view that money demand is partly a function of the opportunity costs of holding balances that earn no interest. In addition, increasing demand deposit velocity lends support to the idea that the public has benefited from the availability of new cash management technology.

Differences by Size of Bank DDOS data indicate that at the end of 1978 large banks held $37.8 billion in household demand deposits, or about 40 percent of the household sector's total holdings. They also held $75.3 billion in nonfinancial business demand deposits, or about 52 percent of the nonfinancial business sector's total holdings. Large banks thus account for almost half of the combined demand balances of households and businesses. This section will examine whether or not demand deposit growth differs by bank size class.

Charts 2a and 2b show annual rates of change for household and nonfinancial business nominal demand deposit balances on a quarterly basis by size of bank. The pattern of growth rates for large banks appears to differ from that of small banks, for both household and nonfinancial business deposits, in two respects: (1) the large bank growth rates are generally lower than the small bank growth rates and (2) there appears to be generally less variation in the growth rate fluctuations for large banks. The average annualized quarterly growth rate for household demand balances is 8.8 percent at small banks versus 6.1 percent at large banks; for nonfinancial business demand balances the average rate is 9.2 percent at small banks and 4.2 percent at large banks. In both deposit categories, therefore, demand balances have grown substantially more at small than at large banks since late 1971. The difference in growth rates is especially noticeable in nonfinancial business deposits, however, the large bank average growth rate being less than half the small bank growth rate.

The patterns of the growth rates on Charts 2a and 2b suggest that there may be a convergence occurring in the large and small bank series in recent years. Since about mid-1974, the large and small bank series for household sector deposits have moved more closely together than in the prior period. This convergence is also visible on Chart 2b for nonfinancial business deposits, although it does not appear as strong as in the case of household deposits.

These results support the conclusion that demand deposit growth has been stronger at smaller, compared to larger, banks during the 1970's. There are several possible explanations for the stronger growth at smaller banks, including higher income growth for the customers of smaller institutions, lower costs of demand deposit services at smaller banks, and greater availability of cash management services at the larger banks. Whatever the reasons, however, it appears that managers of smaller banks are beginning to face the lower demand deposit growth rates already experienced by larger institutions.

Longer-run Demand Deposit Stability Inspection of Charts 2a and 2b makes it clear that there is considerable cyclical variation in demand deposit growth. As mentioned above, the pattern of cyclical variation does not appear to be the same for the small compared to large bank groups. The significance of cyclical instability for household and business demand deposits will be examined here for both small and large commercial banks.

One way to focus on the longer-run cyclical variation in demand deposits is to examine the deviations of seasonally adjusted demand deposits from their underlying trend. To accomplish this, the series being examined must first be seasonally adjusted to eliminate recurring short-run influences that are possible sources of variation. Then a long-run trend

can be computed by relating the movements in the seasonally adjusted series to time. The trend is obtained from a regression equation with the relevant deposit series as the dependent variable and time as the sole explanatory variable. The residuals resulting from such a regression represent the cyclical movements in the series. Measures of such variation are presented in Table III for quarterly household and nonfinancial business demand deposit series of both small and large banks covering the eight-year period 1970 IV to 1978 IV.

The first column in Table III gives the coefficient of determination, adjusted for degrees of freedom, for regression equations that have the log of quarterly seasonally adjusted demand deposits as the dependent variable and time as the sole independent, or explanatory variable. These coefficients are all quite high, indicating in each case that over 96 percent of the variation in the series is trend-related. This result is not unexpected, since trend is the primary component of many financial time series measured in stock form. Nevertheless, the small percentage of the variation in demand deposits not explained by trend, or roughly 4 percent, represents a significant amount of dollar variation, especially when viewed over shorter time periods.

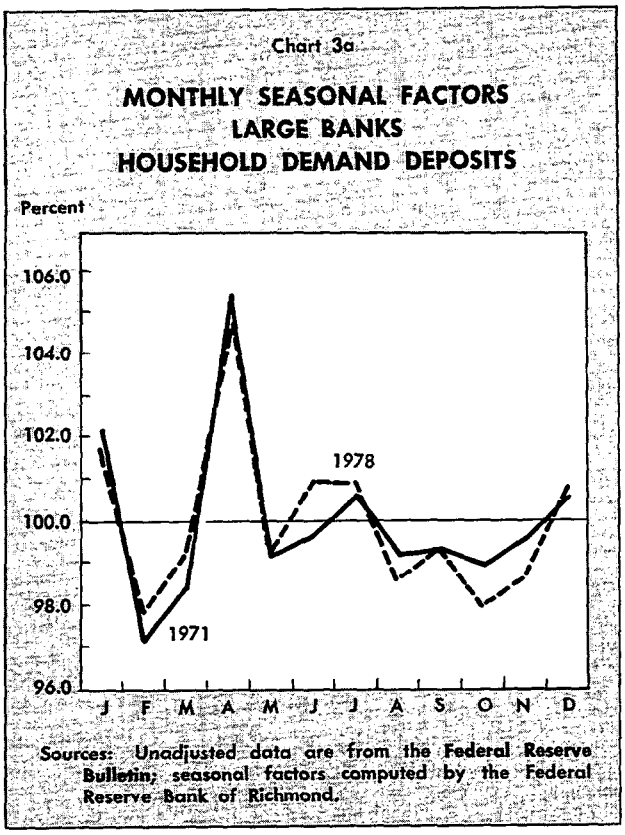
The degree of cyclical variation in the deposit series can be measured using the regression statistic called the standard error of the regression (SER). Like a standard deviation, the SER provides a confidence interval measured in the same units as the series being analyzed. One SER, for example, represents the zone around the regression line (in this case, the trend line) within which roughly two-thirds of all deviations are expected to fall. Although the four series considered in Table III are all measured in dollars, their SER's cannot be used to directly compare the relative degree of variation of household and nonfinancial business demand deposits at small and large banks. This is the case inasmuch as each series is of different absolute size: in 1978 IV seasonally adjusted household demand deposits at small banks totaled $58.1 billion versus $37.8 billion at large banks, while seasonally adjusted nonfinancial business demand deposits totaled $70.9 billion versus $75.3 billion at large banks. Other things equal, the dollar deviation around a higher demand deposit series is expected to be greater than the dollar deviation around a lower demand deposit series. Size differences must be taken into account when evaluating the relative degree of stability among the four demand deposit series in Table III.

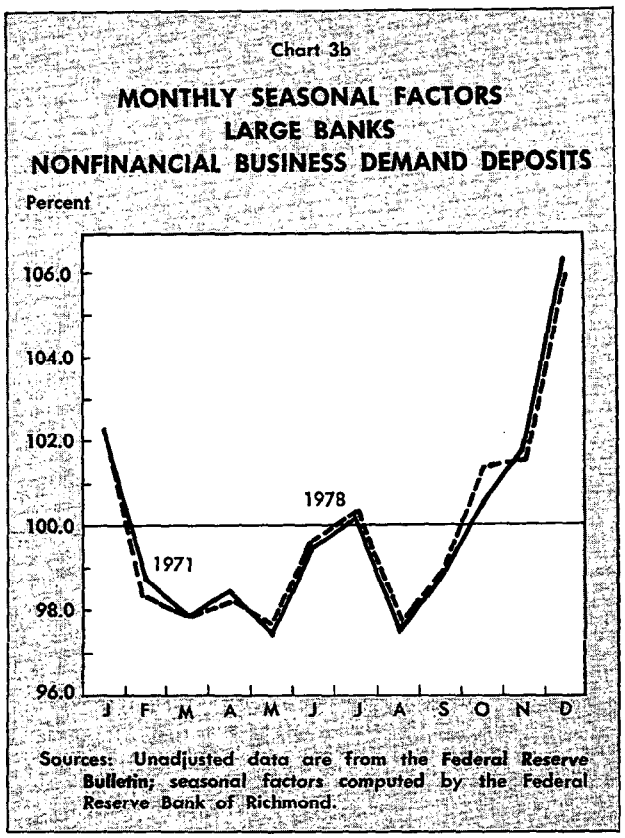
To adjust for differences in the levels of the four demand deposits series, the SER for each is divided by its mean value. The resulting numbers, which may be called standardized SER's, are presented in the second column of Table III. These numbers express the SER as a percentage of the mean value of each series. The standardized SER's in Table III can be directly compared to gain an idea of the relative degree of variation in demand deposits of households and businesses held in small and large banks.

The figures in Table III show that the cyclical stability of household demand deposits is considerably less than the cyclical stability of nonfinancial business demand deposits. For small banks, the SER is greater than 1 percent of the mean of the household demand deposits series versus 0.81 percent for nonfinancial business demand deposits: this indicates about 25 percent more variation in household balances than in business balances at small banks. Likewise, the SER is equal to 0.70 percent of the mean of the household demand deposit series for large banks versus 0.42 percent for nonfinancial business balances; this indicates about 66 percent more variation in household balances than in business balances at large banks. At both small and large banks, therefore, nonfinancial business demand deposits offer considerably more cyclical stability than do household demand deposits.

Further examination of the standardized SER's in Table III provides another interesting comparison, namely that between demand deposit stability at small versus large banks. Recall the discussion of differences in demand deposit growth by size of bank centering around Charts 2a and 2b. It was shown that the average annualized quarterly growth rates for both household and nonfinancial business demand balances were significantly greater at small compared to large banks. Moreover, the pattern of growth rates plotted on Charts 2a and 2b make it appear that there is less variation in growth rate fluctuations for large banks. This latter point is confirmed in Table III. The cyclical variation in household demand deposits is about 45 percent less at large compared to small banks (0.70 percent versus 1.02 percent) and over 90 percent less in the case of nonfinancial business demand deposits (0.42 percent versus 0.81 percent).

Short-run Demand Deposit Stability While cyclical forces are a significant source of longer-run variation in demand deposits, seasonal forces are responsible for considerable short-run variation. The influence of seasonality on the short-run stability of





household and nonfinancial business demand deposits held at large banks will be examined here.[5]

The money holdings of the public are subject to significant changes on a seasonal basis. Although both demand deposit and currency holdings are subject to such short-run variation, seasonality is concentrated in the deposit part of total money holdings. Based on examination of the demand deposit component of M_1, it would appear that April, December, and January, but especially the latter two months, are periods of peak seasonal demand for checking deposit balances, with offsetting seasonal weakness distributed over the rest of the year [9]. Seasonal variations in the demand for checking balances, however, are not identical for households and businesses.

Charts 3a and 3b depict, respectively, the monthly seasonal factors for household and nonfinancial business demand deposits of large banks. Two sets of factors, one for 1971 and another for 1978, are plotted in each of the charts. Looking first at Chart 3a for household balances, it can be seen that January and especially April are months of substantial positive seasonality, i.e., household demand deposits are unusually large at these times. The January peak is over 2 percentage points above and the April peak over 5 percentage points above the yearly average level of demand deposits. These seasonal peaks are explained by what has been termed the "Christmas cycle," which reflects the rising demand for transactions balances associated with increased spending during the holiday season, and by tax payments of individuals in April [2]. June, July, and December are months of moderate positive seasonality. February has a substantially negative seasonal factor, while the months of March, May, and August through November have moderately negative factors.

Chart 3b shows that the seasonal demand for deposit balances by businesses centers around the Christmas season. Seasonal demands are depressed or roughly neutral throughout most of the year, with a seasonal surge beginning in October and peaking in December. The December peak for large banks is nearly 6 percentage points above the yearly average level of demand. This declines to about 2 percentage points above average in January before subsequently falling below average in February.[6]

[5] Monthly seasonal factors cannot be computed for all commercial banks since only quarterly data are available for this group.

[6] Note that the Christmas seasonal peak in demand deposits occurs in January for households but December for businesses. The increased business activity associated

Comparison of the 1971 and 1978 factors reflects a remarkable degree of stability in the seasonal patterns of both household and business demand deposits over the seven-year period. The only case of a shift in the direction of the seasonal is in June for households, where the change is from slightly negative to moderately positive seasonality. This stability in seasonal patterns over time means that short-run changes in demand deposits due to seasonal influences are largely predictable, thus considerably easing the task of adjusting to such variations in demand deposits.

A comparison of the large bank 1978 monthly factors in Charts 3a and 3b suggests that the seasonal patterns exhibited by household and nonfinancial business demand deposit balances are somewhat offsetting. For instance, the year-end factors lying above 100.0 for businesses are offset by lower values for households, and the converse appears true in the second quarter. This implies that the mix of an individual bank's private demand deposits between households and nonfinancial businesses can also influence short-run balance sheet stability.[7] The significance of the demand deposit mix for short-run balance sheet stability can be evaluated by comparing the standard deviation for several different balance sheet combinations of household and business demand deposits.

Assume for a moment that a bank has all household demand deposits. In this extreme case, the standard deviation of the monthly seasonal factors in Chart 3a around the neutral value would be 2.08 percent. At the opposite extreme where a bank has all business demand deposits, the standard deviation of the monthly seasonal factors in Chart 3b for nonfinancial business deposits would be 2.45 percent. Now assume that a bank has an equal mix of demand deposits, half household and half nonfinancial business. The seasonal factors for each category of deposits have equal weight on the balance sheet, and they can be averaged across months to get monthly average factors for the equally weighted mix of deposits. In this case, the standard deviation of the weighted average seasonal factors equals 1.72 percent, a significant reduction from the two extreme cases discussed above. Thus, the mix of demand deposits is important in determining the *total* seasonal variation in demand deposits that a bank will face.[8]

The demand deposit mix which minimizes total seasonal variation can be determined using the formula for calculating the variance of a linear combination of random variables [8, p. 168]. Applying this method to monthly seasonal factors for 1978 shows that a combination of 59 percent household balances and 41 percent business balances would minimize total seasonal variation in demand deposits. Using all the monthly seasonal factors for the years 1971 through 1978 gives results that are very close to those based only on 1978 data, namely, a combination of 62 percent household balances and 38 percent business balances.[9] The closeness of the results reflects the relatively unchanging pattern of seasonality over the period. The actual not seasonally adjusted large bank demand deposit mix as of December 1978 was 32.6 percent household and 67.4 percent business.

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with the holiday starts several months before December, as firms place orders and accumulate inventories, giving rise to greater demand for payments balances. Firms rapidly reduce their demand deposit balances once the holiday activity tapers off. Households apparently pay for a large share of Christmas purchases on a delayed basis, causing their demand deposit balances to peak in January.

[7] A special 1968 survey of demand deposit ownership conducted by the FDIC showed that there is great diversity in the deposit mix by state [10]. The proportion of IPC demand deposits held by businesses ranged from a high of 73 percent in New York to a low of 33 percent in Idaho and North Dakota. The all bank average was 59 percent.

[8] As noted earlier, the mix between household and business demand deposits has changed significantly over the past three decades, with the household share growing steadily. Since the seasonal behavior of household and business balances varies greatly, the changing composition of total private demand deposits is probably an important factor helping explain shifts in the seasonal pattern of M_1 described in [9].

[9] The variance in total demand deposits due to seasonal influences, σ_D^2, is given by the formula:

$$(1)\quad \sigma_D^2 = k_H^2\,\sigma_H^2 + k_B^2\,\sigma_B^2 + 2k_H\,k_B\,\rho_{HB}\,\sigma_H\,\sigma_B,$$

where ρ_{HB} is the correlation coefficient of the monthly seasonal factors for household and business demand deposits. k_H and k_B are weights showing the respective proportions of household and business demand deposits to total demand deposits. Since there is a constraint that $k_H + k_B = 1$, (1) can be expressed as

$$(2)\quad \sigma_D^2 = k_H^2\,\sigma_H^2 + (1-k_H)^2\,\sigma_B^2 + 2\,k_H\,(1-k_H)\,\rho_{HB}\,\sigma_H\,\sigma_B.$$

Setting the first derivative $\frac{d\,\sigma_D^2}{d\,k_H}$ equal to zero and solving for k_H gives

$$(3)\quad k_H = \frac{\sigma_B^2 - \rho_{HB}\,\sigma_H\,\sigma_B}{\sigma_H^2 + \sigma_B^2 - 2\rho_{HB}\,\sigma_H\,\sigma_B}.$$

The second order condition for a minimum holds if the second derivative $\frac{d^2\,\sigma_D^2}{d\,k_H^2}$ is positive, where

$$(4)\quad \frac{d^2\,\sigma_D^2}{d\,k_H^2} = 2\sigma_H^2 + 2\sigma_B^2 - 4\,\rho_{HB}\,\sigma_H\,\sigma_B.$$

Following this procedure using monthly seasonal factors for 1978 gives $\rho_{HB} = .12$, $k_H = .59$, and a positive value for equation (4). Using all the monthly seasonal factors for the years 1971 through 1978 gives $\rho_{HB} = .15$, $k_H = .62$, and a positive value for equation (4).

CONCLUSIONS

Although steadily declining in importance on the commercial banking system's balance sheet since at least 1950, demand deposits nonetheless remain an important source of funds. In fact, privately owned demand deposits in 1978 equaled over 30 percent of total deposits net of interbank balances. The two most important suppliers of demand deposits to commercial banks are households and nonfinancial businesses. Households owned 33.2 percent of total private demand balances, or about $93 billion in 1978, while nonfinancial businesses owned 49.2 percent, or about $138 billion. This article examines the time series behavior of these two ownership categories using the Federal Reserve's Demand Deposit Ownership Survey.

Inflation is an important factor causing the public to hold increasingly larger transactions, or demand deposit balances. When nominal demand deposits are deflated by the price level to get real balances, however, it is found that the growth rates of real demand deposit balances of both households and nonfinancial businesses have been less than the growth rates of real income since at least the early 1970's. Since the second quarter of 1973, growth in household real demand deposits has on average been about 3 percentage points below growth in real income. Since the third quarter of 1972, growth in nonfinancial business real demand deposits has on average been about 5 percentage points below growth in real sales. Thus, both households and businesses have economized on their holdings of cash balances to a significant extent, although businesses have done so more than have households.

The longer-run trend and cyclical behavior of demand deposits is not constant by size of bank. Demand deposit growth has been considerably greater at smaller compared to larger banks for both household and nonfinancial business balances. The cyclical stability of demand balances, however, is considerably greater at larger compared to smaller banks.

Seasonal influences lead to significant short-run variation in demand deposit balances. Comparison of seasonal factors for the years 1971 and 1978, however, shows that changes over this period have been minor. Consequently, the seasonal influences affecting short-run variation in both household and nonfinancial business demand deposits are to a large degree predictable. The seasonal patterns exhibited by the demand deposit balances of households and nonfinancial businesses are partially offsetting. Therefore, the mix of demand balances by ownership classification influences the overall degree of seasonal variation in a commercial bank's demand deposits.

These findings should help bank liabilities managers and financial analysts better understand the patterns of short- and long-run variation in private demand deposits. Perhaps the most interesting general conclusion that can be drawn from the analysis is that there are striking contrasts between the behavior of household and business demand balances. This points out the importance of treating demand deposits held by households and businesses as two separate sources of funds for liabilities management purposes. Moreover, the information gained by following a disaggregated approach to explaining changes in demand deposits should lead to a better understanding of money stock movements.

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