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**Delinquency Rates on Consumer and Mortgage Debt:
Their Determinants and Impact**

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DELINQUENCY RATES ON CONSUMER AND MORTGAGE DEBT: THEIR DETERMINANTS AND IMPACT

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Because of limited data availability, few studies have been made either of the manner in which aggregate consumer and mortgage loan delinquency rates vary over time, or of the impact which changes in delinquency rates have on lender and borrower behavior and on indices of serious consumer financial distress. This study attempts to fill that gap. To do so, Part I of the study relates changes in a wide variety of delinquency measures to changes in general economic conditions, while Part II relates changes in automobile repossessions, home mortgage foreclosures, nonbusiness bankruptcies, automobile credit terms, mortgage lender cash flows, housing starts, and consumer installment credit extensions to changes in related delinquency rate series.

The major findings of Part I are:

1. Consumer credit delinquency rates tend to be strongly affected by changes in the average manufacturing workweek, but are relatively unaffected by changes in the unemployment rate. The opposite effect holds for home mortgage delinquency rates.
2. In recent years, general inflation has been positively associated with delinquency rates on consumer installment loans, but negatively or insignificantly related to delinquency rates on most home mortgage loans. Delinquency rates on some VA mortgage loans, however, appear to be positively associated with atypical rates of food price inflation.
3. Consumer creditor groups that achieve rapid rates of growth in their credit market shares generally appear to increase their risk of subsequent delinquencies.
4. Elevated ratios of consumer debt to disposable personal income are positively related to delinquency rates on commercial bank, auto finance company, and VA mortgage credits.
5. Overall, many of the economic factors which appear to affect delinquency rates on consumer credit appear to have somewhat similar effects on VA mortgage loans. Delinquency rates on conventional mortgage loans are less affected by changes in economic conditions.

A number of conclusions can also be drawn from the research presented in Part II. They are:

1. Delinquency rates appear to be positively associated with automobile repossessions, mortgage foreclosures, and bankruptcy filings--generally with a lag.
2. Delinquency rates are negatively associated with consumer installment credit extensions, particularly net credit extensions.

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3. There is some evidence which suggests that delinquency rates are positively associated with tightened automobile credit terms—but it is not conclusive.
4. Changes in delinquency rates appear to have little or no effect on housing starts and mortgage interest rates, in spite of the fact that they affect mortgage lender cash flows.

PART I: Determinants of Delinquency Rates On Outstanding Consumer Debt Obligations, 1951-74

A. Background

Rising delinquency rates on consumer debt obligations are important to creditors because they imply reduced cash flows and reduced earnings—through increased collection costs and potential increases in credit losses. In addition, rising delinquency rates may provide useful insights to economic forecasters by indicating periods in which an increasing proportion of consumers are becoming financially hard-pressed.

This part of the study investigates the various factors which influence aggregate delinquency rates on a wide variety of consumer debt obligations. Previous investigators have either concentrated on microeconomic determinants of delinquency rates or have generally limited their time series analyses to home mortgage or commercial bank loans.¹

In the following sections, we compare the time series behavior of credit union and auto finance company delinquency rates to the behavior of delinquency rates on consumer loans at commercial banks. We also compare the time series behavior of delinquency rates on a wide variety of mortgage loans to the behavior of delinquency rates on short- and intermediate-term consumer credit. The study is unique not only in that it makes a comparative analysis of the numerous factors which affect aggregate delinquency rates on different types of consumer loans, but also in that it investigates the impact which inflation and changes in creditor market shares have on delinquency rates.

B. Basic Hypotheses

The basic hypotheses investigated in this part of the study are the following:

1. Delinquency rates on consumer debt will tend to rise when consumers experience unexpected periods of financial adversity. Unexpected adversity can be caused by increases in unemployment, decreases in the average workweek, or unexpected inflation—particularly in food prices.
2. Consumers as a group will be more vulnerable to unexpected events and thus will exhibit higher delinquency rates when their debts have recently increased relative to their income.

¹ The most comprehensive summary of research and data on consumer loan delinquencies and defaults is contained in Fiedler and Pech [1]. Herzog and Early [2] present extensive cross-section analyses of the determinants of home-mortgage delinquency rates along with more cursory investigations of related time-series data while von Furstenberg and Green [6] concentrate solely on cross-section determinants of delinquencies. Moore and Klein [4] extensively analyze the effect which changes in loan terms and credit availability have on a priori credit quality and use detailed evidence on commercial bank auto loan delinquency rates and limited evidence on delinquency rates on loans at a small number of retailers and sales finance companies to investigate both the determinants of and the cyclical and geographic patterns of delinquency risk. They conclude from their time series analyses that commercial bank auto credit delinquency rates are a leading cyclical indicator and, in general, that changes in unemployment importantly influence consumer loan delinquency rates.

3. Creditor groups may alter the delinquency risk of their loan portfolios by altering their share of the market. In particular, aggressive expansion in credit market shares by particular creditor groups may be accomplished through the acquisition of lower quality paper by that group. Relatedly, elevated ratios of aggregate debt, or debt expansion, relative to disposable personal income may imply that lender credit standards have changed over time and thus may be associated with increased delinquency rates in general.²
4. Factors which hinder consumer loan repayments at the microeconomic level such as marital problems, may also affect delinquency rates at the national level.³

C. The Data

The delinquency rate series used in this investigation were quarterly averages of the following: (1) commercial bank 30-90 day delinquency rates reported monthly or bimonthly by the American Bankers Association, interpolated and averaged by the staff of the Federal Reserve Board to obtain a consistent quarterly series, (2) credit union loan delinquency rates, as compiled monthly by the National Credit Union Administration,⁴ and (3) 30-day and over delinquency rates at automobile finance companies, collected and compiled monthly by the staff of the Federal Reserve Board. In the mortgage credit area, quarterly delinquency rates on conventional and VA mortgage loans delinquent 60 days or more were analyzed.⁵ FHA mortgage delinquency data were not considered, however, because they have been increased by recent mortgage subsidy programs. The mortgage delinquency series used in this investigation were compiled by the Mortgage Bankers Association and (through 1971) by the Life Insurance Association of America. In addition, a series on VA mortgage "defaults" (which are mortgage loans for which no payment has been received for at least 60 days) was also analyzed. All data used were seasonally adjusted by the Federal Reserve Board staff.

D. Empirical Tests and Results

(1) Delinquency Rates on Short- and Intermediate -Term Consumer Credit Cyclical Behavior. Available time series data for bank, credit union, and auto finance company delinquency rates are plotted in Figure 1. In order to compare the movement of delinquency rates with general economic cycles, the unemployment rate (divided by 6) is plotted on the same graph. Both the bank consumer loan delinquency rate and the auto finance company delinquency rate series exhibit cyclical movements which tend to precede cyclical changes in the unemployment rate. In particular, auto finance company delinquency rates have tended to serve as a "leading

² As noted in hypothesis (2), in the short run an increase in consumer debts relative to income is likely to imply an increased burden of debt repayments on available income as contractual repayment rates are not likely to change rapidly in the short run. Over the period of our study, however, contractual repayment rates have changed substantially as both contractual loan maturities and the composition of consumer debt outstanding have changed. Thus changes in contractual consumer debt repayment rates may not proceed apace with changes in the stock of credit outstanding. Nonetheless, as noted in (3) the ratio of consumer debt to income may be a useful variable for explaining longer-term changes in consumer delinquency rates insofar as it reflects changes in lender willingness to extend credit either on more lenient terms or to more marginal credit risks. For these reasons, and also because the consumer installment debt repayment to income ratio may vary endogenously as consumers voluntarily repay debts at an accelerated rate, in our empirical studies we used the level and recent changes in the debt outstanding to income ratio to test hypotheses (2) and (3).

³ At the microeconomic level, in addition to unemployment, death and illness and marital problems have been found to be important contributors to consumer loan defaults. See, for instance, the Congressional hearings on FHA Mortgage Foreclosures [5].

⁴ The credit union delinquency rate series used was not representative, in terms of levels, of total credit union delinquencies-as year-end reports show higher average delinquency rates for the universe of credit unions. However, movements in delinquency rates for the monthly sample were assumed to represent movements in credit union delinquency rates as a whole.

⁵ Data on 30-day plus delinquencies reported by the Mortgage Bankers Association were also analyzed, but not intensively, for reasons cited in section D (2).

indicator"⁶ as they have commenced cyclical up trends or downtrends one to two years in advance of cyclical reversals in unemployment. The comprehensive commercial bank delinquency data show less systematic cyclical movements. While they basically exhibit precyclical swings, they do not do so consistently as sometimes the bank rate series moves coincidentally with cyclical swings and sometimes, particularly in the 1960's, it varies by itself, without regard to the direction in which unemployment is moving or about to move. In contrast with the other series, the credit union data do not appear to be strongly related to cyclical changes in unemployment.

Regression Results. Table 1 presents statistical results for regressions designed to evaluate the impact that various economic events have had on consumer credit delinquency rates at commercial banks, auto finance companies, and credit unions. The dependent variables in each regression were selected to test the basic hypotheses stated earlier. Where one variable was superior to another related variable, to reduce intercorrelation, only one variable was presented in the final regression. For the same reason, variables which were not significant by conventional standards in any equation were omitted from the final equations.

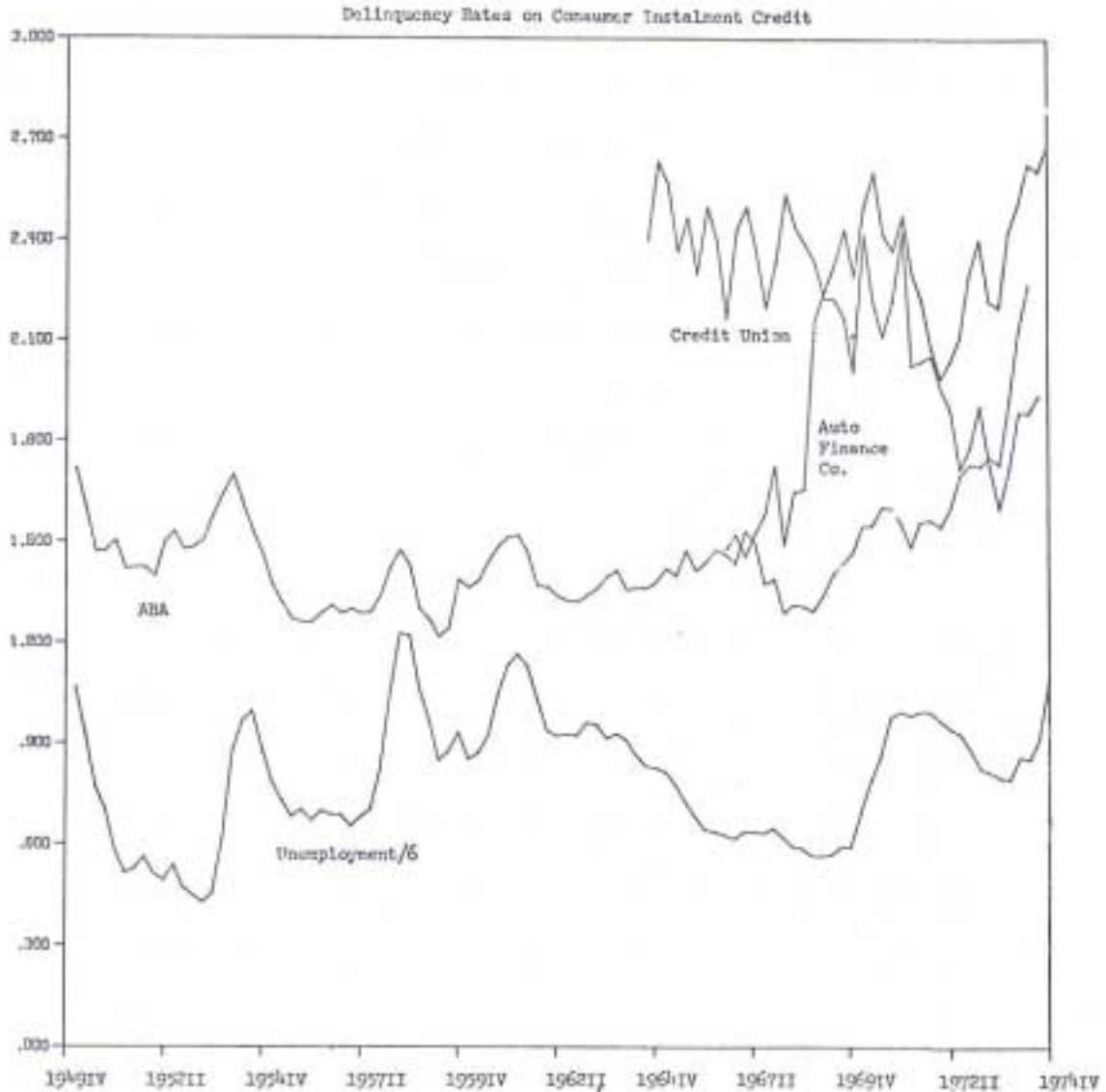
Equations 1 to 3 use total commercial bank 30-90 day delinquency rates on consumer installment credit, as reported by the ABA and seasonally adjusted by the Federal Reserve Board staff, as the dependent variable. The existence of serial correlation required that the first two equations be estimated using a Cochrun-Orcutt iterative procedure. However, over the last decade, there was sufficient coincidental cyclical movement in independent variables that the use of a Cochrun-Orcutt transformation generated collinearity problems in the regression. As a result, even though a high R^2 was obtained, the only variable which appeared to be significant in the Cochrun-Orcutt regressions for bank delinquency rates in the 1966-74 period was the average hours worked variable. Because of similar problems, equation 4 was also estimated using OLS techniques rather than the Cochrun-Orcutt iterative estimation procedure.

In Table 1, equations 4 and 5 respectively show the effect which various economic influences have on automobile finance company 30-dayplus delinquency rates and on credit union loan delinquency rates. The auto finance company rates are calculated from monthly estimates made by the Federal Reserve Board staff while the credit union data are compiled by the National Credit Union Administration. The regressions are run over the periods for which delinquency rate data are available.

The results presented in Table 2 show that short- and intermediate term consumer loan delinquency rates tend to be significantly negatively associated with changes in the average manufacturing workweek (KPK). However, the rate of unemployment, *per se*, has a far less significant effect on short- and intermediate-term consumer loan delinquency rates than the average workweek. The rate of unemployment was a significant explanatory variable only in the commercial bank delinquency rate equations. Even there, however, when unemployment was compared with HPMQ in regressions which excluded all other independent variables, it did not explain as much variance in bank delinquency rates as HPMQ.

The rate of inflation was found to be a significant independent variable in all equations except the 19511-196611 equation for commercial bank delinquency rates. Thus, the results indicate that rapid rates of inflation have positively affected short- and intermediate-term consumer loan delinquency rates in recent years, even though no such effects can be documented for the pre-1966 period when inflation was low or modest.

⁶ In this regard they perform much like the commercial bank auto loan delinquency data analyzed earlier by Moore and Klein [4].



The rate by which food price inflation differed from general consumer price inflation did not appear to add significantly to the explanatory power of any of the equations shown in Table 2. However, in univariate tests the rate of food price inflation, *per se*, appeared to have a larger impact on bank delinquency rates, from 1950-1974, than the general rate of inflation.

The aggregate availability of consumer credit, as measured by the ratio of consumer installment debt to disposable personal income (RCIC), added significantly to the explanation of commercial bank delinquency rates in all periods. However, possibly because aggregate credit availability has changed little in the last decade, RCIC did not add significantly to the explanatory power of the credit union and auto finance company equations. Nonetheless, in lieu of RCIC, recent changes in the debt burden, or aggregate credit availability, lagged one year were positively and significantly associated with auto finance company delinquency rates.

Possibly because bank credit market expansion has been achieved partially by extending loans to higher risk customers, regression 3 suggests that the substantial increase in the commercial bank share of the consumer credit market which has occurred in the last decade has been associated with rising bank delinquency rates. Furthermore, equations 1 and 2 indicate that this phenomenon has not been restricted solely to the most recent period.

By contrast, automobile finance company delinquency rates have tended to rise even though the automobile finance companies, market share has contracted sharply in recent years. This result could have occurred because competitors, such as banks and credit unions with lower loan rates, may have been able to bid away some of the auto finance companies' best quality customers.⁷ Thus, the auto finance companies (which largely are captive finance companies which finance cars to support the sales of their parent manufacturing companies) may have lost part of their market and gained riskier average portfolios simultaneously. At the same time, one would expect their competitors' delinquency rates to rise if the new borrowers which they obtained from the auto finance companies were riskier, on average, than their usual customers. The data presented in Table.2 support this notion, as they show that while the auto finance company delinquency rate has consistently exceeded commercial bank delinquency rates, the difference has narrowed markedly since 1967.

In the case of credit unions, a positive effect of expanding market shares on credit union delinquency rates appears with a lag. However) the simple correlation between credit union delinquencies and market shares is negative as credit unions experienced a substantial increase in their credit market share from 1964 to 1974 while their delinquency rates remained stable or declined. A possible explanation for this is that consumers became more aware of the fact that they could obtain both high lending and low borrowing rates at credit unions during that period. Thus deposits and loans may have increased secularly without a loss of credit quality⁸ even though cyclical expansions in credit were associated with increased future delinquency rates.

Additional variables were tested, but did not appear to be significant. Most notably, aggregate divorce rates did not contribute significantly to the delinquency rate equations when they were included with other variables, even though marital difficulties are often cited as a significant cause of loan losses in microeconomic studies.

Finally, over the last decade, the time trend variable indicates that delinquency rates of all types tested have not risen as rapidly as would have been expected given concomitant changes in rates of inflation, levels of unemployment, etc. However, over the longer term, the bank delinquency rate series show no significant trend.

(2) Delinquency Rates on VA and Conventional Mortgages

For the purposes of this study, VA delinquency rates were analyzed to determine the effect of changing economic influences on what typically are low-down payment loans made, in many cases, to less wealthy borrowers. Conventional mortgage rates were analyzed to determine the effect of various economic events on delinquency rates on loans which typically are made with relatively high down payments to relatively affluent borrowers.

⁷ This process could have been accelerated in recent years by increases in consumer loan rate awareness due to the advent of Truth in Lending regulations. In addition, some credit union administrators speculate that periodic credit squeezes may have had a beneficial effect on credit union loan quality, as members who were initially attracted by credit unions' relatively high rates of return on savings in periods of high interest rate awareness may also have become aware of relatively low loan rates on credit union loans, and thereby switched their borrowing allegiance as well as their funds. Such individuals, who have sufficient funds that switching them in order to earn a higher return on thrift deposits appears worthwhile, may also be better than average credit risks.

⁸ See footnote 7.

In order to get a dual check as to whether certain independent variables affected key delinquency rates in a systematic manner, VA and conventional mortgage delinquency rate series obtained from both the Life Insurance Association of America (LIAA) and the Mortgage Bankers Association (MBA) were analyzed. In addition, a series on VA loan. "defaults"--which approximate 60-day-plus delinquency rates, was also analyzed.

TABLE 1: DETERMINANTS OF DELINQUENCY RATES ON CONSUMER INSTALLMENT CREDIT FOR VARIOUS LENDER GROUPS

Regressions Period	Commercial Banks			Auto Finance Companies	Credit Unions
	(1) 51I-74II	(2) 51I-66II	(3) 66III-74II	(4) 66III-74II	(5) 64III-74II
Variable	Coefficient/(t)				
Hours per week (HMQ)	-0.056 (-2.64)*	-0.048 (-2.39)*	-0.051 (-0.64)	-0.322 (-4.08)*	-0.111 (-2.11)*
Unemployment (UN)	0.056 (3.75)*	0.053 (3.69)*	0.146 (3.80)*		
Inflation (RCPI)	0.7339 (0.95)	-0.176 (-0.22)	3.004 (1.89)*	8.518 (3.91)*	3.024 (2.18)*
Debt Burden (RCIC) (LYRCIC)	9.042 (2.82)*	6.794 (2.18)*	39.50 (4.43)*	18.460 (2.18)*	
Market Share (BSCICO) (BFCACO) (LYRCUCO)	1.533 (2.39)*	1.954 (1.69)*	2.917 (2.11)*	-24.014 (-4.57)	22.125 (2.29)*
TIME	0.007 (1.18)	-0.001 (-0.12)	-0.021* (-3.78)	-0.055* (-3.38)	-0.028 (-10.69)*
CONSTANT	0.199 (0.15)	1.649 (1.37)	-5.288 (-1.35)	17.617 (3.44)*	5.527 (2.08)
R^2/DW	.9269 1.851	.8615 2.054	.8871 0.913	.8092 1.178	.8172 2.176
Regression Technique rho/(t)	C-0 0.969 (3.76)	C-0 0.953 (24.7)	OLS	OLS	OLS

Definitions

HMQ--quarterly average hours per week in manufacturing
 UN --quarterly average national unemployment rate
 RCPI--the ratio of the consumer price index to its value one year earlier
 RCIC--the ratio of consumer instalment credit to disposable personal income
 LYRCIC--the year to year change in RCIC, lagged one year
 BSCICO--the ratio of commercial bank holdings of consumer instalment credit to total consumer instalment credit
 BFCACO--the ratio of finance company auto credit to total automobile instalment credit outstanding
 LYRCUCO--the year to year change in the ratio of credit union credit to total consumer instalment credit, lagged one year

*Significant at the 9% level, for a one-tailed test (or at the 90% level for a two tailed test).

Table 2: Year-End Automobile Delinquency Rates, Unadjusted, 1967-74

	Auto Finance Co. 30 day plus delinquency rates on indirect paper	Commercial Bank 30 day plus delinquency rates on indirect paper	Difference from auto fin. Co. rate	Commercial Bank 30 day plus delinquency rates on direct loans	Difference from auto fin. Co. rate
	Level	Level		Level	
1967	2.37	1.73	(-.64)	1.16	(-1.21)
1968	2.37	1.80	(-.57)	1.08	(-1.29)
1969	2.47	1.92	(-.55)	1.23	(-1.24)
1970	2.43	1.94	(-.49)	1.43	(-1.00)
1971	2.05	1.69	(-.36)	1.22	(-.83)
1972	2.42	2.15	(-.27)	1.37	(-1.05)
1973	2.51	2.37	(-.14)	1.66	(-.85)
1974	3.00	2.86	(-.14)	2.07	(-.93)

Source: Commercial Bank Data, ABA; Finance Company Data, Federal Reserve Board.

The mortgage delinquency rate series analyzed were for 60-day-plus delinquencies. In the case of LIAA rates, those were the only data available. In the case of the MRA data., the 60-day-plus delinquency rate data appeared to give superior analytical results. For instance, in the MBA-VA delinquency case, the 60-day-plus data were associated with higher multiple coefficients of determination and gave less evidence of interaction among explanatory variables. In the NBA conventional loan delinquency case, the 60-day-plus rates generated somewhat lower coefficients of determination but also gave more reasonable signs and levels of significance to coefficients associated with the independent variables. In an earlier study, Herzog and Early [2] found that 30-day mortgage delinquency rates exhibited little cyclical sensitivity and were determined by distinctly different (mainly seasonal) forces from 60-day-plus mortgage delinquencies. Those observations, coupled with our comparative regressions, both suggest that 60-day-plus delinquencies are the preferred variables to analyze if one is concerned with the effect of cyclically related economic variables on mortgage delinquency rates.

Cyclical Behavior. The mortgage delinquency rate series are plotted in Figure 2 along with the unemployment rate (divided by 20) for comparison purposes. Visual inspection of those data indicates that VA delinquency rates have tended to move roughly in conjunction with the rate of unemployment during economic cycles--with the exception of the 1962-65 period when they rose while the unemployment rate was falling. Conventional mortgage delinquency rates exhibit less sensitivity to changes in the unemployment rate but, with the exception of the early to mid-1960's, have also tended to move generally with cyclical changes in the unemployment rate.

Regression Results. Table 3 presents the regression results obtained when available delinquency data were regressed on dependent variables chosen to test the basic hypotheses stated earlier. Due to serial correlation problems, all regressions were run using a CochrunOrcutt transformation. The regressions shown in Table 3 indicate that home mortgage delinquency rates are significantly positively influenced by the unemployment rate. They also suggest that the annual change in consumer prices (RCPI) is inversely related to mortgage loan delinquency rates, although, in these equations, a significant effect can be documented only for conventional mortgage loans serviced by mortgage bankers.⁹ A negative influence of inflation on mortgage

⁹ The inverse relationship between inflation rates and home mortgage delinquency rates appears to have strengthened in recent years. For regressions run from 1958111 on, RCPI had a significant negative effect on delinquency rates for the LIAA-VA., LTAA-conventional and MRA-conventional mortgage delinquency rate series. In addition, in a study conducted on the determinants of home mortgage delinquency rates (by state~, in the early and mid 1960's, Knight 133 found that local rates of Inflation had a significant negative impact on delinquency rates.

delinquency rates has been previously noted by Knight [3], who ascribed that result to accelerated owner buildup of equity in mortgaged property during inflationary times.

In contrast to general inflation, the evidence tends to suggest that insofar as food price inflation proceeds at a different rate than general inflation, it may be positively associated with mortgage delinquency rates as it puts increased stress on household budgets. This effect is most clearly significant for VA loans serviced by mortgage bankers, and when the regressions are run over more recent time periods (from 1958III on) it appears for life insurance company VA loans as well.

The aggregate ratio of debt to disposable personal income has a significant positive effect on VA loan delinquency rates, but no significant effect on conventional mortgage loans. This suggests that either increased aggregate credit availability over time has occurred through the extension of credit to relatively less affluent people (who acquire low down payment mortgages) or that a growing aggregate debt burden tends to impact most heavily on the payment behavior of consumers with relatively low-down payment loans.

Secular differences in conventional and VA mortgage loan delinquency rates also appear, as VA delinquency rates have significantly decreased over time (relative to the rate that would be expected given the rate of inflation, unemployment, etc.) while conventional mortgage loan delinquency rates have significantly increased.

Other variables tested but not found to be significant in any equations were the aggregate divorce rate and the average down payment requirement on conventional mortgage loans.¹⁰ In addition, an attempt was made to determine if changes in the VA or conventional loan composition of mortgage debt outstanding had a significant impact on future changes in delinquency rates, with mixed results.

E. Conclusions

The following conclusions can be drawn from the results presented in this part of the study:

(1) Loan delinquency rates for short- and intermediate-term consumer credit are significantly associated with the average manufacturing workweek, but are less strongly correlated with the national unemployment rate. As a result they tend to vary in advance of cyclical changes in the unemployment rate. In contrast, mortgage loan delinquency rates are significantly correlated with the unemployment rate, but are not affected by variations in the average workweek. Thus, mortgage loan delinquency rates move more nearly in phase with changes in unemployment rates. These results suggest that consumers preferentially repay their mortgage debts when they experience a short-term decline in take-home pay due to a reduction in average workweeks and become delinquent on their mortgage loans only when they suffer substantial losses in income through increases in unemployment.

(2) in recent years, the rate of inflation in the consumer price index has been positively associated with short- and intermediate-term consumer credit delinquency rates and negatively or insignificantly associated with mortgage delinquency rates. The explanation for this relationship is that consumer loan delinquency rates tend to rise when consumer budgets are strained by unanticipated inflation. However, in the mortgage credit area this effect is generally offset by the fact that inflation encourages loan payment by raising homeowner equity.

¹⁰ While the mortgage loan-to-value ratio has been found to be a significant predictor of mortgage: loan delinquencies in cross-section studies (Herzog and Early [21]), that result may come from the fact that the relatively highest risk customers require more lenient terms. The lack of a secular correlation for this variable could indicate either that recent secular movements in the whole structure of loan-to-down payment rates (as opposed to the riskiest component of that structure) have had little effect on loan riskiness, or that improper lag specifications or the use of an atypical period obscured such an effect on the aggregate level.

Nonetheless, the rate of inflation in food prices, insofar as it differs from the overall rate of inflation in the consumer price index, appears to be positively associated with VA mortgage delinquency rates, even though it does not add explanatory power to regression equations for conventional mortgage and short- and intermediate-term consumer credit delinquency rates--once the general rate of inflation has been taken into account.



A possible explanation for this result is that VA-insured loans tend to be made to relatively less wealthy individuals who initially have little equity in their homes unless the general rate of inflation is substantial. Such individuals are likely to be relatively more vulnerable to changes in food prices (since food expenditures may take a relatively large share of their income) and less committed to retaining their (relatively low) equity in their homes.

(3) In the consumer credit markets, in recent years the evidence suggests that commercial banks have increased their market share by taking on greater risks of consumer loan delinquencies. Also, in recent years, it appears that the automobile finance companies have simultaneously acquired a smaller and higher risk segment of the market-possibly because commercial banks and credit unions have obtained some of their better former customers. As a consequence, the delinquency rate on automobile finance company credit has been rising in recent years, even though the finance company share of the automobile credit market has been falling.

TABLE 3: DETERMINANTS OF MORTGAGE LOAN DELINQUENCY RATES FOR VARIOUS LENDER GROUPS

Regressions:	VA Insured Mortgages			Conventional Mortgages	
	(1)	(2)	(3)	(4)	(5)
Independent Var's	VA "Defaults"	LIAA 60+Delinq.	MBA 60+Delinq.	LIAA 60+Delinq.	MBA 60+Delinq.
Period	52I-73IV	54I-71IV	54I-73IV	54I-71IV	54I-73IV
Dependent Variables	Coefficient/(t)				
UN	0.038 (2.98)*	0.060 (4.13)*	0.072 (8.16)*	0.027 (1.77)*	0.014 (1.76)*
RCPI	-1.317 (1.39)	-0.151 (0.13)	-0.569 (0.81)	-1.798 (1.39)	-1.139 (1.78)*
DRPI	0.532 (0.65)	0.431 (0.42)	2.511 (4.65)*	-0.984 (0.81)	0.876 (1.78)*
RD	0.003 (4.39)*	0.003 (3.87)*	0.002 (6.58)*	-0.000 (0.17)	-0.000 (1.06)
TIME	-0.009 (2.99)*	-0.008 (2.10)*	-0.003 (2.14)*	0.008 (2.82)*	0.003 (2.77)*
Constant	0.918 (0.86)	-1.005 (0.78)	0.013 (0.02)	1.788 (1.30)	1.522 (2.19)*
R ² /DM	.9208 1.36	.9206 1.90	.9257 1.81	.8507 2.02	.8763 1.95
C-O rho**	0.8634 (15.96)*	0.900 (17.37)*	0.566 (6.10)*	0.7465 (9.45)*	0.5760 (6.26)*

Definitions:

UN--quarterly average unemployment rate
 RCPI--ratio of quarterly average consumer price index to its average value one year previously
 DRPI--the difference between the ratio of the food price index component of the CPI to its average value over the past two years and RCPI
 RD--the ratio of consumer installment credit plus mortgage debt to disposable personal income
 TIME--a time trend

*Significant at the 95% level for one-tailed tests or the 90% level for two-tailed tests.

**Value of rho obtained by Cochran-Orcutt iterative procedure

Credit union delinquency rates., however, were not significantly related to their aggregate credit market share. Indeed., over the period of our study credit union credit market shares have risen substantially while their delinquency rates have tended to fall. Nonetheless, rates of growth in the credit union *installment credit* market share, when lagged one year., were significantly positively related to the delinquency rate on credit union loan portfolios. This suggests that rapid growth in the credit union market share may raise delinquency rates at credit unions with a lag, even though the secular trend has moved in the other direction. Thus, with the exception of the special captive finance company case, it generally appears that consumer creditor groups that achieve rapid increases in their credit market shares increase their risk of delinquencies.

(4) The ratio of consumer debt outstanding to income is positively associated with delinquency rates on outstanding bank and VA mortgage debt. This may be a consequence of secular increases in aggregate credit availability. In addition, changes in the ratio of aggregate consumer debt to income (lagged one year) are associated with increased delinquency rates on auto finance company loans. Thus cyclical increases in aggregate credit availability may also either increase total delinquency risk or indicate that credit is increasingly being made available to weaker risks.

Conventional mortgage delinquency rates are unaffected by changes in total consumer debt, probably because conventional mortgages have traditionally been extended to only the best credit risks.

(5) Aggregate divorce rates were not significant with the proper sign in any delinquency rate series--possibly because divorce rates tend to move up or down in slow secular trends with little volatility.

(6) No general trend in aggregate delinquency rates appears to have occurred over time, once all other variables are considered. On the one hand, a negative sign appears on the time trend variable over the last decade for bank, credit union, and auto finance company delinquency rates and over a longer period for VA mortgage delinquency rates. On the other hand, over the last two decades, bank delinquency rates have not been significantly correlated with the time trend variable and conventional mortgage delinquency rates show a significant up trend, once all other variables have been taken into account.

(7) With the exception of cyclical changes in employment conditions, the determinants of delinquency rates for conventional mortgage credit do not appear to be closely related to the determinants of delinquency rates on short- and intermediate-term consumer credit. However, the determinants of VA mortgage delinquency rates and short- and intermediate term credit delinquency rates seem to be much more closely related.

PART II: The Relationship Between Delinquency Rates on Consumer and Mortgage Debt, Indices of Acute Consumer Financial Distress, and Related Financial Behavior

A. Background

Delinquency rates are important in their own right, both as a measure of the incidence of consumer distress and as a warning of the danger of more serious types of distress--such as repossession, foreclosure, or bankruptcy. Beyond this, delinquency rates are of interest for their broader implications for such fundamental elements of general economic activity as consumer spending decisions and credit policies of lending institutions. Part I of this paper investigated factors that influence delinquency rates. Part II attempts to measure the statistical influence that delinquency rates exert upon other economic variables--upon other measures of consumer distress and upon general economic activity.

B. Basic Hypotheses

The three general hypotheses investigated in Part II are outlined below. Since the focus of this discussion is upon the role delinquencies may play in a variety of equations used to estimate many different dependent variables, no one model has been explored as fully as would be warranted had the paper focused upon one or two specific dependent variables. Nevertheless, it is hoped that equations have been specified well enough to establish the value of including delinquency rates in more detailed individual studies of the dependent variables discussed.

(1) Measures of serious consumer distress--automobile repossession, mortgage foreclosure, declaration of bankruptcy--will be positively related to delinquency rates, with some lag. Most likely those measures will also be directly influenced by many of the variables (such as the unemployment rate) which were hypothesized in Part I to affect delinquency. While rising unemployment would likely exert an analogous effect upon bankruptcy and other measures of distress, a large part of this effect might already be incorporated in the delinquency rate itself. Thus, the presence of the delinquency rate in these equations was expected to be accompanied by a high degree of multicollinearity.

(2) Lenders will react to rising delinquency rates by lending on more restrictive terms than usual; falling delinquency rates will be associated with more liberal lending terms.

(3) Delinquency rates will be negatively related to gross and net extensions of mortgage or consumer credit for two reasons. Lenders would be expected to cut back on funds committed to installment or mortgage loans if delinquency rates rose on such loans. Higher delinquency rates might also suggest that potential borrowers would reduce their loan demands because of the apparent difficulty in meeting present repayment schedules. It is not clear, however--and thus a topic for investigation here--whether incorporating the delinquency rate into an equation to explain credit extensions would provide any additional explanatory power beyond that present in loan terms, income, or employment.

C. The Data

Installment loan delinquency rates used here were the American Bankers Association's series for all installment loans and for automobile loans, 30-89 days past due, with quarterly averages derived as described in Part I. In addition., automobile delinquency rate (over 30-days) and repossession rate data reported to the Federal Reserve by major auto finance companies were used in the study. Statistics on nonbusiness bankruptcies prepared by the Administrative Office of the U.S. Courts were analyzed. Conventional and VA mortgage delinquency rates of the Mortgage Bankers Association and the Life Insurance Association of America were used, as in Part I, along with series on mortgage foreclosures published by the NBA. All data were seasonally adjusted at the Federal Reserve and most equations were estimated using, alternatively, quarter -t o- quarter and quarterly year over-year changes in the variables, as a means to neutralize the tendency of high serial correlation to obscure the true relationships among dependent and independent variables.

D. Empirical Tests and Results

(1) Delinquency as Predictor of Serious Distress Relationship of Auto Repossessions to the Auto Loan Delinquency Rate. Serious financial distress may result in repossession where the creditor holds a lien on goods of marketable value. Monthly data on repossessions as well as delinquencies were obtained on a confidential basis from the major auto finance companies. The monthly figures were converted to quarterly data. Taking year-to-year changes in the quarterly data, the rate of repossessions was regressed upon the delinquency rate and other variables. As the sole independent variable, the delinquency rate lagged one period was positively related to repossession with a correlation coefficient, R^2 , of .47². The R^2 was somewhat higher when both current and lagged values of the independent variable were used. Additional independent variables did little to enhance the explanatory power of the equation. In part, as mentioned earlier, this may be because the variables chosen as determinants of the repossession rate are also important determinants of delinquency, so that their influence may already be present in the equation through the delinquency rate.

Beyond this, repossessions are difficult to explain statistically because repossession is one of several alternative approaches lenders may adopt to handle nonpayment of debt--two common alternatives are simply to write off a delinquent loan or to refinance it. A refinancing rate on auto loans, also available from the major

finance companies., was added to the equation to account for part of the remaining variation in repossessions unexplained by delinquency. However, this variable did not prove to be statistically significant. Other variables thought to increase the incidence of delinquency also proved to be statistically insignificant.

Basic equations were:

$$(1) \text{ YRRFC} = -.0224 + .1032 \text{ Y1RDFC}_{t-1} \quad R^2 = .469$$

$$(3-19) \quad (4.98) \quad \text{D.W.} = .98$$

$$(2) \text{ YRRFC} = -.243 + .0482 \text{ YRDFC}_t + .0672 \text{ YRDFC}_{t-1} \quad R^2 = .499$$

$$(3-52) \quad (1.60) \quad (2.23) \quad \text{D.W.} = .81$$

where:

Y = a prefix to denote year-to-year changes in quarterly data

RRFC = repossession rate on finance company auto loans

RDFC = delinquency rate on finance company auto loans

R² = correlation coefficient

D.W. = the Durbin-Watson statistics; t-ratios are in parentheses, and the period covered is 1961-II to 1974-IV

Relationship of Mortgage Loan Foreclosures to Delinquency Rates.

As an initial step in determining how well delinquencies presage foreclosures, a mortgage loan foreclosure rate was regressed upon a delinquency rate serving as a single independent variable for each pair of delinquency and foreclosure rates available from the various sources. Over-30-day delinquencies' (where available) and over-60-day delinquencies were used alternatively in the regressions, and each equation was run on both a quarter-to-quarter and a year-to-year change basis.

Results were mixed. In general, the year-to-year change equations were more successful than quarterly equations and 60-day delinquencies were more successful in explaining foreclosures than 30-day delinquencies. Delinquencies lagged one period performed better using the MRA data; current period delinquencies served better in other equations. FHA and VA loan foreclosures were more successfully explained by delinquencies than were conventional loan foreclosures. This is perhaps largely attributable to the generally higher down payment requirements on conventional loans--hence greater homeowner equity--and to the generally sounder financial status of the typical conventional mortgage. These observations are reflected in the representative year-to-year-change equations presented in Table 1.

Analysis of foreclosure rates is hampered by several problems. As with repossessions, foreclosure is a "last resort" reaction to payment problems with several alternative "remedies" available short of foreclosure, such as sale of the property by the owner. Consequently, delinquencies alone would not be expected to be a particularly good predictor of foreclosures. Further, wide variations in state regulations covering foreclosure, with differing waiting periods for initiation and/or completion of a foreclosure., result in differing frequencies of foreclosure among states and different patterns of lagged response to payment problems, thus weakening the analytical value of aggregate national data. Nevertheless, the table shows that over-60-day delinquency rates prove a fairly good predictor of foreclosure rates for many series. Additional tests (not shown) indicate, that the predictive power of mortgage delinquency rates for foreclosures is even greater when a polynomial distributive lag formulation is used--as foreclosures are correlated with both present period and lagged delinquencies.

**TABLE 1: Regressions Relating Mortgage Foreclosures To Delinquency Rates
(Regression Coefficients, with t-ratios)**

Foreclosure Series	Total	Delinquency Total (t-1)	Rate Over 60 days	Over 60 (t-1)	R ²	D.W.
MBA-VA	.0649 (2.74)				.152	.74
MBA-VA		.0706 (3.01)			.183	.75
MBA-VA			.2252 (3.81)		.257	.81
MBA-VA				.2823 (5.41)	.411	1.03
MBA-FHA	.2079 (4.66)				.370	.60
MBA-FHA		.2411 (5.87)			.482	.44
MBA-FHA			.4894 (5-37)		.438	.65
MBA-FHA				.6023 (8.61)	.667	.54
MBA-CV	.0374 (2.91)				.168	.72
MBA-CV		.0302 (2.29)			.111	.73
MBA-CV			.1146 (3-31)		.207	.73
MBA-CV				.0801 (2.24)	.107	.71
LIAA-VA			.1696 (8.06)		.496	.53
LIAA-VA				.1594 (7.11)	4.37	.82
LIAA-FHA			.2028 (5.72)		.331	.87
LIAA-FHA				.2045 (5.70)	.333	.90
LIAA-CV			.0988 (3.21)		.135	.77
LIAA-CV				.0709 (2.21)	.070	.77

MBA designates series of the Mortgage Bankers Association; LIAA denotes the Life Insurance Association of American. CV indicates conventional loans.

Two home-price variables were introduced alternately into the equations on the theory that the more sharply home prices are increasing--generating more rapid buildup of equity--the less likely it is that a delinquency will be carried through to foreclosure. In most of the equations changes in these variables--the price index of new one-family homes sold and the median price of all homes sold., compiled by the Census Bureau--did not achieve statistical significance., although the signs of the coefficients were consistently negative as hypothesized. However, for VA mortgages, where the initial down payment is extremely low, the rate of home price inflation did have a statistically significant negative impact on foreclosures--possibly because a given rate of home price, inflation induces greater percentage increases in homeowner equity for such loans.

The unemployment rate and money supply (W) were also added to the foreclosure equations but also proved statistically insignificant.

On balance, it appeared that, among single-equation models, simply using the previous period's delinquency rate provides the most workable projection of foreclosure rates.

Relationship of Personal Bankruptcy to Delinquency Rates. Bankruptcy is another--perhaps the ultimate--measure of consumer financial distress. Many factors, some measurable some not., can combine to generate bankruptcy. Heavy debt relative to discretionary income is a necessary condition, with such factors as job loss, reduced working hours, tight credit conditions and changes in social attitudes toward bankruptcy affecting the number of bankruptcy petitions filed. The delinquency rate, as evidence of existing financial problems, would be a logical choice as a predictor of bankruptcy. The lagged delinquency rate, in fact, attained a higher degree of statistical significance than any other variable in the bankruptcy equation.

The delinquency variable was not significant in equation (6). However, the auto loan delinquency rate was "significant" in a similar equation with a lower R^2

In sum, delinquency rates do not appear to be a particularly strong predictor of lender behavior, though any conclusions concerning real world relationships must be tempered by recognition of the many inadequacies in the loan terms data, particularly the absence of any input for the nonquantifiable aspects of lending behavior.

Relationship of Housing Starts and Lenders' Cash Flow to Delinquency Rates. Aside from their implications for foreclosure (investigated earlier), changes in mortgage delinquency rates might be expected to affect economic behavior in ways similar to those hypothesized in the installment loan case. Faced with rising delinquencies, lenders might restrict credit availability to homebuyers and builders. Further., the reduction of cash flow to lenders attributable to delinquent payments could theoretically impair lender solvency. To assess these relationships, estimates of delinquency-induced cash flow changes have been generated, and housing starts and mortgage interest rates have been regressed upon delinquency rates and other variables.

Rising delinquency rates cause cash flow to lenders to be lower than it would otherwise be, as quarterly figures for 1972-73 in Table 2 indicate. Given the historically typical magnitudes of change in delinquency rates, however, this effect on cash flow has been rather modest. Table 2 presents estimates of the extent to which loan arrearages reduce cash flow, based on the MBA all-loan delinquency rate and Federal Reserve estimates of monthly mortgage payments (excluding prepayments) for all lenders. (See footnote 2 to Table 2 for the calculation procedure.) Since there is always some fraction of payments in arrears, "normal" cash flow would encompass a "normal" amount of arrearages, so that quarterly changes in delinquent payments would be a more relevant measure of the cash flow effect than would the total amount of, payments in arrears. As shown., quarterly increases in the amount of cash flow reduction were generally less than one percent of total payments during the two-year period, and the larger changes primarily reflect seasonal movements in delinquency rates. Secularly, a greater impact may occur if quarterly changes cumulate. For instance, between the first quarter of 1972 and the fourth quarter of 1973o \$100 million was subtracted from the rate of cash flow, implying that cash flow was about three percent lower (\$100 M. 4 \$3.8 b.) in late 1973 than it would have been had the delinquency experience of early 1972 still pertained. However, seasonal influences apparently accentuate the calculated degree of impairment in cash flow.

Regression results suggest that delinquency rates may have little direct effect upon housing starts. However, over time they tend to be significantly and positively related to mortgage interest rates. Thus, it is conceivable that some long-term indirect impact of delinquency rates on housing starts may occur if secularly rising delinquency rates cause mortgage interest rates to rise. Such a relationship may be weak at best, however, because in the short-run, year-to-year changes in delinquency rates and home mortgage interest rates are significantly negatively related.

When initial values of variables were used, instead of changes, in the housing starts equations, the delinquency rate coefficient was unexpectedly positive in most equations. This may reflect little more than that delinquencies and starts are higher at the end of the period than at the beginning, which tends to establish a positive statistical relationship. Expressing variables in year-over-year changes results in the expected negative -but still statistically insignificant relationship. The most important independent variable of those tested was the mortgage interest rate (FHA series for conventional new home mortgages). The Census Bureau series on home vacancy rates had the expected negative sign but contributed only marginally to the explanation of housing starts. Home prices were positively associated with starts, which could simply reflect similar responses to changing demand for new houses. The most successful starts equation., in which the delinquency rate was insignificant, was:

$$(8) \text{ YHS} = 61.86 - 117.89 \text{ YRDMRATOT}_{t-1} - 514.12 \text{ YRMFHCV} + 18.65 \text{ YHPRIND}$$

$$\begin{array}{llll}
 (.93) & (.26) & (5-85) & (1-73) \\
 -481.17 & \text{YVACHOME} & & R^2 = .506 \\
 (1-54) & & & \text{D.W.} = .59
 \end{array}$$

where:

HS is the Census Bureau series on housing-starts.

RMFHCV is the FHA series on conventional mortgage interest rates for new homes.

HPRIND is the Census Bureau home-price index.

VACHOME is the Census Bureau series on home vacancy rates.

Other variables are as previously defined.

Table 2
Estimate of Reduced Cash Flow to Lenders From Delinquencies on Mortgage Loans
(data not seasonally adjusted)

Period	Average Monthly Repayments 1/	30-day-and-over Delinquency Rate (MBA) 2/	Cash Flow Reduction	Change in C.F. Reduction	C.F. Change as Per Cent of Repayments quarterly	C.F. Change as Per Cent of Repayments cumulative
1972- 1	\$3.23b.	3.16	\$144.8m.			
-2	3.30	3.27	149.1	\$4.3m.	.13%	.13%
-3	3.43	3.82	182.8	33.7	.98	1.11
-4	3.53	4.66	224.9	42.1	1.19	2.30
1973-1	3.50	3.63	181.0	-43.9	-1.25	1.05
-2	3.56	3.84	187.3	6.3	.18	1.23
-3	3.70	4.36	214.8	27.5	.74	1.97
-4	3.80	4.70	245.9	31.1	.82	2.79

1/Average monthly mortgage payments, which exclude prepayments, estimated by David Seiders of the Board's staff.

2/Although the total 30-day-and-over delinquency rate is shown, the cash flow reduction was computed as (1-0 x 30-59 day rate x repayments) + (2.0 x 60-89 day rate x repayments) + (2.0 x 60-89 day rate x repayments).

Relationship of Net and Gross Extensions of Consumer Installment Credit to Delinquency Rates. Several equations were estimated in which consumer installment credit measures were dependent variables and delinquency rates were among the independent variables. Both total installment credit extensions and net installment credit extensions (which equal installment credit extensions less installment credit repayments) were related to the ABA overall delinquency rate.

In general, higher correlation coefficients were recorded using year-to-year differences in the credit measures rather than quarterly differences. The delinquency rate was significant in most equations, sometimes strongly so. Other independent variables included consumer durables expenditures, an income variable, an unemployment rate or layoff rate., and loan terms measures. Consumer durables expenditures were highly significant in estimating changes in gross and net credit extended., with loan terms, income, and the money supply entering significantly as independent variables in one or both credit extension equations.

The best year-to-year equations with two explanatory variables were:

$$(9) \text{ YEXTTOT} = 536.1 - 1271 \text{ YRDABATOT} + 245.2 \text{ YCD} \quad R^2 = .715$$

$$(1.97) (15.15) \quad D.W. = .71$$

$$(10) \text{ YEXTNET} = -388.4 - 2350 \text{ YRDABATOT} + .1350 \text{ YCD} \quad R^2 = .690$$

$$(5.12) (11.54) \quad D.W. = .75$$

where:

EXTNET = net extensions of consumer installment credit

EXTTOT = gross extensions of consumer installment credit

CD = consumer durables expenditures and the period covered was 1961II-1974IV,

Inclusion of additional variables tended to reduce the significance of the delinquency rate. For instance, insertion of wage and salary income into equation (9) yields:

$$(11) \text{ YMXTTOT} = -85.83 - 653.9 \text{ YRDABATOT} + 162.1 \text{ YCD} + 34.77 \text{ YWSS} \quad R^2 = .815$$

$$(.70) \quad (1-11) \quad (9-38) \quad (7-33) \quad D.W. = .77$$

Inclusion of loan terms and money supply variables, which are known to interact with the delinquency rate, further reduce the significance of the delinquency variable while increasing the overall predictive power of the equation.

$$(12) \text{ YMMTOT} = -554.2 - 564.1 \text{ YRDABATOT} + 139.8 \text{ YCD} + 31.12 \text{ YWSS}$$

$$(3.00) \quad (.70) \quad (6.97) \quad (4.54)$$

$$+ 83.71 \text{ YLTI} + .0214 \text{ YM2} \quad R^2 = .885$$

$$(4.27) \quad (2.20) \quad D.W. = 1.35$$

Coefficients of all explanatory variables are of the expected sign-the change in the volume of extensions increases with durable goods spending, wage and salary income, easing loan terms and money supply growth, and becomes smaller as delinquency rates rise. Due to the interactions previously noted, the delinquency coefficient, although negative as hypothesized, was not statistically significant, suggesting that delinquencies are only a marginal determinant of movements in credit volume, given the impact of other economic variables.

The use of the same independent variables to explain year-to-year changes in net extensions (gross extension less repayments) yields the following equation, which reveals some shifts in the relative importance of the variables. In particular, the delinquency rate appears to influence year-to-year changes in the net rate of extension of consumer installment credit significantly., while the money supply and income variables lose significance. In fact, the income variable takes on the opposite sign from that in the gross extensions equation.¹¹

$$(13) \text{ YEXTNET} = -613.0 - 1685 \text{ YRDABATOT} + 150.6 \text{ YCD} - 7.57 \text{ YWSS}$$

$$(4.10) \quad (2.59) \quad (9.30) \quad (1.36)$$

$$+ 55.89 \text{ YLTI} + .0069 \text{ YM2} \quad R^2 = .852$$

$$(3-37) \quad (.92) \quad D.W. = 1.68$$

On balance, movements in net credit extensions, i.e., the change in credit outstanding, can be explained in large part, not unsurprisingly, by movements in sales of consumer durables. Variations in delinquency rates and loan terms permit improved accuracy in estimating net extensions. It is not clear whether the delinquency rate's impact (on contractions in net credit) is through the supply side (credit rationing) or demand side (cautious

¹¹ The significance of income in the gross extensions equation most likely stems from the strong secular trends in both these current-dollar series, even after calculation of year-over-year changes. The net extensions figure, which is more volatile and cyclically responsive, does not have a strong secular relationship with the income variable.

consumer spending), but such rates do add marginally to the accuracy of estimation. In the gross extensions equations delinquency rates do not help explain credit extensions when durable expenditures, income, the money supply, and loan terms are included in the estimation.¹²

E. Conclusions

The following conclusions can be drawn from the empirical results presented in this part of the study.

- (1) Delinquency rates help explain changes in indices of acute consumer financial distress--such as automobile repossessions mortgage foreclosures., and nonbusiness bankruptcies. They are often more significant with a lag than unlagged. With the exception of nonbusiness bankruptcies --where changes in the money supply and, possibly, unemployment also play a role--variables other than delinquency rates were not very helpful in explaining changes in indices of acute consumer financial distress.
- (2) There is some evidence that increases in auto credit delinquency rates are associated with a subsequent tightening of auto nonrate credit terms --maturities and down payments--and that changes in delinquency rates in general may have a similar effect. However, due to strong interaction between delinquency rates and several other cyclically related variables, this conclusion is somewhat tentative--as general delinquency rates lost their significance when a number of other independent variables were added to the loan-terms equation.
- (3) Secular changes in delinquency rates impact on mortgage lenders' cash flows but appear to have little effect on mortgage interest rates or housing starts. For instance, it was estimated that elevated delinquencies reduced mortgage lender cash flows by nearly three percent between 1972I and 1973IV. However, much of the decrease was due to seasonal factors. Moreover, changes in delinquency rates did not appear to have a significant effect on housing starts. Finally, while the expected positive relationship was found in regressions designed to document the impact which the level of delinquency rates had on the level of mortgage interest rates, this relationship reversed in regressions which used quarter-to-quarter or year-to-year changes in delinquency rates and mortgage interest rates. Consequently, the regression results did not unequivocally indicate that delinquency rates affect either housing starts or mortgage interest rates in the expected manner.
- (4) Elevated delinquency rates appear to be negatively associated with installment credit extensions. The relationship can be most clearly documented for net credit extensions. Possibly because of interactions between credit extensions and repayments during periods of consumer financial distress, the relationship is less obvious for gross credit extensions--as the explanatory power of the delinquency rate variable disappears when additional, interrelated, independent variables are added to the equation. It is not clear whether the negative relationship between changes in delinquency rates and net consumer installment credit extensions occurs because of reductions in credit supplies due to lender caution when delinquency rates are high or because of reductions in credit demand due to increased consumer caution during such periods.

¹² The difference in results could be due, in part, to the fact that net extensions are influenced by credit repayments as well as by gross credit extensions. As a result, if, for instance, credit renewals and refinancing were to increase during periods when delinquency rates were high--as consumers sought to defer or stretch out their problem debts--the resulting simultaneous increase in credit extensions and repayments would increase gross credit extensions while leaving the net extensions variable unchanged. Such an artificial inflation of the gross credit extensions variable could obscure, in whole or part, the negative relationship between delinquencies and credit extensions which is documented in the net credit extension equations.

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APPENDIX: The Data Base

I. The New-Car Loan Terms Index

The New-Car Loan Terms Index was constructed from information on auto loan maturities and (loan value or) credit extended-to-dealer cost ratios (CDCR's) collected by the Federal Reserve Board and reported in the monthly G.26 statistical release. The data are in the form of percentage frequency distributions, by maturity and CDCR categories., for all new car loans made by major auto finance companies during a month. New-car maturity categories, up to November 1975, were 24 months or less, 25-30 months., 31-36 months and over 36 months. Recently established categories are: under 30 months, 31-36 months, 37-42 months and over 42 months. Credit-to-dealer-cost ratio categories are 90 percent or less, 91-100 percent, 101-105 percent, 106-110 percent, and over 110 percent.

To construct the index, two maturity categories (31-36, over 36) and three CDCR categories (101-105, 106-110, over 110) were utilized. These were considered to represent liberal terms (high CDCR's indicate low down payments). Maturity and CDCR index components were computed separately, then added together to form the total index. In constructing the maturity component., each of the two maturity categories were weighted to reflect their relative degree of liberality. The three CDCR categories were also weighted in accord with their degree of liberality.

Maturity Component. To determine weights to express the liberality of different maturities., it was assumed that maturities in the over-36-month category are primarily for 48 months (though a considerable number of 42-month contracts, and some for 60 months., are being made)v and that virtually all credit contracts in the 31-36 month category are for 36 months.

Since 36 is three-fourths of 48, it was decided to make the weight of the 31-36 month category 75 percent of that applied to the over 36-month category. Setting the combined sum of the weights to 1.0 for

simplicity, weights can be calculated from the formula: $.75X + X = 1.0$. Resulting weights for the 31-36 and over 36-month categories are, respectively, .429 and .571. Each month these two weights are applied to the appropriate maturity category percentages and the two weighted figures are added. This total in turn is multiplied by a factor constructed so that the maturity index component would equal 50 in January 1965. In January 1965, 76.7 percent of new car contracts had 31-36 month maturities, and .5 percent had maturities over 36 months. Thus, the computation yields an initial maturity component value of $(76.7) (.429) + (0.5) (.571) = 32.9 + 0.3 = 33.2$. To raise 33.2 to 50 for the base month, the computed figure was multiplied by a factor of 1.50602: $(33.2) (1.50602) = 50$. The factor (1.50602) is then used in each computation of the maturity component of the index. For example, computation for September 1973, in which 85.1 percent of all new car contracts had 36 month maturities and 3.3 percent had over 36-month maturities, is as follows:

$$[(85.1) (.429) + (3.3) (.571)] \times (1.50602) = 57.8$$

CDCR Component. The computation of the CDCR *component* is entirely analogous to that of the maturity component. "Average" ratios for the three CDCR categories were set at 103 percent, 108 percent and 115 percent, which generated relative weights of .315, .331, and .354. To convert the initial CDCR component value for January 1965 to 50, a multiplicative factor of 5.95238 was required. Computation for September 1973, in which 12.0 percent of all contracts had CDCR's of between 101 and 105 percent, 5.7 percent had CDCR's of between 106 and 110 percent and 4.1 percent had CDCR's of over 110 percent yields:

$$[(12.0) (.315) + (5.7) (.331) + (4.1) (.354)] \times (5.95238) = 42.9$$

Total Index. Adding the maturity and CDCR components for September 1973--as calculated above, 57.8 and 42.9--results in an overall index (NSA) of 100.7. Seasonal adjustment factors have been calculated for the loan terms index by using the X-11 seasonal adjustment program. When seasonally adjusted, the September 1973 index value equals 101.4. Quarterly figures, simple averages of the monthly observations, are presented in the attached table. The seasonally adjusted index is also charted from 1969-73 in the March 1975 Federal Reserve Bulletin.

NEW CAR LOAN TEPM INDEX, 1960-74
(Not Seasonally Adjusted)

	Q1	Q2	Q3	Q4
1960	87.4	84.2	81.3	78.8
1961	80.8	82.4	83.2	85.2
1962	89.8	90.5	91.7	90.3
1963	96.0	95.8	97.9	97.6
1964	99.5	100.7	100.4	103.2
1965	100.5	100.7	101.5	102.8
1966	104.2	103.8	100.2	97.1
1967	100.6	99.6	100.7	100.1
1968	100.9	99.6	100.1	99.7
1969	101.2	101.7	101.3	96.9
1970	97.1	93.3	94.0	96.4
1971	94.7	93.9	94.2	92.3
1972	96.8	99.8	100.9	103.0
1973	105.0	105.4	103.9	103.9
1974	103.8	101.6	101.0	96.5

(Seasonally Adjusted)

	Q1	Q2	Q3	Q4
1960	86.4	83.9	81.5	79.8
1961	79.9	82.1	93.4	86.1
1962	88.8	90.2	91.9	92.1
1963	95.2	95.5	98.1	98.4
1964	98.8	100.4	100.6	103.9
1965	99.9	100.5	101.6	103.4
1966	103.7	103.6	100.2	97.7
1967	100.1	99.5	100.6	100.8
1968	100.4	99.6	99.9	100.4
1969	100.7	101.8	101.0	97.7
1970	96.6	93.4	93.7	97.0
1971	94.4	93.9	93.9	92.9
1972	96.4	99.8	100.6	103.7
1973	104.7	105.4	103.6	104.6
1974	103.2	101.6	100.8	97.2

II. Delinquency Rate Data

Quarterly data for the various (seasonally adjusted) delinquency rate series used in Part I of the study are presented on the following pages.

ABA 30-90 day delinquency rate for all consumer loans

	1	2	3	4
1950	1.719	1.601	1.470	1.475
1951	1.504	1.419	1.424	1.424
1952	1.397	1.499	1.531	1.477
1953	1.486	1.507	1.582	1.645
1954	1.700	1.615	1.534	1.466
1955	1.374	1.320	1.271	1.261
1956	1.262	1.288	1.311	1.288
1957	1.300	1.288	1.291	1.339
1958	1.425	1.475	1.432	1.301
1959	1.271	1.219	1.245	1.389
1960	1.364	1.385	1.442	1.488
1961	1.515	1.521	1.467	1.369
1962	1.366	1.339	1.326	1.321
1963	1.342	1.361	1.397	1.416
1964	1.359	1.363	1.362	1.382
1965	1.421	1.400	1.475	1.415
1966	1.439	1.478	1.465	1.436
1967	1.533	1.500	1.376	1.391
1968	1.289	1.314	1.308	1.295
1969	1.341	1.405	1.437	1.469
1970	1.548	1.550	1.605	1.601
1971	1.557	1.486	1.563	1.567
1972	1.548	1.603	1.700	1.734
1973	1.727	1.755	1.732	1.918
1974	2.132	2.268	-0	-0

NCUA delinquency rate for monthly reporting credit unions

	1	2	3	4
1964	0	0	2.400	2.633
1965	2.567	2.367	2.467	2.300
1966	2.500	2.400	2.167	2.433
1967	2.500	2.367	2.200	2.333
1968	2.536	2.440	2.390	2.337
1969	2.229	2.224	2.171	2.007
1970	2.418	2.218	2.113	2.219
1971	2.427	2.028	2.039	2.056
1972	1.961	1.901	1.719	1.784
1973	1.908	1.750	1.602	1.717
1974	1.889	1.885	1.938	-0

Auto finance company 30-day-and-over delinquency rate

	1	2	3	4
1966	0	0	1.477	1.523
1967	1.457	1.527	1.583	1.727
1968	1.493	1.650	1.657	2.160
1969	2.250	2.330	2.433	2.293
1970	2.503	2.603	2.420	2.370
1971	2.473	2.303	2.223	2.083
1972	1.987	2.040	2.110	2.303
1973	2.403	2.220	2.200	2.427
1974	2.510	2.627	2.607	2.683
1975	2.953	-0	-0	-0

"Default" rate on VA mortgages

	1	2	3	4
1950	2.143	2.065	2.032	2.024
1951	2.013	1.945	1.859	1.780
1952	1.678	1.556	1.511	1.408
1953	1.274	1.170	1.099	1.062
1954	1.092	1.131	1.156	1.161
1955	1.110	1.086	1.040	1.001
1956	.980	.978	.964	.964
1957	.962	.964	.963	.977
1958	1.052	1.134	1.249	1.259
1959	1.213	1.170	1.129	1.151
1960	1.176	1.169	1.215	1.271
1961	1.321	1.402	1.455	1.495
1962	1.910	1.495	1.474	1.455
1963	1.465	1.502	1.528	1.544
1964	1.557	1.530	1.489	1.475
1965	1.508	1.515	1.539	1.536
1966	1.509	1.516	1.540	1.535
1967	1.382	1.309	1.233	1.179
1968	1.130	1.115	1.041	1.003
1969	.976	.954	.976	.941
1970	.985	.958	.903	936
1971	.968	1.026	1.107	1.178
1972	.987	1.045	1.044	1.025
1973	1.015	1.030	1.032	1.047
1974	1.097	1.039	1.052	1.122
1975	1.199	1.209	-0	-0

LIAA, 60-day-and-over delinquency rate on VA mortgages

	1	2	3	4
1954	.886	1.069	1.021	.899
1955	.837	.769	.782	.819
1956	.814	.845	.869	.804
1957	.843	.0781	.648	.699
1958	.789	.824	.830	.814
1959	.758	.717	.738	.729
1960	.727	.793	.821	.917
1961	.976	1.021	1.015	1.052
1962	.992	1.001	1.071	1.059
1963	1.154	1.199	1.184	1.266
1964	1.256	1.202	1.185	1.147
1965	1.163	1.214	1.237	1.207
1966	1.134	1.153	1.101	1.078
1967	1.023	1.006	.978	.921
1968	.862	.857	.828	.826
1969	.878	.805	.839	.815
1970	.837	.807	.831	.889
1971	.825	.909	.911	.935

MBA 60-day-and-over delinquency rate on VA mortgages

	1	2	3	4
1954	.650	.710	.700	.660
1955	.590	.550	.540	.560
1956	.610	.630	.660	.610
1957	.580	.590	.610	.690
1958	.740	.840	.790	.800
1959	.800	.710	.770	.760
1960	.750	.800	.820	.950
1961	1.040	1.100	1.110	.950
1962	.840	.850	.850	.870
1963	.970	.990	1.000	1.060
1964	.970	.920	.920	.940
1965	.910	.980	.980	.940
1966	.930	.930	.880	.860
1967	.870	.830	.830	.800
1968	.700	.740	.720	.720
1969	.730	.700	.730	.720
1970	.780	.780	.730	.850
1971	.870	.960	.930	.910
1992	.870	.880	.940	.970
1973	.960	.950	1.090	1.020

MBA 60-day-and-over delinquency rate on conventional mortgages

	1	2	3	4
1954	.500	.490	.490	.470
1955	.380	.400	.430	.330
1956	.440	.420	.400	.410
1957	.390	.390	.410	.400
1958	.400	.420	.400	.450
1959	.460	.430	.410	.420
1960	.450	.460	*470	.450
1961	.520	.510	.540	.510
1962	.400	.430	.400	.410
1963	.440	.460	.490	.510
1964	.480	.430	.430	.450
1965	.450	.500	.510	.480
1966	.460	.490	.500	.520
1967	.560	.510	.480	.460
1968	.450	.460	.420	.370
1969	.400	.380	.390	.400
1970	.430	.430	.480	.480
1971	.560	.600	.550	.540
1972	.480	.490	.520	.610
1973	.590	.560	.610	.590

LIAA 60-day-and-over delinquency rate on conventional mortgages

	1	2	3	4
1954	.625	.605	.485	.380
1955	.394	.522	.427	.465
1956	.410	.354	.368	.403
1957	.385	.388	.366	.383
1958	.430	.432	.442	.428
1959	.432	.429	.488	.377
1960	.376	.403	.433	.433
1961	.417	.438	.426	.431
1962	.468	.420	.518	.484
1963	.679	.617	.567	.602
1964	.597	.614	.594	.656
1965	.682	.668	.725	.625
1966	.570	.648	.612	.694
1967	.800	.765	.721	.665
1968	.601	.620	.614	.579
1969	.538	.507	.463	.481
1970	.542	.647	.765	.810
1971	.833	.815	.793	.810

MA 30-day-and-over delinquency rate on VA mortgages

	1	2	3	4
1954	2.870	2.880	2.890	2.740
1-1955	2.540	2.480	2.480	2.540
1956	2.670	2.600	2.740	2.650
1957	2.530	2.510	2.490	2.610
1958	2.860	2.960	2.850	2.850
1959	2.890	2.610	2.820	2.770
1960	2.790	2.890	2.940	3.230
-1961	3.360	3.380	3.600	3.490
1962	3.140	3.210	3.270	3.290
-1963	3.540	3.710	3.550	3.520
1964	3.470	3.310	3.330	3.350
,1965	3.320	3.510	3.470	3.320
1966	3.430	3.380	3.270	3.290
1967	3.270	3.150	3.330	3.290
1968	3.030	3.130	2.990	2.910
1969	2.880	2.900	2.930	2.840
1970	3.030	2.960	3.000	3.100
1971	3.160	3.270	3.180	3.140
1972	3.070	3.170	3.280	3.740
1973	3.380	3.630	3.910	3.860

NBA 30-day-and-over delinquency rate on conventional mortgages

	1	2	3	4
1954	1.770	1.740	1.750	1.750
1955	1.540	1.540	1.630	1.440
1956	1.730	1.630	1.570	1.560
1957	1.490	1.540	1.440	1.420
1958	1.910	1.440	1.470	1.510
1959	1.540	1.470	1.490	1.500
1960	1.470	1.590	1.540	1.600
1961	1.970	1.670	1.800	1.780
1962	1.750	1.790	1.730	1.690
1963	1.760	1.850	1.880	1.800
1964	1.850	1.730	1.730	1.780
1965	1.730	1.810	1.850	1.770
1966	1.740	1.820	1.840	1.930
1967	1.980	1.890	1.870	1.860
1968	1.770	1.860	1.750	1.690
1969	1.640	1.580	1.630	1.630
1970	1.690	1.720	1.770	1.800
1971	2.050	2.030	2.010	1.950
1972	1.790	1.830	1.950	2.280
1973	2.280	2.350	2.380	2.350