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CHAPTER 3 DATA ON CREDIT RISK AND EXPERIENCE

We now turn from the meaning and economic implications of credit risk to its statistical measurement. Based on the concepts discussed in Chapter 2, we can cite, at least in broad terms, the kinds of time series that should be used to register the level of and changes in credit risk. Although we find that the data actually available are extensive and very useful, they fall far short of what would be optimum — and what could reasonably be expected. The topics discussed in this chapter, therefore, are the data we would like to have, the data actually available and the principal gaps in our statistical arsenal.

Our goal is to be able to measure the risk position of the nation's credit as a whole and in its many parts. For each of these we would like to know the historic pattern of the risk, its present position, and the direction and speed at which it is moving. To determine all this with any precision requires a substantial number and variety of statistical time series. More specifically, our basic requisites are a comprehensive set of time series covering both prospective (*ex ante*) and retrospective (*ex post*) credit risk: (1) the loan and borrower characteristics that are known to be related to credit difficulties, (2) the actual collection difficulties, and (3) credit ratings made by either private or government agencies.

All three types of series are included in this volume. Information closely related to credit risk but not included here are (1) series on the volume of debt, (2) interest rate differentials, (3) data on governmental or private insurance of credit obligations, and (4) information on the general stability of the economy or its credit structure. Interest rate differentials are excluded for reasons discussed later in this chapter. The other types of data are beyond the scope of this book and in most cases are readily available in detail elsewhere.

In addition, no attempt has been made to provide information on financial institutions per se. Although credit risk is important to the soundness and solvency of financial intermediaries, our objec-

tive is to provide measures of the risk position of the credit structure in terms of the probability of default by debtors, not to examine the liquidity and safety of financial institutions. Many of the data, however, pertain to credit issued by particular groups of financial institutions.¹

Requirements of Good Time Series

Before discussing the major classes of data desired, it is useful to consider some of the practical requirements and statistical problems of these time series. The first requirement is that these series be published regularly and with reasonable promptness. Although annual data are valuable, in most cases it is important that the data be available on a monthly or quarterly basis so that a more current reading is possible.

Second, it is vital that these series be compatible in form with one another. The different financial institutions reporting on home mortgage loan-to-value ratios, for example, should use the same definitions and approximately the same standards of coverage, so that their series can be combined into a national total for home mortgages. Moreover, this principle should extend to combining different types of credit; to combining, for example, delinquency rates for every type of bond, mortgage and loan outstanding in the nation.

Third, in addition to comprehensive national aggregates, time series should be provided for certain categories within the totals: by major industry group or subgroup and by region or local area. These are of interest to the lender in that they permit him to compare his own risk position with that of others in like circumstances. More directly germane to our purposes, however, is that these detailed figures bring to light changes in the scope of credit-risk developments. They permit the analyst to trace a spreading weakness or improvement in credit quality from sector to sector or region to region throughout the economy. If avail-

able in sufficient detail, the series could be combined into diffusion indexes to serve the credit analyst in the same way that diffusion indexes of economic indicators are now employed in business cycle analysis.

A further use of regional and industry data is to assist in the interpretation of the aggregates. For instance, if persistent regional differences in lending practices existed, it would be useful to know whether a movement in an aggregate time series on credit risk came about as a result of a change in that series in one or more regions, or whether it came about solely through a shift in the distribution of the volume of credit among regions.

Method of Compilation

A fourth requirement of these data is that they have a sound statistical method of compilation. Each series should be based on a good reporting system, one that collects the information directly from the borrowers and lenders themselves, rather than from indirect sources. The reporting system should provide good coverage, either through a complete or nearly complete count, or through a carefully drawn "probability" sample of adequate size.²

The series included in this volume vary widely in the soundness of their compilation. Few, if any, are based on a complete census of the entire population of debts or debtors. Some of the series, however, are compiled from scientifically selected probability samples. These series have the very important advantage of allowing an estimate of the "sampling variance," which is a statistical estimate of how far the value derived from the sample is likely to deviate from the value calculated for all members of the population (i.e., if it were taken by the same techniques from a complete census). If the sample is of adequate size, the sampling variance will be small and thus not troublesome. But a series based on a small sample will have a large variance and will tend to exhibit large, seemingly erratic movements from period to period. Series based on probability samples in this compendium include, for example, those on consumer instalment and home mortgage debt from the Survey Research Center *Surveys of Consumer Finances*, the financial ratios from the FTC-SEC *Quarterly Financial Reports for Manufacturing*

Corporations, and in some instances the series on the credit terms and borrower characteristics of FHA and VA home mortgages.

The FHA and VA data are collected from samples of substantial size, and thus period-to-period changes in these series can be treated with reasonable confidence as true indications of the movement of the FHA or VA population. The FTC-SEC samples of manufacturing firms appear to be very satisfactory, with all large firms included and the smaller corporations well covered on a rotating basis. Unfortunately, this is not the case for the data from the Survey of Consumer Finances, whose samples are rather small for measuring credit risk. Thus, trends which persist over a period of several years can be taken seriously, but movements from one year to the next are of dubious significance, since they may reflect no more than the normal sampling variance.

Series not based on probability samples are subject to unknown amounts of sampling variance. These series can nevertheless be very useful, for in many cases the sampling error may be narrow. It must be kept in mind, however, that the variance is not known. The sampling error will show up as part of the erratic period-to-period movements of the series, as has been mentioned.

All time series, whether compiled from a complete count or calculated from a sample, and whether or not the sample is a probability sample, are subject to bias. The bias arises from an inadequate definition of the characteristic being measured, incomplete coverage of the total population being studied, faulty data-collection procedures, etc. The amount and direction of bias are difficult to determine, though for many purposes they are not of crucial importance in the analysis, since we are often more interested in the trend or cyclical movement of a series than in its absolute level. Although the degree of bias in a series can change over time, as long as the series is defined and compiled in a consistent way this change may not be very large.³

Series Definition

A fifth statistical consideration involves imperfectly defined series. For example, some of our ratios for home mortgage credit (e.g., the payments-to-income ratio, HM11) are based on the

Federal Home Loan Bank Board series — since discontinued — of recorded mortgages that have a value of \$20,000 or less. The \$20,000 limit was originally designed to separate mortgages on private homes from those on income properties, and probably was a reasonably suitable dividing point at the time (although some small-business, garage and other nonhome mortgages were undoubtedly included in the figures). In recent years, as the value and price of housing rose, this dividing point clearly became too low; an increasing proportion of single family homes carries mortgages larger than that amount. The resultant bias means that interpretations of the affected home mortgage series must take this limitation into account.

A similar difficulty affects some of the data on credit collection experience, subjecting them to erratic movements because of changes by lending institutions in their policies (in effect, changes in definition) concerning delinquencies and other forms of credit experience. At times, a borrower's repayment difficulty will not show up as a reported delinquency; instead it will be handled by a formal or informal extension of the due date or by refinancing the balance of the debt. At other times, the lender may sharply curtail such practices. Changes in policy by lenders therefore can change the incidence of delinquencies. Similarly, lenders will vary their policy on how long they carry delinquent loans before instituting repossession or foreclosure proceedings, introducing a variable element into these two measures. There is a comparable variation in how rapidly and completely losses are written off.

Effects of Price Changes

A statistical shortcoming that besets some of the series on loan and borrower characteristics is the distortion brought about by changes in the general price level. For example, loan-to-value ratios might appear to some observers to be venturesomely high yet be justified within a few years by a rising price level, which raises the value of the property and hence the borrower's equity. Other cases in point are the financial ratios for business firms, especially the worth-to-debt and working-capital ratios. Unfortunately, all of the up-to-date balance-sheet ratios presently available are based on book values from company account-

ing records — which are based on original cost, and thus do not reflect current price levels — rather than on present market values. Over the years, inflation adds to the monetary value of assets, but not to their book value and not to debt that has already been incurred. Consequently, in a period of rising prices, these financial ratios are likely to look riskier than they are in fact — unless of course the price trend reverses itself.

Breaks in Continuity

Another statistical problem is brought about by the occurrence of certain exogenous events which distort some of the indicators by breaking their continuity. Changes in tax laws, for example, will alter the relative attractiveness of debt versus equity financing. And changes in the rating methods or in the rating philosophy of credit rating agencies would alter those measures in a way that obviously does not reflect changes in the quality of the obligations. Typically, such changes are not quantifiable and thus the series cannot be adjusted for them. Often they go unnoticed.

Breaks in a series which come about from changes in definitions, changes in sampling methods, or changes in the coverage provided by the reporting system are also troublesome, though the series often can be adjusted for them. If the changes are not of major proportions and if an overlapping period is available, the old and new segments can be spliced together into a continuous series. Where such adjustments have been made to series in Part II of this volume for the purpose of seasonally adjusting the series, the splicing technique is briefly described in the source notes.

Seasonal Movements

Another standard statistical adjustment that is employed to facilitate current analysis of time series is an adjustment for seasonal variation. All monthly or quarterly series that showed recurrent seasonal movements were put through a seasonal adjustment program.⁴ Both the original and seasonally adjusted data are presented in Part II, as are the seasonal adjustment factors for the latest year.⁵

Data Desired on Risk-Related Characteristics

The first general class of data desired are those

series which measure loan, borrower and property characteristics that bear significantly on credit risk. There are four types of risk-related characteristics: (1) ratios of debt or debt payments to income, (2) ratios of debt or debt payments to assets, (3) maturities and (4) measures of the composition of debt by industry or type. Each type of series will be discussed further in Chapter 5.

Newly Extended and Outstanding Credit

The foremost requirement for time series on credit characteristics is that they be compiled both for all outstanding credit and for newly extended credit. The time series on new credit are needed to provide knowledge of the risk embodied in the credit that lenders are currently putting on their books. This knowledge is vital to the question of whether to change economic and financial policies because of considerations of credit risk, and to estimating the impact of policy changes on lenders' risk-taking practices. As Moore put it, "control is most likely to be exercised only over new credit."⁶

But information on new credit is not enough. The risk position of the stock of outstanding credit is not simply a function of the characteristics of the credit put on the books in the past. Rather, the credit risk of outstanding credit experiences marked changes through time. Other things equal, the risk on an amortized loan declines as it matures and the borrower builds his equity. But more significant are the changes over time in some of the key loan and borrower characteristics, such as repayment-to-income ratios or loan-to-value ratios, changes brought about by fluctuations in business conditions. As incomes and prices rise during a business expansion, the borrower's repayment burden is, typically, reduced relative to his income and relative to the value of the property; thus the risk of collection difficulties is reduced. By the same process, a business recession increases the risk on outstanding credit. These changes in risk do not show up in time series of the characteristics of newly extended credit — indeed, changes in such series usually move in the opposite direction (as lending policy is influenced by the experience on outstanding credit). Thus, to gauge the risk exposure of the nation's credit, it is even more important to

have time series covering the total stock of outstanding credit.

To permit finer analysis of the changes in credit risk, we would want separate series for each of the three components of outstanding credit: the inflow of new credit extended, the outflow of credit paid off and the continuing stock of outstanding credit. However, in view of the cost, and in view of the probably very low and consistent level of risk on credit being paid off, information as extensive as that is more than we can expect.

Combined Series

Having these credit characteristics series available separately is not sufficient in itself; they should be known in combination as well. Only then can we obtain an over-all picture of the movements of the risk-related characteristics. Only then can we tell whether they are offsetting or reinforcing one another. What, for example, can be said about the risk on home mortgages if maturities are lengthening but at the same time loan-to-value ratios and debt-payment-to-income ratios are declining? The first of those three developments suggests increasing risk and the last two, declining risk. The net effect of the movements of these three, and all the other related home mortgage characteristics, must be known as well. All of them should be measured simultaneously and their relative importance should be understood so that the proper weight can be assigned to each characteristic when they are combined.

Our data need to be combined in a second way: across credit sectors. How is the risk on a home mortgage, for example, affected by any other debts that the homeowner may have incurred? Does he have an auto loan? Other consumer installment credit? A farm or a vacation home with a mortgage? Or even a second mortgage on this same property? If so, what are the repayment requirements on these loans? How much equity has he accumulated in them? The presence or absence of other loans, and their characteristics, clearly influences the risk on the home mortgage; indeed, each has an influence on every other loan. To bring all these considerations together complicates not only the process of data collection, but also the analytical problems of sorting out the interrelationships among all the risk-related factors.

Nevertheless, if we are to make a respectable projection of credit risk, it is necessary to bring *all* the facts to bear. Perhaps the most efficient approach is to collect the data, not only on a loan-by-loan basis as is nearly always the case now, but also borrowing unit by borrowing unit — i.e., families, business firms, farms and government units.

Information on Extremes

The series showing the averages of these characteristics need to be supplemented by data on the distribution of such characteristics throughout the loan population. Specifically, we want to know the proportion of loans that fall at the extreme (weak) end of the quality scale. It might be just as valuable, and for some purposes more valuable, to know the proportion of home mortgages with a loan-to-value ratio above, say, 90 per cent, as to know the average ratio for all such loans. Movements in the averages generally provide a good clue to movements of the proportion of extreme cases, but at times they may fail to reveal such developments.

The data on loans with characteristics beyond a certain limit should also be available in combination. If, for example, an extremely high loan-to-value ratio is compensated for by a particularly low ratio of payments to borrower's income — or by any combination of other characteristics of lower-than-average risk — then the loan itself could not properly be classified at the weak end of the quality scale. Ideally, then, an index based on all of the relevant characteristics would be calculated for each credit instrument, and our measures of credit risk would include both an average of these indexes and the proportion of loans that were indicated by their index score to be of especially high risk.

Debtor Population vs. Total Population

Another distinction that must be made for the series on characteristics of outstanding credit is the distinction between the debtor population and the total population. The ratio of repayments on consumer instalment credit to disposable personal income, for example, is based on data for the whole population. A rise in this ratio can come about from either or both of two developments: an increase in the proportion of the population that

uses instalment debt, or an increase in the average payments-to-income ratio of the debtor population. In practice, the first of those two possibilities is often ignored and a rising repayments burden of debtors is typically cited — by implication at least — as the explanation for the rising aggregate ratio (i.e., for the total population) of repayments to income. What is needed here is a separate time series on the average ratio of repayments to income for the debtor population. Fortunately, in the consumer instalment sector, there are available several series limited to the debtor population.⁷ These suggest that, in fact, the rise in the aggregate ratio over the past ten years is traceable entirely to the rising proportion of instalment debtors, and that the typical debtor has no larger a share of his disposable income allotted to instalment debt repayments than he did a decade or more ago.

Another area where such series are needed is in the financial ratios of business firms. We have available (from the FTC-SEC and other sources) liquidity, working-capital and debt-to-asset ratios for all manufacturing corporations. But we do not have this information for the entire population of *debtor* corporations. Thus, we cannot tell how much liquidity is in the coffers of heavily indebted corporations vs. those with little or no debt. Similarly, we do not know whether the rise in the debt-to-assets ratio is the result of an increasing proportion of corporations taking on debt obligations or the result of a rising average ratio among debtor corporations — or some combination of the two. Clearly, such information would be useful in judging credit risk in the business sector.

Data Desired on Actual Credit Difficulties

The second general class of risk indicators are the time series that record actual collection difficulties: losses, failures, bankruptcies, foreclosures, repossessions, defaults and delinquencies. By nature these data measure changes in credit quality only in hindsight (*ex post*). Because there is always a lag between the closing of the loan and the first sign of credit difficulty,⁸ rising delinquency and loss rates show up only *after* a deterioration has taken place. Nevertheless, if the information is obtained and evaluated promptly, it may not be too late to use as the basis of a change in credit or economic

policies that might avoid the undesirable consequences of further deterioration.

Note that there is a typical progression in the timing of the various measures of collection experience. The first to signal a turn for the worse in credit performance will ordinarily be the delinquencies and defaults.⁹ When these prove to be uncollectible, repossessions and foreclosures will begin to move. Finally, the losses incurred will be written off the books.¹⁰

Because the delinquencies and defaults are likely to be the first signs of credit difficulty, they are in some ways the most useful measures of credit experience. This is also the reason why the classification of delinquencies by duration (e.g., 30-59 days, 60-89 days, and 90 days and over) represents valuable information.¹¹

In another respect, however, losses are the more important measure. Even though delinquencies and then repossessions and foreclosures become numerous, if a reasonably good market exists for the assets, losses will be small and their secondary effects will be held to a minimum. A government guarantee or insurance on the loan will also serve to minimize losses. If large losses are involved, however, the secondary effects on the economy might be aggravated seriously by a change in lenders' investment policies, or in the extreme case by lenders' financial insolvency. Thus it is important not only to have data on delinquencies and defaults, which are the first measures to show a change in credit performance, but also on foreclosures, repossessions and losses as well.

To realize the full value of these measures of credit experience, they should be available in two forms. First, the delinquencies, losses, etc., should be recorded in the time period that they occur, in the form of time series showing the incidence of credit difficulty for the entire population of outstanding credit. Second, the losses, delinquencies, etc., should be recorded for each group of loans made during a given period; that is, the credit difficulties should be tied back to the original data that the loan was granted in order to provide a time series of the credit experience associated with each separate, identifiable cohort of loans made. This second form provides the vital information necessary to determine the relationship between the intrinsic risk-related characteristics of the loans

and their subsequent collection experience, and enables analysts to determine whether recent loans are experiencing greater or lesser difficulty than loans made earlier, after taking into account the differences between the periods over which the collection experience is recorded.¹²

Data Desired on Credit Ratings

The third general class of credit quality indicators are the credit ratings made by private agencies, bank examiners, etc., on business firms, corporate and municipal bonds, bank loans and mortgages. Each of these types of ratings will be discussed more fully in Chapter 5.

Credit ratings are essentially composite indexes of credit risk; the organizations that formulate the ratings attempt to take account of as much information as they can on the company or security under review. Their process is, in effect, one of combining with implicit weights a set of data on risk-related characteristics and past credit experience into a single composite index. Of course, the agencies include more than data in their ratings; also considered are their assessment of the competence and integrity of the firm's management, their expectations about future business conditions, their evaluation of the firm's accounting records, etc.

In short, the credit ratings combine empirical information with intuitive judgment based on past business and credit experience and impressions about the company. These intuitive judgments undoubtedly make a valuable contribution to the credit ratings, and therefore the credit ratings series are useful additions to our measures of risk. However, the judgments may be inaccurate, and the ratings may not be consistent over time if the rating philosophy or the methods of the rating agencies be altered. Furthermore, the weights with which the facts and judgments are combined are necessarily implicit rather than explicit. For these reasons the credit ratings do not represent a fully satisfactory substitute for quantitative information on the risk-related characteristics and credit difficulties themselves.

Market Ratings

Another type of credit rating is the market rat-

ing, that is, the differential between the interest rate on a specified type of bond or mortgage and the interest rate on a standard "riskless" debt obligation, such as a U.S. government bond. The market rating, then, is the additional reward that the holders of debt obligations require for bearing the additional risk of these obligations as compared to government bonds. The market rating represents the evaluation of the inherent credit risk in debt obligations made by buyers and potential buyers of these obligations in the financial markets.

Some analysts consider these yield differentials to be important and useful indicators of credit risk. A widening of the interest differential between, say, corporate bonds and long-term government bonds is taken as evidence of increasing credit risk in the corporate bonds; a narrowing of the differential as evidence of reduced risk.

Market ratings have been shown to be associated with credit risk.¹³ These interest differentials, however, would seem to reflect much more than just differences in risk. For example, the additional interest return that purchasers require for bearing credit risk may not exactly equal that risk; they may require a premium above the credit risk, and that premium may change over time. Changes in the relative supplies of government securities and other obligations may bring about changes in interest rate differentials between government bonds and other debt instruments, changes that are not related to risk. Hempel appears to have found evidence of this in his study of the quality of municipal bonds.¹⁴ Institutional changes in the capital markets may affect rate differentials in similar ways. For instance, the revision in 1962 by the Federal Reserve Board of Regulation Q, governing the maximum interest rates that commercial banks are permitted to pay on time and savings deposits, seemed to trigger a drastic change in the attitude of banks in favor of holding higher yielding mortgages and state and local government bonds rather than U.S. government securities — a change in attitude related only in an indirect and marginal way, if at all, to their evaluation of the relative credit risks involved.

Another factor is that some financial institutions are legally restricted from investing in certain types of securities; this in itself may alter

yield differentials over time, and revisions in these laws would likely change yield relationships rather abruptly. Changes in tax laws and tax rates represent additional influences on yield differentials.

Thus, because interest rate differentials may vary importantly through time for reasons that are unrelated to considerations of credit risk, we have decided not to include market ratings in our list of time series related to credit risk.¹⁵

Summing Up

Ideally, then, a considerable body of data is required to describe the quality of the nation's credit. Information is required on quality characteristics, payment experience, and credit ratings. These series should be (1) available collectively for all credit and by major credit sectors, (2) provided in some detail by industry and geographic area, (3) published promptly and on a monthly or quarterly basis, (4) based on a sound statistical method of compilation, (5) unambiguously defined, and (6) adjusted, as necessary, for breaks in the continuity of the series and for recurrent seasonal movements. For the risk-related characteristics there is need for data on (1) both new loans and all outstanding credit, (2) both average values and the proportion of weak cases, (3) each characteristic separately and in combination, (4) knowledge of the other debt obligations that the borrower is carrying, and (5) knowledge of the relative importance of each characteristic as an indicator of credit risk. For collection difficulties there is need for series on each type of credit difficulty by degree of seriousness, both as they occur and on the basis of the original date the loans were made. If we were endowed with this much information, we would indeed be in a strong position to maintain a close and accurate surveillance of credit risk.

Statistical Series Available

The credit risk data available to us fall far short of the requirements outlined in the preceding sections. Many important series do not exist and many more are of limited usefulness due to a variety of deficiencies. Yet a large volume of meaningful data is available; if nothing else, the size of this book attests to that. How adequate one considers this body of data to be depends on the

TABLE 1
Summary of Available Time Series on Credit Risk and Experience
(number of series)

	Loan and Borrower Characteristics									
	Loan and Borrower Characteristics					Credit Collection Difficulties				
	Total (1)	Income (2)	Assets (3)	Maturi- ties (4)	Debt Comp. (5)	Credit Ratgs. (6)	Losses (7)	Fails. & Bankrs. (8)	Forecls. & Reposs. (9)	Defits. & Delinqs. (10)
Household Sector										
Consumer instal.	162	11	25	55	0	0	36	0	4	31
Home mortgages	213	26	63	47	0	3	4	0	31	39
All household credit combined	12	3	5	0	0	0	0	4	0	0
Total	387	40	93	102	0	3	40	4	35	70
Business Sector										
General	72	4	12	3	14	19	2	10	0	8
Bank loans	17	0	0	1	9	3	4	0	0	0
Corporate bonds	26	7	2	4	0	9	0	0	0	4
Mortgages on income props.	26	2	4	3	0	0	2	0	10	5
Total	141	13	18	11	23	31	8	10	10	17
Agricultural Sector	36	1	6	8	0	3	5	1	8	4
State and Local										
Government Sector	26	3	2	9	2	6	1	2	0	1
Other Series	9	0	4	0	0	0	0	3	0	2
Grand Total	599	57	123	130	25	43	54	20	53	94

TABLE 2
Summary of Time Series on Credit Risk and Experience; Data Included in This Book
(number of series)

	Loan and Borrower Characteristics									
	Loan and Borrower Characteristics					Credit Collection Difficulties				
	Total (1)	Income (2)	Assets (3)	Maturi- ties (4)	Debt Comp. (5)	Credit Ratgs. (6)	Losses (7)	Fails. & Bankrs. (8)	Forecls. & Reposs. (9)	Deflts. & Delinqs. (10)
Household Sector										
Consumer instal.	48	9	11	15	0	0	8	0	2	3
Home mortgages	51	9	17	8	0	0	3	0	7	7
All household credit combined	6	2	3	0	0	0	0	1	0	0
Total	105	20	31	23	0	0	11	1	9	10
Business Sector										
General	24	2	4	0	2	6	2	6	0	2
Bank loans	5	0	0	0	0	3	2	0	0	0
Corporate bonds	10	7	0	0	0	1	0	0	0	2
Mortgages on income props.	17	2	4	3	0	0	2	0	4	2
Total	56	11	8	3	2	10	6	6	4	6
Agricultural Sector	17	1	4	1	0	0	1	0	6	4
State and Local										
Government Sector	12	1	1	0	2	6	0	1	0	1
Other Series	0	0	0	0	0	0	0	0	0	0
Grand Total	190	33	44	27	4	16	18	8	19	21

purpose in mind. For historical research, there are surely sufficient series available to provide the raw materials for studying many of the important questions about credit risk.

For ongoing analysis of the current risk position of the nation's credit however, the available information is probably inadequate. Given the great complexity of credit risk and its importance to the nation's economic and financial performance, and given the large gaps that exist in the data that are available on a current and continuing basis, it is difficult to conclude that our arsenal of statistical series is satisfactory for current analysis of risk.

Many readers, however, will be more impressed with the large volume of data that *is* available, than with what is not. The list in Part II of this book contains, altogether, some 599 series — many, many more than we ever contemplated finding at the onset of the study. This list is designed primarily for research economists, to provide them with a comprehensive catalogue of time series related to credit risk. The coverage provided by these series, classified by major credit sector and subsector, and by type of measure, is outlined in Table 1.

Most of these series, however, are of only limited interest for maintaining surveillance over the current risk position of the nation's credit. The interpretation of some may be ambiguous, some may have only narrow coverage, and many others are not available on a current and continuing basis or are statistically inadequate.

From the comprehensive lists, therefore, a second list has been selected, comprised of 190 series that are considered to be the most meaningful and useful indicators of credit risk, especially to those business and financial analysts who want to follow the current status of risk. This selection was based on the following criteria:

(1) The series is clearly related to risk, and interpretation of the series is relatively unambiguous.

(2) The series has a reasonable breadth of coverage in terms of both the type of credit and the importance of the financial institutions reporting.

(3) This series is published regularly and promptly. Monthly and quarterly series were selected in preference to annual series.

(4) Over-all, an effort was made to obtain a balanced representation of the many types of series: to include some series in each major credit sector (consumer instalment, business, agriculture, etc.); some of each type of measure (risk-related characteristics, ratings and payment difficulties) within each sector; some series related to the stock of credit outstanding and some to newly extended loans; some series from each type of reporting institution (banks, savings and loan associations, FHA, etc.); and some series showing the proportion of loans with weak risk-related characteristics as well as those showing average values.

Not all of these criteria could be met in every case. In certain categories no data are available. In many instances, to meet one criterion, another had to be foregone; some of these series, for example, are not published regularly, or are available only with extended delays. On balance, however, these 190 series represent the most important and most useful block of credit risk data that are available, and it is these series that are published, in both tables and charts, in Part II of this book. The coverage provided by these series is outlined in Table 2.

A Short List

Even 190 series represent a formidable volume of data, more than many analysts will take the time to maintain and review regularly. To meet this objection, we have selected from the 190 a shorter list of 34 series (Table 3). Their selection was based on the same criteria as the 190 but applied more stringently — and no exception was made to the requirement that the series be published on a continuing basis. These thirty-four do not provide sufficient information for a comprehensive examination of credit risk, but they do comprise a representative cross section of the available data. In the absence of more inclusive measures, these thirty-four are perhaps the minimum that it is necessary to follow in order to maintain even a moderately close watch on the risk position of the nation's credit.

TABLE 3
Short List of Series on Credit Risk and Experience:
Thirty-Four Key Measures

	Frequency and Period ^a
<i>I. HOUSEHOLD SECTOR, CONSUMER INSTALMENT CREDIT</i>	
<u>A. Risk-Related Characteristics</u>	
HI5 Ratio of repayments on consumer instalment debt to disposable personal income.	A 1929 on Q 1940 on
HI7 Median ratio of instalment debt repayments to disposable income, instalment debtor families.	A 1954 on
HI8 Proportion of all families with instalment debt repayments equal to 20 per cent or more of disposable income.	A 1954 on
HI12 Proportion of new car loans made with dealer-cost ratio over 100 per cent and with maturity over 30 months (or on a balloon basis), major sales finance companies (HI16, 1960 on). ^b	M 1966 on
HI13 Proportion of used car loans made with loan-to-wholesale-value ratio over 100 per cent and with maturity over 24 months (or on a balloon basis), major sales finance companies (HI22, 1960 on).	M 1966 on
<u>B. Credit Experience</u>	
HI92 Delinquency rate on six types of consumer instalment loans past due 1 month or more, commercial banks.	M 1948–64 BiM 1965 on
HI145 Gross losses rate on personal loans as a per cent of loans made during the year, commercial banks (HI149, 1935-52).	A 1955 on
<i>II. HOUSEHOLD SECTOR, HOME MORTGAGES</i>	
<u>A. Risk-Related Characteristics</u>	
HM10 Ratio of debt service on 1-to-4 family home mortgage debt to disposable personal income.	A 1946 on
HM13 Ratio of average housing expense to average net effective income, FHA-insured home mortgages, existing homes.	A 1942 on Q 1959 on
HM15 Proportion of FHA-insured home mortgages made with ratio of average housing expense to average total effective income amounting to 25 per cent or more, existing homes.	Q 1959 on
HM27 Proportion of FHA-insured home mortgages insured at or within 2 per cent of the maximum permissible amount and with maturity of 30 years, existing homes (HM66, 1957 on; HM67, 1949 on; HM68, 1941-54).	Q 1966 on
HM29 Proportion of VA-guaranteed primary home mortgages made with no down-payment and maximum (30 year) maturity (HM75, 1944 on).	M 1963 on

(continued)

TABLE 3 (continued)

	Frequency and Period ^a
HM32 Average loan-to-price ratio on conventional home mortgages, existing homes, five types of lenders (HM40, 1946-65; HM59, 1920-47).	M 1963 on
HM90 Average maturity on conventional home mortgages, existing homes, five types of lenders (HM113, 1951-63; HM115, 1920-47).	M 1963 on
HM122 Proportion of FHA-insured home mortgages made with maturity over 35 years, existing homes (HM123, 1955 on).	Q 1962 on
 <u>B. Credit Experience</u>	
HM140 Delinquency rate on home mortgages in arrears 2 months or more, savings and loan associations (HM143, 1948 on; HM159, 1938 on).	M 1953 on
HM179 Real estate foreclosure rate (HM180, 1950-68; HM197, 1920-47).	Q 1967 on
 <i>III. HOUSEHOLD SECTOR, ALL HOUSEHOLD CREDIT COMBINED</i>	
 <u>A. Risk-Related Characteristics</u>	
HC2 Ratio of debt service on consumer instalment and 1-to 4-family home mortgage debt to disposable personal income.	A 1946 on
 <i>IV. BUSINESS SECTOR, GENERAL</i>	
 <u>A. Risk-Related Characteristics</u>	
BG4 Ratio of cash flow to required debt repayments, manufacturing corporations.	Q 1954 on
BG7 Ratio of net worth to debt, manufacturing corporations.	Q 1947 on
BG10 Ratio of net working capital to total assets, manufacturing corporations.	Q 1947 on
 <u>B. Ratings</u>	
BG34 Proportion of all rated business firms with "high" or "good" credit rating.	BiM 1950 on
 <u>C. Credit Experience</u>	
BG53 Trade credit delinquency rate, manufacturers.	Q 1959 on
BG61 Ratio of liabilities of business failures to current liabilities of all nonfinancial corporations (BG62, 1900 on).	Q 1946 on
 <i>V. BUSINESS SECTOR, BANK LOANS</i>	
 <u>A. Credit Experience</u>	
BL14 Gross loss rate on loans of Federal Reserve member banks.	A 1919 on

(continued)

TABLE 3 (concluded)

	Frequency and Period ^a
<i>VII. BUSINESS SECTOR, MORTGAGES ON INCOME-PRODUCING PROPERTIES</i>	
<u>A. Risk-Related Characteristics</u>	
BM2 Average debt-coverage ratio on multifamily and nonresidential mortgages, 15 life insurance companies.	M 1951 on
BM3 Average loan-to-value ratio on multifamily and nonresidential mortgages, 15 life insurance companies (BM4, 1920-47).	M 1951 on
<u>B. Credit Experience</u>	
BM10 Delinquency rate on multifamily mortgages past due 2 months or more, life insurance companies (BM13, 1949 on).	Q 1964 on
BM17 Rate of foreclosures in process on multifamily mortgages, life insurance companies.	Q 1946 on
<i>VIII. AGRICULTURAL SECTOR</i>	
<u>A. Risk-Related Characteristics</u>	
A1 Ratio of interest charges on farm mortgage debt to realized net income of farm operators.	A 1910 on
A2 Ratio of debt to purchase price, credit-financed sales of farmland.	A 1940 on
<u>B. Credit Experience</u>	
A19 Delinquency rate on farm mortgages, past due 3 months or more, life insurance companies (A21, 1940 on).	Q 1954 on
<i>IX. STATE AND LOCAL GOVERNMENT SECTOR</i>	
<u>A. Risk-Related Characteristics</u>	
S3 Ratio of state and local debt interest to general revenues.	A 1902...42, 1944
<u>B. Ratings</u>	
S20 Proportion of all rated state and local bonds issued rated Ba and below.	A 1951 on

^aA denotes annual series; Q, quarterly; BiM, bimonthly; M, monthly; . . ., intermittently during period.

^bNumbers in parentheses at end of series title designate series of a similar nature which may be used as supplementary series to provide a longer historical perspective.

Consumer Instalment Credit

As the three tables indicate, the risk of the consumer's debt is relatively well measured. With some exceptions, time series for the risk-related characteristics are fairly plentiful, and almost the same can be said for the several types of series on repayment difficulties. The American Bankers Association (for commercial banks), the Survey Research Center (family data), the Federal Reserve Board (sales finance companies and other data), and the First National Bank of Chicago (sales finance and small loan companies) all provide useful sets of data. The Survey Research Center series on the relationship between repayments and income are particularly valuable; it is regrettable that this survey is taken but once a year, and is subject to a long publication lag.

Home Mortgages

Thanks to housing agencies of the federal government and to several private trade associations, considerable risk information is available for the home mortgage sector. In fact, except for series on the characteristics of credit outstanding, the available data for home mortgages come as close as any to being adequate. The housing-expense-to-income ratios for new FHA and VA borrowers, for example, are valuable series that are not available in other credit sectors. The set of data on mortgage characteristics collected from five major types of lending institutions and brought together into combined series by the Federal Home Loan Bank Board, is another example. Unlike these, most credit risk series are collected from smaller groups and differ from one another sufficiently that they cannot easily be brought together into more comprehensive aggregates.

Business Credit

It is in the business sector where far and away the most important shortfall of credit risk statistics exists. Very few important series are available on a current basis: (1) the financial ratios of manufacturers, from the FTC-SEC, (2) the credit terms of mortgages on income properties, from the Life Insurance Association of America, (3) the Dun & Bradstreet credit ratings of business firms, (4) busi-

ness failure liabilities, also from Dun & Bradstreet, and (5) the loss rates on bank loans to businesses, from the Federal Reserve Board. All of the other business series listed have one disability or another, but even more important are the many time series that simply do not exist.

Farm Debt

The United States Department of Agriculture publishes a fair volume of data relating to the risk of farm debt. Credit experience is reasonably well covered, but only a few series on risk-related characteristics are collected. Unhappily, the USDA data are primarily annual or biennial and their usefulness is somewhat reduced by long publication lags.

State and Local Government Debt

Hempel's valuable study¹⁶ contains probably all the relevant time series available on the risk of state and municipal debt, but unfortunately only a handful of those series — mostly rating distributions from the Investment Bankers Association — are currently published.

The Gaps in Our Statistical Arsenal

Despite the large variety and volume of useful time series included in this report, probably the greater lesson of this study is the extent and importance of the data that are not available. In general terms, the most significant gaps in the available statistics are the following:

- (1) The foremost shortfall in this voluminous assemblage of data is the lack of series on the risk-related characteristics of outstanding credit. These are, as was pointed out in both this and the previous chapter, vital to any analysis of the probability of credit difficulties. As Fisher points out, although the quality of real estate credit changes from period to period, attention is ordinarily given to loans at no more than two discontinuous points in time. One occurs when loans are approved or closed. The other occurs, if ever, when loans go into default. What happens to loan quality in the interim often may only be inferred, at best.

. . . Initial ratios, therefore, provide only one-time indexes of loan characteristics. Additional soundings need to be taken from time to time to reveal the direction and extent of change.¹⁷

It is especially unfortunate that we have only a small handful of such series for the home mortgage sector, and none at all for corporate bonds and mortgages on income-producing properties. It is these sectors where, because maturities are long and thus the volume of outstanding credit is large relative to the flow of new credit extended, it is particularly important that information on the characteristics of outstanding loans be available.

(2) Our knowledge of the relative importance of the various loan and borrower characteristics that have a bearing on the risk of nonfulfillment is limited. Over the years, as discussed in Chapter 5, a number of characteristics have been conclusively demonstrated to be associated with the risk of delinquency or failure or loss. But in nearly every case the relationship was developed on a one-factor-at-a-time basis, characteristic by characteristic.

Only recently have there been attempts to examine several risk-related characteristics simultaneously in order to provide an assessment of the impact of each characteristic after allowing for the effects of the others; in other words, to determine the relative *ceteris paribus* importance of each characteristic. Moore and Klein took some steps in this direction with cross-classification tables of some characteristics of automobile installment credit.¹⁸ Also, a number of numeric credit-scoring systems have been developed by consumer installment lenders as a basis for accepting or rejecting loan applications. These systems, some of which are based on discriminant or multiple regression analysis, have had mixed results.¹⁹ Herzog and Earley applied multiple regression analysis in their study of the determinants of credit difficulties on home mortgage loans. They also took the next step by applying their regression results in the construction of risk indexes based on the several risk-related characteristics for which time series data were available. Robert E. Knight also investigated credit problems on home mortgages with regression analysis.²⁰

In the area of business credit, Edward Altman has used multiple discriminant analysis to examine simultaneously the ability of a large number of financial ratios to predict failure for small manufacturing firms, and Lawrence Fisher made a multiple regression analysis of the risk premiums on corporate bonds.²¹ To my knowledge, no other research of this sort has yet been made in the business area. On the whole, therefore, our understanding of the relative importance of the many risk-related characteristics, and thus of the weights that should be assigned to them in arriving at an over-all risk index, remains at a very early stage of development.²²

(3) Even if we had reliable weights to attach to these characteristics, they would not be of maximum benefit at present because virtually nowhere are the characteristics reported in combination on a current and continuing basis. Only three partial exceptions to this are to be found: two are in the home mortgage sector, where the Veterans Administration and the Federal Housing Administration publish information on mortgages made with both maximum maturity and no or minimum downpayment, and the third is the Federal Reserve Board data on new and used automobile installment loans made by sales finance companies, in which several cross-classifications by maturities and dealer-cost ratios are reported.²³

(4) The bulk of the data on characteristics is published in averages or medians, but only in a minority of instances are these accompanied by series showing the proportion of loans at the extreme end of the risk scale. Occasionally, the reverse is true: data are available on the proportion of loans with, say, a maturity beyond a certain cutoff point, but no average maturity is available for all of the loans.

(5) Even harder to find are credit experience data tied back to the original dates the credit instruments were drawn. The only cases in which this has been done are in the Springfield Land Bank data on farm mortgage loans, Hickman's data on corporate bond defaults, and Ilse Mintz' series on defaults of foreign bonds issued in the 1920's — none of these is published on a current and continuing basis.²⁴ Without series of this sort, it is not possible to make comparative empirical studies on

a consistent basis of the movements through time in risk-related characteristics against the subsequent credit experience on the same loans.

(6) Many of the available series are of limited value for a variety of reasons. Almost one-third of them are no longer maintained on an up-to-date basis; most of these were constructed for a specific study and afterward discontinued. A few are too new to have built up an historical pattern against which their current levels and movements can be judged. A great many are published only once yearly, often with a long publication lag, which renders them of only limited usefulness for short-term, forward-looking analysis — though they are still valuable for longer-term considerations and historical studies. The coverage provided by our collection of risk measures is very spotty. This is true to at least some degree in every credit sector, but it is especially notable for business credit.

A Modest Proposal

This discussion and assessment of the available information on credit risk, and their shortcomings, can, perhaps, best be concluded by a short list of specific recommendations for additional and improved data. These recommendations represent, in effect, the first step of a broad program designed to make available to economists and credit analysts a reasonably complete collection of time series on credit risk. The list is kept short in order to emphasize the most important shortcomings in this area. It should be understood, however, that the recommendations below refer to only a part of the information presently unavailable — that part it seems most reasonable to expect our economic intelligence system to provide before very many more years have passed.

(1) The most important requirement is the establishment of regular surveys to provide series on the risk-related characteristics of outstanding credit, particularly in the areas of home mortgages, corporate bonds and mortgages on income-producing properties.

(2) The next requirement is for a continuing series of studies — one in each credit sector or major subsector — of all risk-related loan and borrower characteristics to establish their current re-

lative importance, in combination, as determinants of credit risk.

(3) A result of these research studies would be arrangements to have all important risk-related characteristics regularly reported, in combination.

(4) The collection of data should be standardized so that, e.g., the automobile instalment loan figures collected from sales finance companies could be integrated with those obtained from banks and other sources; e.g., FHA home mortgage data could be combined with VA data and with the figures on conventional home mortgages collected by the FHLBB and several private organization; etc.

(5) Pending the adoption of the above four recommendations, series should soon be initiated (in most cases, both an average value and a proportion of loans with weak values) on the following: (a) maturities on bank loans to businesses, and the proportion of bank term loans repaid in regular instalments; (b) net-worth-to-debt ratios for all nonfinancial businesses, with each firm weighted by its total liabilities outstanding (this could be done at the same time for the working-capital ratio and for the ratio of debt payments to income); (c) and debt-payments-to-income ratios and certain other borrower characteristics series for newly issued consumer instalment debt and conventional home mortgages. (Particularly needed in the home mortgage sector is a series showing the prevalence of junior financing, a factor that Herzog and Earley, among others, found to be very significant.)

(6) The following series should be resurrected, brought up to date, and continued on a current basis: the Federal Home Loan Bank Board's series showing the distributions of maturities and loan-to-value ratios of conventional home mortgage loans (e.g., HM33, HM93), the corporate bond series on defaults, times-charges-earned ratios, and agency ratings (BB1-BB7, BB14-BB26); and the series on revenue bonds as a per cent of all state and local government bonds (S15 and S16).

(7) A broad group of series now published annually and with long delays should be produced more frequently and made available promptly. The instance that comes to mind most readily is the set of payments-to-income ratios for families with

consumer instalment debt collected by the Survey Research Center in their *Surveys of Consumer Finances* (HI3, HI7-HI10).

(8) A quarterly publication should be undertaken to report (a) the best available collection of current data on credit risk and (b) the results of analytical studies on these and related series.

¹This is not to conclude that examination of the liquidity and safety of financial institutions is not needed. See Albert M. Wojnilower, "The New Banking and the Quality of Credit," *Proceedings of the Business and Economics Section, American Statistical Association*, 1966, pp. 225-230.

²For a more developed discussion of the statistical adequacy of time series, see Moore and Shiskin, *Indicators of Business Expansions and Contractions*, pp. 16-17 and 89-90.

³This is not true in all situations, however. If, for example, a sampling procedure consistently underrepresented large businesses, over time the resultant bias might increase significantly.

⁴The "Census Method II, X-11" technique was used. For a description, see the October 1965 issue of *Business Cycle Developments*, and Bureau of the Census, Technical Paper No. 15, *The X-11 Variant of the Census Method II Seasonal Adjustment Program*.

⁵Since seasonal adjustment factors may change fairly rapidly, they should be reexamined and perhaps reestimated every year or two. Hence the seasonal factors presented here are provisional.

⁶Moore, "The Quality of Credit in Booms and Depressions," p. 294.

⁷Annual *Survey of Consumer Finances*; see series HI3, HI4, and HI7-HI10 in Part II.

⁸In many cases, perhaps, the lag is rather brief. Mr. Charles G. Klock, President of the General Electric Credit Corporation, reported: "Here is what we found, for instance, in payment experience on accounts finally resulting in write-off. About 50% of these losses came on accounts that had made six or less payments. Not surprising — we've known for some time that our losses are heaviest during this period. However, it was surprising to find that 13% of these accounts never made the first payment." "Credit Risk Selection by Statistical Evaluation," *Credit Management Yearbook*, 1965-66.

⁹In practice, there is one development that appears even earlier. This is the refinancing of outstanding loan contracts when the borrower finds himself financially short. In many cases the borrower will report his difficulty to the lender before he actually becomes delinquent and the two will agree to liquidate the loan, substituting a new one with a longer maturity and lower monthly payments, thus avoiding delinquency, at least for

a while. Consequently an increase in the incidence of refinancing may represent the first indication of rising credit difficulties (with delinquencies and defaults next). Unfortunately, no time series are available on refinancing.

¹⁰For a further discussion and some empirical evidence on this sequence in consumer instalment credit, see Moore and Klein, *The Quality of Consumer Instalment Credit*, p. 140 ff. and p. 182 ff.

¹¹For an example of differential behavior of "casual" (one month) and more serious delinquency, see Herzog and Earley, "Residential Mortgage Delinquency and Foreclosure," pp. 35-39.

¹²These differences include (1) the length of the periods, (2) the economic environment in each period and (3) the normal time pattern of repayment difficulties (consumer instalment loans, for example, have a high incidence of trouble early in their life).

¹³See, for example, Atkinson, *Trends in Corporate Bond Quality*, pp. 70-71.

¹⁴George Hempel, *The Postwar Quality of State and Local Debt*.

¹⁵For differing views on the usefulness of market ratings as measures of credit quality, see Cohan, *Yields on Corporate Debt Directly Placed*, and *The Ex Ante Quality of Direct Placements*; Hempel, *ibid.*; W. Braddock Hickman, *Corporate Bond Quality and Investor Experience*, Princeton for NBER, 1958, Chapter 5; Atkinson, *Trends in Corporate Bond Quality*, Chapter 6; and James S. Earley, "Problems in the Measurement of the Quality of Credit," *Proceedings of the Business and Economics Section, American Statistical Association*, 1966, pp. 202-217. For an example of perverse movements in market ratings, i.e., where interest differentials declined during a period when the risk of default was increasing, see Moore, Atkinson and Kilberg, *Report to the Committees on Currency and Banking . . .*, p. 79 (quoted in Chapter 2, above), and Ilse Mintz, *Deterioration in the Quality of Foreign Bonds Issued in the United States, 1920-1930*, New York, NBER, 1951, p. 70.

¹⁶George H. Hempel, *The Postwar Quality . . .*

¹⁷Robert M. Fisher, "The Quality of Real Estate Credit," in American Statistical Association, *1966 Proceedings of the Business and Economics Section*, p. 221.

¹⁸Moore and Klein, Chapter 5.

¹⁹Two articles on these credit-scoring plans, with comments by the editors, are reprinted in Kalman J. Cohen and Frederick S. Hammer, eds., *Analytical Methods in Banking*, Homewood, Ill., 1966. See also William P. Boggess, "Screen-Test Your Credit Risks," *Harvard Business Review*, November-December 1967, pp. 113-122; Frank E. Dotson, "The Development of a Numerical Scoring System for Evaluating Mortgage Loan Delinquency Risk," unpublished Ph.D. dissertation, University of Southern California, 1968; and David C. Ewert, "Trade-Credit Management: Selection of Accounts Receivable Using a Statistical Model," unpublished Ph.D. dissertation, Stanford University, 1968 (abstracted in *Journal of Finance*, December 1968, pp. 891-892).

²⁰Robert E. Knight, "The Quality of Mortgage Credit: Part II," *Monthly Review*, Federal Reserve Bank of Kansas City, Mo., April 1969, pp. 10-18.

²¹Edward I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," *Journal of Finance*, September 1968, pp. 589-609; and Lawrence Fisher, "Determinants of Risk Premiums on Corporate Bonds," *The Journal of Political Economy*, June 1959, pp. 217-237.

²²It should be noted, however, that even with a large research effort, the development of a single, effective, general index of risk on any type of credit is by no means

a foregone conclusion. Herzog's and Earley's effort to devise such an index for home mortgages, for example, revealed that "delinquency risk" differed from "foreclosure risk," and thus that using one index for both would have been a mistake.

²³See series HM27 through HM31, HI12 and HI13, in Part II.

²⁴For these series and their sources, see Part II, series A29, A33, BB24, M5, and M6. See also the source notes for HM153 and BM10 for reference to the new series on mortgage foreclosures now being collected on this basis by the Life Insurance Association of America.