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# Household Insolvency: A Review of Household Debt Repayment, Delinquency, and Bankruptcy

Sharon A. DeVaney
Ruth H. Lytton

*This review paper explores the issues related to the meaning and measurement of insolvency within the domain of household finances. Conceptual and empirical evidence to explain the onset of insolvency is reviewed. Predictive models and financial ratios are presented as techniques for identifying insolvent households. Implications for monitoring of solvency by households and responses to insolvency are presented.*

## I. INTRODUCTION

The term insolvency is more frequently associated with a business entity than a household. The concepts of solvency and its opposite, insolvency, can be simply defined as having either a positive or negative net worth. In the *equity sense*, insolvency refers to the failure to submit the timely repayment of debts as they mature. This situation can result in an increase in liabilities and a reduction in the equity in assets held. In the *bankruptcy sense*, insolvency means that net assets at fair market value are less than liabilities, which can necessitate the liquidation of assets through a court-ordered bankruptcy process (Becker, 1992). Factors that contribute to insolvency and the implications for the household vary significantly; we know that consumers are taking on more debt and more consumers can be characterized as insolvent.

In fact, many policy observers have referred to the 1980s as a "decade of debt." Between 1979 and 1982, the growth in consumer installment credit outstanding was less than an annual compound rate of 6% per year. From the end of this recessionary period until 1987, consumer installment credit outstanding grew at an average compound annual rate of 18% (Avery, Elliehausen, & Kennickell, 1987; Luckett & August, 1985). It is estimated that

**Sharon A. DeVaney** • Consumer Sciences and Retailing Department, Purdue University, Room 216 Matthews Hall, West Lafayette, IN 47907. **Ruth H. Lytton** • Department of Housing, Interior Design and Resource Management, Virginia Polytechnic and State University, Blacksburg, VA 24061.

personal debt increased by 79% between 1980 and 1990 while real personal assets rose by only 36% (Federal Reserve, 1991, pp. 19–24).

Between 1981 and 1990, the percentage of disposable personal income consumed by consumer installment credit payments grew from 14.5% to 18.5% (Courtless, 1993). In 1992, the ratio of consumer installment credit payments to disposable personal income fell to a seven-year low of 16.7%, indicating that consumers had begun to reduce their indebtedness to more manageable levels (Scheld, 1993). However, Scheld suggests that the apparent improvement in the total debt service ratio was due to interest reductions during the recession, not a decline in the level of total household debt. Further, consumers have been replacing traditional credit card debt and personal loans with less expensive home equity loans and lines of credit which are classified as home mortgage debt. In addition, leases now account for 25% of new car purchases (Cunniff, 1995). Both of these consumer practices create debt obligations that are unrepresented in government credit statistics.

Cunniff (1995) reports that consumer installment debt increased a record $118 billion during 1994. This amount represents 17.8% of personal disposable income and an even larger estimated 20% if amounts committed to both auto leases and home equity credit lines were included. It is estimated that total household borrowing for consumer debt and mortgages accounts for more than 90% of after-tax income. In comparison, total household debt represented about 70% of after-tax income in 1980.

While the 1980s were the decade of debt, the 1990s have been described as the decade of repayment (Hughes, 1991). And, if consumer borrowing trends continue, the 1990s may well represent a decade of "repayment" for too many consumers. Economic conditions include a slower pace of income growth, flat housing prices, and sluggish economic growth. Fiscal policies in many states and localities have caused significant tax increases. But for the creditors of the increasing numbers of consumers who have declared bankruptcy, the 1990s may not be the decade for repayment. The number of consumer bankruptcy filings almost tripled between 1985 and 1991, when there were 943,987 bankruptcies (Bhandari & Weiss, 1993). Although 1992 represented a record year with 977,478 filings, the rate of increase slowed to 6.4%, compared to the 22.5% increase from 1990 to 1991 (Singletary, 1993). Of the 1992 filings, 92.6% were personal bankruptcies. Filings decreased in 1993 for the first time since 1984. The increased bankruptcy filing rate has generated concern among creditors, legislators, and regulators responsible for laws governing the bankruptcy process.

But the study of household insolvency goes beyond concerns over increasing debt levels and bankruptcy filings. Insolvency, like debt, has "carrying charges" of direct and indirect costs. For consumers who are delinquent, late fees and other collection costs simply add to liabilities that are already not being reduced. Although the intent of a bankruptcy filing is to give people a "fresh start," filing fees, loss of assets, inability to use credit for a period of time, and the stigma of having declared bankruptcy cannot be ignored. These represent direct costs for the use and abuse of credit. There are also indirect personal, emotional, and psychological costs which are beyond the scope of this analysis.

For businesses, the cost of doing business is affected. Insolvent households directly impact the "write-off rate" and the profit margin. For example, an American Banking Association survey revealed that 25% to 30% of all bank consumer credit losses resulted from bankruptcy ("Easing Borrowers," 1990). According to the Credit Union National Association ("Bankruptcy reform," 1995), credit unions lost $710 million in 1993, a loss approximately 150% higher than nine years earlier. Businesses are replacing in-house review

of customer applications with sophisticated customer screening services provided by credit bureaus to protect against potentially delinquent or fraudulent accounts. Furthermore, these costs for losses and operation are indirectly passed on to consumers. This represents an increase in cost for those who pay on time as well as for those who do not. A further concern is the fraudulent or abusive use of bankruptcy filings by some consumers.

Finally, there is potentially a much larger cost to society when the economy is fueled through consumer spending on credit with little or no associated savings to provide capital for future investment in sustained economic growth. As a percentage of national output, savings has steadily declined from 12.3% in 1950 to approximately 2.4% in the 1990s (Cunniff, 1995b).

In summary, the nuances of applying and interpreting the concept of insolvency to a household financial situation should be of concern to financial professionals and to policy-makers in business and government, as well as to individual consumers. The remainder of this article provides additional background on insolvency and bankruptcy then addresses the following questions:

- What theoretical or empirical evidence is available to explain insolvency?
- What predictive models are available for use by businesses for customer screening and by financial professionals who assist consumers?
- What are the implications for credit grantors, financial professionals, and consumers?

## II. Background

The condition of insolvency is contrary to the accounting concept of "a going concern" or the idea of a business functioning for an indefinite future. Most households are not viewed as "going concerns," although planning to provide for later retirement or an estate for future generations are reasons to save or realize a positive net worth. Furthermore, while an insolvent business might cease to exist, dissolution of a household due to insolvency is not a viable alternative. Although children grow up and leave home and parents divorce, the family, or an individual, must continue to function as an economic and financial unit.

Insolvency is often associated with bankruptcy, although insolvency, in the literal sense of a negative net worth, is not a requirement for bankruptcy filing. Historically, the terms *insolvency* and *bankruptcy* represented different bodies of English law and different attitudes toward creditors. Bankruptcy was an involuntary procedure designed to protect creditors through the confiscation and equal division of the debtor's property among the creditors. Debtors often faced imprisonment, at the expense of creditors. The second body of law purported to protect debtors, who would voluntarily declare insolvency, give all their property to the court, and be discharged from debtors' prison. Debtors were still liable for the payment of their debts.

The word *bankruptcy* is derived from the Latin words for "bench" and "break" (Luckett, 1988). The literal meaning of bankrupt is broken bench. Under Roman law, creditors would physically break the debtor's workbench after gathering together and dividing up the debtor's assets. The broken workbench served as both a punishment and a warning to other debtors. Satisfaction of the claims of creditors and punishment of the debtors were the objectives of the early law. Bankrupt persons were deprived of their civil rights. Other societies required bankrupts to dress in distinctive garb. In 1705, English law provided for remission of the

debts of bankrupts. The purpose was not a humane gesture to give the bankrupt a new start but rather a counter to the concealment of assets by debtors.

Almost 300 years later, a new start for debtors and the availability of debtors' assets for meeting the needs of creditors and debtors remain a concern. Individuals usually file under Chapter 7, straight bankruptcy, or Chapter 13, the wage earner plan. Chapter 11 is available for consumers with unsecured or secured debts that exceed the limits set for Chapter 13, and Chapter 12 allows family farmers with regular income to restructure their debt while remaining in operation. There are no restrictions on the number of Chapter 11, 12, or 13 filings per household, and these chapters allow debtors to protect more assets. A Chapter 7 filing discharges most debts; however, a person cannot file bankruptcy again for six years.

Under straight bankruptcy, people are allowed to keep a small equity in their homes, an inexpensive automobile, and limited personal property. State or federal laws govern what can be kept. Some debts such as education loans, fines, alimony, child support, and income taxes may never be excused. Under a Chapter 13 filing (wage earner), the person is allowed to keep all assets and is protected from creditors while debts are being repaid according to the court-approved plan. The time period is usually three years. Chapter 7 may be used by both business and nonbusiness petitioners while Chapter 13 is limited to nonbusiness petitioners.

## III. Characteristics Associated with Debt Repayment, Delinquency and Bankruptcy: Empirical Evidence

The study of consumer insolvency is not a well-developed science. No theory has emerged to explain, or predict, the onset of insolvency. Although fragmented and not without its limitations, research on related topics such as consumer debt repayment, delinquency, and bankruptcy offers some empirical evidence to explain the incidence of consumer insolvency.

### A. Repayment of Consumer Debt

The lack of delinquency in repaying debt is an important indicator of the quality of credit. The 1983 Survey of Consumer Finances (SCF) was one of the first surveys to provide information obtained from borrowers about their debt repayment behavior. Prior to the 1983 SCF, most information about delinquent debt repayment came from lenders. Approximately 22% of the 3,824 respondents of the 1983 SCF reported that they had made late payments or missed payments at some time during the previous year. Using univariate and bivariate analysis, Sullivan and Fisher (1988) showed that the incidence of slow or missed payments in the 1983 SCF decreased as income increased and as the age of the borrower increased. The risk of payment difficulty was very high (37%) for the lowest income group, below $10,000, and very low among the highest income group (7%), $50,000 and over. As the household head aged, generally the probability of payment difficulty declined. Further, regardless of the level of income, respondents with no or very low liquid asset balances had an above-average tendency for payment difficulty.

Renters were almost twice as likely to report having had debt payment difficulties as were homeowners. The analyses showed that missed or slow payments were more likely to occur among nonwhites or Hispanics, in households with less-educated heads, and in

households with higher ratios of mortgage or consumer debt payments to income. Those who had obtained credit from finance companies, stores, or dealers were substantially more likely to be late or behind than those who borrowed from banks, credit unions, or savings and loan associations.

Canner and Luckett (1990) pointed out a limitation of the Sullivan and Fisher study—that is, the respondents had already been screened by lenders, who had weeded out those at greatest risk of default. Therefore, the results showed factors associated with missed payments given the credit standards prevailing in the marketplace but not which factors were associated with risk of default. Further, the study did not consider interrelationships among the variables.

Subsequently, Canner and Luckett (1990) used multivariate analysis to study the data. A logistic regression was performed to estimate the probability that a borrower would be late or delinquent holding the values of the other variables constant. They found that the variable for prior credit history—whether the person had been previously rejected for credit—had the greatest statistical significance as a predictor of late or missed payments. Other important variables were age and amount of liquid assets relative to debt. Just as Sullivan and Fisher found a strong positive relationship for age to repayment of debt, and for the ratio of liquid assets to consumer debt and timely repayment of debt, so did Canner and Luckett. Further, households with more children had a greater probability of missed or late payments. In contrast to Sullivan and Fisher's findings, Canner and Luckett did not find a significant relationship between income, education, or housing tenure and late or missed payments. Canner and Luckett suggested that creditors may have done a competent job of accounting for income in the loan approval process.

The Federal Reserve Board surveyed 1,534 families as part of the Survey of Consumer Attitudes (Canner & Luckett, 1991) to obtain information on consumer debt. Eighty-five percent of all households had an outstanding debt obligation or access to a line of credit. Among all households, 45% had only consumer credit debt; 3% had only home mortgage debt, and 38% had both outstanding mortgage and consumer debt. About 14% of households with debt reported that they were late for at least one of the scheduled debt payments. Payments that were frequently reported as being late were vehicle loans, other types of non-credit-card installment debt, and credit card debt. Persons who were more likely to have payment problems were renters, divorced or separated persons, and those with the highest debt-service burdens. Households headed by people under age 35 were nearly four times as likely to report payment problems as were those headed by an individual at least 55 years of age.

Canner and Luckett (1991) found that 9% of all indebted households fell behind more than 30 days on *one or more* of their debt obligations in the year prior to the survey. Roughly 3% of all debtors fell *more than three* payments behind within a 12-month period. Of the families experiencing payment problems, 55% indicated that they became overextended; 24% either lost their jobs, were not working, or had experienced a cutback in the number of hours worked, and 6% experienced medical-related problems. Nearly 40% of those having debt repayment problems reported that they paid delinquent bills the following month or "when they were able." Others with debt problems reduced spending, took second jobs, worked longer hours, sold items to raise money, or borrowed from friends or relatives.

### B. Default on Auto Loans

The possibility that the relationship of default risk to personal attributes such as occupation and employment might vary when size of down payment varied was investigated by Peterson and Peterson (1981). The researchers postulated that interactions could exist among borrower characteristics, loan terms, and default risk. Using data from the Federal Reserve System on commercial bank lending to consumers for auto loans from 1965 to 1970, Peterson and Peterson showed that changing the amount of down payment altered the risk of default. They found that default rates fell substantially if down payments were as high as 20% of the loan.

Peterson and Peterson extended the study to examine default rates by occupational group and size of down payment. Professionals had a much lower default rate than other groups and drivers or laborers had the highest default rate. However, when cash down payments were over 30% of the auto loan, the borrower's occupation was not significantly related to default rates. Then, Peterson and Peterson compared age to the size of the down payment and found that when down payments exceeded 30%, default rates were considerably reduced for all borrowers but default was still twice as high for younger as compared to older borrowers. Peterson and Peterson concluded that creditors should consider the size of the down payment when evaluating credit risk. However, they cautioned that the down payment needed to represent voluntary saving by the borrower, not borrowing from other sources.

Livingstone and Lunt (1992) looked at the growth of personal debt in the United Kingdom, which has experienced similar growth of debt as in the United States. In 1981, the ratio of outstanding debt to annual household disposable income was 8%; in 1988, it was 14%. Livingstone and Lunt believed that a possible explanation for the increase in personal debt would involve psychological, social, and economic determinants. Analysis of personal debt and debt repayment of a sample of predominantly lower-middle-class/upper-working-class respondents in 1989 produced results which in several respects contradict those previously reported. Debt repayment was not significantly predicted by sociodemographic variables such as social class, age, or the number of dependent children; however, the amount of disposable income was an important predictor of the amount of regular debt repayment. The more income people had, the more likely they were to make regular payments on debt.

The Livingstone and Lunt study found that those who repaid a greater amount were more concerned with personal achievement and self-direction. The findings showed that having a positive attitude toward credit was a predictor of repayment of more debt. Also, those who repaid more acknowledged that their use of credit was a result of external uncontrollable needs and not caused by their own greed or simply the convenience of credit. The respondents viewed debt repayment as a budgeting strategy. A limitation of this study is that the analysis focused on the amount of debt repayment, not on late payment or default.

### C. Propensity for Insolvency

The effect of age, income, and marital status on the propensity for insolvency was analyzed using data from the 1983 and 1986 Surveys of Consumer Finance (DeVaney & Hanna, 1994). Insolvency was defined as having a net worth less than one month's income. Analysis showed that age of the household head had a negative relationship with insolvency. Income had a strong negative effect with on the propensity for insolvency. In the first time period (1983), married couples had lower predicted insolvency rates than other household

types, but in 1986, the relationship between marital status and insolvency was unclear. Household size, education, and race were not significant variables related to insolvency in either year.

### D. Bankruptcy

According to Hira (1992), empirical evidence to support a philosophy of bankruptcy is fragmented and incomplete because it has been too broadly focused. Nevertheless, researchers tend to formulate generalizations based on the empirical evidence which is available. Limitations of early empirical studies included the size, location, and response rate of the sample. More recently, researchers have used data from large, nationally representative samples. Often studies assume that bankruptcy is associated with a fault and this assumption may introduce bias into the conclusions (Hira, 1992). This section reviews several empirical studies on bankruptcy.

Researchers have sought to identify causes of bankruptcy by studying the financial and demographic characteristics of those who claim bankruptcy. Studies in the 1960s in Michigan and Utah found that most bankrupts were employed in lower-paying jobs in unskilled or semi-skilled manual labor. However, most were employed when they filed for bankruptcy. Similarly, two surveys in the 1980s showed that about 80% of bankrupts were employed when they filed and that, of those who were employed, most were in blue-collar jobs. In one of the studies, 20% of the families had two incomes (Sullivan, Warren, & Westbrook, 1989).

In research using aggregate data on consumer bankruptcies from 1945 to 1981, Shepard (1984) found a positive relationship between divorce rates and the ratio of consumer installment and non-installment debt to income and bankruptcy rates. Also, nonwhites were positively associated to the rate of Chapter 7—straight—bankruptcies. He showed a negative relationship between residential wealth and bankruptcy rates. Overall, credit debt accounted for about 80% of the increment in bankruptcy filings during the period investigated.

Sullivan et al. (1989) collected data on 1,529 families who filed for bankruptcy in Illinois, Pennsylvania, and Texas in 1981 with the intent of identifying characteristics of bankruptcy filers and causes of filing for bankruptcy. They found that bankrupts earned about a third less income than the average earner and that their households were larger (3.4 members compared to 2.7 members for the general population). While mortgage debt for the bankrupts was about average, consumer debt was excessive when compared to the general population ($10,800 compared to $2,400). Mean unsecured debt amounted to $15,500 for each bankrupt debtor; this was about equal to the average bankrupt's annual income.

Most bankruptcy filers were unemployed during some part of the two years prior to filing for bankruptcy. Twenty percent of bankrupt debtors were currently or formerly involved in entrepreneurial businesses. Moving a lot was characteristic of Chapter 7 bankruptcy filers (Sullivan et al., 1989, p. 246).

Using data from the 1983 SCF, Sullivan et al. compared the net worth of respondents from the general population with that of the bankrupt debtors. Allowing for differences in method of calculation, Sullivan et al. concluded that "about one-third of the general population has a net worth of less than $5,000, while 84% of the debtors are worth less than that amount" (p. 71). Median net worth for the bankrupt debtors and the general population equalled $8,100 and $24,600, respectively. Not all debtors were insolvent, as 16% reported a positive net worth greater than $5,000; homeowners represented 94% of this group.

Sullivan et al. found that single women who filed for bankruptcy had incomes very similar to single women not in bankruptcy ($10,600 for bankrupts and $14,100 for those not in bankruptcy). What distinguished women in bankruptcy from others was the lack of supplemental income received by other women. Women in the general population received about $4,200, or 30% of their total family income, from other sources while single women who filed for bankruptcy received an average of only $500 annually from other sources. "These data suggest that supplemental income, such as alimony or a child's income, may represent the difference for many women between staying out of bankruptcy and going in" (Sullivan et al., 1989, p. 156).

Sullivan et al. found that married couples in financial trouble were one-income families in far greater proportion than one-income families in the general population. During the year prior to the bankruptcy filing, only about one-third of the wives in bankruptcy were employed, compared with almost two-thirds of the wives in the general population. Of the wives in bankruptcy who were employed, many worked only part time. Sullivan et al. concluded that the bankruptcy data portray the increased risk faced by lower-income families that do not follow the national trend toward two incomes (p. 157).

An investigation of the relationship of medical debt burden indicated that medical debts did not play a central role in most consumer bankruptcies. While medical-debt-to-income ratios (constructed by the researchers) did not vary significantly by state or district, they varied by chapter. Those in Chapter 7 bankruptcy owed more medical debt than those in Chapter 13; the mean medical debt/income ratio of 0.25 for Chapter 7 was significantly higher than the 0.09 of those in Chapter 13. Interestingly, the joint filers' mean medical debt/income ratio was 0.12; the mean of single-filing males was 0.24, and that of single-filing females, 0.43 (p. 171). The impact of medical debt on single-filing women was much greater because they have lower incomes available to pay their debts. Sullivan et al. speculated that women were more likely to be employed in retail trade and personal services and to be without medical coverage. Information about the filer's availability of fringe benefits is not asked by the court system.

Examination of the credit card debt held by the filers in the study revealed that almost one-third owed credit card debt equal to or greater than three months' gross income, a debt-to-income ratio of 0.25. Nearly 13% of the debtors owed more than a half-year's income in credit card debt. Yet, only *two percent* of the respondents met the researchers' criteria for *credit card abuse*: high credit card debt/income ratio, high proportion of unsecured debt in credit cards, and in the top 15% of the absolute amount of credit card debt carried into bankruptcy (Sullivan et al., 1989, p. 185). The debtors with the worst credit card/income ratios were more often debtors with low job tenure or income swings.

Hira (1992) compared American and Canadian bankrupts' attitudes and satisfaction with the bankruptcy process. Data collected in Manitoba (Canada) and Iowa in 1988 showed that the demographic profile of filers was remarkably similar. In general, the filers were young, male, and married and had children. The largest proportion of debtors in both countries not only borrowed from banks and retail stores but also owed large sums to the two sources. A majority of the debtors believed that bankruptcy should be used only as a last resort. Also, a majority from each country said that filing for bankruptcy provided relief from debt, saved them from creditors' actions, and improved their family living conditions. About half the debtors in both Iowa and Manitoba indicated that their bankruptcy was caused by too much borrowing and that the final decision to file was made because creditors had

started collection efforts. A larger proportion of Canadians than Americans learned the importance of setting up a budget, saving regularly, not using credit cards, and paying by cash only. Hira cautions against drawing conclusions from the results because the response rate was low and only one province in Canada and one U.S. state were included in the survey.

In summary, Sullivan et al. found that consumers in bankruptcy looked like other Americans in the workplace but had very different financial circumstances. Debtors tended to earn less and owe more than other Americans. Families with serious debt problems had about one-third less income than average earners. Bankrupts may have experienced unemployment problems within the two years prior to filing bankruptcy. About one-fifth of bankrupts had been involved in entrepreneurial businesses. While mortgage debt was similar to other families, families in serious economic trouble had excessive consumer debt. Household size tended to be larger for families with debt problems. Single women were shown to be especially vulnerable because of their low incomes and possible lack of fringe benefits.

The research described here provides insight into the complexity of analyzing late payment behavior, default, and bankruptcy. Although the conceptual review has suggested that attitudinal and life-style factors as well as financial and life events impact repayment of debt, factors measured were limited to easily observed and readily quantifiable items. But, the studies show that individuals and families who are most *at risk* are more likely to become insolvent. These at-risk individuals and families include persons who are younger, nonwhite, divorced or separated, renters, single-earner low-income families, those with high debt service levels, and those with little or no liquid assets. Also, Sullivan et al. (1989) found that single women who received little or no supplemental income such as child support or alimony and single women with high levels of medical debt to income were particularly vulnerable to bankruptcy. The studies are not detailed enough to pinpoint the causes of insolvency but the underlying current is apparent: one or more related demographic characteristics in conjunction with a life event or attitudinal factor.

## IV. Predictive Models of Insolvency

Although the previous studies are useful in describing the financial statuses of households, a shortcoming of these studies is that they are not prescriptive. While they tend to pinpoint the problems that appear to be related to insolvency, they neglect to provide businesses or consumers with the necessary information to estimate the incidence of insolvency. Consumer credit, and more recently commercial credit and mortgage lending, rely on credit scoring systems to determine creditworthiness for establishing accounts as well as later strategies for account management.

Selected financial ratios represent just one information source considered by some scoring schemes. Recently, financial educators, counselors, and planners have advocated the use of financial ratios as a useful tool to help consumers monitor financial progress and anticipate problems. These predictive models and the assumptions upon which they are based are now reviewed.

### A. Credit Scoring: Avoiding the Insolvent

The origins of credit scoring are traced to the 1940s (Durand, 1941), but it was not until the 1960s that there was widespread interest in the development and use of credit scoring

systems for establishing creditworthiness among applicants. An increasingly competitive market, a rapidly expanding and mobile consumer market, and later concerns over fairness and discrimination in lending practices increased demand for automated credit evaluation systems. More recently, other factors, such as economies of scale associated with automation, the availability of management for other tasks, and a rapidly changing marketplace characterized by inflation and recession, have contributed to the expansion of the technology.

Originally, credit scoring referred to the use of statistical methods for predicting the likelihood of default by comparing key applicant characteristics with a known profile to classify credit applicants, on the basis of the score generated, as "good" or "bad" risks. "Application scoring" later evolved into "behavioral scoring" for tracking and predicting the performance of individual accounts on an ongoing basis. Although prediction of delinquency and bankruptcy are major concerns of behavioral scoring, other issues include account attrition, account collection efforts, changes in account credit limits, account reissue periods, and other account promotional/marketing decisions (Pellegrino, 1988; Radding, 1992; Rosenberg & Gleit, 1994).

Neural networks, or expert systems technology, offers yet another advancement over more traditional statistical procedures by predicting multiple, as opposed to binary, outcomes (Jenson, 1992; Jost, 1993). Scoring systems can be developed in-house or in conjunction with a major vendor (e.g., American Management Systems, Fair-Isaac, etc.); services can be purchased from the four major credit bureau companies, or in-house and credit bureau services can be overlapped to yield additional information (Robins, 1992).

Although a comprehensive review of the development of scoring models (see Capon, 1982; Makowski, 1985; Rosenberg & Gleit, 1994) and the statistical procedures (see Chhikara, 1989; Collins & Green, 1982; Grablowsky & Talley, 1981; Rosenberg & Gleit, 1994) on which they are based are beyond the scope of this article, two issues are of primary concern in the context of consumer insolvency. The first considers the use of these tools for managing risk *and* profitability, while the second considers the characteristics used by the system for predicting consumer outcomes that could result in insolvency.

Initially, credit scoring systems offered the benefits of efficiency, consistency, and relative accuracy in determining the risk associated with a potential credit applicant. But rapid advances in technology and the ability to accumulate and use consumer profile data have extended the use of these tools from risk management to profitability management. Singularly and in combination, the variety of consumer profile reports (e.g., credit bureau reports, behavior scoring reports, chargeoff and/or bankruptcy prediction reports, attrition reports, prescreening profiles, recovery scoring) allow a creditor to manage a portfolio not only to predict not only the "good" and "bad" accounts but also to more accurately identify the "optimal crossover point," or the point at which costs and losses associated with bad accounts will exceed profits from additional "good" accounts (McCorkell, 1994).

In this environment, creditors can employ "lifetime value analysis" (Irvin, 1994) or "adaptive control models" (Marshall, 1992) to facilitate *customer* management and analysis as opposed to *account* management and analysis. These tools enable managers to achieve optimal profitability while reducing chargeoff rates, collection costs, and the high costs of attracting new accounts in an increasingly competitive marketplace. In other words, creditors can optimize the mix of consumer types with unique use and repayment strategies to maximize revenues generated versus the cost of obtaining and maintaining accounts.

**TABLE 1**
Selected Consumer Characteristics Considered in Credit Scoring

| |
|---|
| **Family Status/Living Arrangements** |
| Marital status |
| Own/rent dwelling |
| Postal code |
| Telephone |
| Length of time at current residence |
| Number of dependents |
| Age of automobile(s) |
| Automobile balance(s) |
| Co-applicant information, if any |
| **Employment** |
| Occupation |
| Employment status |
| Length of time with employer |
| Education |
| **Personal Information** |
| Age |
| Gender |
| Geodemographic information |
| **Financial History** (*may duplicate some credit bureau information*) |
| Income |
| Debt ratios |
| Ratio of regular expenditures to income |
| Monthly income less committed payments |
| Total monthly credit payment expenses |
| Credit references (account types: bankcard, finance company, etc.) |
| Bank references (account types: checking, saving, both, etc.) |
| Largest previous amount of debt |
| Other loan commitments/level of indebtedness |
| Amount of loan |
| Purpose of loan |
| Number of monthly payments |
| Delinquency during performance period reviewed |
| Account activity during performance period reviewed |
| Account balance during performance period reviewed |
| Amount past due on account |
| Returned checks on account |
| Age of account(s) |
| **Credit Bureau Information** (*may duplicate some financial history*) |
| Credit payment experience |
| Past due balance(s) |
| Derogatory information per tradeline |
| Derogatory information from public records |
| Number of tradelines |
| Type(s) of tradelines |
| Age of the oldest/newest tradeline |
| Inquiries |

Creditor information needs to support this sophisticated and indepth analysis of consumers is based on the historical five Cs of credit evaluation—character, capacity, capital, conditions, and collateral. But the sophisticated systems exceed what was historically a creditor's personal knowledge of the debtor's situation to a study of over 100,000 consumers

randomly selected from a national sample for initial analysis of over 350 sets of characteristics (Gothe, 1990) or a behavior scoring model built on up to 200 variables (Robins, 1993).

In a review of characteristics consistently considered in credit scoring schemes internationally, Friedland (1993) suggested a framework comprised of five categories of predictors: family status/living arrangements, employment, personal information, financial history, and credit bureau information. This framework was used, as shown in Table 1, to group common predictor characteristics included in U.S. credit and behavioral scoring schemes (Apilado, Warner, & Dauten, 1974; Boyes, Hoffman, & Low, 1989; Gothe, 1990; Jenson, 1992; Long & McConnell, 1977; Lyons, 1993; Makowski, 1985; Overstreet & Kemp, 1986; Robins, 1993; Rosenberg & Gleit, 1994).

A detailed listing of the predictors and weightings incorporated into a credit scoring system is proprietary information, and likely specific to the individual industry and geographic region. However, a review of Table 1 suggests that decisions are limited to quantifiable data available through the application data, internal auditing of account records, or credit bureau files. Financial ratios representing debt and expenditure relationships have been an acknowledged part of the review process for consumer and mortgage lending. The mortgage industry relies heavily on the use of financial ratios in the approval process and has considered the use of subsequent ratio analyses of mortgage holders to identify, and avert, potential payment problems (Harney, 1994).

Research also suggests that among a sample of financially distressed homeowners, most could not subsequently meet the qualification ratios established at the time of purchase (Lytton & Parrott, 1994; O'Neill, Lytton, & Parrott, 1995). However, as described below, it has been only in the last decade that financial educators and other financial professionals have used financial ratio calculations when assessing financial well-being.

### B. Financial Ratios: Educating to Prevent Insolvency

Financial ratios emerged in the business world in the early part of the 20th century but their first formal use occurred during the 1920s (Horrigan, 1978). The first serious empirical tests of financial ratios were conducted during the 1930s. These studies were overlooked for almost two decades. During the post-World War II period, financial ratios were either severely criticized or just plain ignored. However, by the early 1960s, there was a renewed interest in financial ratios.

A study using financial ratios in the 1930s and several later studies were concerned with business failure (Altman, 1968, 1971). Failing firms exhibited significantly different ratio measurements than businesses which were successful, and one of the later studies provided evidence of the use of financial ratios for prediction. Although, historical accounts specifically cite the use of ratios in predicting bankruptcy, ratios measuring profitability, liquidity, and solvency have prevailed as significant indicators of progress over time and as standards for comparison of similar companies within an industry (Byrne, 1992; Brandt, Danos, & Brasseaux, 1989; Chen & Shimerada, 1981; Ketz, Doogar, & Jensen, 1990; Lawder, 1989; Pressel, 1991). The primary function of ratios should be to act as indicators or *red flags*—to point to areas of acceptable or unacceptable results or conditions. The key to ratio analysis lies not in the values which are calculated but in the significance of the relationships being studied.

**TABLE 2**
Financial Ratios

| |
|---|
| **Liquidity** |
| Liquid assets/Monthly expenses |
| Liquid and financial assets/Monthly expenses |
| **Debt** |
| Liquid assets/Total debt |
| Liquid and financial assets/Debt |
| Liquid assets/Non-mortgage debt |
| Liquid assets/One-year debt payment |
| Liquid and financial assets/One-year debt payment |
| **Inflation Protection** |
| Tangible and equity assets/Fixed dollar assets |
| **Derivatives of Net Worth** |
| Tangible and equity less home/Net worth |
| Non-mortgage debt/Net worth |
| Total debt/Net worth* (change to Debt/Asset) |
| Liquid assets/Net worth* (change to /Total assets) |
| Liquid and financial assets/Net worth* (change to /Total assets) |
| Tangible and equity assets/Net worth* (change to /Total assets) |
| Tangible assets/Net worth* (change to /Total assets) |
| Income-generating assets/Net worth* (change to /Total assets) |

*Note*: *with change suggested by Prather.
*Sources*: Griffith (1985); Prather (1987).

In a seminal work, Griffith (1985) noted that the analysis of personal financial statements seemed "undeveloped" and titled his proposal for the use of 16 financial ratios "a modest beginning" (p. 123). The 16 original ratios are shown in Table 2. Griffith stated that financial ratio analysis could be used by individuals and families: (1) as a measure of change in financial progress over time, (2) as an objective measure of analysis of family finances, and (3) as a tool for financial professionals to make recommendations to families (Griffith, 1985).

Later, Mason and Griffith (1988) discussed the application of financial ratios to personal financial statements by professionals such as bankers, life insurance brokers, certified public accountants, attorneys, and financial planners. In each setting, the financial ratio could be used to help determine the financial well-being of the client in regard to one or more of the following areas: consumption, investment, and the use of credit. Following an analysis of 22 personal finance and financial planning texts, Mason and Griffith (1988) noted the lack of a theoretical framework for using certain data when analyzing a client's financial situation. They stated:

> Despite the absence of sound theory, the authors believe it is still useful to develop ratios . . . Empirical research is needed to test these ratios, and those ratios that are good predictors of financial problems and performance should be retained (p. 73).

Prather (1990) used data from the 1983 Survey of Consumer Finances (SCF) to examine the financial ratios suggested by Griffith. Following statistical analysis, Prather suggested: (1) instituting household norms for each of the ratios, and (2) that the divisor of five ratios be changed from net worth to total assets. Prather stated: "Relating a part to the whole would

**TABLE 3**
Financial Ratios

| |
|---|
| **Liquidity** |
| Net consumption expenditures/Disposable income |
| Liquid assets/Net consumption expenditures |
| Total housing expenses/Disposable income |
| **Debt Service** |
| Consumer debt repayments/Disposable income |
| Annual consumer and mortgage debt repayments/Annual disposable income |
| Gross annual debt repayments/Gross annual income |
| **Meeting Financial Goals** |
| Total household assets/Total household liabilities |
| Annual total savings/Annual disposable income |
| Investment assets/Net worth |

*Source*: Lytton, Garman, & Porter (1991).

provide a ratio value which is more intuitively meaningful" (1990, p. 66). Changes to the original ratios are annotated in Table 2.

Although Garman and Forgue (1991) recommended eight ratios that measured liquidity, debt burden, and progress toward meeting financial goals, they stated:

> Since standards for these ratios do not exist, it is best to subjectively evaluate each ratio in light of the peculiarities of each individual and family circumstance, considering such factors as stage in the life cycle, marital status, income, and financial goals (Garman & Forgue, 1991, p. 92).

Not satisfied with the current research and literature on ratios, Lytton, Garman, and Porter (1991) presented a list of ratios (shown in Table 3) and applied them to a case study. When available, "widely accepted" guidelines for interpretation were suggested. Lytton et al. noted that "recommendations for change should not be made on the basis of one ratio. Instead, it is imperative that these nine ratios be calculated and the combined effects of the results considered in an interrelated manner" (p. 21).

Iwuagwu (1989) analyzed ratios from a different perspective—as predictors of perceived household financial security. Using data from the Wisconsin Basic Needs Survey which was collected in 1981 and 1982, Iwuagwu found several ratios that were statistically significant predictors of perceived financial security (shown in Table 4). Five of the seven ratios that were used had been identified by Prather as being the "most useful" of the original 16.

Prather (1990) and Iwuagwu (1989) acknowledged that a smaller number of ratios was more useful and each reviewer recommended the use of similar ratios. Lytton et al. (1991) assumed that families were knowledgeable about their amount of disposable income and suggested that income should be a reference point for many of the ratios. In a descriptive analysis of household financial status in the 1980s, DeVaney (1993) compared the proportions of households meeting financial ratio guidelines, as cited in two personal finance textbooks. Almost 10% of households in 1986 were technically insolvent with an asset/liability ratio less than 1.0 (i.e., debts were greater than assets) and 40% did not have access to a standard emergency fund measure (liquid assets equal to three months of disposable

**TABLE 4**
Financial Ratios

| |
|---|
| **Liquidity** |
| Liquid assets/Monthly expenditures* |
| **Debt** |
| Liquid assets/Consumer debt* |
| Consumer debt/Gross income |
| Liquid assets/Total debt |
| Liquid assets/Short-term debt plus 1 year of other debt |
| Monthly debt payment/Monthly gross income |
| **Inflation Protection** |
| Inflationary assets/Total assets* |

*Note*: *Predictor of household's perceived financial security.

income). Also, several ratios indicated that the level of household debt compared to income increased between 1983 and 1986.

In another study, again using Survey of Consumer Finance data for 1983 and 1986 and negative or zero net worth as a dependent variable, DeVaney (1994) showed that comparing the value of a financial ratio to a cutoff or guideline was a statistically significant predictor of household insolvency three years later. When the outcome of two statistical procedures—logistic regression and a classification tree—were compared, the most likely predictors of insolvency were the liquidity ratio and the assets-to-liability ratio, respectively. However, gross annual (non-mortgage) debt compared to disposable income was the second most likely predictor of insolvency for each of the two methods. Financial ratios that were tested with a cutoff or guideline are shown with the appropriate value for the guideline in Table 5.

A study comparing ratio measurements in three time periods with the same families has provided further evidence of the usefulness of ratios (Fanslow, 1994). Six financial ratios were calculated using data collected during interviews with 84 household money managers in 1982, 1986, and 1991. The ratios suggested some financial concerns for the households. Fewer families had adequate liquid assets to meet three months of household expenses compared to in 1986. Similarly, slightly fewer met the criterion of saving 5% of annual

**TABLE 5**
Financial Ratios with Guideline

| | |
|---|---|
| **Solvency** | |
| Total assets/Total liabilities | > 1 * |
| **Liquidity** | |
| Liquid assets/Disposable income | >.25 * |
| **Debt Service** | |
| Annual shelter costs/Total income | < .28 |
| Consumer debt payments/Disposable income | < .15 |
| Gross annual debt payments/Disposable income | < .30 * |

*Note:* *If guideline is not met, ratio predicts a propensity for insolvency.
*Source*: DeVaney (1994).

**TABLE 6**
Financial Ratios: Iowa Longitudinal Study

| | |
|---|---|
| Housing expenses/Net income | ≤ .30–.40 |
| Financial assets/Net worth | ≥ .25 |
| Expenditures/Net income | ≤ 1.00 |
| Savings/Net income | ≥ .05 |
| Liquid assets/Expenditures | ≥ .25 |
| Consumer debt service | ≤ .10 |

*Source:* Fanslow (1994).

take-home pay. Consumer debt load had increased for more of the families when compared to the two previous years (see Table 6).

The rather lengthy discussion of credit scoring and financial ratios for consumers has revealed a similar history of development for each of the predictive models. Each model is quantifiable so that both consumers and the industry can have information readily available for use. The creditors have a responsibility to inform educators which ratios have been most useful as predictors in their modeling (Cambridge Seminar, 1988; Mierzwinski, 1995) and then educators have a responsibility for informing the public on the use and interpretation of those ratios.

## V. IMPLICATIONS

The management of the credit use/payment behavior relationship needs to be a win-win situation for all the parties involved. Each part of the relationship needs to work to support the other. Insolvency is a breakdown in the relationship. The credit community has to be judicious in the use of credit. Consumers have to be judicious in the acceptance and use of available consumer credit. Educators and other professionals who offer advice, counseling, and education to consumers can mediate in this relationship. Consequently, this paper has implications for all these parties:

For the credit industry:

- Consider attitudinal or other life-style variables for inclusion in credit scoring schemes;
- Realize that while profit is necessary to sustain the industry, the need exists to continually improve credit scoring systems but not at the expense of losing consumers to the bankruptcy process;
- Use predictive ability to identify potential problems by monitoring accounts and offering trained professionals to assist consumers to adjust their spending patterns;
- Guard consumer privacy to avoid abuse of the information storage and retrieval possibilities associated with sophisticated scoring schemes; and
- Accept responsibility for providing credit information and education to the public.

For consumers:

- Learn to monitor their financial situation and to notify creditors when problems arise, as opposed to the common practice of creditor avoidance;

- Accept responsibility to prepare for the unexpected by learning and practicing strategies for efficient money management such as developing an emergency fund, notifying creditors, and curbing spending to allow for the purchase of insurance, savings for emergencies, and accomplishment of other goals; and
- Recognize the fundamental need for planned spending and managed cash flow. The calculation and tracking of net worth, income, and expenses—and selected financial ratios—provide needed information for monitoring the individual consequences of insolvency.

For financial professionals/educators:

- Recognize that financial stability may be short-lived (e.g, decline in housing values, downsizing of corporations, etc.) to insure that families are prepared for contingencies through plans for risk management and other savings; and
- Educate clients, regardless of income level, about appropriate use and abuse of credit, in particular, the use of financial ratios to identify potential problems.

For educators/researchers:

- Develop theory to explain the body of literature and research on insolvency;
- Include random effects of unexpected events and the macroeconomic environment—that is, the error term in the statistical equation;
- Work with creditors to learn what they are including in predictive models so that consumers can be better informed;
- Collect data and use more sophisticated statistical procedures to support comprehensive study of factors contributing to insolvency; and
- Continue research and development on the use of financial ratios to guide consumers in assessing their current financial status, in making comparisons to past records and time periods, and in making decisions about the use of financial resources in the future.

## VI. Conclusions

In conclusion, the nuances of applying and interpreting the concept of insolvency in a household financial domain is complex and multidimensional. What is unclear is the relationship between the manifest and latent characteristics that contribute to the onset, and severity, of insolvency. The randomness of life events, which can represent either latent or manifest effects, can never be predicted or controlled for. According to one author, some creditor grantors consider the life of the credit obligation as a proxy for these unforeseen life events (Wagner, Reichert, & Cho, 1983). Another author acknowledges that the combination of macroeconomic factors and the increasingly precarious nature of the microeconomic environment of too many households have increased the complexity of bankruptcy and chargeoff prediction ("Who Will Go Bankrupt?" 1992). But both creditors and consumers can reduce the impact of the "random error." Consumers can monitor spending and attempt to prepare for contingencies, while creditors can use their tools to monitor and help consumers avoid overextension. Although issues of privacy and fairness are paramount, the

benefits of remedial, not punitive, interventions which reduce the incidence of insolvency should not be discounted.

Learning more about insolvency is equally important to the credit community, consumers, and professionals who serve consumers. Continued theory development and research, both public and proprietary, offers avenues for protecting all parties, including the larger economy. But, judiciousness on the part of creditors and debtors is critical to the continued success of the relationship. Insolvency, in the equity sense of failing to repay debts in a timely manner, represents a deterioration of the relationship. In the bankruptcy sense, insolvency represents the failure of this relationship.

## REFERENCES

Altman, E.I. (1968). Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. *The Journal of Finance, 23*(4), 589–609.

Altman, E.I. (1971). *Corporate bankruptcy in America.* Lexington, MA: Heath Lexington Books.

Apilado, V.P., Warner, D.C., & Dauten, J.J. (1974). Evaluative techniques in consumer finance—Experimental results and policy implications for financial institutions. *Journal of Financial and Quantitative Analysis*, (March), 275–283.

Avery, R.B., Elliehausen, G.E., & Kennickell, A.B. (1987). Changes in Consumer installment debt: Evidence from the 1983 and 1986 surveys of consumer finances. *Federal Reserve Bulletin, 73*(10), 761–778.

Bankruptcy reform: Truth or consequences. (1995, Spring). *Everybody's Money, 34*(4), 19–21.

Becker, N.D. (1992). *Becker CPA review course*, Lecture 7. Ventura, CA: Becker.

Bhandari, J.S., & Weiss, L.A. (1993). The increasing bankruptcy filing rate: An historical analysis. *The American Bankruptcy Law Journal, 67*(Winter), 1–15.

Boyes, W.J., Hoffman, D.L., & Low, S.A. (1989). An econometric analysis of the bank credit scoring problem. *Journal of Econometrics, 40*, 3–14.

Brandt, L., Danos, J.R., & Brasseaux, J.H. (1989). Financial statement analysis: Benefits and pitfalls. *The Practical Accountant, 22*(5), 68–70.

Byrne, P.M. (1992). Select financially healthy suppliers. *Transportation and Distribution, 33*(1), 21–23.

Canner, G.B., & Luckett, C.A. (1990). Consumer debt repayment woes: Insights from a household survey. *Journal of Retail Banking, 12*(1, Spring), 55–62.

Canner, G.B., & Luckett, C.A. (1991). Payment of household debts. *Federal Reserve Bulletin, 77*(April), 218–229.

Capon, N. (1982). Credit scoring systems: A critical analysis. *Journal of Marketing, 46*(Spring), 82–91.

Chandler, G.G., & Parker, L.E. (1989). Predictive value of credit bureau reports. *Journal of Retail Banking, 11*(4, Winter), 47–54.

Chen, K.H., & Shimerada, T.A. (1981). An empirical analysis of useful financial ratios. *Financial Management, 10*(Spring), 51–60.

Chhikara, R.K. (1989). The state of the art in credit evaluation. *American Journal of Agricultural Economics, 71*(5), 1138–1144.

Collins, R.A., & Green, R.D. (1982). Statistical methods for bankruptcy forecasting. *Journal of Economics and Business, 34*, 349–354.

Courtless, J. (1993). Trends in consumer credit. *Family Economics Review, 6*(3), 8–17.

Cunniff, J. (1995). Nobody's saving a penny to earn a penny anymore. *The Roanoke Times and World News*, (February 5), B7–B8.

DeVaney, S.A. (1993). Changes in household financial ratios between 1983 and 1986: Were American households improving their financial status? *Financial Counseling and Planning, 4*, 31–46.

DeVaney, S.A. (1994). The usefulness of financial ratios as predictors of household insolvency: Two perspectives. *Financial Counseling and Planning, 5*, 5–24.

DeVaney, S.A., & Hanna, S. 1994. The effect of marital status, income, age and other variables on insolvency in the U.S.A. *Journal of Consumer Studies and Home Economics, 18*, 293–303.

Durand, D. (1941). *Risk elements in consumer installment financing.* Study #8. New York: National Bureau of Economic Research.

Easing borrowers off the road to bankruptcy. (1990, February). *ABA Banking Journal, 82*(February), 42–44.

Fanslow, A. (1994). Financial ratios as a tool for assessing the financial health of Iowa's households. In M. Bretz (Ed.), *The link.* Ames: Iowa State University.

Federal Reserve System, Board of Governors. (1991, September). *Balance sheets of the U.S. economy: 1945–1990.* Washington, DC: Author.

Friedland, M. (1993). In any language, credit grantors say "yes!" to scoring. *Credit World, 82*(1, September/October), 13–16.

Garman, E.T., & Forgue, R.E. (1991). *Personal finance.* 3rd edition. Boston, MA: Houghton Mifflin Company.

Gothe, P. (1990). Credit bureau point scoring sheds light on shades of gray. *Credit World, 78*(5, June), 26–29.

Grablowsky, B.J., & Talley, W.K. (1981). Probit and discriminant functions for classifying credit applications: A comparison. *Journal of Economics and Business, 32*(3), 254–261.

Griffith, R. (1985). Personal financial statement analysis: A modest beginning. In V. Langrehr (Ed.), *Proceedings, Third Annual Conference of the Association of Financial Counseling and Planning Education* (pp. 123–131). Iowa State University. Ames, IA: AFCPE.

Harney, K. (1994). Credit-tracking service can spot consumer loan payment difficulties. *The Washington Post,* (February 5), F3–F4.

Hira, T.K. (1992). The rehabilitative aspects of consumer bankruptcy procedures. *Proceedings of The Association for Financial Counseling and Planning Education, 10*, 120–138.

Horrigan, J.O. (Ed.). (1978). *Financial ratio analysis: An historical perspective.* New York: Arno Press.

Hughes, J.W. (1991). Understanding the squeezed consumer. *American Demographics, 13*(July), 44–49.

Irvin, S. (1994). Using lifetime value analysis for selecting new customers. *Credit World, 82*(3, January/February), 37–39.

Iwuagwu, U.S. (1989). Financial ratios and perceived household financial security. Unpublished M.A. thesis, University of Wisconsin, Madison.

Jenson, H. (1992). Using neural networks for credit scoring. *Management Finance, 18*(6), 15–26.

Jost, A. (1993). Neural networks: A logical progression in credit and marketing decision systems. *Credit World, 81*(4, March/April), 26–33.

Ketz, J.E., Doogar, R.K., & Jensen, D.E. (1990). *A cross-industry analysis of financial ratios.* New York: Quorum Books.

Lawder, K.E. (1989). Ratios 101: Back to the basics of financial analysis. *Business Credit, 91*(6), 28–30.

Lease Instead of Buy? (1995). *Consumer Reports,* (April), 268–269.

Livingstone, S.M., & Lunt, P.K. (1992). Predicting personal debt and debt repayment: Psychological, social, and economic determinants. *Journal of Economic Psychology, 13*, 111–134.

Long, M.S., & McConnell, J.J. (1977). Credit scoring system aids second mortgage makers. *Mortgage Banker, 37*, 29–34.

Luckett, C.A. (1988). Personal bankruptcies. *Federal Reserve Bulletin, 74*(9), 591–603.

Luckett, C.A., & August, J.D. (1985). The growth of consumer debt. *Federal Reserve Bulletin, 71*(6), 389–402.

Lyons, F. (1993). Using segmentation analysis: Identifying customer segments for scoring model development. *Credit World, 81*(5, May/June), 36–37.

Lytton, R.H., Garman, E.T., & Porter, N.M. (1991). How to use financial ratios when advising clients. *Financial Counseling and Planning, 2*, 3–23.

Lytton, R.H., & Parrott, K.R. (1994). Could Virginians qualify for a mortgage today? In A.A. Hertzler, M.J. Sporakowski, & N.L. Templeman (Eds.), *Virginia's families in a changing world.* Blacksburg, VA: VPI & SU College of Human Resources.

Makowski, P. (1985). Credit scoring branches out. *Credit World, 74*(1, November–December), 30–37.

The Management of Risk. (1988). *Banking World, 6*(10), 34–36.

Marshall, J. (1992). Zap—The computer lops off another bad risk. *United States Banker, 102*(8, August), 49–50.

Mason, J.W., & Griffith, R. (1988). New ratios for analyzing and interpreting personal financial statements. *Journal of the Institute of Certified Financial Planners*, (Spring), 71–87.

McCorkell, P.L. (1994). Regulations of credit data. *Credit World, 82*(3, January–February), 12–14.

Mierzwinski, E. (1995). Creditors shouldn't be averse to helping consumers. *Credit World, 83*(3, January–February), 29–31.

O'Neill, B.M., Lytton, R.H., & Parrott, K.R. (1995). Living on the edge: Characteristics and practices of overextended homeowners. In S. Hanna (Ed.), *Family economics and resource management biennial.* Washington, DC: Family Economics and Resource Management Division, American Association for Family and Consumer Sciences.

Overstreet, G.A., & Kemp, R.S., Jr. (1986). Managerial control in credit scoring systems. *Journal of Retail Banking, 8*(1 & 2), 79–86.

Pellegrino, M.K. (1988). The evolution of scoring in the 1980s. *Credit World, 77*(2, November/December), 26–29.

Peterson, C.M., & Peterson, R.L. (1981). Downpayments, borrower characteristics, and defaults. *Journal of Retail Banking, 3*(1, March), 1–6.

Prather, C.G. (1990). The ratio analysis technique applied to personal financial statements: Development of household norms. *Financial Counseling and Planning, 1*, 53–69.

Pressel, J.R. (1991). Tools of the trade: Financial statements. *Business Credit, 93*(2), 12–14.

Radding, A. (1992). Credit scoring's new frontier. *Bank Management, 68*(September), 57–62.

Robins, G. (1992). Scoring: Retailers are finding new uses for the technique. *Stores*, (September), 45.

Robins, G. (1993). Credit scoring: Can retailers benefit from neural networks? *Stores, 75*(April), 34–35.

Rosenberg, E., & Gleit, A. (1994). Quantitative methods in credit management: A survey. *Operations Research, 42*(4, July–August), 589–613.

Scheld, K.A. (1993). Debt in the 1990s. *Chicago Fed Letter*, The Federal Reserve Bank of Chicago, *69*(May).

Shepard, L. (1984). Accounting for the rise in consumer bankruptcy rates in the United States: A preliminary analysis of aggregate data (1945–1981). *The Journal of Consumer Affairs, 18*(2), 213–229.

Singletary, M. (1993). Bankruptcy filings hit record high. *Washington Post*, (January 12), C1.

Sullivan, C., & Fisher, R.M. (1988). Consumer credit delinquency risk: Characteristics of consumers who fall behind. *Journal of Retail Banking, 10*(3, Fall), 53–64.

Sullivan, T.A., Warren, E., & Westbrook, J.L. (1989). *As we forgive our debtors: Bankruptcy and consumer credit in America.* New York: Oxford University Press.

Wagner, G.M., Reichart, A.K., & Cho, C. (1983). Credit scoring, part II: Conceptual issues in credit scoring models. *The Credit World, 71*(6, July–August), 22–28.

Who will go bankrupt? (1992). *U.S. Banker, 102*(9), 47–51.