CREDIT CARDS IN AN INTERDISCIPLINARY SURVEY: TOWARD A GENERAL THEORY OF CONSUMER BEHAVIOR

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ABSTRACT

The article summarizes and integrates the separate literatures on credit cards from the economic, legal, marketing, and socio-psychological disciplines. In doing so it suggests an interdisciplinary theory of consumer behavior in a rationed market as a framework for future research.
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Credit cards appeal to different research interests in the several disciplines of the behavioral sciences. In this paper, however, a beginning is made in an attempt to integrate the separate strands of consumer research into a general theory of consumer behavior.

The paper begins by examining the history of credit card growth and then develops an economic model of a rationed market in a critique of research on user characteristics. It continues by suggesting a causal model of consumer demand in which credit cards are but one aspect of consumer behavior. The model is used as a framework in which to examine research on the determinants of card use and their effects on other social, sociopsychological, and economic variables. Special attention is given to credit cards' effects on consumption and the demand for money. Finally, credit cards are examined as an introduction to the electronic money era.

CREDIT CARD HISTORY

In the present analysis inquiry will be limited to the role of plastic cards as a means of access to, or the postponement of, the transfer of money. Money cards can be classified into two categories: debit and credit cards. Debit cards give their holder the ability to receive currency or to make a purchase in exchange for an instantaneous electronic deduction from a checking account (or demand) deposit. Use of a credit
card, however, postpones the day when the consumer needs to make settle-
ment. In the case of store cards the retailer provides the credit. In
the case of bank, gas, and travel and entertainment cards, the retailer
receives payment from a third party, the card-issuer, who bills the con-
sumer at the end of the month. Holders of gas, retail and bank credit
cards usually have the option to revolve credit and pay interest, typi-
cally at the rate of 18 percent per annum or to repay before the next
billing date and avoid interest charges. In this article credit cards
are the subject of inquiry.

Credit cards were first issued in the United States by hotels at
the beginning of the century.1 By 1914, large department stores and gas
station chains were issuing cards. Their spread was retarded by the two
World Wars and by the Great Depression, so that it was not until the
1950s that third party cards began, first as travel and entertainment
cards and then as bank cards. During the sixties the BankAmericard, now
Visa, and the Mastercharge systems eliminated competition and established
themselves, effectively, as the bank credit card industry. In the mean-
time, bank and travel and entertainment cards had become acceptable world-
wide.

Table 1 presents data on the history of credit cards during the
past decade. Credit card use in general has grown at an average annual
rate of 12.2 percent. This growth has been faster than growth of the
GDP (8.6 percent), consumer expenditures (9.0 percent), and total install-
ment credit (10.0 percent), thus lending support to the hypothesis that
increasing credit card availability has reduced the restraint of credit rationing on consumer behavior and expenditure. Cards' growth rate has varied with the business cycle. The highest rates occurred during the expansionary phases of the cycle in 1973 and 1977. The lowest rate occurred during the recession of 1975. The cyclical oscillation is the result of card usage's direct variation with income and interest rates (Garcia, 1978b). Further, when credit is tight elsewhere, consumers may substitute their credit card line of credit for more traditional installment loans (Peterson, 1977).

Growth has not been uniform over all types of credit cards. Bank cards have grown most rapidly at an average annual rate of 28.7 percent. Thus they have raised their share of the credit card market from 7.3 percent in 1967 to 38.4 percent in 1977. Their growth has been at the expense of gas and retail store cards whose shares fell from 8.4 percent to 5.5 percent and from 83.7 percent to 55.4 percent, respectively. Federal Reserve (1978) evidence from a survey of card use supports these findings.

The reasons for bank cards' increasing market share have not been explicitly examined in the literature, but they have been modeled as a new product in its expansion phase (Garcia, 1978b). To date, no evidence of product maturity or market saturation has been found. For example, during the twelve months ending in August 1978, bank card credit outstanding grew at an annual rate of 26.0 percent. On the supply side, the reason for bank cards' growth at the expense of retail cards appears to be in an assessment that it is cheaper for stores to use bank cards than to provide their own credit. On the demand side, bank credit cards have the
advantages of universality as compared to store cards and of omitting
the annual charge which Travel and Entertainment cards impose.

Expenditure by bank credit card has also grown rapidly from less
than $1 billion in 1967 to $37.6 billion in 1977. Nevertheless, by 1977
bank card expenditure still accounted for only 3 percent of all consumer
expenditure, while all cards are estimated to represent 8 percent of con-
sumer expenditure. This small share may explain the inattention to date
to theoretical issues underlying the card phenomenon. Cards have grown,
however, into an important source of consumer credit. By the end of 1977
bank card debt represented 13.7 percent of commerical bank installment
credit, so cards are important to bank operations and profitability. Debt
on all cards accounted for 17.8 percent of all installment credit, and as
such becomes a significant factor in consumer behavior and economic policy.

SURVEYS OF USER CHARACTERISTICS

Much of the research on credit cards has been devoted to examining
who uses them. Shay and Dunkelberg (1975) and Dunkelberg and Smiley (1975)
are the prime sources of information on nonbank card use. Their data were
obtained, respectively, from surveys of cardholders in New York state and
in California. They tabulated the distributions of retail store cards by
income, age of the head of the household, occupation, and by the numbers
and types of other cards held. Tabulations of bank card use by economic
and demographic characteristics have been provided by Johnston (1974),
Mandell (1973), and Shay and Dunkelberg (1975). Card use is found to in-
crease with income, education, and social class and to be lower among re-
tired people.
What little research there is on the causes of credit card use is essentially descriptive. For example, Baxter, Cootner and Scott (1977) make predictions of user characteristics based on their assessment of credit cards' advantages in saving time when shopping and paying bills. Blackwell, Hayes and Talarzyk's (1975) attitudinal survey also refers to cards' convenience over checks as reported by a third of the users surveyed. With respect to convenience, however, it is worth establishing how much time is saved and how the decision to save it is taken. A time budget study, such as that recommended by Jacoby, Szybillo, and Kohn Behring (1976) would provide information on actual time-savings.

Credit cards have two attributes: they can be used as a medium of exchange as "charge" cards and they also provide a source of short- or intermediate-term revolving credit. Much of the research on the determinants of card use concentrates on one or other of these attributes. For example, Sporleder and Wilson (1974) use a multiperiod, but essentially static, utility-maximizing model to argue that card use is rational because revolving credit defers payment and reduces the present value of the commodity's price. As long as credit card interest rates exceed market rates use is "rational" only if repayment is made before interest charges are incurred. As market rates have not exceeded card rates in the past in the United States, this model cannot explain why consumers have used credit cards. The observed willingness to pay interest on card use can be explained, however, either by a general "time preference" or by a more specific and realistic redistribution of expenditure over the consumer's life cycle.
Mathews and Slocum (1969) and Slocum and Mathews (1970) provide survey evidence that both motives are relevant to explaining card use. Cardholders with low income and low socio-economic status use cards to generate revolving credit more often than do rich and high status holders. The rich more frequently use cards as a convenient exchange medium. Consequently, analyses of card use and of user characteristics need to take both considerations into account. What is really needed is a theoretical model which recognizes that cards offer simultaneously transactions convenience and a source of credit. Incorporation of both elements in an economic model of consumer demand requires an intertemporal utility-maximization specification with transactions costs.

Subsidies in Credit Card Use

Surveys of user characteristics have been used to make inferences about subsidies in credit card use. Dunkelberg and Smiley (1975) and Shay and Dunkelberg (1975) examine what they claim to be "the popular notion that the low-income credit user subsidizes the high income users." The popular notion arises from observations that the poor are more likely to revolve credit and pay interest than are the rich, who tend to settle their bills in time to avoid interest charges (Mathews and Slocum, 1969; Slocum and Mathews, 1970). Dunkelberg and Smiley (1975, p. 471), however, conclude that "lower income credit card users are subsidized by higher income credit card users." This conclusion is based on an analysis of the costs of providing credit to different income classes. The principal cost difference lies in the unequal probabilities of default, which are higher among the
lower classes. This leads Dunkelberg and Smiley (1975, p. 488) to con-
clude that the store benefits more from selling on credit to the rich
than to the poor.

Presumably, however, the store benefits from selling to both
groups. Showing that a store profits more from selling to one group than
to another is not equivalent to demonstrating that the first subsidizes
the second. Thus, Dunkelberg and Smiley's analysis of cost differentials
is not sufficient to support their subsidy conclusion.

Baxter, Cootner and Scott (1977) address the issue of subsidies
in retail store credit from a different and opposing viewpoint. They em-
phasize that it is spurious to isolate the store's credit division from the
rest of the store's operations. Accounting evidence shows that credit
divisions lose money so that they can be said to provide a subsidy to card
users (see the studies conducted by Touche Ross and Company, (1969) and that
presented in chapter 3 of Shay and Dunkelberg, 1975). The authors argue,
however, that the store as a whole willingly provides the credit division's
subsidy because it functions to increase sales and raise overall profits.

Legislative proposals designed to reduce credit costs by lowering
interest rate ceilings are predicted to reduce the supply of credit and
ration lower income customers out of the market (The National Commission on
Consumer Finance, 1972; Shay and Dunkelberg, 1975; Dunkelberg and Smiley,
1975). Shay and Dunkelberg suggest that the rationing would be implemented
by changing the point scoring scales by which credit card worthiness is
judged, to more heavily penalize low income applications. As their credit
cost analysis is based primarily on the delinquency probability, this
policy would appear to do injustice to a low income applicant who has no
history of delinquency. Perhaps a more equitable and more efficient way to ration credit would be to give more weight to, and demand more evidence of, sound credit history.

The suggestion that stores benefit more from credit selling to the rich than to the poor indicates that retailers might profitably use card granting discrimination to segment their markets and to permit different market strategies between segments. Merchants who accept bank credit cards have no control over card issuance, however, so they must find different ways to profit from segmentation among income strata. Murphy and Ott (1977) redirect the microeconomic theory of price discrimination to analyze discrimination between consumers who have differing income elasticities. Card users, they argue, belong to high income strata who have high opportunity costs of time and high income elasticities for luxury goods. From their analysis, they predict that bank cards will most profitably be accepted by firms which sell goods which have high income elasticities; for example, by airlines, but not by bus companies, by convenience grocery stores rather than by supermarkets, and by the more exclusive restaurants. Evidence from Blackwell, Hawes and Talarzyk's (1975) survey supports these predictions. Moreover, they find in their examination of the use of cards in the purchase of leisure time goods and services, that cards are most commonly used in the purchase of shopping goods such as clothes and shoes, and convenience goods such as gasoline, and are used less to pay for admission tickets to leisure time events and performances.

Evidence from Caplovitz (1967) for a different market also lends support to Murphy and Ott's analysis. Caplovitz shows how the immobile poor who buy goods which have inelastic demands and who are rationed out
of the credit card market, become dependent on their neighborhood stores. This situation allows ghetto stores to charge high prices, offer low quality, and to charge "extortionate" interest rates. The resulting entrapment of customers is compared by Moyer and Hutt (1978) to that of the sharecropping system in the south.

A MODEL OF A RATIONED MARKET

To understand the causes underlying observations of the price and quantity of any good, economists traditionally dichotomize the determinants into two sets, one measuring demand and the other supply influences. Surveys of user characteristics have not followed this path, however. Rather they merely look at correlates of the quantity used. If we make no inference as to their underlying model, then surveys cannot isolate the causes of the observed behavior. They do something to explain, for example, why some people who have cards do not use them, but they do nothing to describe why others who wish to use them cannot get them. These latter people have been denied credit by suppliers. If, therefore, we postulate that user characteristics determine the demand for card use, then we face the possibility that the model is misspecified by the confounding of supply with demand influences.

In a freely competitive market with free access to all, a family's use of credit cards can be posited to be a function of price, income, and taste effects. But the credit card market is not of this simple form. Access is not universal: credit is rationed by its suppliers. Not everyone who would like to use a card and is prepared to promise to pay
for its use can get one. The rationing restriction is reflected in the lack of variation in interest rates in both time series and cross section data. Rates would be expected to vary over time in response to changes in costs and demand and to vary among individuals in reflection of their differing risk premia corresponding to the differing probabilities of default. In short, in a rationed market, usage is only partially a reflection of demand; it is also a reflection of discrimination in supply.

To examine this question more carefully, a simplified model of a rationed market can be constructed. Three values are pertinent to credit card usage, \( y_{j1}, i=1, 2, 3 \). When \( i = 1 \), the value refers to demand; when \( i = 2 \), the value reflects that supplied to the consumer; and when \( i = 3 \), the value is that actually used.

These values are determined by \( k \) explanatory variables. In this simplified model there are four explanatory variables. The quantity which the \( j \)-th family would wish to utilize, \( y_{j1} \), is expressed as rising with its income, \( x_{j1} \), and its tastes, \( x_{j2} \), and falling with increases in the interest charges it faces, \( x_{j3} \). In a perfectly competitive market each family would face the same price, but in the traditional loan market the interest rate price will vary among borrowers to reflect their differing risk premia and perhaps also their price discrimination mark-ups. In the case of credit cards, however, rates do not vary between consumers, so that lenders use their power to discriminate by offering different quantities to different customers. The quantity offered to the \( j \)-th family, \( y_{j2} \), is written as a function of its income, the interest rate charged,
and the family's credit history, $x_{j4}$. The functions are both written with errors, $e_{j1}$ and $e_{j2}$, respectively. The demand function is,

$$y_{j1} = a_{j0} + a_{j1}x_{j1} + a_{j2}x_{j2} + a_{j3}x_{j3} + e_{j1}$$

$$j = 1, \ldots, j, \ldots, J,$$  \hspace{1cm} (1)

and the supply function is,

$$y_{j2} = b_{j0} + b_{j1}x_{j1} + b_{j3}x_{j3} + b_{j4}x_{j4} + e_{j2}$$  \hspace{1cm} (2)

For an unrationed consumer, $j = 1, \ldots, j$ the quantity used, $y_{j3}$, is given by the demand function plus an error. That is,

$$y_{j3} = y_{j1} + e_{j3}, \hspace{0.5cm} y_{j1} < y_{j2} \hspace{0.5cm} j = 1, \ldots, J$$  \hspace{1cm} (3)

Here the quantity supplied does not constrain usage because demand is less than supply. For the rationed consumer, $j = j + 1, \ldots, J$, however, quantity used is limited to that supplied.

$$y_{j3} = y_{j2} + e_{j4}, \hspace{0.5cm} y_{j1} \geq y_{j2} \hspace{0.5cm} j = j + 1, \ldots, J.$$  \hspace{1cm} (4)

Consequently, in any cross section sample of individual families or consumers, organized so that the first observations, $j = 1, \ldots, j$ are unrationed and the last observations, $j = j + 1, \ldots, J$, are rationed, the tabulations, or regressions, will represent some inseparable confounding of demand and supply influences. The same problem will obtain in any
general sample of aggregate data. For unrationed consumers their aggregate demand will determine usage. That is,

\[ \sum_{j=1}^{J} y_{j3} = \sum_{j=1}^{J} y_{j1} + \sum_{j=1}^{J} e_{j3} \]  

(5)

\[ \sum_{j=1}^{J} y_{j1} = \sum_{j=1}^{J} a_{j0} + a_{j1} \sum_{j=1}^{J} x_{j1} + a_{j2} \sum_{j=1}^{J} x_{j2} + a_{j3} x_{j3} + \sum_{j=1}^{J} (e_{j1} + e_{j3}) \]  

(6)

where the primed parameters in equations 6, 8, and 9 reflect the aggregation process. For the rationed consumer use will be given by

\[ \sum_{j=J+1}^{J} y_{j3} = \sum_{j=J+1}^{J} y_{j2} + \sum_{j=J+1}^{J} e_{j4} \]  

(7)

where aggregate supply to rationed consumers is given, from equation (2), by,

\[ \sum_{j=J+1}^{J} y_{j2} = \sum_{j=J+1}^{J} b_{j0} + b_{j1} \sum_{j=J+1}^{J} x_{j1} + b_{j3} x_{j3} + b_{j4} \sum_{j=J+1}^{J} x_{j4} + \sum_{j=J+1}^{J} (e_{j2} + e_{j4}). \]  

(8)

The aggregate value of credit in use is the sum of credit taken by both rationed and unrationed consumers. The determinants of this sum are the determinants of equations (6) and (8). That is,

\[ \sum_{j=1}^{J} y_{j3} = \sum_{j=1}^{J} y_{j1} + \sum_{j=J+1}^{J} y_{j2} = \sum_{j=1}^{J} a_{j0} + b_{j0} + a_{j1} \sum_{j=J+1}^{J} x_{j1} + b_{j1} \sum_{j=J+1}^{J} x_{j4} + \sum_{j=J+1}^{J} b_{j3} x_{j3} + b_{j4} \sum_{j=J+1}^{J} x_{j4} + \sum_{j=J+1}^{J} (e_{j1} + e_{j3} + e_{j2} + e_{j4}). \]  

(cont.)
\[ + a_j^2 \sum_{j=1}^{J} x_j + (a_j^3 + b_j^3) x_j + b_j^4 \sum_{j=j+1}^{J} x_j + \sum_{j=1}^{J} (e_j + e_j^3) + \sum_{j=j+1}^{J} (e_j^2 + e_j^4). \]

(9)

The coefficient of \( x_2 \) is, then, a demand relationship for unrationed customers, that of \( x_4 \) is a supply relationship for rationed customers, and those of the remaining coefficients are some unidentified mixture of demand and supply.

Thus, in any sample of the whole population, which includes both rationed and unrationed families, usage will reflect both demand and supply influences. There is no way of inferring causation from existing samples for there is no mechanism to distinguish demand from the supply factors. Consequently, a regression equation of credit card use needs careful derivation and interpretation (Mandell, 1972; White, 1975).

Future research on the determinants of credit card demand could avoid this problem by careful model specification and by employing the switching regression regime techniques of Goldfeld and Quandt (1973) or the approach of Fair and Jaffee (1972) to regression estimation in markets in disequilibrium.

As an example of a misspecified model, consider the study by Peterson (1977) wherein he performs an unstructured regression of bank card debt using interstate data. The debt variable is written as a function of each state's income, the variance of its unemployment rate, and dummy variables to distinguish farming areas and those states which have usury and unit banking laws. This specification seriously confounds demand and supply influences. To what extent debt is higher in higher income states
and low unemployment variance states because a rich, job-secure person demands more or because banks are prepared to supply larger aggregate credit lines, remains unanswered. Evidently, the usury and unit banking laws reflect solely supply side influences, while the other variables could represent both demand and supply influences in some unidentified mixture. Consequently, care must be taken in interpreting Peterson's results.¹⁰ For example, his finding that unit banking laws increase card usage disagrees with that of Goldberg (1975), and may be a misleading result arising from the misspecified model.

Adcock, Hirschman and Goldstucker (1977) also overlook supply side influences when they conclude that demographic characteristics are sufficient to distinguish bank card users from nonusers. Goldstucker and Hirschman (1977) and Hirschman and Goldstucker (1978) use demographic, psychographic and sociographic variables to discriminate bank card holders from nonholders and users from nonusers. All studies assume that usage reflects demand, thus failing to recognize supply side restrictions.

The supply constraint problem can be substantially avoided, however, by confining attention to usage among cardholders under the implicit assumption that users are not rationed.¹¹ Ash and Waters (1974), for example, simply ask the question: which cardholders are more likely to use bank credit cards? Using a linear discriminant analysis they distinguish between active and inactive cardholders on the basis of demographic, attitudinal, and economic variables.
Their survey results show that attitude toward bank cards is the most important determinant of card use. The authors conclude that unfavorable attitudes towards bank card use are based primarily on fear of excessive reliance on credit and that, therefore, advertisements which stress cards' convenience and enhanced ability to purchase may be misdirected. No research could be found investigating the impact of advertising against which to check this cautionary advice, but Blackwell, Rawes and Talarzyk (1975) find that over 60 percent of card users regard cards' convenience as essential to their use and a further 33 percent used them for their credit-generating potential. Awh and Waters' conclusions may, therefore, be misleading.

A MODEL OF CONSUMER DEMAND

The research into credit cards which has been reviewed so far strongly suggests that there is a need for a theoretical framework in which to conduct empirical work in this area. Traditionally, theories in economics and sociology have postulated that people's actions are directly determined by their environment. The different disciplines tend to concentrate attention on separate subsets of the constraints on the choice process. For example, microeconomists assume that a household maximizes utility subject to a budget constraint. Tastes are not explicitly modeled, they are represented only by random variation in cross section or time series studies. Sociologists assume that people's actions result from their socially learned responses to external, normative -
stimuli. Psychologists, on the other hand, suggest that people's behavior is influenced less by external stimuli than by their internal needs and mental processes.

The research to date plus further studies by Curtis (1972), Mathews and Slocum (1972), Plummer (1971), and Wiley and Richard (1974), suggest that in future research a general model should be developed which would consider a complete range of social, psychological, and economic variables in any attempt to explain credit card use. Further, usage should be related to the growth of consumer credit in general in order to jointly explain these phenomena.

A comprehensive theory would include determinants which are both external and internal to the decision-making unit. This is the approach taken by Bagozzi and Van Loo (1978b, 1979) in their studies of the determinants of family size. This approach takes the decision-making unit to be the family rather than the individual on the assumption that any individually executed purchase by a family member has explicit or implicit repercussions on the family's psychological, social, and economic welfare.

Such a theory could describe a model of the social psychological processes which intercede between external stimuli and household demands. The process, which is constrained by the social, legal, and economic environment, could then simultaneously determine the household's demands for consumption, saving, money, debt in general and card use in particular, and its shopping habits. The framework for such a model is presented in Figure A.

[Figure A about here]
Then, unlike traditional sociological or economic paradigms, this theory of human behavior could permit the modeling not only of the interrelationships between the actions families take, but also the meaning that these actions have for the people involved. Consequently, it would be substantially more complex than either previous theoretical or empirical work on credit cards has allowed. It would provide a step toward the integration of behavior sciences into the mainstream of economics (and vice versa): an integration whose absence Katona (1974) regretted in the first issue of this journal.

The Economic, Legal, and Social Constraints

In Figure A the household is postulated to find its actions constrained by factors in its legal, social, and economic environment. Among the economic constraints on household demands are income, interest rates, credit rationing, and merchant acceptance. Traditionally income (or wealth) has been the prime determinant of household demand. That tradition is followed here, and evidence suggests that the income elasticity is high (Garcia, 1978b).

Consumer demand is also constrained by prices in the traditional economic model. In the case of credit cards the own-price is measured as an interest rate which is fixed, being stated by contract. Although contracts can be altered when they are renewed, historically contract rates have changed little and credit cards' rates do not vary among users. Relative prices of card use do vary widely over time and among individuals, however, because they reflect the interest rates charged on alternative forms of credit. Between individuals the effective
costs of alternative credit differ because they reflect differing risk premia and different taxation rates. Over time relative prices change as market interest rates respond to the economic environment and as real interest rates reflect changes in the rates of inflation and taxation.

In the case of credit cards, two further, nontraditional constraints are recognized. The first postulates that demand is also indirectly constrained by the degree of credit rationing in operation. This varies between families and over time. The second recognizes that use is also constrained by merchant acceptance rates. For example, a heavy card user on moving to a district where cards are not widespread would be forced to reduce usage.

In Figure A, two legal constraints are modeled. The first postulates that the truth in lending and advertising laws affect the sources of information on the alternatives facing the household and that these, indirectly affect its decisions. These laws change over time and the degree of compliance with the laws may vary in the environment facing different social classes. The second legal constraint recognizes that personal bankruptcy laws may affect some consumers' decisions. These change over time and knowledge of them may vary with social class and education.

The sociological factors influencing household decisions are classified into two groups in Figure A. The first group, norms (from which the legal components have been separately catalogued) reflect accepted standards of material aspirations and societal attitudes toward
debt as a method of acquiring desired goods. The norms affect the family's attitudes and its social interaction in decision making. Aspirations are also influenced by advertising and the transmission of societal values through the media.

The second group of social determinants, socioeconomic status constraints, influence both family attitudes toward credit-use and other variables and its social exchanges. Families are posited to formulate individual aspirations as to their life style and codes for their reconciliation when conflict arises. The aspirations and codes vary with social status. Indeed, several studies have found that social class is an important determinant of card use (Mathews and Slocum, 1969; Plummer, 1971; Slocum and Mathews, 1970).

Social Psychological Processes

The present model postulates that the economic, legal and social constraints do not directly determine household demand, but that they do so indirectly through the social-psychological decision making processes within the family. Thus, the process represented in Figure A provides the driving force of the model. Together with the legal, social and economic constraints, the social-psychological decision making processes determine, for example, the family's attitude towards credit.

In the analysis of the outcomes of the social psychological process, the Bagozzi-Van Loo model is extended to recognize that the credit card decision is not taken in isolation but is made simultaneously with other
decisions which determine the demand for substitute and complementary goods. This approach, which can be implemented empirically by use of the Jöreskog and van Thillo (1942) computer program for the general structural equation model, provides a general theory of consumer behavior and a particular determination of such variables as consumption, saving, money, consumer debt, and credit card use, and shopping habits. From the implementation of this model a set of demand functions for economic goods could be derived.

CREDIT CARDS' IMPACT ON OTHER VARIABLES

Much research conducted on credit cards examines their effects on other, usually economic, variables. The model of card credit determination presented in Figure A, can be used to examine the effects of a relaxation of the credit rationing constraint on other consumer decisions.

Consumption

Russell (1975) addresses the issue whether consumer credit stimulates consumption. He examines the question in the context of a model in which the consumer chooses the optimum allocation of his or her lifetime income over time. Credit cards can be introduced into this model as one method of relaxing an imperfect capital market's constraint on the ability of a (young) consumer to borrow in anticipation
of future income. As the household is assumed to spend lifetime income and to die with neither debts nor bequests, the room to change consumption patterns is limited to a time redistribution and to some second-order small change in total lifetime consumption expenditure, which arises from the payment or receipt of interest. Hirschman's (forthcoming) empirical study shows, however, that possession of a credit card is associated with measurably higher expenditure levels and a greater incidence of in-store purchasing among customers of a northeastern department store chain. Thus Hirschman's study suggests that cards raise, not merely redistribute over time consumer expenditure.

For the macroeconomy the theoretical effects of relaxing the borrowing constraints are in the Russell model ambiguous: if the sum of the growth rates of income and of population exceed the interest rate, then the relaxation stimulates consumption, and vice versa. The empirical effects on the United States economy remain undetermined although Fisher (1911), Baxter, Cootner, and Scott (1977), Garcia (1978a, b) have discussed the possibilities. Neither is there any examination of the effects of credit cards or of consumer credit in general on the bequest motive or on the incidence of "death in debt." Penning (1974), however, questions the effects of consumer credit availability on personal bankruptcy rates.

The Demand for Money

Fisher (1911) and Keynes (1930) forecast long ago that increasing credit-availability would reduce the demand for money. Sastry (1970) first modeled this process in an extension of the Baumol-Tobin inventory-
theoretic approach to money demand. The household chooses the optimum pattern of money and interest-earning asset holdings in the light of interest rates and asset exchange (or transactions) costs. Introducing credit into the model permits at least a partial synchronization of payments with receipts. This reduces the required money inventory. Marcus (1960) first applied the reduction hypothesis to credit card use. Micro-theoretic models are also provided by Flannery and Jaffee (1973) and Russell (1975) using the inventory theory approach. Both conclude that transactions balances would be reduced as a result of card use.

Empirical work has conclusively shown that money demand is reduced as a result of card use. In 1971, Mandell (1973) using sample survey data had been unable to find a statistically significant association between card use and money demand. However, White (1976), shows in cross-section regressions that "average balances held per dollar for credit card payment are less than one-tenth of those held for other transactions." This result leads him to predict that consumers will markedly decrease their average balances as credit card usage grows and this will result in an upward trend in the economy's velocity of money earlier in circulation. Bester (1972) had/reached a similar conclusion. No examination of the velocity of money in the household sector has been conducted to test this prediction, however.

At the macroeconomic level, bank credit card extensions have been shown to reduce the demands for currency, for both household and aggregate
money holdings and for consumer time and savings deposits at commercial banks (Garcia, 1977a, b, 1978a). Although statistically significant, the money demand reduction is found to be small.

The savings account reduction runs counter to the predictions of the inventory theoretic approaches to money demand but it agrees with the finding of Rosek and Zahn (1974) that the use of installment credit reduces savings deposits.

Inventory theoretic models are not rich enough to permit an examination of several interesting behavioral implications of credit card use. By confining attention to financial assets and to only three of these (money, credit card debt, and liquid assets) they do not allow a full examination of what the consumer does with the released trans-revolving actions balances. Further, by ignoring the/credit-generating attributes of cards, they exclude their stimulus to use credit to buy durable and luxury goods now and to pay later. Previously, consumers had to accumulate savings balances in order to both pay and buy later. The causal modeling approach presented above would, however, permit a richer analysis.

Monetary economists have also asked whether credit card use has increased the supply of money. Evidently lines of credit increase purchasing power, but traditionally economists have in mind a transactions medium when they speak of money. Using this definition, lines of credit are not money per se: they merely provide a means to postpone the payment for a good bought. But payment in full will eventually require a transfer of exchange media. So an investigation of the question.
whether credit cards increase the supply of money involves examining whether they increase the commercial banks' willingness to supply currency and demand deposits. As the supply of currency is demand-determined, attention must be confined to demand deposit supply. Then, if bank credit cards provide a new and profitable outlet for bank lending, it will encourage banks to make more efficient use of any existing supply of bank reserves which the Federal Reserve provides by making more loans and by creating more demand deposits. The question of money creation in this sense was raised by Bosek, Oster and Zahn (1977) and was given weak support in the empirical test of Garcia (1977b).

Several economists have inquired whether credit card use hampers the Federal Reserve System's attempts to stabilize the economy (Garcia, 1978b; Hester, 1972; Peterson, 1976; Russell, 1975).

CREDIT CARDS INTO THE ELECTRONIC TRANSFER ERA

Credit cards are already serving as a transition phase to electronic transfer systems. For example, drafts negotiated by a Visa cardholder outside the state of California reach the processing center in San Francisco in nonpaper form, and 30 percent of them are handled electronically. Simultaneously, EFT is being integrated into the Mastercharge system (Woodruff, 1977). Baxter, Coote and Scott (1977) discuss the relative merits of payment by check, credit card, and debit card as offering varying opportunities to save time or to obtain interest free credit.

Their discussion suggests that credit cards must be substantially replaced
by debit cards before the electronic era will arrive. This is not necessary. A more likely scenario is that credit card use will continue to grow and that electronic technology will be increasingly used in its processing, as Straw (1977) describes. In the meantime, the extent to which debit cards will replace checks involves factors beyond time and interest savings. Also important are questions of consumer confidence in the security and privacy of any electronic debit system.

For example, on losing a wallet which contains solely currency, the loss is immediate and limited. If the wallet also contains credit cards, the law limits the extra loss from fraudulent reuse to $50 per card. But if the wallet also contains a debit card, the risks could be much greater. Fraudulent use of a debit card could give access to the loser's total demand deposit balance, to the line of credit when one exists, and to the savings account also when this can be assessed by automatic transfer. Consequently, a new law was introduced in February 1979 to give debit card users the same $50 liability limit as credit card users. Problems of inside "computer fraud," however, become increasingly serious as society proceeds towards an era of instantaneous, electronic transfer. In this environment, consumer reluctance to bear the risks has acted as a brake on the banks' desires to hasten into the, for them, potentially cost-saving electronic era (Dunkelberg and Johnson, 1975; National Commission of Electronic Funds Transfer, 1977).
Baxter, Cootner and Scott's (1977) questions of privacy of information should be distinguished from those of the functional reliability and the security of the system. The authors (pages 168-169) address the privacy issue at some length and are sanguine in concluding that the adoption of EFT systems "will not deliver us to the doorstep of 1984." The question of security is raised and rapidly dismissed with a cheerful optimism in the power of technology and in the competitive system. They conclude, "In a competitive EFTS environment, system-operators will have continuing incentives to search out security levels and improved technology that correspond to the security needs and values of their customers." Consumer advocates and the writer are more skeptical. Until these issues are more reassuringly addressed, as Nilson (1978) reports and Staw (1977) illustrates, EFTS and the Edsel have a lot in common; both look good on paper but will not sell. Vinus and McVandon (1978, p. 84), however, have shown that consumer resistance can be overcome. Focus groups which were "adamantly opposed to any form of electronic banking" before receiving "factual information" on "its advantages both to the banking industry and to bank customers" later became "very enthusiastic."

Issues of consumer protection against a systematic and pervasive invasion of privacy, against bearing directly the cost of criminal activity, about the technical efficiency of the computer system in face of, for example, electricity blackouts, all need to be
addressed and publicly discussed. Whether society would best be served by several freely competitive EFTS systems or by regulated competition or by treating the industry as a regulated natural monopoly, remains to be answered, as does the question whether regulation should be state or federal, or even, eventually international.21

CONCLUSIONS

This review has revealed that credit cards are now sufficiently important in magnitude and in conceptually interesting issues to warrant future research effort. The paper has suggested a framework in which future research may examine the causes of credit card use and its effects on the household's sociopsychological decision process and on various economic demand functions, which result from these processes. Thus, the approach provides an opportunity to examine credit card use not in isolation, but as one integral item in an interrelated set of consumer decisions. As such it gives rise to a rich source of research hypotheses.
FOOTNOTES

1. The history of credit cards remains to be written. At present historical information must be obtained from the card companies and from articles in the business press. A short history of bank cards is given by Russell (1975).

2. Touche Ross, Incorporated made this conclusion in a confidential report to a department store client.

3. The reasons for cards' small share of consumer expenditure have not been explicitly examined in the literature but may perhaps be attributed to credit limits which prevent their use in the purchase of large ticket items and interest rates which are high relative to those typically charged on alternative sources of credit for large collateralized expenditures.

4. Shay and Dunkelberg (1975), p. 188.

5. Blades and Lynch (1976) and Dunkelberg (1976) investigate the effects of usury laws on credit policies. Dunkelberg (1978a, b) examines the transfer implications of consumer credit regulation.


7. It remains an open question whether interest rates are "extortionate" because they include monopoly rents or because they reflect high risk premia. Day and Brandt (1973) argue that the poor in California are not immobile.

8. The following model abstracts from any probable need to use different models to explain the demands by convenience, charge-card users
from revolving credit-takers. It also assumes for simplicity that only one card is available.

9Eisenbeis and Murphy (1974) conclude that some types of lender "skim off" the more credit-worthy borrowers, leaving the less desirable to other types of creditor.

10Mandell (1977) pointed out a further misspecification in Peterson's study.

11This assumption will not hold in general, for some card users would like to obtain more credit.

12To make rational decisions consumers need to know the constraints they face. Research workers have frequently been concerned that consumers, particularly the poor, do not have this information (Parker and Shay, 1974). Shay and Dunkelberg (1975) found that knowledge of interest charges on card credit was not widespread and varied with income--only 20 percent of the poorest group and 40 percent of the richest group knew these rates. Truth in Lending laws were introduced in 1969 to remedy consumer ignorance of interest charges. Several studies undertaken to examine the effectiveness of the Trust in Lending laws (Day and Brandt, 1972; Mandell, 1971; Shay and Schober, 1972; Federal Reserve Board, 1978), show that the laws have led to increases in consumer awareness. Shay and Schober interpret the evidence as a substantial improvement, while Moyer and Hutt (1978) remain concerned about the seriousness of the problem.

13Bagozzi and Van Loo (1978, 1979) model the sociopsychological processes in detail.
Some demands may be determined sequentially rather than simultaneously. The model presented in figure A does not allow for this possibility.

In the inventory-theoretic specification the household receives its income periodically and expends it slowly, at a constant rate, but completely. The analysis then determines the least-cost average holding (or inventory) of money.

However, as there are no published data on lines of credit, the obvious empirical operationalization is not available in time series studies. Consequently, several researchers have replaced it by actual credit card usage in their demand functions for variables affected by card growth.

Money here consists of currency in circulation plus checking account deposits.

The expanded money supply argument hypothesizes that bank credit card operations are profitable. Evidence by Brimmer (1971) indicates, however, that card operations were not then profitable, but suggested that they might become so when better established. Results of a survey of bank card officers by Fitzpatrick (1976) show that the net profit rate did, indeed, improve. By 1972, it was positive, but small (at 3.2 percent), although expected to rise further in future as usage increases.

Net charge-offs from noncollectible charges, overspending, and fraud on bank cards alone were $400 million or 1.3 percent of card sales volume in 1977.
See also the National Commission on Electronic Funds Transfer. The state of California has recently commissioned confidential research into EFT issues in anticipation of its taking regulatory control.

Baxter, Cootner and Scott (1977) estimated, by state, the number of systems which would be commercially viable under alternative cost and usage assumptions.
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FIGURE A
A MODEL OF CONSUMER BEHAVIOR