MEANS OF PAYMENT DIFFERENCES OVER TIME: THE MYTH OF THE CASHLESS SOCIETY

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> The 1990's augurs a society where computers will govern every facet of the individual's daily life. Each home will be equipped with a computer terminal; banking will be conducted from the comfort of one's home. By simply using a telephone, the average citizen will be able to pay bills. Funds will be transferred internationally via satellite communications, through a global computerized financial network. ....
>
> We are now on the threshold of the cashless society, a society in which funds and related financial data are transferred, electronically, with the aid of computers. Electronic Funds Transfer Systems (EFTS), precursors of a pure cashless society, have already made an appearance; rudimentary EFTS are in daily operation [Bequai, 1981].

The above quote is but one, albeit one of the most optimistic, of the many predictions over the last twenty years of the cashless society. While the opportunity set of payment mechanisms has widened in the United States, it is not clear that the mixed system of cash, checks, money orders, and card based payments will be replaced in the foreseeable future by a cashless-checkless society described in the above quote. The purpose of this paper is to test for movement toward a cashless society by determining whether there have been significant changes across time in means-of-payment usage.

Over time, changes in the payments system are adopted slowly as users of the payments system recognize the advantages of the new technology. Moreover, that adoption is by those who find the new technology useful given their utility functions and the opportunity costs of adoption. Those who do not find the new technology worthwhile continue

their use of previously existing means of payment. Frequently, the adoption of the new technology does not imply rejection of the old, but instead, both technologies are used. The result is not replacement of the old means of payment, but rather, a widened spectrum of possibilities available to the consumer.

If consumers are adopting new payment mechanisms and ceasing to use old payment mechanisms, this change should be reflected in the changing patterns of means of payment over time. If the economy is moving toward a cashless society, the change in means-of-payment usage will be toward more sophisticated means of payment, i.e. cash to checks and checks to credit cards. Lack of change over the past fifteen years would cast doubt on those predictions of a rapidly approaching cashless society.

In an attempt to shed more light on the issue of means of payment, the authors analyze data from two distinct time periods: 1971, and 1983, to determine if consumers have changed their patterns of making payments. The data are survey data collected from households in the Atlanta, Georgia area. Consumers were asked whether they paid such bills as rent, groceries, gasoline, utilities, clothing, small household goods, and bills paid by mail with cash, charge account, money orders, checks or credit cards (see Appendix 1). Probit analysis is used to analyze the responses to the survey and discover if the households' pattern of payment changed over that time period.

This study offers several advantages over previous works which have looked at the payments system. First, by looking at data collected in the same geographic area, at two different points in time, using the same survey instrument, it is possible to look at changes over time. Much of the other work on means of payment has been based on surveys conducted at a single point in time. Second, other studies have focused on the usage of checks and credit cards and the possible trend toward electronic funds transfer systems (EFTS) but disregarded the usage of cash and money orders. Yet, the data collected for this study, and other studies, show that both cash and money orders are frequently used means of payment and should not be ignored. Finally, most of the prior studies consist of an enumeration of survey results with very little statistical analysis. The more sophisticated analysis in this study makes it possible to look at the changes in the means-of-payment usage as a function of time along with other characteristics, such as race, gender, age, income, and education, rather than time alone.

The first section of this paper summarizes existing literature relevant to the means-of-payment question. Also examined is the question of how consumers choose among means of payment alternatives. Methodological issues are addressed in the second section: probit analysis is discussed and the survey data are described. The third section contains the probit results. In the final section the implications of these results are presented.

I

Means Of Payment Literature

Investigative studies of means of payment (the usage of cash, checks, credit cards, EFTs, etc.), have been numerous because changes in the payments system are of special interest to financial institutions and policy-makers. These studies do not investigate directly a system of means of payment; however, they do focus on individual parts of a means of payment system and collectively supply a background for this paper. They also give an indication of the importance of economic and demographic variables, such as income, gender, marital status, and age and their impact on the means of payment.

Over the period of time covered by the survey (1971 - 1983), the major means of payment used by households were cash, money order, check and credit card. Over that time period cash was used for roughly two-thirds of the total number of transactions [National Commission, p. 333]. Consistently, checks have been the dominant means of noncash payment; money orders have declined in importance both in terms of dollar volume and in terms of total number of transactions; and credit cards have increased but are still very small relative to checks [Tables 1 and 2]. To facilitate exposition, discussion of the literature is divided into subsections discussing cash, checks, credit cards, money orders, and EFTs. Next, studies which focus on the choice process of means of payments are reviewed.

Cash

Cash constitutes the most frequently used means of payment in the United States. While only 28 percent of M_1 is currency, [Federal Reserve Bank of St. Louis, August 22, 1985 pp. 3-4] one study has estimated that two-thirds of the total number of transactions are conducted with cash [National Commission, p. 333]. At least throughout the 1970's, the attractiveness of cash did not diminish.

> Despite the growth of checks and other payments mechanisms, the demand for cash apparently has not abated. In the last half of the 1970s, the total volume of currency in circulation grew at an average annual rate of 10.3 percent. . . . While cash and checks can certainly be substituted for one another, both appear to be mature payments mechanisms [The Federal Reserve Bank of Atlanta, November 1981, p. 17].

The coexistence of cash and checks can be explained by the preference of large numbers of persons for using cash for certain types of transactions.

> . . . cash is still the predominant method of payment at the point of sale at frequently visited shopper-type and convenience-type retail locations [Stern, 1980]

Checking

Checks constitute the most popular noncash means of payment in terms of the number of transactions (93.19%) and far outdistance credit cards (4.37%). This can be seen from Table I which contains a distribution of transactions across means of payment for 1979 [Federal Reserve Bank of Atlanta, November 1981]. ATM's, ACH, Wire Transfer and Telephone

Billing together, which are part of the existent EFTs, make up only 2.45 percent.

Table II focuses specifically on the noncash means of payment used in this paper: checks, money orders and credit cards. Little consistent data are kept on all checks or all money orders but the Federal Reserve keeps data concerning the number and dollar volume of transactions of checks which they clear and of postal money orders. Again, it is clear that checks dominate as the noncash means of payment constituting over ninety percent of the number of transactions and dollar volume.

The percentage of families which have a checking account and/or a credit card is contained in Table 3. Although a larger percentage of families have checking accounts than credit cards, this difference is not nearly as great as the difference in their use. Over seventy percent of households had a checking account while over fifty percent had a credit card of some kind and over forty percent had a bank credit card in 1983. Yet, as was noted above, checks accounted for more than 90 percent of the volume of transactions. Obviously, checking accounts are used more intensively than credit cards for making purchases.

Additional studies which investigate checking accounts include some initiated by bankers demonstrating the interest of banks in means of payment. Studies by Arthur Little, Inc. [1970], Powers [1976] and the Federal Reserve Bank of Atlanta, November 1981] focus on the volume of checks used in the

United States. Carolan [1981] looks at bank balances, deposits, and to whom the checks are written. Working from a different perspective, Schlax and Levy [1971] study why people do not have checking accounts.[1] Studies designed to aid banks in planning their long-run strategies include works published by the Association of Reserve City Bankers [1982] and Payments Systems, Inc. [1983]. These studies look at current usage of various means of payment and at consumer attitudes towards new payment services. While information from the 1970 survey by Katona, Mandell and Schmiedeskamp [1971], the 1977 survey by Durkin and Elliehausen [1978] and the 1983 survey by Avery, Elliehausen, Canner and Gustafson [1984] can be combined to give a time perspective, their specific focus is not on the payments system.

Credit Cards

Credit cards of all kinds show increases over time in terms of transactions and dollar volume as can be seen in Table 2. Table 3 shows that, concurrently, there has been an increase in the percentage of families which hold a credit card. Credit cards also have drawn the attention of researchers. Garcia [1980] gives an overview of this literature. Kinsey [1981] uses Tobit analysis and Awh and Waters [1974] use discriminant analysis to relate income and demographic data to the holding and usage of credit cards. Slocum and Mathews [1969, 1970] relate credit card usage to income and a constructed variable measuring social class.

Hirschman [1979] looks at the effect of credit card possession on spending.

Unlike cash, money orders and checks, credit cards have an upper limit on their importance as a means of payment. Credit cards have eligibility requirements in terms of income and credit rating and are not available to everyone. It is estimated that more than eighty percent of those eligible hold some form of bank credit card [Wall Street Journal, 1985, p.27]. Thus, if credit cards are to increase in importance as a means of payment, this increase would have to come from more intensive use by existing card holders rather than from more widespread holding of credit cards.

Money Orders

Money orders have a long history in the United States and constitute a surprisingly large dollar amount of transactions per year. Postal money orders alone were $9.085 billion in 1984 [Board of Governors, 1984]. Both the private sector and the United States Postal Service provide money order services. Yet, judging from the small amount of literature, money orders qualify as the forgotten item as a means of payment. Studies by Horvitz and Harper [1980] and Schmitt [1977] have raised the issue of safety in the money order industry, but no study of means of payments systems has included money orders as an alternative means of payment.

The true magnitude of money orders is probably understated in Table 2. Comparing the 1977 information from Table 2 and the 1979 information from Table 1, total checks

cleared are more than twice as large as checks cleared by the Fed. Horvitz and Harper [1980] estimate that in 1977 the total dollar volume of money orders was between $40 - $45 billion. If they are correct, total money orders are around seven times as large as postal money orders. Applying these relationships to the 1977 numbers in Table 2, money orders and credit cards are equally important when expressed as a percentage of total check, money order and credit card transactions. Estimated money orders would account for 3.23 percent of transactions, credit cards for 3.38 percent and checks for 93.3 percent.

The survey data used in this paper include only household means of payment usage. The aggregate figures in Tables 1 and 2 understate the importance of money orders as a means of payments for households. No differentiation is made in these aggregate numbers between payments by consumers and payments by businesses. Obviously, households are more likely to use money orders than are businesses.

A further demonstration of the importance of both cash and money orders as a means of payment is contained in Table 3. In 1981, only 79 percent of households had checking accounts and only 42 percent had bank credit cards. Cash and money orders are the only real alternative means of payment for those not having checking accounts or credit cards. In situations where bills must be paid by mail, money orders are the most logical payment method if the household has no checking account.

EFTS

EFTS, as the newest and most technologically advanced means of payment, have captured the imagination of futurist writers. In a more objective study of EFTS, Cox and Metzker [1983] look at the possibility of electronic funds transfer systems replacing checks within the context of the diffusion of innovations. They make the point that diffusion of a new product generally takes years observing that most new consumer products introduced after World War II took 15 to 20 years to move from 10 percent to 50 percent penetration in U.S. households. Insightfully, they argue that, even if the EFTS systems are highly successful, they will never reach 100 percent adoption. By their estimates, checking accounts have saturated their market at 85 percent penetration, and bank credit cards have saturated their market at 50 percent. If checking accounts have not achieved 100 percent adoption, it seems unlikely that any of the electronic funds transfer systems will achieve 100 percent.

While considerable consumer resistance to EFTS exists, the desire of financial institutions to replace the current paper-based payments systems (credit cards and checks) with electronic payments is understandable. McLeod [1979] looks at the change in bank operations which would result from the use of bank credit cards for EFTS and finds significant cost savings to the financial institutions.

Choice Process

Means of payment are chosen by consumers on the same basis that other services are chosen. The benefit from using the service must exceed the costs of acquiring the service. Thus, means of payment can be analyzed in terms of a choice model. Consumers chose among the existing means of payment and select one or more means to conduct their exchanges. Some only use one, such as strictly cash users, while others use two or more, such as those who use cash, checks, and credit cards depending on the purchase.

The introduction of a new means of payment adds another dimension to the choice process. Information concerning newly introduced technologies only gradually becomes available to individuals because it takes time for the information to move through the system regardless of how beneficial the technology. Once information is available, individuals then weigh the perceived costs and benefits of the innovation and make the decision to adopt or not to adopt the innovation based on the perceived costs and benefits. If an individual chooses to adopt a new, more sophisticated means of payment, it may replace one of the other means of payment, or it may supplement other means of payment leading the consumer to use a greater part of the spectrum of means of payment.

For analytical purposes, the possible methods of payment can be ranked in terms of sophistication with cash being the

least sophisticated followed by money orders, checks, credit cards and lastly, some form of electronic funds transfer including point of sale terminals.

Some interesting aspects to the above ranking should be noted. Persons using only the lowest means in order of sophistication, i.e. cash, are not likely suddenly to skip over checks and credit cards into EFTs. Since current EFT systems generally are card-based, those who are unable or unwilling to have and use credit cards do not have access to the EFT systems. On the other hand, those using the most sophisticated form, EFTs, could well choose to use one or more of the less sophisticated forms.

Relatively little work has been done to analyze statistically the consumer's choice of payment method. White [1975], in his study of bank credit cards, utilizes a model in which consumers make their choices among payment methods on the basis of minimizing the cost of obtaining payment services. His concept of costs includes out-of-pocket costs as well as the cost of time, aggravation, and possible psychological costs. While his model could be applied to all methods of payment, his empirical work is limited to predicting the usage of credit cards.

Gambs [1976] attempts to measure the costs of different means of payment and argues that the choice of means of payment depends on total costs (including time and aggravation costs as well as dollar costs). Lipis [1978] reviews previous studies of the costs of the various means of payment but

argues that further research needs to be done to acquire good estimates of the cost of EFTS to the banking system. G. White [1980], looking at the payment system of tomorrow, sees new payment mechanisms which will emerge as lower cost alternatives to checks. Consumers will be attracted to the new payment systems when the cost savings are, at least in part, passed along to them. Metzker [1983], in his paper on debit cards, argues that lower costs of point-of-sale transactions relative to other means of payment, are leading to increased demand for POS systems from the retailers. He notes, however, that consumers are reluctant to use debit cards and are likely to continue to be reluctant until they see some economic advantage to themselves.

Hirschman [1981;1982] compares different means of payment on the basis of the attributes which consumers perceive the means of payment to have. Some of these attributes are budgeting potential, ability to control spending, reversibility, transaction record, and social desirability, to name a few. The dollar cost of the payment method is not considered directly. These attributes then are related to consumer's choice of payment method in different situations. She emphasizes the fact that cash, checks, bank credit cards, store credit cards, travel and entertainment cards, and personal checks are not perfect substitutes in all situations.

Other studies have looked at the payment system from the supply of means-of-payment services. Humphrey [1984] estimates the costs of the different payment methods and

discusses pricing strategies. He concludes that the emphasis given to foregoing the advantages of float is fallacious since the costs and benefits to float are a wash. On this basis, he concludes that the real resource costs are the true costs and that checks are a high cost payments service to supply.

Schwartz [1978] looks at consumer attitudes towards electronic-funds-transfer systems and concludes that the cashless and checkless society is unlikely to arrive in the near future due to consumer resistance. Schwartz found significant differences in attitude toward EFTS based on gender and bank or nonbank job classification.

Finally, the Federal Reserve Bank of Atlanta has participated in a variety of studies and conferences concerning changes in the payments system [1981; 1984]. From these works the Atlanta Fed seeks information useful for monitoring changes in the payment system and anticipating future changes.

Each of these papers, from somewhat different perspectives, indicate that consumers make their choice among means of payment in such a way as to minimize the cost of obtaining payment services. Not only dollar costs, but costs in terms of time, fear of error, concern for privacy, and dislike of computers are considered.

Data Collection and Empirical Methodology

Prior literature makes it clear that the choice of means of payment is based on consumer preferences and costs which are not directly observable. These studies have used economic

and demographic variables to proxy these underlying factors. Thus, an individual's intensity of preference for, and choice of, a means of payment is a function of his or her economic and demographic characteristics. By observing means of payment choices and changes in economic and demographic characteristics over time, insight can be gained into the dynamics of the means-of-payment choice process.

Employed in this paper are data from two temporally distinct surveys: one taken in 1971; and another in 1983. Both surveys collected data from randomly selected households in the Atlanta, Georgia area using a cluster sampling technique. The samples contained 247 usable responses out of 321 interviews for 1971, and 240 out of 349 for 1983. In addition to the questions on means of payment (see Appendix 1), information was gathered on race, home ownership, car ownership, income, head of household age, head of household education, and gender of the head of household[2]. A dummy variable for the year was created with 1971=0 and 1983=1. Income figures for 1971 are indexed to 1983 values in order to make real income comparisons.

Sixteen payments or purchases on the questionnaire were analyzed (see Appendix 1). Seven were chosen for this study to avoid overburdening the reader with details. The seven chosen are representative and the most interesting to the authors. None of those excluded showed results which varied with what is reported in this paper. The seven are: rent-house payment, groceries, utilities, gasoline, clothing, small

household goods, and mailed bills. Choosing seven, which represent a variety of types of transactions, is less cumbersome than discussing all sixteen.

Seven separate equations are estimated. In each, the categorical dependent variable takes on values representing the means of payment which are relevant for that type of transaction. For example, rent or house payments are generally made with cash, money orders or checks so the categorical dependent variable can take on one of three values. Groceries, on the other hand, have only two frequently used alternative means of payments: cash and checks, so the dependent variable can only take on two values.

The independent variables include race, income, homeownership, car ownership, gender, education, age, and year. Many of these variables have been used in prior studies. The individual's financial sophistication may be reflected by education, income and the wealth variables, homeownership and car ownership. Race has been shown to be a significant determinant of financial services by Lindley, Selby and Jackson [1984]. Gender and age have been used in a variety of papers looking at credit card usage.

The intensity of an individual's preference for a means of payment is not directly measurable. All that can be observed is an individual's actual choice when confronted with a bill or purchase. Given these observed choices and the information which reflects the individual's economic and demographic situation, the problem is to estimate the

probability of an individual employing a particular means of payment. The ordered N-Chotomous probit model developed by Richard McKelvey and William Zaviona [1975] is used to estimates these probabilities. This model has been applied in the finance literature by Richard Dietrich and Robert Kaplan [1982], Robert Kaplan and Gabriel Urwitz [1979], and James Lindley, Edward Selby, and John Jackson [1984].

N-Chotomous probit was designed to handle a number of qualitative dependent variables. All that is required is that the components of the dependent variable have a ranking which has a theoretical or an actual basis. The ranking cannot be arbitrary or unrelated. For our purposes, the ranking of means of payment from highest to lowest are: cash, charge, money order, check, credit card. This ranking is based on the degree of sophistication of the means of payment. As a test of this ranking, all other possible combinations of rankings were tried as predictive models, but all produced a lower chi-square value than the ranking proposed for this paper.

Empirical Results

The primary objective of this paper is to determine if there have been significant changes across time in means of payment usage given the economic and demographic characteristics of the respondents. Therefore, we focus on the sign and the significance of the dummy variable "year" where 1971 = 0 and 1983 = 1. A positive and significant coefficient for year would indicate a movement toward a more sophisticated payment mechanism. A negative and significant

coefficient would indicate a movement toward a less sophisticated payment mechanism.

While the demographic and economic variables in the model are of interest, their primary role is to "hold other things constant" so that the change in means-of-payment usage over time can be isolated. Attention is given to these other variables in the paper where they have relevance.

Empirical results are discussed in the following order: rent-house payment, groceries, utilities, gasoline, clothing, small household goods, and bills that are mailed. The numbers of observations for each type of payment are not equal. Where a respondent did not have the particular payment in question, or, where there were too few respondents in a payment category to perform statistical analysis, observations were deleted from the analysis.

Rent-House Payment

Shelter costs are a common expense across the population; seventy-six percent of the sample either paid rent or made mortgage payments. The remaining twenty-four percent did neither, either owning their dwelling free and clear or having the payments made by a third party.

Shelter payments are primarily made with cash, check, or money order. To try to capture any type of change which may have occurred in means of payment usage, the dependent variable is structured in several ways. In the first equation, the dependent variable can take on one of three values (0, 1, 2) for the means of payment (cash, money orders,

check). In the next three equations, the dependent variable can take on only two values. The means of payment are paired (cash with checks, cash with money orders and money orders with checks) to identify any changes which might occur between two of the payment alternatives. Finally, cash is compared with checks and money orders added together to see the movement from cash to either means of payment.

Part A of Table 4 shows the pattern of these payments. First, comparing the full spectrum of cash, money order and check, the coefficient for year is positive indicating a trend toward more sophisticated payment means, but it is not significant. Likewise, there is no significant change when comparing cash and checks when money orders are excluded from consideration. However, comparing cash and money orders excluding checks, there is a positive and significant movement from cash toward money orders, a more sophisticated payment mechanism. Yet, when comparing money orders and checks apart from cash, the sign is reversed. There is a significant negative coefficient indicating movement from checks toward money orders. Money orders seem to be gaining from both the less sophisticated means of payment, cash and the more sophisticated means of payment, checks. Finally, comparing cash against checking plus money orders, i.e., comparing cash against the combination of alternatives, the coefficient is positive and significant indicating a clear movement away from cash.

Other variables with significant coefficients are race, homeownership, car ownership, income, and education. The race coefficients are negative and significant in all but one case indicating that blacks are more likely to be using less sophisticated means of payment. The one comparison yielding an insignificant, but negatively signed, coefficient is in the comparison of cash and money orders apart from checks. Since cash and money orders are less sophisticated means of payment than checks, these results are not inconsistent with the other equations. That is, race is not significant in delineating between the use of two less sophisticated means of payment since blacks are more likely to use those two means.

House and car ownership coefficients generally are positive and significant supporting the notion that wealth, in the form of houses and cars, is consistent with the use of more sophisticated means of payment. Education coefficients also generally are positive and significant indicating that higher education is consistent with more sophisticated means of payment. Gender is not significant supporting the notion that other economic and demographic factors are more important than sex differences in means of payment choice.

In summary, there is some evidence of a movement toward more sophisticated means of payment when paying for shelter costs. However, it is not a strong movement and involves more of a shift from cash toward money orders than any large change towards checks. Also, blacks, renters, the less educated, and those without house and car wealth are more likely to use less

sophisticated means of payment. This latter result is not counter intuitive and would be expected a priori. These results which indicate relatively small changes in the means of payment are contrary to the predictions of many and thus, may come as a surprise. However, it is not inconsistent with some of the literature such as G. White [1980] and Metzker [1983].

Groceries

Cash and checks were the dominant means of payment of groceries with over ninety-eight percent of the respondents using one or the other. Two percent either had no such bill or marked some rarely used means of payment for groceries.

The probit results for groceries are contained in Part B of Table 4. The coefficient for year is negative but not significant indicating little change over the period in means of payment for groceries. This lack of change over the past decade may cast doubt on the theory that grocery stores are one of the prime candidates for point-of-sale terminals in the future. Certainly, point-of-sale will be difficult to sell to those who have shown a strong propensity to use cash for purchasing groceries.

Again, the race coefficient is negative and significant indicating a preference for cash over checks by blacks. House and car ownership, income, age, and education all have positive and significant coefficients consistent with the results found in shelter payments.

Utilities

Cash, money orders, and checks are the dominant payment means for utilities. Ninety-six percent of the respondents had a utilities bill and paid it with one of these three means of payment. In the first equation, the dependent variable can take on three values which are related to cash, money order and checks. Turning to Part C of Table 4, the year coefficient is positive and significant at the ten percent level indicating a movement toward more sophisticated means of payment. However, there is little change between cash and checks, the coefficient of year in the cash-check equation is not significant. The highly significant and positive relationship is between cash and money orders indicating a move from cash toward money orders. The coefficient for year when considering money orders and checks shows a negative sign indicating movement from checks to money orders; however, the coefficient is not significant at the ten percent level. When comparing cash against the combination of alternatives, i.e., money orders plus checks, the coefficient is positive and significant at the five percent level. Thus, there is evidence that there is movement away from cash in paying utility bills, but not strongly to checks. The movement seems to be to money orders from checks.

The coefficients for race follow the previous patterns, negative and generally significant except when comparing money orders and checks. House and car ownership, income, age and education, all have positive coefficients with varying levels

of significance. They generally correspond to the not surprising conclusion that persons of better education, higher income, higher wealth use more sophisticated means of payment.

Gasoline

Gasoline purchases are made with cash, checks, and credit cards where credit cards include both bank credit cards and other credit cards. Only sixty-eight percent of the respondents had such a bill. Since the sample area has relatively cheap and convenient public transportation, the lower number of auto users is not surprising. It would likely be found in most metropolitan areas. Surveys in more rural areas could have a higher percentage of persons with autos.

In the first equation of Part E in Table 4, cash, check and credit cards are the three values which the dependent variable can take. The coefficient for year is negative and significant at the one percent level. There is a marked movement away from sophisticated means of payment in the purchase of gasoline. The pattern is one of movement out of checks into either credit cards or cash. The comparison of cash and credit card is negative, but not significant indicating little change between cash and credit cards. However, there is a positive and significant coefficient for year when comparing checks and credit cards indicating a movement from checks to credit cards. When comparing cash and checks, the coefficient is negative and highly significant

demonstrating a strong move from checks back to cash. When comparing cash against alternatives, i.e. checks plus credit cards, the coefficient is highly significant and negative. There has been a very strong move to cash in gasoline purchases.

The strong positive relationship between more sophisticated means of payment and wealth, education, age and education continued. The strong and negative relationship between race and means of payment likewise continued.

Clothing

As shown in Part F of Table 4, four payment possibilities exist for clothing purchases: cash, charge account, checks, or credit cards. Credit cards included bank credit cards and other credit cards. In the first equation where the dependent variable can take on one of four values corresponding to cash, charge account, check or credit card, the year coefficient is positive and significant at the five percent level indicating movement toward more sophisticated means of payment. The cash and check and credit card comparison indicated the same. Comparison of cash and check yielded a negative coefficient, significant at the ten percent level, indicating movement from check to cash. Cash versus credit card, and check versus credit card comparisons yield positive and significant coefficients indicating greater use of credit cards. Comparing cash against the alternatives of check plus credit cards yields a positive and significant coefficient.

The evidence for clothing purchases shows that there is a definite movement away from cash to more sophisticated means of payment. Moreover, the movement is toward credit cards as a means of payment. This is a heartening result for those who anticipate a future shift in the total means of payment structure. Race, age, gender, income, education, and ownership follow the patterns previously reported.

Small Household Goods

The means of payment used for small household goods was the same as for clothing and a similar pattern of change was expected. The results are contained in Part G of Table 4. The signs of the coefficients generally are the same, but the coefficients are not significant at the five percent level. While the results are supportive of the changes indicated for clothing, the strength of the change is less encouraging to those expecting a rapid shift toward more sophisticated means of payment. The other independent variables followed the patterns established with other purchases or bills.

Mailed Bills

Payments which must be mailed present a different choice pattern than previously considered payments as shown in Part D of Table 4. Cash is not a generally accepted means of payment for mailed bills. Indeed, roughly two and one-half percent of the respondents who indicated they mailed cash. Eighty-four percent of the respondents had at least one bill to pay by mail and used checks or money orders instead of cash.

The pattern of means of payment used when paying by mail has not changed over the period. The coefficient for year is positive, but not significant. Money orders have a high level of use in the sample in terms of percentage, but that is partially due to the large percentage of blacks in the sample. The percentage of blacks in this sample is high in terms of the U.S. population, but not the Atlanta population. Nonetheless, money orders appear to be the choice of a large number of people when mailing payments.

The other independent variables follow the established pattern. Race is negative and highly significant demonstrating the propensity of blacks to use money orders. Wealth in the form of house and car ownership, income, age, and education are all positively related and significant. This supports the previous results of utilization of more sophisticated means of payment by the wealthier, higher income, more educated consumer. Only gender was not significant as a variable.

Conclusion

The question, "has there been a movement over the past decade toward a more sophisticated system of payment?" would have to be answered no. While there is one instance, clothing, where there is a change toward more sophisticated means of payment, it is offset by another instance of the opposite direction, gasoline. In general, consumers have not made significant changes in their demand for more sophisticated means of payment. Cash has not fallen

significantly in popularity and money orders continue to have a strong constituency. The evidence in this paper supports those who have suggested a moderate movement toward the cashless society and cast doubt on the predictors of a totally cashless society.

ENDNOTES

[1]The Bank Administration Institute literature survey [1979] reports on much of the work dealing with checks and checking accounts.

[2]Head of household gender was determined somewhat arbitrary in that if there was a male in the household, the head of household was considered to be male.

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TABLE 1

Ranking Of Payments By Transaction Volume For 1979

Payments Mechanism	Transaction Volume	Percentage
Cash	*	*
Check	32,000	93.19%
Credit Cards	1,500	4.37%
ATMS	593	1.73%
ACH	173	.50%
Wire Transfer	52	.15%
Telephone Bill Pay	23	.07%

* Actual dollar volume was not reported, but it is believed to constitute approximately two-thirds of all transactions.
** Federal Reserve Bank of Atlanta, Quantitative Description of the Check Collection System , Federal Reserve Bank of Atlanta, November 1981 p. 24.

TABLE 2

CLEARINGS, TRANSACTIONS AND AMOUNT

Transactions (in millions)

Activity	1971		1977		1981	
	Number	Percent	Number	Percent	Number	Percent
Checks Cleared by Fed*	16,563	96.58	14,052	92.24	16,563	92.2
Postal M O Cleared by Fed*	181	1.06	139	.91	126	.70
Credit Cards**	405	2.36	1,016	6.68	1,276	7.10

Amount (in billions)

Activity	1971		1977		1981	
	Number	Percent	Number	Percent	Number	Percent
Checks Cleared by Fed*	4037	99.68	5916	99.42	10,066	99.42
Postal M O Cleared by Fed*	6.03	.15	5.66	.10	4.81	.05
Credit Cards**	7.00	.17	29.00	.49	54.00	.53

*Annual Report of Board of Governors of the Federal Reserve System, various years

**Statistical Information on the Financial Services Industry, 2nd edition, American Bankers Association, 1983

TABLE 3

Percent of Families Having Checking Accounts and Credit Cards

Activity	1971*	1977**	1983***
Checking Account	75%	81%	79%
Any Credit Card	50%	62.9%	n. a.
Bank Credit Card	16%	38.5%	42%

*Katona et al., 1970 Survey of Consumer Finances, U. of Michigan Institute for Social Research (Ann Arbor, Michigan), 1971.

**Durkin and Elliehausen, 1977 Consumer Credit Survey, Board of Governors of the Federal Reserve System (Washington, D.C.), 1978.

***Avery et al., "Survey of Consumer Finances,1983", Federal Reserve Bulletin, September 1984, pp. 679-692.

The 1970 figures are the percentage of families which use credit cards rather than those which have credit cards. These use numbers would understate the percentage which have credit cards but they do serve to establish a trend.

TABLE 4

Probit Results 1971-83

Part A
Rent or House Payment As Dependent Variable

Payment mechanisms sufficient in number for analysis were:
Cash, Money Orders (MO), and Checks (Chk)

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
Cash=140 MO=48 Chk=182	-.6320	.3395	.3881	.2201	-.0810	.0056	.0828	.2030
Chi^2=215; t-val	(3.73)	(2.10)	(2.12)	(3.90)	(0.42)	(0.98)	(3.37)	(1.34)
Percent correctly classified / percent prior: 72%/49%								
Cash=140 Chk=182	-.6960	.4179	.5129	.2218	-.1939	.0050	.0956	.0642
Chi^2=194; t-val	(3.40)	(2.03)	(2.22)	(3.33)	(0.83)	(0.68)	(2.95)	(0.33)
Percent correctly classified / percent prior: 84%/57%								
Cash=140 MO=48	-.1364	-.0947	.3207	-.0131	-.2583	-.0137	-.0417	.8811
Chi^2=22; t-val	(0.47)	(0.39)	(1.29)	(0.14)	(0.95)	(1.64)	(1.14)	(3.75)
Percent correctly classified / percent prior: 76%/74%								
MO=48 Chk=182	-.7179	.6197	.1783	.2965	.7151	.0189	.1745	-.7091
Chi^2=102; t-val	(2.40)	(2.24)	(0.50)	(2.67)	(1.77)	(1.76)	(3.74)	(2.51)
Percent correctly classified / percent prior: 86%/79%								
Cash =140 Chk + MO=230	-.5312	.2645	.4236	.1763	-.1852	.0087	.0520	.4102
Chi^2=147; t-val	(2.86)	(1.50)	(2.18)	(2.90)	(0.92)	(0.14)	(1.96)	(2.47)
Percent correctly classified / percent prior: 78%/62%								

Part B
Groceries As Dependent Variable

Payment mechanisms sufficient in number for analysis were:
Cash, and Checks (Chk)

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
Cash=356 Chk=122	-.4690	.5971	.2111	.0036	-.1539	-.0141	.0665	-.0670
Chi^2=98; t-val	(3.10)	(3.48)	(1.06)	(0.08)	(0.83)	(2.81)	(2.76)	(0.47)
Percent correctly classified / percent prior: 79%/74%								

TABLE 4
(continued)

Probit Results 1971-83

Part C
Utility Payment As Dependent Variable

Payment mechanisms sufficient in number for analysis were: Cash, Money Orders (MO), and Checks (Chk)

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
Cash=176 MO=40 Chk=252	-1.041	.1821	.4130	.2261	-.1646	.0107	.0831	.2451
Chi^2=271; t-val	(6.85)	(1.20)	(2.47)	(4.23)	(0.95)	(2.05)	(3.59)	(1.74)
Percent correctly classified / percent prior; 75%/54%								
Cash=176 Chk=252	-1.178	.1607	.5098	.2408	-.1202	.0117	.0795	.1416
Chi^2=188; t-val	(6.50)	(0.90)	(2.57)	(3.92)	(0.61)	(1.89)	(2.97)	(0.84)
Percent correctly classified / percent prior; 82%/59%								
Cash=176 MO=40	-1.119	-.5081	.0539	.0186	-.7256	-.0058	-.0164	.7804
Chi^2=36; t-val	(4.02)	(1.98)	(0.21)	(0.19)	(2.43)	(0.66)	(0.43)	(3.18)
Percent correctly classified / percent prior; 82%/81%								
MO=40 Chk=252	.0011	.8187	.6982	.1772	.7860	.0180	.2110	-.3734
Chi^2=91; t-val	(0.04)	(3.10)	(2.21)	(1.76)	(2.04)	(1.86)	(4.22)	(1.44)
Percent correctly classified / percent prior; 89%/86%								
Cash =176 Chk + Mo=292	-1.175	.0314	.3860	.2040	-.2938	.0077	.0575	.3442
Chi^2=141; t-val	(6.84)	(0.19)	(2.19)	(3.53)	(1.61)	(1.35)	(2.34)	(2.26)
Percent correctly classified / percent prior; 79%/62%								

Part D
Bills Which Are Mailed As Dependent Variable*

Payment mechanisms sufficient in number for analysis were: Money Orders (MO) and Checks (Chk)

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
MO=144 Chk=264	-.8351	.6139	.6594	.2073	.3549	.0721	.1407	.1147
Chi^2=227; t-val	(4.61)	(3.40)	(3.19)	(3.14)	(1.65)	(2.64)	(4.85)	(0.66)
Percent correctly classified / percent prior; 83%/65%								

TABLE 4
(continued)

Probit Results 1971-83

Part E
Gasoline Purchases as Dependent Variable

Payment mechanisms sufficient in number for analysis were: Cash, Checks (Chk), and Credit Cards (CC). Credit Cards include Bank Credit Cards and Oil Company Cards.

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
Cash=206 Chk=49 CC=74	-.7395	.3528	.3008	.1689	-.2556	.0046	.0373	-.3894
Chi^2=106; t-val	(6.85)	(1.20)	(2.47)	(4.23)	(0.95)	(2.05)	(3.59)	(2.53)
Percent correctly classified / percent prior: 70%/63%								
Cash=206 CC=74	-1.095	.3646	**	.2000	-.5343	.0058	.0233	-.1580
Chi^2=98; t-val	(4.71)	(1.46)	**	(2.93)	(1.71)	(0.86)	(0.70)	(0.77)
Percent correctly classified / percent prior: 81%/74%								
Chk=49 CC=74	-1.257	.6181	**	-.0077	-1.480	.0034	-.0323	1.072
Chi^2=42; t-val	(3.67)	(1.61)	**	(0.08)	(2.68)	(0.32)	(0.61)	(3.47)
Percent correctly classified / percent prior: 76%/60%								
Cash=206 Chk=49	-.0520	.2171	-.0635	.1620	.1728	.0047	.0725	-1.190
Chi^2=45; t-val	(0.230	(0.875	(0.15)	(2.25)	(0.61)	(0.58)	(1.94)	(5.09)
Percent correctly classified / percent prior: 82%/81%								
Cash =206 Chk + Mo=123	-.5920	.3272	.2527	.1786	-.1715	.0053	.0496	-.6482
Chi^2=95; t-val	(3.37)	(1.68)	(0.59)	(3.19)	(0.73)	(0.92)	(1.77)	(3.86)
Percent correctly classified / percent prior: 74%/63%								

** Model would not converge with this variable in the equation.

TABLE 4
(continued)

Probit Results 1971-83

Part F
Clothing Purchases as Dependent Variable

Payment mechanisms sufficient in number for analysis were: Cash, Charge (CG), Checks (Chk), and Credit Cards (CC).

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
Cash=263 CG=28 Chk=78 CC=108	-.5519	.7732	.3421	.1467	.2221	.0027	.0849	.2439
Chi^2=259; t-val	(4.14)	(5.22)	(1.95)	(3.48)	(1.39)	(0.61)	(3.92)	(1.96)
Percent correctly classified / percent prior; 65%/55%								
Cash=263 Chk=78 CC=108	-.5688	.8805	.3630	.1618	.2505	.0026	.0894	.1969
Chi^2=255; t-val	(3.92)	(5.36)	(1.83)	(3.61)	(1.42)	(0.54)	(3.84)	(1.45)
Percent correctly classified / percent prior; 70%/59%								
Cash=263 Chk=78	-.6804	.7111	.2879	.1364	.1513	-.0023	.1017	-.3619
Chi^2=109; t-val	(3.610	(3.375	(1.16)	(2.23)	(0.63)	(0.35)	(3.25)	(1.90)
Percent correctly classified / percent prior; 82%/77%								
Cash=263 CC=108	-.7223	1.124	.3018	.2288	.3512	.0060	.0839	.5327
Chi^2=214; t-val	(3.45)	(4.41)	(1.05)	(3.67)	(1.47)	(0.88)	(2.68)	(2.63)
Percent correctly classified / percent prior; 85%/71%								
Chk=78 CC=108	-.0872	.5717	.0651	.1400	.1638	.0071	.0177	.6549
Chi^2=32; t-val	(0.36)	(1.89)	(0.16)	(1.87)	(0.56)	(0.96)	(0.44)	(3.09)
Percent correctly classified / percent prior; 72%/58%								
Cash =263 Chk + CC=186	-.6647	.9082	.3648	.1687	.2491	.0018	.1002	.0463
Chi^2=237; t-val	(4.16)	(5.01)	(1.72)	(3.30)	(1.27)	(0.32)	(3.88)	(2.98)
Percent correctly classified / percent prior; 81%/59%								

TABLE 4
(continued)

Probit Results 1971-83

Part G
Household Goods Purchases as Dependent Variable

Payment mechanisms sufficient in number for analysis were: Cash, Charge (CG), Checks (Chk), and Credit Cards (CC).

Payment Means	Race	House	Car	Income	Gender	Age	Educ	Year
Cash=288 CG=24 Chk=68 CC=76	-.6731	.6117	.2124	.1654	.0206	.0063	.0822	.1114
Chi^2=230; t-val	(4.75)	(3.82)	(1.08)	(3.74)	(1.39)	(0.61)	(3.92)	(0.84)
Percent correctly classified / percent prior; 70%/63%								
Cash=288 Chk=68 CC=76	-.7480	.6655	.1076	.1877	.0491	.0047	.0841	.1119
Chi^2=225; t-val	(4.80)	(3.76)	(0.49)	(3.84)	(0.26)	(0.92)	(3.31)	(0.76)
Percent correctly classified / percent prior; 74%/67%								
Cash=288 Chk=68	-.4434	.8600	.1255	.1289	-.1284	.0030	.0813	-.2460
Chi^2=90; t-val	(2.32)	(3.87)	(0.48)	(2.02)	(0.52)	(0.35)	(2.58)	(1.31)
Percent correctly classified / percent prior; 84%/81%								
Cash=288 CC=76	-1.123	.6003	.0910	.2348	.1830	.0076	.0735	.4056
Chi^2=178; t-val	(4.65)	(2.34)	(0.27)	(3.55)	(0.72)	(1.04)	(2.10)	(1.82)
Percent correctly classified / percent prior; 89%/79%								
Chk=68 CC=76	-.7073	-1.430	-.1758	.1753	.2631	.0043	.0373	.4287
Chi^2=31; t-val	(2.43)	(0.41)	(0.35)	(2.04)	(0.76)	(0.52)	(0.75)	(1.72)
Percent correctly classified / percent prior; 72%/53%								
Cash =288 Chk + CC=144	-.6988	.7746	.1158	.1869	.0086	.0047	.0853	-.0130
Chi^2=203; t-val	(4.19)	(4.12)	(0.51)	(3.49)	(0.04)	(0.84)	(3.12)	(0.08)
Percent correctly classified / percent prior; 82%/67%								

APPENDIX 1

Questionnaire

1. What means do you usually use to purchase these goods and services or to pay these bills?

	DOES NOT APPLY	CASH	CHECK	MONEY ORDER	BANK CREDIT CARD	OTHER CREDIT CARD	CHARGE ACCOUNT	LAY AWAY	OTHER MEANS
Rent or house payment	1	2	3	4	5	6	7	8	9
Groceries	1	2	3	4	5	6	7	8	9
Utilities (lights, gas)	1	2	3	4	5	6	7	8	9
Automobile purchase (if other than installment)	1	2	3	4	5	6	7	8	9
Car Payments (installment)	1	2	3	4	5	6	7	8	9
Gasoline and oil	1	2	3	4	5	6	7	8	9
Insurance (all types)	1	2	3	4	5	6	7	8	9
Clothing, shoes	1	2	3	4	5	6	7	8	9
Small household goods (sheets, towels, dishes)	1	2	3	4	5	6	7	8	9
Furniture, appliances	1	2	3	4	5	6	7	8	9
Medical doctor, dentist	1	2	3	4	5	6	7	8	9
Bank credit cards	1	2	3	4	5	6	7	8	9
Other credit cards	1	2	3	4	5	6	7	8	9
Charge accounts	1	2	3	4	5	6	7	8	9
Loan payments (other than auto or house) to banks, finance companies, others	1	2	3	4	5	6	7	8	9
Bills that need to be paid by mail	1	2	3	4	5	6	7	8	9

2. Race of respondent: _____white _____black

3. Sex of respondent _____male _____female

4. How old are you and your spouse _____Husband
_____Wife

5. What is the highest grade of regular school that you and your spouse have completed? _____Husband
_____Wife

6. How many people are living in this household? _____

7. How many dependent children are in this household? _____

8. Is the head of the household currently employed? _____Yes
_____No

9. Are additional members of the household employed? _____Yes
_____No

10. Do you or one of the members of the household own this house?
_____Yes _____No

11. Does one of the members of your household own a car?
_____Yes _____No

12. Please check below your approximate annual family income.

_____$0-$4,999
_____$5,000-$9,999
_____$10,000-$14,999
_____$15,000-$19,999
_____$20,000-$24,999
_____$25,000-$34,999
_____$35,000-$49,999
_____$50,000 or above