Impact of Consumer Installment Debt on Food Expenditures

by

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Abstract

Trends in consumer installment credit over the period 1970 to 1989 are discussed and an empirical model developed to identify and assess the impact of installment credit on food expenditures. Real per capita food expenditures are modeled as a function of the real price of food, real per capita personal disposable income, seasonality, and a measure of the level of consumer installment credit entered as a polynomial distributed lag to determine its effect over time. Results indicate that installment credit has a positive effect on food expenditures in the short-run, a negative effect in the long-run, and little effect overall. Results from separate models of the 1970s and 1980s provide evidence of structural change taking place between the two time periods.

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Introduction

Consumers are allocating progressively more of their income to expenditures whose payments cannot be altered in the short run. Mortgage payments have always been a factor in the budget of consumers, but in the 1980s a rapid rise in the level of consumer installment credit has raised many questions about its possible implications (Figure 1). A recent Nilsen survey indicates that the *average* credit card holder has access to 8 credit cards. Consumer installment credit has been defined as credit used to purchase durable and other goods where the repayment of money is to be made in two or more installments, *excluding mortgages* (Eastwood 1975).

The main concern for consumers with installment credit and other fixed commitments such as mortgages and insurance is they have first lien on disposable income. Therefore, if these sets of fixed payments are high, food and other categories of variable living expenses must fall to compensate (Courtless 1971). Hayes (1989) suggest that consumption patterns depend on transitory shocks, that consumers adjust slowly to movements in price and permanent income, and that the availability of credit is a determinant in the short-term reaction to shocks. In this paper effects of higher installment credit on food expenditures are of particular interest. However, the effects of installment credit have been largely ignored in empirical applications of demand analysis (Capps 1986).

The objectives of this paper are twofold. First, trends in consumer installment credit are discussed, with subsequent discussion pertaining to major causal factors. Second,

because little information exists pertaining to the influence of consumer installment debt on food expenditures, an empirical model is developed to measure this relationship.

Trends in Consumer Installment Credit

From the 1960s to 1970, consumer installment credit showed moderate growth. Since 1970, however, growth in consumer installment credit has been alarming, climbing from roughly $100 billion to $700 billion in nominal terms (Figure 1). In real terms, growth in installment credit has more than doubled over the period 1960 to 1990. In 1960, consumer installment credit accounted for roughly 12% of disposable income, but in 1988 it accounted for 19% of disposable income (Figure 2). Consumer installment credit rose from 2 percent of total assets in 1960 to 3.5 percent of total assets in 1988 (Figure 3).

As a result of the economic slowdown of the early 1980s coupled with a high cost of credit as well as limits on consumer loans, consumer installment credit as a percent of disposable income fell from 17.4% in 1979 to 14.6% in 1982. The economic recovery of the rest of the 1980s coupled with lower interest rates and deregulation of the banking industry, increased consumers ability to borrow. In the time period from 1982 to 1988 consumer installment credit rose from 14.6% of disposable income to 19.3%. Longer maturities and continued increases in credit card use also contributed to the growth of consumer credit during this time period.

Factors Contributing to the Growth in Consumer Installment Credit

There are numerous factors contributing to the growth in consumer installment credit over the last 30 to 40 years. Fluctuations in the level of credit have been attributed to inflation, recessions, interest rate changes, and other economic factors.

Figure 1
Consumer Installment Credit

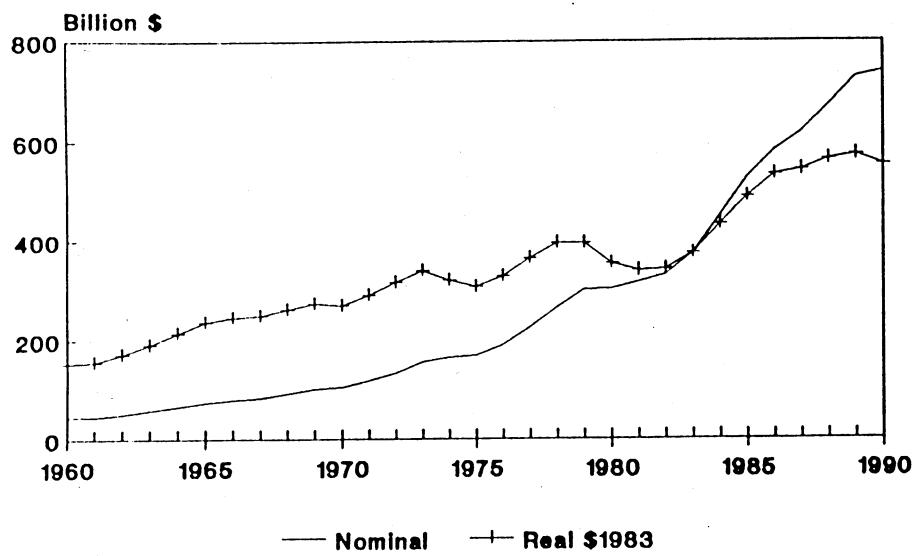


Figure 2
Consumer Installment Credit as Percent of Disposable Income

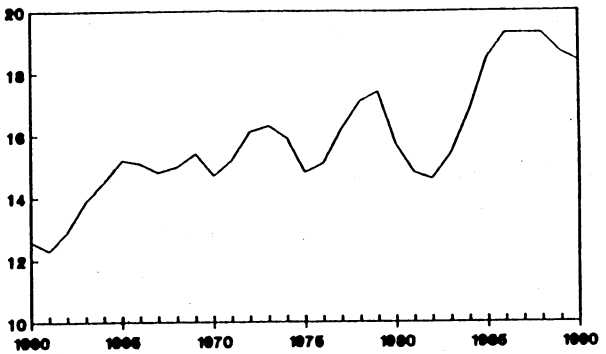
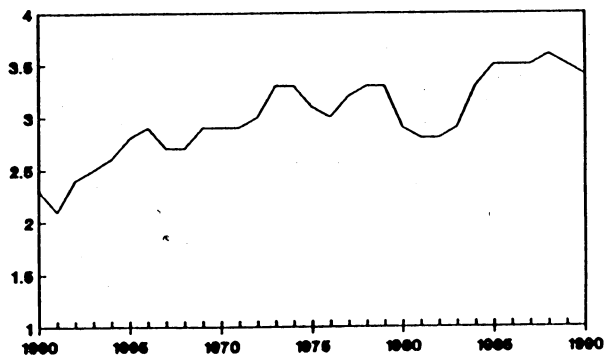


Figure 3
Consumer Installment Credit as Percent of Total Assets



Demographics

The main demographic factor affecting the growth in consumer installment debt in the 1980s revolves around the age of the population. The baby-boom generation reached their peak of borrowing in the 1980s. The proportions of the population aged 25 to 45 years changed from 23.5% in 1970 to 29% in 1982 (Luckett and August 1985). In 1983, 42% of households were headed by people 25 to 45 years of age. The main effect of age of head of household comes from the life-cycle theory[1], which states that people from this age group are in their prime borrowing years. With a higher percentage of people borrowing at their lifetime peak, there is going to be a short-term increase the overall amount of consumer credit.

Length of Maturities

The average length of maturities on installment loans for consumer durable goods has been increasing over the last four decades. Almost all of the higher-priced durable goods are now bought on some kind of installment payback plan, either financed by a bank or by a retailer. The increasing maturity lengths of these loans have the effect of lowering the monthly installment payment. With lower monthly installment payments, consumers are able to borrow more money in the short run, thereby raising the stock of consumer installment credit.

[1]The life-cycle theory of consumer spending states that in the early years, before 45, consumers are in an asset accumulation stage. During this stage, they consume more than they earn and consequently borrow money. In subsequent years, consumers start to earn more than they consume. During this stage, they pay off the debt acquired earlier and start saving for retirement.

Credit Cards

Credit cards are becoming more popular among American consumers as more banks compete for users of their cards. Spencer Nilsen, publisher of the Nilsen Report, reported that $375 billion in purchases were made with credit cards in 1987. Card users financed $157 billion of these purchases. In the age group of 17 to 65 year olds, approximately two-thirds of the population, 107.2 million people (67.5%) held credit cards, (Jeffery 1988). The massive amount of credit card purchases are part of the consumer installment credit total, even if part of them are only for convenience use. A convenience purchase is one which is paid in full on the first billing. Industry numbers roughly estimate convenience credit to be roughly 35% to 50% of all credit card purchases. Convenience credit does cause the amount of total installment credit to be overestimated; however, the effect is small. In 1987, the prediction for this overestimation is about 1% for the ratio of consumer installment credit to disposable income (Luckett and August 1988).

Innovations in Credit Markets

Deregulation of the consumer credit market occurred in the early 1980s by the Depository Institutions Deregulation and Monetary Control Act of 1980; this Act widened the asset powers of these institutions (Luckett and August 1985). The deregulation of the banking industry allowed the supply of consumer credit to increase by giving more lending power to thrifts and by removing usury ceilings (Silvia and Whall 1988). This set of facts lead to a rightward shift in the supply curve for consumer credit, ceteris paribus.

Along with deregulation, several market innovations have encouraged increased consumer credit. They include:

* The increased marketing of credit cards by different financial institutions, along with different characteristics of these cards.

* Savings and loans have entered the consumer installment credit market, increasing supply and making competition greater. Consumer credit was the fastest growing component for savings and loans during 1983 and 1984 (Luckett and August 1985).

* Open ended credit offered by non-bank companies, including real estate firms, and an increase in revolving credit both backed by home equity. While most of these are classified as junior mortgages, some are classified as installment credit.

* Adjustable-rate financing of consumer loans has increased the willingness of financial institutions to make consumer loans by shifting the interest rate risk to the borrower. This shifting of risk has also been a factor in the lengthening of maturities for consumer loans.

* The securitization of consumer loans has been growing in the 1980s. Secondary markets have been developed for automobile loans, student loans, home improvement loans, and others. The effect of secondary markets is to increase the supply of funds for consumer loans by bringing in investors who otherwise would not supply money to the market (Luckett and August 1985).

Possible Problems in Studying Consumer Installment Credit

The typical measure of consumer installment credit is the ratio of consumer installment debt to disposable income (debt to income). This measure, however, may be outdated due to changes in the structure of the consumer credit market. The main interest in studying consumer installment credit is to determine its burden on the budgets of

consumers and consequently the effects on consumption patterns. The problem of measuring debt to income is one of measuring a stock (debt) to a flow (income). This measure does not allow for the effects of longer maturities that lower the monthly payment, convenience credit use (Kowaleski 1987), and demographic effects. Measures that compare a flow to a flow or a stock to a stock would be preferred. However, since 1982, figures on the amount of debt serviced each month (the flow of debt) are no longer reported. A measure suggested by some economists (Kowaleski 1987, Silvia and Whall 1988) is a comparison of consumer credit to consumer net worth or total assets (debt to assets). In this measure, a stock (debt) is being compared to a stock (assets). The main argument for using a debt to asset ratio, instead of a debt to income ratio, is that total assets are a better measure of a consumer's ability to pay off debt. This measure would in essence deflate the problem of rising debt in the 1980s. Real per capita liabilities grew 24.3% from 1985 to 1987, however, real per capita net worth grew 17.6% (Kowaleski 1987).

Another argument put forward when measuring the effects of consumer installment credit are the implications of consumers using future expected income when determining their amount of debt (Silvia and Whall 1988). Consumers will be paying back debt acquired now with income earned in the future. If future incomes are expected to rise then the burden of a high stock of debt currently is not as significant. The use of the ratio expected debt payments to expected income may prove worthy in determining the effects of current debt levels on consumption patterns.

Empirical Models Linking Consumer Credit to Food Expenditures

To determine the impact of consumer installment credit on food expenditures, an empirical model is developed. Two model specifications will be employed. The first entails

food expenditures as a function of the real price of food, real personal disposable income, seasonality, and the ratio of the level of installment credit to personal disposable income. Seasonality is captured by the use of quarterly dummy variables. The second specification differs from the first specification only in the measure of installment credit. In lieu of installment credit as a proportion of personal disposable income, installment credit is expressed as a proportion of total assets.

The price of non-food items is not included in these specifications primarily because of degrading collinearity problems with the price of food. The own-price effect is expected to be negative and the income effect positive. The effect of installment credit is expected to be distributed over time. To capture this expected time effect, a polynomial distributed lag (PDL) of the measure of the level of consumer installment credit is used. Whenever a PDL is used, two main questions must be answered; (1) What is the degree of polynomial? (2) What is the length of the lag? Numerous runs were done with different degrees of polynomials and different lengths of lags. Polynomials of second, third, and fourth degrees were used, along with lengths of lags of 24, 36, and 48 months with and without endpoint restrictions. A third degree polynomial with a 36 month lag and with endpoint restrictions provided the best results in regard to the estimated own-price and income elasticities and to the significance of the estimated lag coefficients.

The effect of the level of installment credit on food expenditures seem to have changed over time. During the 1980s the level of consumer credit grew at alarming rates. There is cursory evidence that structural change in the effect of installment credit on food expenditures occurred during the 1980s. To test for structural changes, models are developed for the time periods of 1970 to 1988, 1970 to 1979, and 1980 to 1989. This

partition allows for the use of a Chow test to test for structural changes in the model from the 1970s to the 1980s.

Mathematically,

MODEL I

$$PCFE_t = \alpha_0 + \alpha_1*PFD_t + \alpha_2*PCPDI_t + \alpha_3*Q1_t + \alpha_4*Q2_t + \alpha_5*Q3_t + \beta_0*IC/PDI_t + \beta_1*IC/PDI_{t-1} + \beta_2*IC/PDI_{t-2} + \ldots + \beta_{35}*IC/PDI_{t-35} + \beta_{36}*IC/PDI_{t-36} + \epsilon_t$$

MODEL II

$$PCFE_t = \gamma_0 + \gamma_1*PFD_t + \gamma_2*PCPDI_t + \gamma_3*Q1_t + \gamma_4*Q2_t + \gamma_5*Q3_t + \delta_0*IC/TA_t + \delta_1*IC/TA_{t-1} + \delta_2*IC/TA_{t-2} + \ldots + \delta_{35}*IC/TA_{t-35} + \delta_{36}*IC/TA_{t-36} + \nu_t$$

Where,

$PCFE_t$ = log of real per capita food expenditures in time period t,

$PCPDI_t$ = log of real per capita personal disposable income in time period t,

PFD_t = log real price of food items in time period t,

IC/PDI_t = log of installment credit divided by personal disposable income in time period t,

IC/TA_t = log of installment credit divided by personal total assets in time period t,

Q1 = Q1 = 1 for January, February, and March,

Q2 = Q2 = 1 for April, May, June, and

Q3 = Q3 = 1 for July, August, September.

The sources of data for this analysis are the Survey of Current Business available from the U.S. Department of Commerce, and Balance Sheets for the U.S. Economy available from the Board of Governors of the Federal Reserve System, and information from the Bureau of Census, Washington D.C. Monthly data from the time period January 1970 to December

1989 are used in the analysis. A measure of personal total assets is only available on a yearly basis. To get a monthly estimate for personal total assets, yearly personal total assets are regressed as a function of time and time squared[2]. Monthly imputations of total assets are made using this auxiliary regression.

Descriptive statistics of the variables in the two model specifications for the respective partitions appear in Tables 1-3. Real per capita food expenditures averaged around \$44.57 (\$1967=100) per month and real personal disposable income averaged \$3499.8 (\$1967=100) per year for the period from 1970 to 1989. The proportion of installment credit to personal disposable income (ICPDI) averaged 0.15609 for the period of 1970 to 1989. In the 1970s ICPDI was 0.14448 and rose to 0.16769 in the 1980s. Installment credit as a proportion of total assets averaged 0.02950 in the 1970s, 0.03261 in the 1980s, and 0.03105 for the 1970 to 1989 time period.

Empirical Results

The empirical results for the respective models and time periods are summarized in Tables 4-6. A generalized least squares procedure is used to correct for serial correlation in all model specifications and time periods. The goodness-of-fit statistics for the two model specifications using the data from 1970 to 1989 are 0.7121 for model I and 0.7089 for model II, respectively. Durbin-Watson statistics are 2.0068 for model I and 1.9976 for model II.

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[2] $TA = 4.8971E+06 + 55978*TIME + 175.71*TIME2 + e_i$
(13.88) (4.21) (6.73)
$ADJR^2 = 0.9973$ D-W STAT = 1.43
Where, t-Statistics in parenthesis
TIME = 12, 24, 36,...,180, TA = Yearly total assets,
TIME2 = TIME*TIME, AND T = 1 - 180 is used to estimate TA on a monthly basis.

The sign of both the own-price and income elasticities conformed to prior expectations. The own-price elasticities of -0.4633 and -0.4590 for models I and II, respectively, are reasonable given that food expenditures include both food at home and food away from home. The

Table 1. Descriptive Statistics, 1970 - 1989 ($1967=100)

NAME	N	MEAN	ST. DEV	MINIMUM	MAXIMUM
PCFE	240	44.565	2.8832	36.502	51.435
PFD	240	101.66	4.7165	95.177	111.38
PCPDI	240	3499.8	277.19	3004.5	4128.7
ICPDI	240	0.15609	0.18355E-01	0.12904	0.1903
ICTA	240	0.31053E-01	0.27763E-02	0.26669E-01	0.0356
Q1	240	0.25000	0.43392	0.00000	1.0000
Q2	240	0.25000	0.43392	0.00000	1.0000
Q3	240	0.25000	0.43392	0.00000	1.0000

Table 2. Descriptive Statistics; 1970 - 1979 ($1967=100)

NAME	N	MEAN	ST. DEV	MINIMUM	MAXIMUM
PCFE	120	43.084	2.3407	36.502	47.576
PFD	120	104.78	4.5482	96.896	111.38
PCPDI	120	3325.0	175.26	3004.5	3615.6
ICPDI	120	0.14448	0.11568E-01	0.12904	0.1723
ICTA	120	0.29501E-01	0.23735E-02	0.02666	0.0352
Q1	120	0.25000	0.43483	0.00000	1.0000
Q2	120	0.25000	0.43483	0.00000	1.0000
Q3	120	0.25000	0.43483	0.00000	1.0000

Table 3. Descriptive Statistics 1980 - 1989 ($1967=100)

NAME	N	MEAN	ST. DEV	MINIMUM	MAXIMUM
PCFE	120	46.047	2.6060	39.306	51.435
PFD	120	98.543	2.0992	95.177	104.55
PCPDI	120	3674.6	248.89	3329.0	4128.7
ICPDI	120	0.16769	0.16466E-01	0.14473	0.1903
ICTA	120	0.32605E-01	0.22334E-02	0.02844	0.0356
Q1	120	0.25000	0.43483	0.00000	1.0000
Q2	120	0.25000	0.43483	0.00000	1.0000
Q3	120	0.25000	0.43483	0.00000	1.0000

income elasticities of 0.3309 and 0.3693 for models I and II, respectively, are in agreement with prior studies.

The pattern of the estimated coefficients of the PDL indicates that in the short-run increases in installment credit lead to increases in food expenditures. This finding could be the result of the increased liquidity of the consumer when they first receive credit. The consumer has more cash on hand and may use some of this money to increase food expenditures. The increase may not be due to more food being bought, but rather because more expensive products and more food away from home are purchased. Later, when the debt has to be repaid and the consumer cannot borrow to increase liquidity, the earlier increase in installment credit leads to a decrease in food expenditures as the consumer has to buy less costly foods and consume less food away from home. Overall, the short-run increase and the long-run decrease cancel each other out and there is not much change in food expenditures in the total long-run. The sum of the lags for model I is 0.0452 and for model II is 0.0417. This finding implies that there is a small long-run effect of installment credit on food expenditures.

The quarterly dummy variables are significant indicating that seasonality is important in the level of food expenditures. Quarters I, II and III have significant dummy variables implying differences for these quarters from the base quarter IV.

To test the hypothesis that structural changes occurred during the 1980s, separate models were run using data from 1970 to 1979 and 1980 to 1989 for both model specifications. A Chow test is used in the determination. The two separate runs showed vast differences in the empirical results in both the pattern of the estimated lag coefficients and the estimated own-price and income elasticities.

For the 1970s, the two model specifications yield quite similar own-price and income elasticities, and the estimated lag coefficients are comparable to each other in sign and magnitude. However, the results for the 1970s differ greatly from the results for the 1970 to 1989 time period. The pattern of the lag coefficients for the 1970s is opposite those of the 1970 to 1989 time period. In the 1970s, the short-run effect is to decrease food expenditures, although none of the negative lag coefficients is significantly different from zero in either model specification. In the longer-run, the estimated lag coefficients are positive and statistically significant. The sum of the lags are much larger for the 1970s when compared to the 1970 to 1989 time period. The sum of the lags are around 0.2700 for both model specifications, indicating a positive total long-run effect of installment credit on food expenditures. The estimated elasticities for the 1970s are larger than the estimated elasticities for the entire time period. The income elasticity for model I is 0.7307 and for model II is 0.7741. The own price elasticities of -0.6201 for model I and -0.6292 for model II are higher than the estimates from the 1970 to 1989 time period.

Empirical results for the 1980s show differences in the two respective model specifications. In 1980s, the pattern of the estimated lag coefficients are similar to the pattern found over the period 1970 to 1989. In the short-run, the estimated lag coefficients are positive and significant, indicating that an increase in installment credit increases food expenditures. In the longer-run, the signs become negative and significant in the total model, but they are insignificant in the 1980s. The sum of the lags for the 1980s is larger than the 1970 to 1989 time period, 0.1664 for model I and .2055 for model II, indicating a positive total effect for the 1980s. The estimated own price elasticity for the 1980s is larger

Table 4. Empirical Results, for the Years 1970 - 1989

Model I			Model II		
VARIABLE NAME	ESTIMATED COEFFICIENT	T-RATIO 196 DF	VARIABLE NAME	ESTIMATED COEFFICIENT	T-RATIO 196 DF
LRPFD	-0.46332	-8.6799	LRPFD	-0.45898	-8.1383
LRPCPDI	0.33091	6.7103	LRPCPDI	0.36926	9.0088
LICPDI	0.15755E-02	2.8023	LICTA	0.11917E-02	2.2970
$LICPDI_{t-1}$	0.29153E-02	2.8078	$LICTA_{t-1}$	0.22084E-02	2.3149
$LICPDI_{t-2}$	0.40320E-02	2.8151	$LICTA_{t-2}$	0.30595E-02	2.3117
$LICPDI_{t-3}$	0.49379E-02	2.8222	$LICTA_{t-3}$	0.37537E-02	2.3171
$LICPDI_{t-4}$	0.56460E-02	2.8283	$LICTA_{t-4}$	0.43009E-02	2.3271
$LICPDI_{t-5}$	0.61683E-02	2.8349	$LICTA_{t-5}$	0.47098E-02	2.3389
$LICPDI_{t-6}$	0.65178E-02	2.8409	$LICTA_{t-6}$	0.49898E-02	2.3489
$LICPDI_{t-7}$	0.67068E-02	2.8449	$LICTA_{t-7}$	0.51501E-02	2.3687
$LICPDI_{t-8}$	0.67479E-02	2.8484	$LICTA_{t-8}$	0.52000E-02	2.3855
$LICPDI_{t-9}$	0.66538E-02	2.8480	$LICTA_{t-9}$	0.51486E-02	2.3908
$LICPDI_{t-10}$	0.64365E-02	2.8455	$LICTA_{t-10}$	0.50050E-02	2.4108
$LICPDI_{t-11}$	0.61096E-02	2.8387	$LICTA_{t-11}$	0.47789E-02	2.4288
$LICPDI_{t-12}$	0.56842E-02	2.8149	$LICTA_{t-12}$	0.44786E-02	2.4486
$LICPDI_{t-13}$	0.51744E-02	2.7706	$LICTA_{t-13}$	0.41147E-02	2.4088
$LICPDI_{t-14}$	0.45913E-02	2.7001	$LICTA_{t-14}$	0.36946E-02	2.3274
$LICPDI_{t-15}$	0.39488E-02	2.5781	$LICTA_{t-15}$	0.32294E-02	2.1910
$LICPDI_{t-16}$	0.32581E-02	2.3650	$LICTA_{t-16}$	0.27268E-02	1.9367
$LICPDI_{t-17}$	0.25331E-02	2.0173	$LICTA_{t-17}$	0.21971E-02	1.6604
$LICPDI_{t-18}$	0.17849E-02	1.5155	$LICTA_{t-18}$	0.16488E-02	1.2606
$LICPDI_{t-19}$	0.10276E-02	0.8726	$LICTA_{t-19}$	0.10913E-02	0.8454
$LICPDI_{t-20}$	0.27228E-03	0.2199	$LICTA_{t-20}$	0.53410E-03	0.3911
$LICPDI_{t-21}$	-0.46730E-03	-0.3468	$LICTA_{t-21}$	-0.13970E-04	-0.0095
$LICPDI_{t-22}$	-0.11796E-02	-0.7974	$LICTA_{t-22}$	-0.54337E-03	-0.3453
$LICPDI_{t-23}$	-0.18512E-02	-1.1393	$LICTA_{t-23}$	-0.10454E-02	-0.6129
$LICPDI_{t-24}$	-0.24702E-02	-1.3970	$LICTA_{t-24}$	-0.15099E-02	-0.8196
$LICPDI_{t-25}$	-0.30238E-02	-1.5912	$LICTA_{t-25}$	-0.19289E-02	-0.9762
$LICPDI_{t-26}$	-0.34994E-02	-1.7382	$LICTA_{t-26}$	-0.22921E-02	-1.1030
$LICPDI_{t-27}$	-0.38846E-02	-1.8544	$LICTA_{t-27}$	-0.25910E-02	-1.2104
$LICPDI_{t-28}$	-0.41666E-02	-1.9464	$LICTA_{t-28}$	-0.28159E-02	-1.2949
$LICPDI_{t-29}$	-0.43333E-02	-2.0202	$LICTA_{t-29}$	-0.29579E-02	-1.3631
$LICPDI_{t-30}$	-0.43716E-02	-2.0802	$LICTA_{t-30}$	-0.30077E-02	-1.4257
$LICPDI_{t-31}$	-0.42695E-02	-2.1304	$LICTA_{t-31}$	-0.29560E-02	-1.4767
$LICPDI_{t-32}$	-0.40141E-02	-2.1725	$LICTA_{t-32}$	-0.27937E-02	-1.5192
$LICPDI_{t-33}$	-0.35930E-02	-2.2078	$LICTA_{t-33}$	-0.25115E-02	-1.5569
$LICPDI_{t-34}$	-0.29935E-02	-2.2383	$LICTA_{t-34}$	-0.21003E-02	-1.5873
$LICPDI_{t-35}$	-0.22033E-02	-2.2656	$LICTA_{t-35}$	-0.15507E-02	-1.6254
$LICPDI_{t-36}$	-0.12096E-02	-2.2890	$LICTA_{t-36}$	-0.85376E-03	-1.6446
Q1	-0.62467E-01	-11.029	Q1	-0.62348E-01	-10.8940
Q2	0.13439E-01	2.4763	Q2	0.13414E-01	2.4445
Q3	0.21221E-01	3.7431	Q3	0.21316E-01	3.7214
CONSTANT	3.3263	5.8923	CONSTANT	3.05430	5.7029
RHO	-0.00394		RHO	0.00082	
$ADJR^2$	0.71210		$ADJR^2$	0.70890	
D-W STAT	2.00680		D-W STAT	1.99760	
SUM OF LAGS	0.04519		SUM OF LAGS	0.04174	

Table 5. Empirical Results, for the years 1970 - 1979

Model I			Model II		
VARIABLE NAME	ESTIMATED COEFFICIENT	T-RATIO 76 DF	VARIABLE NAME	ESTIMATED COEFFICIENT	T-RATIO 76 DF
LRPFD	-0.62012	-4.0929	LRPFD	-0.62919	-4.0969
LRPCPDI	0.73074	7.8016	LRPCPDI	0.77407	8.3427
LICPDI	-0.12409E-02	-1.3812	LICTA	-0.73630E-03	-0.9861
$LICPDI_{t-1}$	-0.21614E-02	-1.3113	$LICTA_{t-1}$	-0.12359E-02	-0.8996
$LICPDI_{t-2}$	-0.27833E-02	-1.2288	$LICTA_{t-2}$	-0.15148E-02	-0.8015
$LICPDI_{t-3}$	-0.31263E-02	-1.1335	$LICTA_{t-3}$	-0.15906E-02	-0.6902
$LICPDI_{t-4}$	-0.32134E-02	-1.0311	$LICTA_{t-4}$	-0.14773E-02	-0.5637
$LICPDI_{t-5}$	-0.30635E-02	-0.9102	$LICTA_{t-5}$	-0.11949E-02	-0.4204
$LICPDI_{t-6}$	-0.26999E-02	-0.7695	$LICTA_{t-6}$	-0.75602E-03	-0.2593
$LICPDI_{t-7}$	-0.21418E-02	-0.5989	$LICTA_{t-7}$	-0.17986E-03	-0.0595
$LICPDI_{t-8}$	-0.14119E-02	-0.3965	$LICTA_{t-8}$	0.51840E-03	0.1705
$LICPDI_{t-9}$	-0.52990E-03	-0.1521	$LICTA_{t-9}$	0.13224E-02	0.4390
$LICPDI_{t-10}$	0.48207E-03	0.1432	$LICTA_{t-10}$	0.22150E-02	0.7460
$LICPDI_{t-11}$	0.16034E-02	0.4980	$LICTA_{t-11}$	0.31806E-02	1.0999
$LICPDI_{t-12}$	0.28131E-02	0.9155	$LICTA_{t-12}$	0.42021E-02	1.4833
$LICPDI_{t-13}$	0.40893E-02	1.3860	$LICTA_{t-13}$	0.52639E-02	1.8694
$LICPDI_{t-14}$	0.54127E-02	1.8640	$LICTA_{t-14}$	0.63477E-02	2.2363
$LICPDI_{t-15}$	0.67591E-02	2.3656	$LICTA_{t-15}$	0.74414E-02	2.5486
$LICPDI_{t-16}$	0.81115E-02	2.7113	$LICTA_{t-16}$	0.85212E-02	2.9315
$LICPDI_{t-17}$	0.94443E-02	3.1323	$LICTA_{t-17}$	0.95800E-02	3.4337
$LICPDI_{t-18}$	0.10741E-01	3.3805	$LICTA_{t-18}$	0.10593E-01	3.2853
$LICPDI_{t-19}$	0.11976E-01	3.4897	$LICTA_{t-19}$	0.11549E-01	3.6513
$LICPDI_{t-20}$	0.13132E-01	3.6048	$LICTA_{t-20}$	0.12429E-01	3.5580
$LICPDI_{t-21}$	0.14186E-01	3.5908	$LICTA_{t-21}$	0.13218E-01	3.2733
$LICPDI_{t-22}$	0.15116E-01	3.5511	$LICTA_{t-22}$	0.13899E-01	3.3999
$LICPDI_{t-23}$	0.15904E-01	3.4899	$LICTA_{t-23}$	0.14455E-01	3.4316
$LICPDI_{t-24}$	0.16526E-01	3.4251	$LICTA_{t-24}$	0.14872E-01	3.3888
$LICPDI_{t-25}$	0.16962E-01	3.3745	$LICTA_{t-25}$	0.15130E-01	3.3009
$LICPDI_{t-26}$	0.17191E-01	3.3186	$LICTA_{t-26}$	0.15215E-01	3.2211
$LICPDI_{t-27}$	0.17191E-01	3.2723	$LICTA_{t-27}$	0.15109E-01	3.1693
$LICPDI_{t-28}$	0.16942E-01	3.2264	$LICTA_{t-28}$	0.14799E-01	3.1162
$LICPDI_{t-29}$	0.16423E-01	3.1838	$LICTA_{t-29}$	0.14264E-01	3.0833
$LICPDI_{t-30}$	0.15612E-01	3.1458	$LICTA_{t-30}$	0.13492E-01	3.0422
$LICPDI_{t-31}$	0.14488E-01	3.1093	$LICTA_{t-31}$	0.12462E-01	3.0004
$LICPDI_{t-32}$	0.13031E-01	3.0731	$LICTA_{t-32}$	0.11161E-01	2.9794
$LICPDI_{t-33}$	0.11219E-01	3.0377	$LICTA_{t-33}$	0.95713E-02	2.9507
$LICPDI_{t-34}$	0.90307E-02	3.0016	$LICTA_{t-34}$	0.76769E-02	2.9100
$LICPDI_{t-35}$	0.64460E-02	2.9801	$LICTA_{t-35}$	0.54611E-02	2.8714
$LICPDI_{t-36}$	0.34424E-02	2.9462	$LICTA_{t-36}$	0.29076E-02	2.8569
Q1	-0.59060E-01	-7.7264	Q1	-0.59189E-01	-7.6690
Q2	0.17677E-01	2.4313	Q2	0.17447E-01	2.3785
Q3	0.24958E-01	3.2723	Q3	0.25017E-01	3.2493
CONSTANT	1.25450	1.0241	CONSTANT	1.3623	1.1563
RHO	-0.17917		RHO	-0.16992	
$ADJR^2$	0.64930		$ADJR^2$	0.64550	
D-W STAT	2.32100		D-W STAT	2.30220	
SUM OF LAGS	0.27190		SUM OF LAGS	0.26817	

Table 6. Empirical Results, for the years 1980 - 1989

	Model I		Model II		
VARIABLE NAME	ESTIMATED COEFFICIENT	T-RATIO 76 DF	VARIABLE NAME	ESTIMATED COEFFICIENT	T-RATIO 76 DF
LRPFD	-0.59965	-1.4955	LRPFD	-0.75804	-1.7836
LRPCPD	0.10787	0.8049	LRPCPDI	0.16545	1.5318
LICPDI	0.25609E-02	2.6789	LICTA	0.21053E-02	2.0294
$LICPDI_{t-1}$	0.47795E-02	2.7066	$LICTA_{t-1}$	0.39594E-02	2.0541
$LICPDI_{t-2}$	0.66724E-02	2.7325	$LICTA_{t-2}$	0.55735E-02	2.0899
$LICPDI_{t-3}$	0.82570E-02	2.7614	$LICTA_{t-3}$	0.69586E-02	2.1199
$LICPDI_{t-4}$	0.95501E-02	2.7917	$LICTA_{t-4}$	0.81275E-02	2.1607
$LICPDI_{t-5}$	0.10569E-01	2.8236	$LICTA_{t-5}$	0.90896E-02	2.2006
$LICPDI_{t-6}$	0.11330E-01	2.8565	$LICTA_{t-6}$	0.98592E-02	2.2454
$LICPDI_{t-7}$	0.11851E-01	2.8904	$LICTA_{t-7}$	0.10445E-01	2.2954
$LICPDI_{t-8}$	0.12148E-01	2.9248	$LICTA_{t-8}$	0.10860E-01	2.3475
$LICPDI_{t-9}$	0.12239E-01	2.9584	$LICTA_{t-9}$	0.11115E-01	2.4058
$LICPDI_{t-10}$	0.12140E-01	2.9871	$LICTA_{t-10}$	0.11222E-01	2.4627
$LICPDI_{t-11}$	0.11869E-01	3.0056	$LICTA_{t-11}$	0.11193E-01	2.5178
$LICPDI_{t-12}$	0.11442E-01	3.0105	$LICTA_{t-12}$	0.11037E-01	2.5577
$LICPDI_{t-13}$	0.10877E-01	2.9896	$LICTA_{t-13}$	0.10770E-01	2.5671
$LICPDI_{t-14}$	0.10191E-01	2.9304	$LICTA_{t-14}$	0.10397E-01	2.5855
$LICPDI_{t-15}$	0.94001E-02	2.8230	$LICTA_{t-15}$	0.99371E-02	2.5662
$LICPDI_{t-16}$	0.85214E-02	2.6387	$LICTA_{t-16}$	0.93931E-02	2.5181
$LICPDI_{t-17}$	0.75734E-02	2.3924	$LICTA_{t-17}$	0.87863E-02	2.3878
$LICPDI_{t-18}$	0.65706E-02	2.0674	$LICTA_{t-18}$	0.81187E-02	2.2346
$LICPDI_{t-19}$	0.55328E-02	1.7113	$LICTA_{t-19}$	0.74092E-02	2.0510
$LICPDI_{t-20}$	0.44744E-02	1.3336	$LICTA_{t-20}$	0.66644E-02	1.7816
$LICPDI_{t-21}$	0.34145E-02	0.9718	$LICTA_{t-21}$	0.58983E-02	1.5218
$LICPDI_{t-22}$	0.23687E-02	0.6413	$LICTA_{t-22}$	0.51218E-02	1.2726
$LICPDI_{t-23}$	0.13546E-02	0.3496	$LICTA_{t-23}$	0.43455E-02	1.0317
$LICPDI_{t-24}$	0.38944E-03	0.0961	$LICTA_{t-24}$	0.35824E-02	0.8266
$LICPDI_{t-25}$	-0.51067E-03	-0.1215	$LICTA_{t-25}$	0.28419E-02	0.6354
$LICPDI_{t-26}$	-0.13275E-02	-0.3075	$LICTA_{t-26}$	0.21387E-02	0.4652
$LICPDI_{t-27}$	-0.20453E-02	-0.4663	$LICTA_{t-27}$	0.14800E-02	0.3200
$LICPDI_{t-28}$	-0.26460E-02	-0.6023	$LICTA_{t-28}$	0.88132E-03	0.1911
$LICPDI_{t-29}$	-0.31134E-02	-0.7200	$LICTA_{t-29}$	0.35115E-03	0.0770
$LICPDI_{t-30}$	-0.34299E-02	-0.8216	$LICTA_{t-30}$	-0.97111E-04	-0.0220
$LICPDI_{t-31}$	-0.35790E-02	-0.9109	$LICTA_{t-31}$	-0.45286E-03	-0.1091
$LICPDI_{t-32}$	-0.35431E-02	-0.9891	$LICTA_{t-32}$	-0.70467E-03	-0.1864
$LICPDI_{t-33}$	-0.33062E-02	-1.0577	$LICTA_{t-33}$	-0.84075E-03	-0.2557
$LICPDI_{t-34}$	-0.28497E-02	-1.1220	$LICTA_{t-34}$	-0.84978E-03	-0.3175
$LICPDI_{t-35}$	-0.21585E-02	-1.1749	$LICTA_{t-35}$	-0.72046E-03	-0.3733
$LICPDI_{t-36}$	-0.12139E-02	-1.2208	$LICTA_{t-36}$	-0.44084E-03	-0.4198
Q1	-0.63586E-01	-7.0621	Q1	-0.62729E-01	-6.8063
Q2	0.12461E-01	1.5181	Q2	0.12729E-01	1.5141
Q3	0.23852E-01	2.8259	Q3	0.24351E-01	2.8206
CONSTANT	6.00320	2.4872	CONSTANT	6.66400	2.7816
RHO	-0.04684		RHO	-0.03594	
$ADJR^2$	0.60390		$ADJR^2$	0.59400	
D-W STAT	2.08370		D-W STAT	2.06240	
SUM OF LAGS	0.16635		SUM OF LAGS	0.20555	

Figure 4
PDL; Lagged Coefficients 1970 - 1989

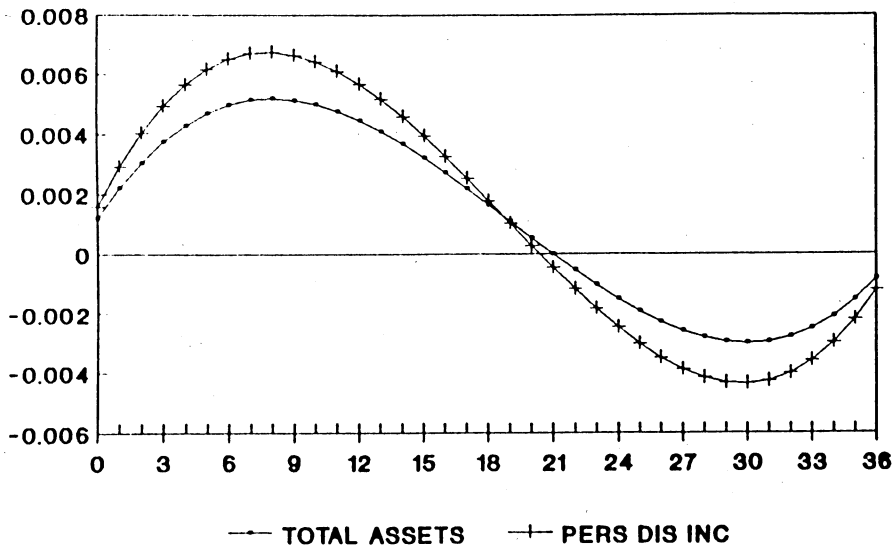


Figure 5
PDL; Lagged Coefficients 1970 - 1979

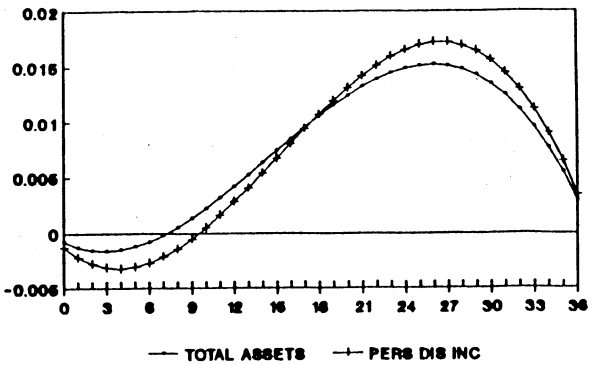
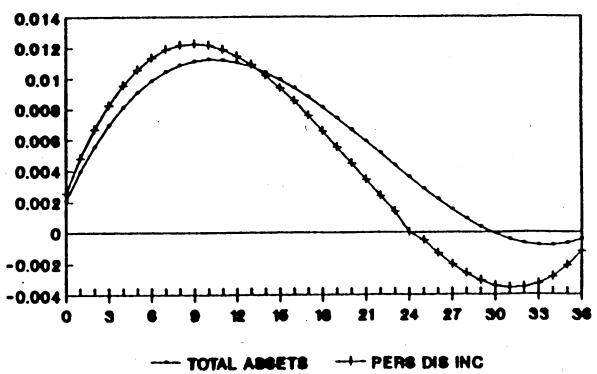


Figure 6
PDL: Lagged Coefficients 1980 - 1989



than the 1970 to 1989 model, but the income elasticity is considerably smaller for the 1980s than the corresponding estimates for the 1970 to 1989 model.

The results from the 1970s differ greatly from results from the 1980s. The pattern of the estimated polynomial lags are different and the magnitudes of the estimated elasticities also differ. The own-price elasticities are similar but the income elasticities are noticeably different. The sum of the lag coefficients also differ by a considerable margin. Overall, the 1970s and 1980s appear to show different effects of changes in installment credit on food expenditures. The results of Chow tests for both model specifications reject the null hypothesis that the structural coefficients of the models are identical, therefore, evidence exist to support the notion that structural changes occurred in the models between the decades of the 1970s and the 1980s. F-statistics for the respective model tests are: model I; F = 11.47, and model II; F = 11.63, with $F_{7,154,.05}$ = 2.01. Figures 4-6 depict the weights associated with the polynomial distributed lag formulations for the respective models by time periods.

Implications

Overall, the results imply that the short-run and long run effects of installment credit on food expenditures differ. In the short run, an increase in installment credit increases the liquidity position of the consumer, and results in an increase in food expenditures. However, in the long-run, the consumer may borrow up to their limit, and have to pay back the old debt. This situation results in a lower liquidity level for the consumer in the long-run leading to a decrease in food expenditures. In this study, the total long run effect was minimal as the short-run increase was seemingly off-set by the long-run decrease.

Structural changes are indicated by the results of the Chow test. The separate models for the 1970s and 1980s imply different effects of increased installment credit on food expenditures. During the 1970s, increased installment credit had little effect on food expenditures in the short-run. However, in the long-run increased installment credit led to higher expenditures on food. During the 1980s, increased installment credit had a positive impact on food expenditures in the short-run, then had a negative impact in the long-run. In both the 1970s and 1980s, the total effect was positive.

The reasons for the structural changes are discussed earlier in the paper, they included; demographics, length of maturities, credit cards and credit market innovations. These factors have led to a different view of credit by the consumer. No longer is credit only for the purchase of consumer durables, but now is being used for everyday purchases. The basic effect may come into play in the consumer's budgeting decisions. Consumers are no longer saving for relatively expensive purchases or for emergencies, but are relying on credit to solve these problems. The main impact on food expenditures would seem to be in the "quality" of food consumed. As the budget of consumers becomes more constrained by the repayment of debt, consumers are likely to consume lower quality foods, and purchases of higher-quality foods are likely to fall.

Concluding Comments

This paper attempts to capture the relationship between consumer installment credit and food expenditures. The results do indicate a significant relationship between the two variables. The next logical step would be to try to separate the impacts of consumer installment debt on food expenditures at home and away from home. Another possibility

of future research would be to integrate credit into demand analyses of food expenditures and other goods. Some work has already been done on modeling consumer credit in demand analysis (Eastwood 1975, Hayes 1989). Further work in this area may necessitate reconsideration of consumer credit as an endogenous variable, and not solely as an exogenous variable as in this paper. To accomplish this, a multi-equation macroeconomic model capturing structural relationships of income, interest rates, and other factors needs to be employed. This development would allow the consumer to simultaneously determine the level of expenditures and credit needed for consumption categories. Finally, given that consumption accounts for about two-thirds of Gross National Product, the effects of consumer credit need to be related to macroeconomic relationships as well.

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