# The Effect of Credit Constraints on the Severity of the Consumer Debt Service Burden

The life cycle theory of savings proposes that households smooth spending over the life cycle by borrowing in early stages. Some researchers have suggested that credit constrained consumers cannot adjust their spending as the model prescribes due to their inability to borrow. This research investigates whether credit constraints prevent borrowing by investigating the relationship between credit constraints and the consumer debt service burden. The results fail to support the assumption that credit constrained households cannot borrow and suggest an alternative hypothesis, that credit constrained households are presently credit constrained because of earlier excessive borrowing. Using data from the 1998 Survey of Consumer Finances, we found that credit constrained households had 1.9 times the odds of having a high debt service burden as households that were not credit constrained, indicating that being credit constrained was not an obstacle to obtaining credit but a result of past borrowing.

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## Introduction

According to the life cycle theory of savings, households attempt to smooth spending over the life cycle by borrowing during early stages when earnings are lower, paying off debt and accumulating savings during middle stages when earnings increase, and spending from savings during later stages. According to the theory, spending should be based on lifetime wealth, not the income of any given year. Central to the theory is the ability to borrow during times of lower earnings and pay off that debt later with higher earnings. Several authors have proposed that being credit constrained – not being able to borrow as much as desired – prevents the consumption smoothing central to the life cycle theory. Lyons (2003) adopted this perspective, stating "if a household is constrained, it is assumed that the household is unable to obtain its desired level of borrowing and only able to acquire an amount equal to its borrowing limit . . . it is assumed that the household's ability to smooth consumption over its lifetime is limited." Lyons estimated that in 1998, households were unable to acquire about 32% of their "desired debt" (the amount she calculated they would have if unconstrained) due to credit constraints. She reported the borrowing gap has narrowed over the years for all households regardless of permanent earnings, age, gender, or race, with the greatest increase in borrowing being by Black households and those with low permanent incomes. She proposed that "increases in credit have likely helped to improve the economic status of U.S. households throughout the 1990s by giving them the opportunity to better smooth their consumption and maintain or improve their standard of living." Though noting that the households might find themselves overextended in the long run, Lyons portrayed increased borrowing as desirable because of its consumption smoothing potential.

While access to credit may have improved between 1983 and 1998 (Lyons 2003), other consumer problems increased during the same years. The percentage of homeowners who were 30 days or more delinquent in their mortgage payments exceeded 10% for the first time ever at the end of 2000, a figure greater than in the recessions of the early 1990s and 1980s (Leonhardt 2001). Having a high ratio of debt payments to income has been shown to be an important factor leading to household financial trouble. Canner and Luckett (1991) found that households with a high debt burden were four times as likely to be late or to miss payments as those with low burden, and that missing payments could be an indicator of future default. Lower debt burden is also related to lower future levels of insolvency. Households whose annual consumer debt payment to disposable income ratio was no more than 15% in the 1983 Survey of Consumer Finances had about one-third of the likelihood to suffer insolvency (having assets worth less than debts) three years later than those who exceeded that ratio (DeVaney 1994). Others have shown that even apparently small differences in the debt service burden can have serious consequences. Zandi and Chen (1998) asserted that a 0.3 percentage point decrease in the debt service burden would ultimately result in 60,000 fewer bankruptcy filings by year-end 1999. Additional confirmation of the debt service burden predicting serious financial problems is provided by Maki (2000), who found that the debt service burden is a statistically significant predictor of current delinquencies and changes in personal bankruptcies.

While ideally, the reduction in the gap between desired and actual borrowing that Lyons found should have enabled consumers who were previously credit constrained to rationally engage in consumption smoothing and to obtain needed durable goods, access to credit also can lead to overspending and financial problems. It is possible that borrowing intended to smooth consumption will result in becoming overextended. Furthermore, a household that is overextended during middle and later years of the life cycle might never accumulate wealth needed in later years.

One question that has not been resolved in the literature is the relationship between credit constraints and the burden of consumer debt on a household. Credit constraints might be a limitation on borrowing, as Lyons (2003) suggested, or credit constraints might reflect overextension and inability to pay. This study attempts to add some perspective to the question of the relationship between the availability of credit as a tool for smoothing spending, on the one hand, and financial difficulties of households that result from high debt, on the other, by analyzing the relationship between being credit constrained and the consumer debt burden of households.

## Literature Review

### Credit Constraints

Research on household credit constraints built upon earlier research on liquidity constraints, the economic concept that a shortage of liquid assets could prevent smoothing of consumption over the life cycle. If a household has sufficient liquid assets to purchase durable goods and smooth consumption by withdrawing funds, it does not have a liquidity constraint. If a household can borrow as much as it desires at low interest rates, it can also freely smooth consumption over the life cycle. Some authors have discussed credit constraints as identical to the economic concept of liquidity constraints. These authors propose that a lack of credit leads to the inability to smooth consumption over the life cycle. As Gross and Souleles (2002) noted, other researchers have defined liquidity constraints as the difference in rates households must pay to borrow money as compared to the rates they earn for savings. Thus, using credit and borrowing to smooth spending is compatible with the basic life cycle model of savings only if the cost to borrow is no more than the earnings from savings. Nevertheless, several authors have used the term "liquidity constrained" as identical to "credit constrained."

Lyons (2003) and Cox and Jappelli (1993) explored the determinants of liquidity constraints, discussing liquidity or borrowing constraints in terms of not being able to obtain as much credit as desired. The conceptualization of borrowing constraints was inspired by Jappelli (1990), especially his choice of the questions related to rejected and discouraged borrowers available in the Survey of Consumer Finances (SCF). In these questions, respondents were asked whether in the past few years they had been turned down for credit, were unable to obtain as much credit as they applied for, or did not apply for credit because they thought they might be turned down. A household that did not get credit or as much credit as desired, but later reapplied and got the full amount desired, was not counted as credit constrained. Those who did not get the amount of credit desired or were turned down were counted as credit constrained.

Lyons (2003) estimated that 19% of the households in the United States were liquidity constrained in 1998, assuming that if not constrained, those households would have the same level of borrowing as the non-constrained.[4] Using the Cox and Jappelli's (1993) definition of a household being borrowing constrained, Lyons concluded that although there had not been large reductions in the number of households who were constrained, as reflected by the responses to those questions, the amount of credit that households obtained increased substantially between 1992 and 1998.

### Debt-Income Burden

The debt service burden has been defined as the ratio of scheduled payments on debt to income. The ratio captures the magnitude of household debt obligations in proportion to earnings. Measures of debt burden have appealed to economists in reporting household indebtedness for some time (e.g., Palash 1979; Paquette 1986; Canner and Luckett 1991; Canner, Kennickell and Luckett 1995; Zandi and Chen 1998; Maki 2000). The concept of debt burden is important to personal finance because the higher the proportion of the household income that must be devoted to fixed obligations, the lower the household's flexibility to deal with emergencies such as decreases in income.

Various methods of measuring consumer debt burden have been proposed. Lytton, Garman and Porter (1991) suggested that debt payments plus auto lease payments be included as part of consumer debt obligations. Proposing several means for measuring the debt burden in households, they suggested guidelines that relate debt service/income ratios to safe levels of household debt. They suggested that a safe debt limit for the consumer debt-service ratio (consumer debt repayments as a portion of disposable income) is 10% or less, that a ratio of 11% to

15% reduces financial flexibility, and a ratio of 16% to 20% signals that the household is fully extended. For the debt-service ratio (consumer debt plus mortgage debt repayment as a portion of disposable income) they suggested that a ratio of less than 30% is safe.

Other authors have proposed higher ratios as reasonable or safe amounts of household debt. Garman and Forgue (1991) stated that a debt service-to-income ratio (total debt repayments as a portion of gross income) under 36% leaves reasonable leeway for other household expenses. Greninger, Hampton, Kitt and Achacoso (1996) surveyed financial planners and financial educators to identify financial ratio benchmarks in household portfolios. Based on the median values of the opinions expressed in their survey, a ratio of 10% or less is an acceptable level for the ratio of non-mortgage debt payment to after-tax income and a ratio of 20% is a danger-point. When debt payments include mortgage debt, the planners and educators responded that 35% is an acceptable ratio and 45% is a danger point. For all households, some have exceeded the acceptable level, as 10.7% of households had total debt payments amounting to over 40% of income in 1992, 13.6% exceeded this level in 1998, 11.8% in 2001, and 12.2% in 2004 (Bucks, Kennickell, & Moore 2006). These rates may understate the potential for problems, because rent is not included in the total debt payment ratio, and therefore renters are less likely to be included in the high debt burden group even though they might have relatively high consumer debt burdens relative to income.

The objective of this study is to investigate the effect of being credit constrained on the consumer debt burden of households. We measure consumer debt burden as the ratio of payments on installment and credit card debt, plus vehicle lease obligations,[5] to income. We have chosen to study the consumer debt burden, as opposed to the total debt burden, which includes mortgage debt, because of the difficulty of making accurate assumptions in comparing the rent burden of renters to that of mortgage holders. Many assumptions need to be made about mortgage payments, and the foundation for those assumptions and some related information is not available in the public dataset that the SCF provides. For instance, the magnitude and purpose of mortgage debt varies considerably according to geographic regions. In some regions, mortgage payments are equivalent to rent. In areas of increasing home values, mortgage payments may be a form of investment. Given our purpose of analyzing all households, a focus on the consumer debt burden is appropriate.

## Methods

The dataset analyzed in this research is the 1998 Survey of Consumer Finances (SCF). We used the 1998 SCF partly for comparison with Lyons (2003) and partly because credit problems appear to have reached a peak in that year (Aizcorbe et al. 2003; Bucks et al. 2006). The survey, sponsored by the Federal Reserve Board, is conducted every three years using a dual frame sampling method that includes both a geographic probability sample and a sample taken from lists of taxpayer households (Bucks et al. 2006; Kennickell 2002).

The SCF data used in this study includes information on various types of consumer credit, including credit cards, lines of credit (including lines of credit secured by real property), automobile loans, automobile leases, education loans, pension loans, life insurance loans, margin loans, and other consumer loans.

### Model of Analysis

The life cycle savings theory implies that households should attempt to smooth consumption, by using accumulated assets or credit. A household that cannot obtain as much credit as desired will be unable to optimally smooth consumption. The previous literature has implicitly assumed that being credit constrained simply limited the household. It is possible, however, that being credit constrained is the result of the household's past credit use, and therefore, rather than limiting optimal consumption smoothing, might limit households from taking on even greater risks with credit. The primary variable of interest is the consumer debt service burden. According to the previous literature on credit constraints, we should expect that credit constrained households should be less likely than otherwise similar unconstrained households to have a high consumer debt service burden. We included demographic variables in the model to determine the effect of life cycle stage and related variables on the consumer debt service burden and to control for factors related to debt.

The model is:

> *Consumer debt service burden = f* (Credit constrained, age, income, education, marital status, household size, presence of children, housing tenure, business ownership, liquid assets, employment status, attitude on installment credit, number of credit cards, attitude on acceptable borrowing, income increase expected, inheritance expected, and income interruption experienced).[6]

Dependent Variable

The dependent variable in the model is consumer debt service burden. We define the consumer debt service burden as the ratio of the annual consumer debt repayment to annual household gross income. The annual consumer debt repayment is the annual combined payments on installment loans and the payments on credit cards. We calculated the payments on installment types of loans by multiplying the number of payments in a year by the amount of each payment. Credit card payments were based on the method used by DeVaney (2000), in which the projected debt payment for the next year is assumed to be equal to the current balance. This method assumes that no additional purchases will be added to the balance and the balance will paid off in one year. The method provides an amount that can be used to compare repayment amounts for credit card debt among consumers, even though it may overestimate the actual payments for consumers making minimum payments on credit card balances.

We chose categorical variables for the analysis instead of using actual ratios for both statistical and practical purposes. The literature on household debt status describes debt in terms of threshold levels, and our research is of more use if we can compare our findings to those levels. Analysis of categorical variables also is appropriate for the data because the ratio of consumer debt payments to income is not normally distributed,[7] ranging from zero to very high values, though primarily clustered around low ratio levels (Figure 1**)**. Because of the violation of the error term assumption, an Ordinary Least Squares regression analysis of the numerical ratio is inappropriate. The relative level of a household's debt service burden, below or above some cutoff, is of more importance than the exact ratio. The approach is similar to that used by McCullagh (1980) and Anderson (1984), who justified using ordinal models on a "grouped continuous" variable, where a continuous variable is classified into groups according to pre-specified range criterion and then treated as a categorical dependent variable in modeling.

Our analysis is based on four distinct levels of burden we defined based on the literature. The four categories, based on increasing levels of severity as represented by the ratio of consumer debt to income, are: No burden (ratio = 0%), low burden (0% to 9.99%), moderate burden (10.0% to 20.0%), and high burden (over 20%). The thresholds levels are based on the discussion in Lytton, Garmen and Porter (1991) and Greninger et al. (1996).

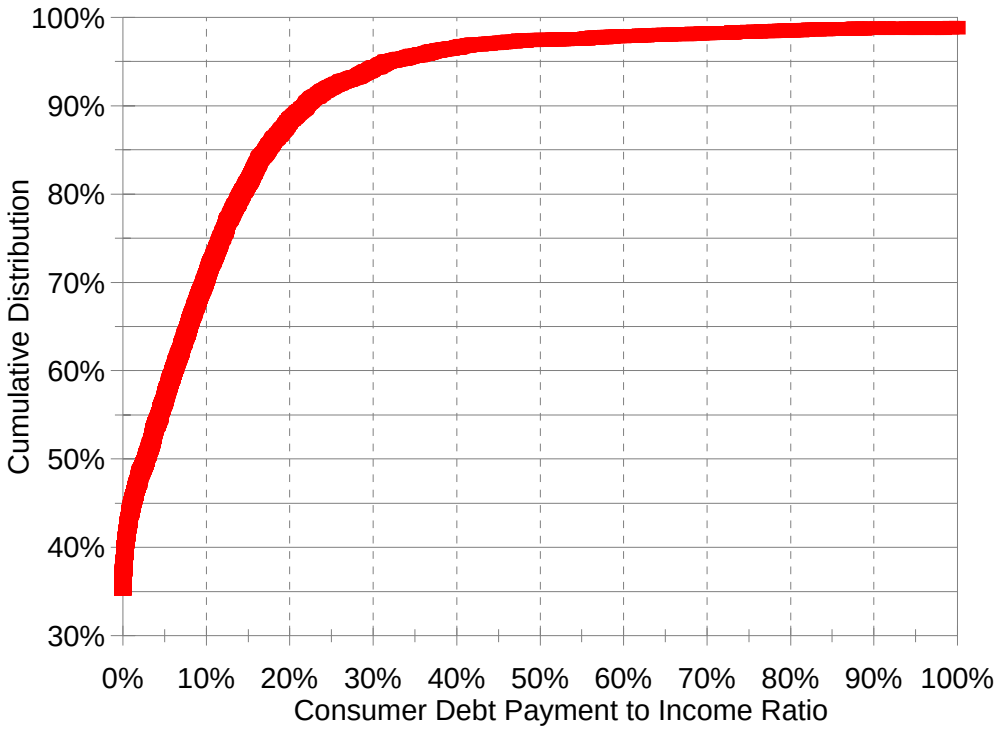
We tested an ordered logit model for the burden levels, but rejected it.[8] We conducted a cumulative logit analysis based on three separate multivariate analyses of the model above, each with a different level of debt to reflect the degree of the debt service burden. We calculated three dummy variables for the dependent variables from combinations of the four debt service burden levels, above. The definitions of the three dependent variables and the coding of the variables are:

Any burden = having a low, moderate, or high debt service burden, which includes all households with a ratio greater than 0. (Coded as any burden = 1, no burden = 0.)

Moderate or high burden = having a debt service burden ratio of 10% or higher. (Coded as moderate or high burden = 1, zero or low burden = 0.)

High burden = having a debt service burden ratio over 20%. (Coded as high burden = 1, zero, low, or moderate burden = 0.)

Figure 1
Cumulative Distribution of the Consumer Debt Service Burden, 1998.




Created by authors based on the 1998 Survey of Consumer Finances

Independent Variables

We chose the independent variables for the model based on theoretical discussions and empirical findings in the literature. Our main consideration in including a variable in the model was its importance in affecting the consumer debt service burden.

Credit constrained. The primary independent variable of interest was whether a household was credit constrained. We counted a household as credit constrained if it reported that in the past five years it had been turned down for credit, was unable to obtain as much credit as applied for, or did not apply for credit because of an anticipated rejection.[9]

Age. To allow for possible non-linear effects of age on the debt burden, we grouped the age of the head into five categories: less than 35 years old, 35-44, 45-54, 55-64, and older than 65 years. We coded the categories as dummy variables and included four of the dummy variables in the regression analysis, leaving "less than 35" as the reference group.

Education. The education of the head was based on the highest degree the head earned. We created five categories of education: "high school dropout" (comprised of those who finished less than grade 12), "high school graduate" (diploma or equivalency test), "Bachelors" (college degree), "graduate school" (a degree beyond college), and "some college" (all others). Four categories of the education variable were included in the regression analysis as dummy variables, with the lowest education level being left out to serve as the reference group.

Marital status. Marital status was based on the head's current marital status in response to the question "What is your current legal marital status? Are you married, separated, divorced, widowed, or have you never been married?" We combined separated, divorced and widowed into a single category called "previously married," and created a dummy variable for that category and the categories of "married" and "never married." We included

"married" and "never married" in the regression analysis, leaving out "previously married" to serve as the reference category.

Household size. For household size, we used the actual number of people in the household, with households of 10 and over being coded as 10.

Child. We created a dummy variable to indicate whether the household has a dependent child younger than 19.

Income. To allow for non-linear and non-monotonic relationships between income and the debt service burden, we segmented 1997 household income into ten levels, each of which were coded into a dummy variable. The deciles were: less than $8,100, $8,100-13,999, $14,000-19,999, $20,000-25,999, $26,000-32,999, $33,000-41,999, $42,000-52,999, $53,000-66,999, $67,000-92,999, and $93,000+. The dummy variables for the nine higher ranges of household income were included in the multivariate analysis and the lowest income group served as the reference category.

Liquid assets. The ratio of liquid assets to monthly income was included in the model. Liquid assets included the total worth of assets in checking accounts, savings accounts, money market deposits, mutual funds, call accounts at brokerage, and certificates of deposit. We created a dummy variable for each of four ratio categories: <1.00, 1.00-2.99, 3.00-5.99 and 6.00 and higher, and included the three higher categories in the analysis and treated the lowest category as the reference group.

Homeownership. Homeownership status was based on the answer to the question "is there a mortgage or land contract on this (home/home and land/apartment/property)?" Households were classified into: owner with a mortgage, owner with no mortgage, and do not own. The two ownership variables were included in the analysis as dummy variables, with "not own" as the reference group.

Employment. Employment status is based on the SCF variable for the household head, which has four categories: "salaried" (works for someone else), "self-employed," "retired," and "unemployed or other." We created four dummy variables, and used "unemployed" as the reference group for the analysis.

Business ownership. Business ownership is a dummy variable indicating whether any member of the household owns or shares ownership in any privately-held business, farm, professional practice, limited partnership or any other type of partnership.

Attitude toward credit. Attitude toward credit use was based on a question of how the respondent feels about buying things on an installment plan: "Good idea," "Good in some ways, bad in others," and "Bad idea." Dummy variables were calculated for each response and included in the analysis with the reference group being "Bad idea."

Credit cards. The number of credit cards in the household was included as the actual total number of credit cards possessed by household members for five categories of cards: bank cards (such as Visa and MasterCard), store cards, gasoline cards, convenience cards (such as American Express), and airline or rental car cards.

Borrowing attitude. Borrowing attitude was based on whether the respondent feels "it is all right for someone like yourself to borrow money" for each of the following five reasons: to cover the expense of a vacation trip, to cover the living expenses when income is cut, to finance the purchase of a fur coat or jewelry, to finance the purchase of a car, or to finance educational expenses. Based on the planning horizon and the purpose, we collapsed the five categories to three: "Luxury" (vacation trip, fur coat, and jewelry), "Long-term utility" (education and car), and "Living expenses" (when income is cut).

Income growth. This variable reflects the respondent's expectation as to whether household income in the next year will go up: "more than prices," "less than prices," or "about the same as prices." Dummy variables were created for each response category, with two included in the analysis, and "less" as the reference category.

Expect to inherit. This variable is a dummy variable that reflects whether the head or spouse expects any substantial inheritance or transfer of assets in the future.

Unemployed in past year. This dummy variable indicates whether a currently employed head was unemployed and looking for work at any time during the past year.

Multivariate Analysis Procedure

Because of the ordered nature of the categories of the dependent variable, we considered using an ordered logit (proportional odds logit) to analyze our research models. We rejected using this method in favor of a cumulative logit model In view of the ordinal nature of the dependent variable, a cumulative logit model enabled the analysis of "at or above category *m*" versus "below *m*" for each possible value of the ordinal variable. If the ordinal variable has *J* values, there will be *J*-1 cumulative logits:

$$\log it[P(Y \le m)] = \log(\frac{P(Y \le m)}{1 - P(Y \le m)}), \qquad \text{where } m=1,\ldots, J\text{-}1$$

With a vector of predicator *X*, the estimation of an ordered logit model becomes

$$\log it[P(Y \le m)] = \alpha_m + \beta_m X, \qquad \text{where } m=1,\ldots, J\text{-}1$$

Therefore, we formed three separate cumulative logit models. The three separate cumulative logit models essentially are three binary logistic models:

$$\log it(Y \le 1) = \log\left(\frac{Y \le 1}{Y > 1}\right) = \alpha_1 + \beta_1 x \ ;$$

$$\log it(Y \le 2) = \log\left(\frac{Y \le 2}{Y > 2}\right) = \alpha_2 + \beta_2 x \ ; \text{ and}$$

$$\log it(Y \le 3) = \log\left(\frac{Y \le 3}{Y > 3}\right) = \alpha_3 + \beta_3 x$$

where 1, 2, and 3 correspond to the zero, 10%, and 20% cutoff points in the consumer debt burden ratios. We thus treat the research question as a comparison of the different magnitudes of effect of the predictors on each cumulative odds ratio, contrasting a relatively lower group to a higher group in the debt burden level.

Because of the multiple implicate design of the Survey of Consumer Finances, we used the repeated imputation inference (RII) method with the logit analyses (Montalto and Yuh 1998).

## Findings

Credit-Constrained Households

A household is credit constrained if, during the past five years, it applied for credit and was turned down, applied and did not receive as much credit as desired, or not apply for credit because it anticipated being turned down. We found that 28.5% of households in the 1998 SCF were credit-constrained[10] (Table 1). These credit-constrained households differed from non-constrained households in terms of their level of consumer debt service burden as well as demographic characteristics.

Based on life cycle savings theory, a household that is credit constrained would not be able to borrow to smooth spending over the life cycle. However, we found high debt service burden levels among the credit constrained, indicating that credit constrained persons at some time had access to credit and currently have relatively high levels of payment on credit debt. Although they may be credit constrained at the present, the high level of debt service burden among credit constrained households indicates that they have obtained credit in the past. The consumer debt service burden (ratio of annual consumer debt payments to annual income) of the constrained households was significantly greater than the burden of the non-constrained households, with a mean ratio of 66.2 versus 11.3, and a median ratio of 0.08 versus 0.01 (Table 1). The heads of constrained households were substantially younger than their non-constrained counterpart, 39 years old versus 56, had significantly lower annual incomes, $38,522 compared to $57,787, and possessed considerably less liquid assets as well, $6,824 versus $26,665. Constrained households were larger than non-constrained (median of 3 compared to median of 2) and were less likely to have a dependent child in the home. Recent inability to obtain credit was reflected in the number of credit cards held by the household, as constrained households had fewer credit cards (3) than non-constrained households (3.7).

Table 1.
Descriptive Statistics of Credit Constrained and Non-constrained Households.

| | Credit constrained* | | Non-constrained** | | | |
|---|---|---|---|---|---|---|
| | 28.5% | | 71.5% | | p-value | |
| Variable | Mean | Median | Mean | Median | T-test | Non-parametric test |
| Total debt | $ 46,331 | $ 16,200 | $ 49,625 | $ 11,900 | NS | 0.07 |
| Annual total debt payment | $ 8,593 | $ 4,680 | $ 8,026 | $ 3,647 | NS | NS |
| Consumer debt | $ 17,639 | $ 7,000 | $ 14,230 | $ 1,300 | NS | <.0001 |
| Annual consumer debt payment | $ 4,707 | $ 2,600 | $ 3,246 | $ 250 | NS | <.0001 |
| Total debt service burden | 118.90 | 0.16 | 19.40 | 0.10 | NS | <.0001 |
| Consumer debt service burden | 66.20 | 0.08 | 11.30 | 0.01 | NS | <.0001 |
| Age | 39 | 38 | 53 | 51 | <.0001 | <.0001 |
| Family income | $ 38,522 | $ 30,000 | $ 57,787 | $ 36,000 | 0.02 | <.0001 |
| Liquid assets | $ 6,824 | $ 1,000 | $ 26,665 | $ 5,000 | <.0001 | <.0001 |
| Household size | 2.9 | 3.0 | 2.4 | 2.0 | <.0001 | <.0001 |
| Number of children | 1.0 | 1.0 | 0.5 | 0.0 | <.0001 | <.0001 |
| Number of credit cards | 3.0 | 2.0 | 3.7 | 3.0 | <.0001 | <.0001 |

NS = non-significant
All dollar amounts are in 1997 dollars.

Consumer Debt Service Burden

We established four distinct levels of consumer debt service burden ratios to compare relative level of the burden among households: No Burden, Low Burden, Moderate Burden, and High Burden. There is a significant relationship between the debt service burden and being credit constrained. Only 14.8% of households with no debt burden were credit constrained, while 46.7% of households with a high debt service burden were credit constrained (Table 2, part A). Only 8.7% of unconstrained households had a high debt service burden, while 19.1% of constrained households had a high debt service burden (Table 2, part B).

Of all households, 29.5% of households had a moderate or high burden level (Table 3). Age of the head was related to debt burden, with 17.1% of households under 35 having a high debt burden, compared with 10.0% of those age 55 to 64. Households with income under $20,000 per year had 17% or higher rates of having a high debt service burden, while only 11.0% of those with incomes of $33,000 to $42,999 had a high debt service burden. Households headed by somebody with some college but no degree were the most likely to have a high debt service burden. Renters were more likely than owners to have a high debt service burden. Households who felt it was acceptable to borrow for luxuries were more likely to have a high debt service burden

Table 2
Credit Constraint by Debt Burden Category

A. Percent Credit Constrained in Each Debt Burden Level

| Debt Burden Level | Not Credit Constrained | Credit Constrained | Total |
|---|---|---|---|
| No debt burden | 85.25% | 14.75% | 100% (N=1517.1) |
| Low debt burden (0%<debt burden ratio < 10%) | 69.10% | 30.90% | 100% (N=1516.2) |
| Moderate debt burden (10%≥debt burden ratio ≤ 20%) | 60.96% | 39.04% | 100% (N=770.74) |
| High debt burden (debt burden ratio>20%) | 53.29% | 46.71% | 100% (N=500.96) |

The N for each debt burden category is the weighted number of households.

B. Percent in Each Debt Burden Level by Credit Constraint

| Debt Burden Level | Not Credit Constrained | Credit Constrained |
|---|---|---|
| No debt burden | 42.02% | 18.23% |
| Low debt burden (0%<debt burden ratio < 10%) | 34.04% | 38.18% |
| Moderate debt burden (10%≥debt burden ratio ≤ 20%) | 15.27% | 24.52% |
| High debt burden (debt burden ratio>20%) | 8.67% | 19.07% |
| Total | 100% (N= 3077.78) | 100% (N=1227.22) |

The N for each credit constraint category is the weighted number of households.
Chi-Square statistic = 268.58 ($p<0.0001$) for N=4305.

Consumer Debt Service Burden Cumulative Logit Model

We tested the model of consumer debt service burden using cumulative logit with three separate logit regressions, each with a different level of debt service burden as the dependent variable. The three levels were: Any burden (any of the three levels of burden versus no burden) Moderate burden (moderate or high burden versus no or low burden) and high burden (high burden versus no, low, or moderate burden). The parameter estimates, chi-square statistics, and p-value of the three separate cumulative logistic regressions are shown in Table 3.

There is a significant and positive effect of credit constraints on the probability of a household having other than a zero burden. The odds ratio of constrained households having debt repayments is 2.3, indicating that the predicted odds ratio is over twice as high as the odds ratio for otherwise similar unconstrained households.

Being credit constrained also has significant and positive effects in the other two regressions with higher burden levels. The odds ratio for households with credit constraints falling in the moderate-high burden category is 1.8, indicating a substantial effect compared to otherwise similar households who were not constrained. The odds ratio for households with credit constraints falling into the high burden level versus lower levels is about 1.9, compared to otherwise similar non-constrained households.

Table 3
Distribution of Independent Variables by Consumer Debt Service Burden Levels.

| Variables | Zero burden | Low burden (0.01% to 9.99%) | Moderate burden (10.00%-20.00%) | High burden (>20%) |
|---|---|---|---|---|
| % of total | 35.24 | 35.22 | 17.90 | 11.64 |
| Age of the head* | | | | |
| Less than 35 | 26.13 | 35.73 | 21.07 | 17.06 |
| 35-44 | 22.65 | 43.93 | 21.69 | 11.73 |
| 45-54 | 25.46 | 41.02 | 22.31 | 11.21 |
| 55-64 | 34.69 | 38.08 | 17.23 | 10.00 |
| 65 and over | 69.12 | 17.38 | 6.37 | 7.13 |
| Family income* | | | | |
| $0-8,099 | 64.06 | 13.29 | 4.96 | 17.69 |
| $8,100-13,999 | 55.87 | 21.70 | 5.10 | 17.34 |
| $14,000-19,999 | 42.47 | 25.14 | 14.26 | 18.13 |
| $20,000-25,999 | 37.82 | 29.60 | 19.32 | 13.26 |
| $26,000-32,999 | 27.87 | 33.87 | 25.32 | 12.94 |
| $33,000-41,999 | 27.67 | 35.52 | 25.85 | 10.97 |
| $42,000-52,999 | 23.23 | 45.87 | 22.20 | 8.70 |
| $53,000-66,999 | 23.76 | 40.03 | 26.45 | 9.76 |
| $67,000-92,999 | 24.03 | 50.14 | 21.67 | 4.16 |
| $93,000+ | 28.05 | 55.30 | 12.39 | 4.26 |
| Education level of the head* | | | | |
| Less than High school | 52.96 | 24.16 | 13.40 | 9.48 |
| High school diploma or GED | 38.17 | 32.17 | 18.13 | 11.54 |
| Some college | 25.57 | 37.98 | 21.72 | 14.73 |
| Bachelor's degree | 26.38 | 42.22 | 19.08 | 12.32 |
| Graduate or professional degree | 35.03 | 44.14 | 13.43 | 7.41 |
| Marital Status* | | | | |
| Alone | 45.66 | 27.69 | 14.24 | 12.40 |
| Married | 27.98 | 40.90 | 20.02 | 11.10 |
| Single | 39.64 | 31.04 | 17.39 | 11.93 |
| Household size* | | | | |
| 1 | 50.77 | 26.41 | 13.42 | 9.40 |
| 2 | 38.68 | 31.24 | 18.30 | 11.78 |
| 3-5 | 23.35 | 43.11 | 20.66 | 12.87 |
| 6+ | 23.40 | 49.12 | 14.72 | 12.75 |
| Presence of non-adult child(ren)* | 22.32 | 43.40 | 21.17 | 13.11 |

Table 3 (continued)

| Variables | Zero burden | Low burden (0.01% to 9.99%) | Moderate burden (10.00%-20.00%) | High burden (>20%) |
|---|---|---|---|---|
| Residential Status* | | | | |
| Owner with mortgage | 19.93 | 44.68 | 23.38 | 12.01 |
| Owner with no mortgage | 56.37 | 25.34 | 10.96 | 7.33 |
| Renter | 38.43 | 31.01 | 16.19 | 14.37 |
| Business ownership* | 24.38 | 40.74 | 20.80 | 14.09 |
| Liquid assets/monthly income ratio* | | | | |
| <1 | 29.48 | 36.09 | 21.05 | 13.39 |
| 1-3 | 25.91 | 43.53 | 18.71 | 11.85 |
| 3-6 | 33.21 | 40.15 | 17.25 | 9.39 |
| 6+ | 64.11 | 20.25 | 7.88 | 7.49 |
| Employment Status* | | | | |
| Self-employed | 27.36 | 38.56 | 19.23 | 14.85 |
| Salary earners | 22.86 | 41.59 | 22.77 | 12.78 |
| Retired | 67.08 | 19.55 | 6.55 | 6.83 |
| Unemployed | 56.33 | 24.16 | 9.06 | 10.44 |
| Credit general use opinion* | | | | |
| For | 25.92 | 39.02 | 21.75 | 13.31 |
| Mixed | 35.78 | 35.32 | 17.59 | 11.31 |
| Against | 42.86 | 31.83 | 14.76 | 10.55 |
| Number of credit cards* | | | | |
| zero | 60.94 | 18.33 | 11.39 | 9.34 |
| 1-5 | 27.18 | 41.22 | 20.03 | 11.57 |
| 6-10 | 23.23 | 43.49 | 19.99 | 13.29 |
| 10+ | 19.94 | 38.96 | 23.37 | 17.74 |
| Borrow for Investment* | 35.39 | 35.92 | 18.93 | 9.76 |
| Borrow for Unexpected* | 34.13 | 34.83 | 17.53 | 13.69 |
| Expectation on income growth compared to price* | | | | |
| More | 24.71 | 41.16 | 19.99 | 14.14 |
| Same | 36.42 | 47.94 | 17.74 | 10.52 |
| Less | 42.12 | 30.17 | 16.26 | 11.45 |
| Expect to inherit*: Yes | 21.24 | 44.27 | 21.08 | 13.41 |
| No | 37.45 | 33.84 | 17.35 | 11.36 |
| Unemployed in last 12 months*: Yes | 35.77 | 34.99 | 18.06 | 11.18 |
| Unemployed in last 12 months: No | 31.84 | 36.92 | 16.22 | 15.01 |

* Chi-square test significant at 0.001 level. Weighted to represent U.S. population
All dollar amounts are in 1997 dollars.

Table 4
Cumulative Logit Analyses of Consumer Debt Burden Levels.

| | Non-zero versus zero burden | | Moderate-high versus zero-low burden | | High vs. Zero-low-moderate | |
|---|---|---|---|---|---|---|
| Variables | Coefficient | Log odds | Coefficient | Log odds | Coefficient | Log odds |
| Intercept | -2.154*** | | -2.060*** | | -2.438*** | |
| Credit constrained | 0.836*** | 2.308 | 0.604*** | 1.829 | 0.624*** | 1.866 |
| Age of the head (Reference category=Less than 35) | | | | | | |
| 35-44 | 0.025 | 1.025 | -0.134 | 0.874 | -0.203 | 0.816 |
| 45-54 | -0.008 | 0.992 | -0.081 | 0.922 | -0.206 | 0.814 |
| 55-64 | -0.009 | 0.991 | -0.179 | 0.836 | -0.094 | 0.910 |
| 65 and over | -0.502** | 0.606 | -0.410* | 0.664 | -0.200 | 0.819 |
| Household income (Reference category= less than $8100 | | | | | | |
| $8,100-13,999 | 0.355 | 1.426 | -0.097 | 0.907 | -0.194 | 0.824 |
| $14,000-19,999 | 0.679** | 1.972 | 0.025 | 1.025 | -0.536 | 0.585 |
| $20,000-25,999 | 0.673** | 1.960 | -0.085 | 0.919 | -1.068*** | 0.344 |
| $26,000-32,999 | 0.947*** | 2.577 | 0.072 | 1.075 | -1.117*** | 0.327 |
| $33,000-41,999 | 0.774*** | 2.168 | -0.159 | 0.853 | -1.591*** | 0.204 |
| $42,000-52,999 | 1.021*** | 2.776 | -0.456* | 0.634 | -1.719*** | 0.179 |
| $53,000-66,999 | 0.708** | 2.029 | -0.476* | 0.621 | -1.93*** | 0.145 |
| $67,000-92,999 | 0.706** | 2.027 | -0.852*** | 0.427 | -2.629*** | 0.072 |
| $93,000+ | 0.248 | 1.282 | -1.617*** | 0.198 | -2.946*** | 0.053 |
| Education of the head (Reference category= less than high school diploma) | | | | | | |
| High school diploma/GED | 0.116 | 1.123 | 0.136 | 1.146 | 0.239 | 1.270 |
| Some college | 0.513** | 1.670 | 0.392** | 1.481 | 0.654** | 1.922 |
| Bachelor's degree | 0.290 | 1.336 | 0.294 | 1.342 | 0.662** | 1.938 |
| Graduate or professional degree | -0.047 | 0.954 | -0.037 | 0.964 | 0.374 | 1.454 |
| Marital status (Reference category=divorced/widowed) | | | | | | |
| Married | 0.090 | 1.094 | 0.201 | 1.222 | 0.145 | 1.156 |
| Never married | -0.376** | 0.687 | -0.229 | 0.795 | -0.448* | 0.639 |
| Household size | 0.062 | 1.064 | -0.062 | 0.940 | -0.002 | 0.998 |
| Presence of children under age 18 | -0.113 | 0.894 | -0.016 | 0.984 | -0.060 | 0.942 |
| Housing status (Reference category = rent home) | | | | | | |
| Owner with mortgage | 0.423*** | 1.527 | 0.335** | 1.398 | 0.222 | 1.249 |
| Owner with no mortgage | -0.253* | 0.777 | -0.114 | 0.892 | -0.234 | 0.791 |
| Business ownership | 0.093 | 1.098 | 0.301* | 1.351 | 0.501** | 1.650 |
| Liquid assets/monthly income ratio (Reference group = <1) | | | | | | |
| 1-3 | -0.023 | 0.977 | -0.143 | 0.867 | -0.010 | 0.990 |
| 3-6 | -0.278* | 0.757 | -0.196 | 0.822 | 0.001 | 1.001 |
| 6+ | -0.797*** | 0.451 | -0.375** | 0.687 | 0.034 | 1.035 |
| Employment status of head (Reference category=unemployed) | | | | | | |
| Self-employed | 0.633*** | 1.884 | 0.625** | 1.868 | 0.883*** | 2.417 |
| Salary earners | 0.911*** | 2.487 | 0.720*** | 2.055 | 0.715** | 2.045 |
| Retired | 0.329 | 1.389 | 0.222 | 1.249 | 0.380 | 1.463 |

| | Non-zero versus zero burden | | Moderate-high versus zero-low burden | | High vs. Zero-low-moderate | |
|---|---|---|---|---|---|---|
| Variables | Coefficient | Log odds | Coefficient | Log odds | Coefficient | Log odds |
| Attitude toward credit | | | | | | |
| For | 0.546*** | 1.727 | 0.301** | 1.351 | 0.207 | 1.230 |
| In-between | 0.200* | 1.222 | 0.066 | 1.068 | -0.009 | 0.991 |
| Number of credit cards | 0.092*** | 1.097 | 0.070*** | 1.072 | 0.092*** | 1.096 |
| Borrowing orientation | | | | | | |
| Borrow for unexpected | -0.058 | 0.944 | -0.012 | 0.988 | 0.040 | 1.041 |
| Borrow for long-term | 0.596*** | 1.815 | 0.505** | 1.657 | 0.197 | 1.218 |
| Expectation on income growth compared to prices (reference category = increase less) | | | | | | |
| Up more | 0.189 | 1.209 | -0.093 | 0.911 | -0.071 | 0.932 |
| The same | 0.088 | 1.092 | -0.032 | 0.969 | -0.087 | 0.917 |
| Expect to inherit | 0.042 | 1.043 | 0.036 | 1.037 | 0.052 | 1.053 |
| Unemployed in last 12 months | 0.350* | 1.419 | 0.037 | 1.037 | 0.070 | 1.073 |

Note:

* p<0.05, ** p<0.01, *** p<0.001

All dollar amounts are in 1997 dollars.

The other independent variables were included in the logits to control for factors plausibly related to the consumer debt burden level. As income increases, the chance of being in the high burden level instead of lower levels generally increases. Households with a head who had a bachelor's degree or some college are more likely to be in the highest consumer debt burden level than households with a head who had not graduated from high school. Households with employed or self-employed heads are more likely to be in the highest level than households with unemployed heads. Business owning households are more likely to be in the highest level than those that did not own a business. The chance of being in the highest consumer debt burden level increases with the number of credit cards. Attitudinal variables and other variables did not have significant effects on the chance of being in the highest burden level, although some of these other variables had significant effects on being in the moderate-high level versus lower levels or in the non-zero burden level versus the zero burden level.

## Summary and Implications

This research collapses the consumer debt service burden into levels representing zero, low, moderate, and high levels of burden. Considering all types of consumer debt, the guidelines in the literature suggest a safe threshold at 10% and a danger level if consumer debt payments are over 20% of income. In 1998, 70% of households were under the safe and 88% were under the danger level. Overall, credit-constrained households represented over 28% of U.S. households. Multivariate analysis revealed that the presence of credit constraints in a household has a statistically significant relationship with the debt service burden. Credit constrained households have almost 1.9 times the odds of being highly burdened as otherwise similar households that are not constrained. This result suggests that, rather than credit constraints limiting desired credit, as implied by Lyons (2003), constraints might be the result of past credit use. Ideally, longitudinal datasets might allow for more sophisticated analyses of this issue.

Getter (2003) asserted that unexpected negative events lead to household delinquency. As unpredictable and uncontrollable as the external environment is, households should be cautious in taking on debt. Households that maintain a low or moderate burden will have greater flexibility in handling expenses if income drops or some other negative event occurs. Households that have been turned down for credit seem to be at particular risk of having a high debt burden, and should be educated about the possible negative consequences of debt payments being a high portion of their budgets.

The increased access to credit estimated by Lyons (2003), rather than improving household well being as she proposed, may well have worsened the financial situation for some households, given our finding that all other things equal, credit constrained households are more likely to be above the recommended safe level in terms of the

consumer debt burden. Consumer educators and policy makers should take these findings into account in terms of educational programs and policies related to credit.

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4. Based on one traditional definition of liquidity constraints, not having enough liquid assets to buy desired durable goods or to engage in optimal consumption smoothing, a much higher percent of households in the United States are liquidity constrained than are credit constrained. Using the 1998 Survey of Consumer Finances, we estimate that 72% of U.S. households had liquid assets (including certificates of deposit) amounting to less than three months income, compared to Lyons' estimate of 19% being credit constrained.
5. Leasing and purchasing vehicles essentially differ concerning the title and the ownership, but not in terms of the means or the amount of regular payment. Therefore, the lease payment is included in the debt payment calculation. Getter (2003) and Lytton et al. (1991) included lease payments in their debt burden measures.
6. We did not include race categories as independent variables, partly because race might be reflected in the credit constraint variable (Lyons 2003). However, even though not in the model for theoretical reasons, we tested our multivariate analyses with the inclusion of race variables, and none of the race variables had significant effects on credit burdens.
7. A formal normality test using the Kolmogorov-Smirnov test statistics rejects the normal distribution assumption.
8. A Score test was performed for the proportional odds (ordered) logit, and rejected the model. The test statistics and p-value of a Score test are part of the output when using PROC LOGISTIC in SAS©. If a Score test is non-significant, the parallel assumption is considered appropriate, otherwise, it is not appropriate to fit a proportional odds model as in this case.
9. The questions used for the credit constraint variable are (from the 1998 SCF codebook):

   X7131 Have you applied for any type of credit or loan in the last five years?]
   1. *YES
   5. *NO

   X407 In the past five years, has a particular lender or creditor turned down any request you made for credit, or not given you as much credit as you applied for?]
   (PROBE: Turned down, or not as much credit?)
   IF TURNED DOWN AND NOT AS MUCH CREDIT, ASK WHICH IS MORE RECENT
   1. *Yes, turned down
   3. *Yes, not as much credit
   5. *No
   0. Inap. (no credit application in previous 5 years: X7131=5)

   Was there any time in the past five years that you thought of applying for credit at a particular place, but changed your mind because you thought you might be turned down?
   1. *YES
   5. *NO
10. Our result that 28.5% of households were credit constrained differs from Lyons (2003) result that 19.3% were credit constrained, because she did not include in that category households that reported that they later received the amount of credit they had desired when they reapplied later.