

**Keeping Up With the Joneses:
The Effect of Income Inequality on Demand for
Consumer Credit**

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2003/67/MKT

(Revised Version of 2002/84/MKT)

Working Paper Series

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July 11, 2003

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Abstract

The provision of financing options to stimulate consumption has become a pervasive and important strategic marketing tool. While many firms are increasingly deriving more profit from financing than selling products, this has coincided with an increase in household debt relative to disposable personal income from about 60% in 1980 to 90% in 2000. Using quarterly U.S. data for 1980–2000, we empirically examine the effect of income inequality on debt relative to disposable personal income and find a strong effect. We argue that rising income inequality induces households with smaller gains to increase borrowing to maintain social position.

Key Words: Financing Plans, Consumer Credit, Income Inequality, Conspicuous Consumption.
JEL Classification: D12, G29, J31, M30.

Financing plans have become a pervasive marketing tool to attract customers and stimulate consumption. Advertising for cars, furniture, electronic goods, jewelry and other consumer durables has increasingly emphasized terms of such plans rather than product benefits. Despite the relatively high extra cost of financing, such options have become very popular. In recent years, many sellers of consumer durables such as electronics retailers have derived as much or even more profit from their financing operations than from their products.¹ In keeping with this increase in the availability of financing options, between 1980 and 2000, total household debt relative to disposable personal income (DPI) soared from 61% to 90%. Over the same time period, the per capita rate of personal bankruptcy filings quadrupled.² With these two trends in mind, the objective of this paper is to examine factors that drive consumers' use of debt to finance consumption. Of particular interest to this study is the effect of income inequality on consumer borrowing.

The rapid increase in household debt and personal bankruptcies during a period of strong economic growth has attracted a lot of attention and numerous explanations have been offered. To some, this "debt puzzle" is a consequence of the healthy economy. Rising wealth allows consumers to borrow more. This effect is amplified by the increase in the number of families due to the aging of baby boomers. According to the life-cycle hypothesis (Ando and Modigliani 1963), people between 25 and 45 years of age borrow the most. Others argue that the increase in borrowing may be driven by growing income inequality. Consistent with the permanent income theory (Friedman 1957), lower income households use debt to keep consumption constant and maintain their standard of living in the face of declining real incomes. Other accounts, especially in marketing, focus on the increased availability of credit cards (Soman 2000; Soman and Cheema 2002). While such factors and financial deregulation certainly play a role, it is difficult to accept any one of them or all of them together as sufficient explanation for the dramatic rise in both the debt-to-income ratio and the personal bankruptcy rate (Kowalewski 2000). Hence, more research is needed to better understand the factors behind the popularity of financing plans.

In this paper we focus on increasing income inequality as a possible contributing factor because it is another important economic trend that has emerged over the last two decades. Income for high earners relative to medium or low earners has increased significantly for U.S. women since 1984 and for U.S. men since 1980 (Gottschalk 1997; Katz and Autor 1999). Most research related to income inequality has focused on confirming the trend and attempting to describe why the gap has been widening (e.g., Lee 1999). Little attention has been paid to implications of this trend for marketers. While income inequality has increased over the last two decades, it is however, not the case that a significant fraction of households has experienced a real income decline. During the 1980s, and in particular the 1990s, even the lowest wage earners experienced real income gains, albeit small ones. If real income did not decline, it is difficult to explain a link between income inequality and consumer borrowing with the permanent income theory. Rather than maintain an absolute level of lifestyle, the data suggest that consumers are actually trying to improve their lifestyles (i.e., they are increasing consumption) beyond what can be explained by their own income gains.

Despite anecdotal evidence of its importance (see Frank and Cook 1995), there is little empirical evidence for this potentially intriguing relationship between income inequality and consumer borrowing (Krueger and Perri 2002). Using quarterly US data for the years 1980 to 2000, we find a strong positive effect of income inequality on total household debt as well as on the different types of debt (i.e., mortgage debt and consumer credit, which further consists of credit card debt and non-revolving debt), even after controlling for a number of other factors. The effect of income inequality is not only statistically significant, but also economically highly relevant. For example, consumer borrowing is more sensitive to changes in income inequality than to changes in interest rates. Most important for marketers, we find that the level of non-revolving debt, which is primarily used to finance consumer durable purchases (e.g., car loans), is affected most by income inequality.

While this effect cannot be explained by the permanent income theory (Friedman 1957), it is, alternatively, consistent with the idea that people care about their social standing within a

community, which is maintained or increased through *conspicuous* or *positional* consumption (Veblen 1899). Since the effect of such consumption depends on the level of consumption and thus on the income of others, rising income inequality should lead to reduced savings and more borrowing by those who experience no or smaller income gains to “keep up with the Joneses” (Frank and Cook 1995). Moreover, since the ‘race’ for increased social standing can have only few ‘winners’, the need for conspicuous consumption also explains the greater (financial) risk taking on the part of consumers (Gaba and Kalra 1999).

Despite the success of offering financing options to consumers, little empirical research exists to explain this trend. The importance of social effects on consumption has long been advocated in marketing (e.g., Levy 1959; Grubb and Grathwohl 1967; Belk 1985), but its economic relevance has not always been considered. By empirically examining the relationship between income inequality and consumer borrowing, this paper links two important economic phenomena and has implications not only for marketers but also for public policy.

The rest of the paper is organized as follows. First, we review data about household debt, income inequality and consumption and discuss existing explanations for the debt puzzle. In Section 2, we develop an empirical model and in Section 3 we provide the estimation results for the effect of income inequality on total household debt as well as individual debt components. This also includes analyses to assess the robustness of the results and the relative importance of the income inequality effect. The theoretical argument for this strong empirical effect on consumers’ willingness to increase debt *and* take more financial risks is presented in Section 4. To further support the proposed effect of conspicuous consumption and to rule out alternative explanations for our empirical findings, we present results from several additional analyses in Section 5. Concluding remarks are provided in Section 6.

1. Trends in Household Finances

Household debt as a percentage of disposable personal income (DPI) increased rapidly in the 1950s after World War 2, but then stayed relatively constant between 50% and 60% until the

early 1980s. Figure 1a plots total household debt and its primary components, mortgage debt and consumer credit, relative to DPI since 1952. (The shaded areas in Figures 1 to 6 indicate periods of recession.) Mortgage debt accounts for most of the recent increase in household debt. In 2000 it accounted for 78% of total household debt, up from 66% in 1980. In contrast, consumer credit relative to DPI has remained relatively stable. While increasing real estate prices partially explain the increase in mortgage debt, another significant use of mortgage debt is the refinancing of consumer credit. Within consumer credit, however, there is a striking trend between non-revolving, i.e., installment credit such as car loans, and revolving credit, the bulk of which is made up by credit card debt (see Figure 1b).³ Since 1982 as the household debt level soared, the savings rate relative to DPI declined (see Figure 2). In contrast, there was no such decline during the earlier increase in household debt.

[INSERT FIGURES 1 – 3 HERE]

Figure 3 shows the growth in total consumer credit along with the growth in expenditures for consumer durables per capita. The two series are highly correlated indicating that consumer credit is largely used to finance purchases of consumer durables. According to Figure 3, consumer credit grew most quickly when the economy came out of a recession, which suggests that the primary use of consumer credit is not as a “bridge” to get households through tough times as suggested by the permanent income theory.

Next, Figure 4 shows the trend in income inequality. Specifically, it depicts the Gini-Index, which is a frequently used measure of income inequality.⁴ Overlaid in Figure 4 is the household debt ratio from Figure 1a. Figure 5 shows the change in real wages (in 1996-dollars) for three different income groups over the last two decades. It illustrates that the incomes at the higher end of the income distribution have increased more rapidly than those at the lower end. More importantly, it shows that, on average, real wages have increased even at the lower end.

Finally, Figure 6 shows the number of personal bankruptcy filings in the U.S. for 1980 to 2000.⁵ Overlaid in Figure 6 is the household debt ratio from Figure 1a to indicate the correlation between the two time series. The number of personal bankruptcy filings has increased during all

but one economic expansion in the post-WWII period. The rate has trended upward particularly strongly in the 1980s and 1990s, with modest declines following recessions.⁶

[INSERT FIGURES 4 – 6 ABOUT HERE]

One set of explanations for the rapid increase in the household debt level over the last two decades focuses on the deregulation of financial markets, which has dramatically expanded the supply of credit. The most obvious sign of deregulation is the widespread availability of credit cards. In 2000, U.S. consumers held about 1.4 billion credit cards or roughly 9 cards per holder.⁷ These cards are not just used as a convenient payment mechanism. According to data from the Survey of Consumer Finances (SCF), at any given point over 60% of all households with credit cards are borrowing (i.e., paying interest) on those cards. While pervasive, credit cards are not the only convenient means to borrow against future income to finance current consumption. As mentioned earlier, financing plans have become an effective and profitable marketing tool for many sellers of consumer durables. One shortcoming of credit supply-side explanations is the fact that the extra cost incurred from financing (e.g., credit card interest rates, refinancing charges) has remained very high despite competition among credit suppliers and declining federal funds rate (Ausubel 1991; Bennett et al. 1998). This suggests that strong credit demand-side effects must exist as well.

Existing demand-side explanations also focus on the effect of credit availability, especially due to credit cards. Consumer advocacy groups point to the credit industry's aggressive marketing practices.⁸ The consumer is portrayed as a victim lost in 3.5 billion credit card solicitations per year, which all appear to offer money for free. The availability of credit cards does indeed affect consumer behavior. Experimental evidence shows that consumers using credit cards spend more for otherwise identical products than those using cash or checks (e.g., Feinberg 1986; Soman 2000).⁹ Hyperbolic time preferences combined with the ease of borrowing through credit cards offer another explanation for the high outstanding amount of credit card debt (Laibson et al. 2000). According to the credit industry, a driving factor for the high level of debt and the rate of personal bankruptcy filings is the ease with which consumers

can walk away from their financial obligations by filing for personal bankruptcy (e.g., Johnston 1998). The argument is that the shame or stigma that has traditionally been attached to debt and bankruptcy has diminished (Gross and Souleles 2002; Fay et al. 2002).¹⁰ Consumer naïveté and malice may contribute to increased borrowing and bankruptcy rates in individual cases, but they cannot account for the entire trend. As shown in Figure 1b, credit card borrowing has increased significantly over the last two decades, but still accounts for only about 10% of outstanding debt.

Finally, there are two contradictory views about the effect of economic growth. One view sees the rise in household debt as a natural consequence of a strong economy where rising household wealth due to appreciating real estate prices and booming stock markets have significantly increased the capacity to borrow. In fact, household net worth relative to disposable personal income increased between 1980 and 2000 from 470% to 590%. Moreover, the entry of baby boomers into the family formation stage (the aging of baby boomers led to an increase in the share of population between 25 and 45 years of age) caused a demographic shift that amplified the ‘wealth’ effect (Morgan and Toll 1997). According to the life-cycle hypothesis (Ando and Modigliani 1963), people in this age group tend to borrow the most. However, the wealth effect cannot account for the simultaneous increase in personal bankruptcy filings (see Figure 6). This phenomenon indicates that consumers have not only borrowed more, but also taken much greater financial risks.

An alternative view points to growing income inequality as a determinant of both the debt and bankruptcy trends. Downsizing, displacement of workers from high-paying manufacturing jobs into low-wage service sector jobs, and a lack of health insurance are seen as primary drivers of rising debt levels and financial distress (e.g., Sullivan et al. 2000). The “losers” in the economy are forced to go (more) into debt to maintain their standard of living. The development of credit markets has greatly facilitated this process (Krueger and Perri 2002). The problem with this argument is that few people experienced real income declines (see Figure 5). While many people “lost” ground relative to people in high-income groups, their own income situation did not deteriorate to the point where they needed to resort to additional borrowing to *maintain* their

standard of living. In spite of not needing to borrow to maintain an absolute standard of living, we ask whether growing income inequality still contributed to the rise in household debt.

2. Model and Data

2.1 Empirical Model

The model for our empirical analysis is based on the accounting identity $\Delta D_t \equiv C_t + S_t - Y_t - T_t$, where ΔD_t is the change in debt, C_t consumption, S_t savings, Y_t disposable income, and T_t tax payments, all at time t . As a result, total household debt is $D_t \equiv \Delta D_t + D_{t-1} \equiv C_t + S_t - Y_t - T_t + D_{t-1}$. Income inequality must affect debt through consumption, C_t .

The previous section summarized a number of likely factors that influence a household's propensity to consume and borrow. In particular, we assume that it is influenced by past consumption, C_{t-1} , current disposable income, Y_t , and the cost of borrowing. The cost of borrowing not only includes interest rates, ρ_t , but also the expected cost of default. The expected likelihood of default depends on expectations about future income and the value of household assets, A_t . There are a number of factors that could be used as a proxy for expected future income such as GDP growth or changes in unemployment rate. Since these factors are highly correlated, we only include past changes in real personal income, ΔY_{t-d} , in our empirical model.¹¹ The cost of bankruptcy is difficult to quantify, especially since a large element of this cost is the social stigma associated with bankruptcy (White 1998). Following existing research (e.g., Fay et al. 2002), we use past bankruptcy rates, BR_{t-d} , as a proxy for this cost. Higher bankruptcy rates may cause people to discount this social cost or stigma, which would suggest a positive effect. On the other hand, lenders likely tighten their lending policies as a result of higher bankruptcy rates, which would suggest a negative effect.

This leads to the following consumption equation $C_t = f(C_{t-1}, Y_t, \rho_t, BR_{t-d}, \Delta Y_{t-d}, A_{t-d}, \sigma_{t-d}) + \varepsilon_t$, where σ_t is the level of income inequality. Combining this consumption equation with the debt equation, assuming a linear functional form, f , and standardizing debt and consumption

elements by disposable income and bankruptcy rates and asset values by population size leads to the following estimation equation,

$$\frac{D_t}{Y_t} = \alpha_0 + \alpha_1 t + \alpha_2 \frac{D_{t-1}}{Y_{t-1}} + \beta_1 \frac{C_{t-1}}{Y_{t-1}} + \beta_2 \rho_t +$$

$$(1) \quad \sum_i \beta_{3i} \frac{BR_{t-i}}{POP_{t-i}} + \sum_j \beta_{4j} \% \Delta Y_{t-j} + \sum_k \beta_{5k} \frac{A_{t-k}}{POP_{t-k}} + \sum_l \gamma_l \sigma_{t-l} + \varepsilon_t.$$

In addition to total household debt, we also consider the effect of income inequality on individual debt components. The Federal Reserve, in its Flow of Funds Account, divides total household debt (D/Y) into mortgage debt (MD/Y) and consumer credit (CD/Y), which is further divided into non-revolving debt (ND/Y) (e.g., car loans) and revolving debt (RD/Y) (mostly credit card debt). This partition is important because, although consumers refinance mortgage debt sometimes to provide more consumer borrowing capacity (called “reloading”), non-revolving and credit card debt are generally more important to marketers than mortgage debt. Thus we have a total of 5 estimation equations.

We also assume that concurrent bankruptcy rates, income changes, asset values and income inequality are unknown to households. As a result, we use only lagged variables on the right-hand side of equation (1) except for interest rates, ρ_t . However, since interest rates are determined by credit supply and demand factors and thus potentially correlated with the empirical error term, ε_t , we use 1-period lagged interest rates, ρ_{t-1} , as an instrument. Finally, as indicated in equation (1), we also consider the possibility of a time trend. Before estimating a debt equation, however, we will assess the stationarity of the debt data to determine whether this trend variable is appropriate or whether the data need to be differenced first.

2.2 Measures and Data

Debt, consumption, income, asset and interest data are readily available from various government sources (see Appendix A for details). Of primary interest to this study is the effect of income inequality. A variety of measures have been proposed to determine the amount of

inequality in an income distribution, including income classes, income shares, percentile ratios, and indexes. Frequently used measures in the earnings and wage inequality literature are the Gini-Index, and the 90th/50th or the 90th/10th percentile ratios (Ryscavage 1999). In contrast to the percentile ratios, the Gini-Index is based on the entire income distribution. We use the Gini-Index as our primary measure of income inequality but we examine whether the results are sensitive to the use of a particular income inequality measure.¹²

We use different interest rates for different debt components, although different interest rates tend to be highly correlated. For total household debt we use the 1-year T-Bill rate, which is also a good measure for the cost of lenders (Ausubel 1991). Since consumer credit and non-revolving debt consist of different types of debt with varying interest rates, we use the same T-Bill rate as an average measure. For revolving debt, which consists largely of credit card debt, we use the average credit card rate. For mortgage debt we use the 30-year standard mortgage rate.

The estimation of the equations for individual types of debt poses an additional problem since their amount is not only influenced by consumption but also by shifts between debt components. For example, an important use of home equity loans is the refinancing of consumer credit. Thus, we include the difference between consumer credit and mortgage rates as a proxy for the incentive to refinance consumer credit. In the end, accounting more precisely for the cost of debt is limited at the aggregate level by the high correlation of various interest rates.

We estimate our empirical model using quarterly U.S. data covering the years from 1980 to 2000. We focus on this time period for a number of reasons. First, as shown in Figure 1a, this is the period during which most of the growth in household debt levels occurred. Second, it corresponds with the deregulation of financial markets and covers the period after the change in bankruptcy law in 1979.

3. Estimation Results

3.1 Specification Tests

We start by first assessing whether the different debt-to-income ratios are stationary or not. From Figures 1a and 1b it is obvious that except for consumer credit all ratios exhibit a more or less strong trend. We use the augmented Dickey-Fuller (ADF) test to test for unit roots in these variables as described in Enders (1995). The results of this test are presented in Table 1. In all cases we can reject the hypothesis of a unit root. However, non-revolving debt has a drift but no trend and the significance of the unit root test for mortgage debt is not very strong. We examine therefore the sensitivity of our results from level (i.e., non-transformed) data by estimating *all* debt equations also with differenced data using an error-correction model (Enders 1995).

[INSERT TABLE 1 ABOUT HERE]

A second estimation problem concerns the choice of lags for the different explanatory factors, especially for income inequality. We start our estimation with lags $t-1$ and $t-2$ for all variables and then retain only the (more) significant lag. We then examine whether longer lags should be included. In the end, we always retain the $t-2$ lag for income inequality as well as the change in income and the value of available assets because this yields a lower standard error of estimation and does not materially change the parameter results compared to using $t-1$ lags.

3.2 Base Model Results

The estimation results for the base model – level data with Gini-Index – are reported in Table 2.¹³ We find a strong relationship between income inequality and debt. The effect of income inequality is positive and significant for total household debt as well as for individual types of debt. The parameter estimates for individual types of debt are consistent with their aggregate counterparts. For example, the effects for non-revolving and revolving debt sum roughly to the estimated effect for consumer credit. Similarly, the effects for consumer credit and mortgage debt approximately sum to the effect of total household debt. The effect size varies significantly

across types of debt. Compared to their relative contribution to total household debt, the income inequality effect is strongest for non-revolving debt and weakest for mortgage debt. While non-revolving debt currently accounts for about 12% of total household debt, it accounts for about 40% of the effect of income inequality on total debt. This result makes the effect of income inequality particularly relevant for marketers of consumer durables since non-revolving debt is predominantly used to finance the purchase of such products.

[INSERT TABLE 2 ABOUT HERE]

3.3 Effect of Other Factors

The signs of the parameter estimates of other factors are generally as expected. For example, the estimates for lagged debt-to-income ratios are significant and close to one. For revolving debt the estimate even exceeds one (although it is statistically not different from one), which indicates that credit card balances, unlike other types of debt, are not repaid immediately. Initial payments cover mostly interest charges. Past consumption, which limits current consumption and thus the need to borrow, and interest rates have the expected negative signs and are always significant.

For the individual debt components, we also include the difference between credit card and mortgage rates (MRG_t) to capture the incentive to refinance consumer credit with mortgage debt. For consumer credit we find that this incentive has a larger effect than a change in interest rates (i.e., a change in mortgage rates). While this is also true for non-revolving debt, it is important to note that the use of the credit card rate is not an ideal measure in this case. Other interest rates such as the rate for car loans, however, are too highly correlated with the mortgage rate. For revolving debt, interest rate changes tend to have a much smaller effect. This finding indicates that consumers seem to be relatively “price” insensitive, which is consistent with the observation of rapidly increasing credit card debt levels in spite of persistently high credit card rates (after the introductory teaser rate). An alternative explanation for the smaller refinancing effect is the incentive of credit card firms to increase credit limits and marketing efforts when this margin increases because it also represents the lenders’ profit margin (Ausubel 1991).

Over the last two decades, appreciating real estate prices and a booming stock market significantly increased the value of household assets and thus the capacity to borrow. This ‘wealth’ effect is confirmed by our results for total household debt, which stems largely from the effect on mortgage debt. This makes sense given that most households’ primary asset is the home, comprising over 44% of the average household’s total worth.¹⁴ On the other hand, there is no ‘wealth’ effect for revolving debt.

Consumers also assume more debt when they have a more optimistic outlook for their future income prospects. For total household debt we do not find a significant effect of a past change in income (see Table 2).¹⁵ Income changes only affect the two different types of consumer credit. Non-revolving debt increases and revolving debt decreases with a prior income increase. This is consistent with the importance of positive consumer expectations about future economic conditions for the purchase of durable products. The negative effect for revolving debt is consistent with the use of credit cards as a lender of last resort. After an income decline an individual’s loan applications for other types of credit will more likely be turned down, while capacity to borrow on credit cards may still remain.

Finally, we find the effect of last period’s bankruptcy rate to be negative and significant for all debt components at $p < 0.10$ (see Table 2). This negative effect does not necessarily contradict the argument that the stigma of bankruptcy has declined (Fay et al. 2002) since lenders may tighten their lending policies as a result of an increase in the bankruptcy rate. On the other hand, it is also possible that consumers use an increase in the bankruptcy rate not as a signal of lower costs, but as a reminder of the risk associated with borrowing. This would make consumers grow more cautious.

3.4 Sensitivity Analysis

To further corroborate the evidence for the income inequality effect shown in Table 2, we repeat the analysis by varying model assumptions and estimation approach. In Table 3, we report the effect of income inequality for each type of debt for eight different specifications (of which

seven are new). They result from 2 types of data transformation X 2 model specifications X 2 measures of income inequality. The first model reported in Table 3 – level data with Gini-Index – corresponds to the base case reported in Table 2. When estimating the debt equations with differenced data using an error correction model, the hypothesis of no co-integration was rejected in all cases at 0.05-level of significance or better.

Table 3 reports a total of 40 parameter estimates for the effect of income inequality (standard errors are in parentheses). All estimates have the expected positive sign, 33 are significant at the 0.05-level or better and 5 more are significant at the 0.1-level. For mortgage debt with differenced data and the Gini-Index as a measure of income inequality, the two parameter estimates are not statistically significant. The results in Table 3 indicate that the parameter estimates do not change much when using differenced data with an error-correction model instead of OLS with level-data. Finally, the R^2 -values obtained with differenced data for our specification (1) are fairly high. For consumer credit, our model explains about 60% of the variation in the change of this type of debt. For mortgage debt, it achieves about 29%.¹⁶

[INSERT TABLE 3 ABOUT HERE]

3.5 Comparison of Effect Sizes

The various estimates of the income inequality effect do not say much about the economic importance of income inequality relative to other factors. To be able to compare effect sizes, we convert the parameter estimates from Table 2 to point elasticity estimates based on the average value for each parameter for 1991 to 2000. The results are reported in Table 4.

[INSERT TABLE 4 ABOUT HERE]

The point elasticity estimates indicate that the effect of income inequality is significantly larger than the effect of most other factors. The effect is particularly strong for non-revolving debt, for which we obtain an elasticity value of 1. The level of non-revolving debt is about four times more sensitive to changes in income inequality than the level of mortgage debt. The level of non-revolving debt is also about twice as sensitive to income inequality as to past

consumption and about 9 times as sensitive as to the value of household assets, which are the two next most important factors. For mortgage debt, the effect of past consumption is considerably larger and the ‘wealth’ effect is only slightly less important than the effect of income inequality. The effects of interest rates and past bankruptcies are much smaller than either the income inequality or the ‘wealth’ effect, except for revolving debt. For revolving debt, those two effects are significantly larger than the ‘wealth’ effect. The effect of past income changes is negligible.

In a second analysis, we examine how much of the increase in household debt relative to disposable income between 1980 and 2000 can be attributed to changes in different factors. The results are also shown in Table 4. Of the factors included in our model, the ‘wealth’ effect is the most significant contributor to the rise in (total) household debt. The doubling of the real value of household assets contributed almost 5 points, which equals about 18.1% of the increase in the debt-to-income ratio over the 20-year period. Similarly, the drop in the T-Bill rate from 15.8% to 5.6% added about 1.13 points or 4.1% of the debt increase. The effect of income inequality for total household debt falls between these two factors. The 10% increase in the Gini-index added about 2.66 points or about 9.7% to the household debt-to-income ratio. For consumer credit, however, income inequality is the most significant contributor. It contributed about 44% more than the fall in interest rates and over 100% more than the appreciation of household assets. While this analysis of the relative contribution of the various factors is somewhat basic, it does provide an indication of the importance of income inequality relative to other factors.

4. Income Inequality and Conspicuous Consumption

Why does income inequality, a measure of relative income, affect the level of household debt? Income inequality at the individual level increases when: 1) one’s own income decreases or 2) the income of others increases. As pointed out earlier, one of the arguments in favor of an effect of income inequality on household debt is the need to borrow by those who have suffered an income loss to maintain their current consumption levels (Sullivan et al. 2000). We call this the “own” effect for income inequality. While we cannot fully exclude the possibility that decreases

in income (a negative “own” effect) explain our empirical results, the data suggest it is highly unlikely that income inequality is acting as a proxy for income decreases by lower income groups. As shown in Figure 5, real income at even the lowest decile has increased over the time considered in this study. However, at the higher levels, real income has increased considerably faster, which accounts for the large observed change in income inequality. We call this the “cross” effect of income inequality because is caused by a change in the income of others.

Given these wage and income inequality changes over the past two decades, our results imply two possible behaviors: Either households that experience faster increases in income increase their debt levels even faster (perhaps because they expect larger future income increases) or households with smaller income increases increase debt faster (perhaps because they want to maintain their relative consumption level with others). The former hypothesis implies that consumption inequality increases even faster than income inequality; the latter implies a smaller consumption inequality. Kruger and Perri (2002), however, find that consumption inequality did not rise as much as income inequality. This suggests that the reported effect of income inequality is consistent with the “keeping up with the Joneses” argument.

4.1 Consumption in a Social Context

The income of others matters because in a social context their consumption influences a household’s preferences. The important role of consumption in order to satisfy consumer needs for belonging and distinction or status in a society has long been recognized by economists and other social scientists (e.g., Pigou 1913; Rae 1905 [1834]; Veblen 1899). Thorstein Veblen suggested that all individuals crave for status, which is obtained by wasteful displays of wealth: “In order to gain and to hold the esteem of men, wealth must be put in evidence, for esteem is awarded only on evidence” (p. 24). By social custom, the evidence consists of unduly costly goods that fall into the “accredited canons of conspicuous consumption” (p. 71). He distinguished between two motives for consuming conspicuous goods: “invidious comparison”

and “pecuniary emulation.” The former motivation refers to the attempt of a member of a higher class to distinguish himself from members of a lower class. The latter motivation refers to the attempt of a member of a lower class to pretend to be a member of a higher class. This process of differentiation and imitation leads to a game where goods are consumed and favored for their relative scarcity and not just for their functional utility. When consumers begin to mimic the consumption of others, some of that meaning from previously purchased goods is lost and consumption shifts to other goods to maintain social distance.

Marketers have long understood that consumers buy products not only for their functional utility but also for their social meaning (e.g., Belk 1985; Grubb and Grathwohl 1967; Levy 1959; Soloman 1983). In discussing brand equity, Keller (1993) finds that consumers may value the prestige, exclusivity, or fashionability of a brand because of how it relates to their self-concept (also see Soloman 1983). These ideas are related to Hirsch’s (1976) more general discussion of congestion or crowding – where the number of other people consuming a good negatively affects its desirability (e.g., car ownership and road congestion). When consumption of such social goods, which Hirsch labeled *positional* goods, becomes too great, the status component of consumption will be lost. According to Hirsch, positional or conspicuous consumption occurs in all societies but is particularly important in affluent societies. When incomes rise, patterns of demand change. More specifically, spending on positional goods relative to non-positional goods as a proportion of income will increase.

Frank (1985) offers an evolutionary perspective for conspicuous consumption. He argues that preferences are shaped by the forces of natural selection. The success of individuals and their children depends largely on their relative standing in a society. Since relevant attributes such as ability are difficult to observe, individuals engage in a signaling contest to attain a high relative position and increase the chance of succeeding. The higher the relative payoff for those who rank highest, the more risk everybody takes. Gaba and Kalra (1999) show theoretically and empirically that in ranking contests even inherently risk-averse individuals are willing to take greater risks.¹⁷

Frank and Cook (1995) argue that the US economy has increasingly become a ‘winner-takes-all’ economy. Among other things, they cite education as an important and costly example of a conspicuous good. The value of an Ivy League college education or a top-ten MBA degree arises not only from the (possibly) superior instruction. Equally, or even more significant, is the fact that only a select few are admitted and thus endowed with this signal. The ensuing “positional arms race” may not stop until one party is overextended financially, as increased conspicuous consumption constantly establishes new, and more expensive, reference points.

The attempts to develop formal models of conspicuous consumption are more recent and date back to Leibenstein (1950). In Appendix B we provide a formal utility model that includes social interactions based on the work of Becker (1974). It theoretically shows that a higher income increase by an individual’s community leads to an increase in conspicuous consumption at the expense of savings.

4.2 Importance of Social Interaction Effects

Evidence to support the argument that relative income affects consumption behavior is relatively strong. For example, the cross-sectional observation that the savings rate increases with income (Duesenberry 1949; Frank 1985) is not consistent with the permanent income theory or the life-cycle hypothesis. The question related to our empirical findings is, however, whether the need for conspicuous consumption is strong enough to explain the magnitude of our results.

There is no systematic evidence but numerous anecdotes highlight the significant effect of other people’s consumption behavior. For example, Clayton Lewis of Huntington Beach, California felt after only three years his “old” gas grill and picnic table were inadequate relative to what his neighbors had. He fixed that with a \$100,000 backyard makeover that made Mr. Lewis “the envy of the neighborhood.”¹⁸ The garage at Shaquille O’Neal’s mansion in Orlando, Fla., is reportedly bigger than most houses. At 5,000 square feet, it not only fits cars, but also has a movie theater, a lounge, two bathrooms – and wall-to-wall carpeting. Remarks Mr. O’Neal: “Except for Jerry Seinfeld and Jay Leno, none of my friends has anything like that

size.”¹⁹ This consumption behavior is not just limited to the rich and beautiful or those in secure life situations. Klein (2002) reports that inmates in Nazi concentration camps used goods such as small clothing items to establish a distinctive position within a block. These items were acquired by trading already limited food rations.

While conspicuous consumption has a long history,²⁰ there are a number of recent trends that could have accelerated the escalating effect of conspicuous consumption. First, consumers are exposed to a larger number of reference points (Schor 1998). When fewer women worked, the neighborhood was the primary point for social reference. Increasingly, the workplace and television have become people’s social references. These changes have also increased the exposure to higher-end positional goods. Moreover, the standards that define acceptable schools, housing, clothing, transportation, and a host of other important items ultimately depend on what others spend on them (Frank and Cook 1995).

Second, consumers also consider the relative performance of previously purchased goods to goods currently available on the market (Frank and Cook 1995). As goods and services improve to meet the demands of the positional arms race, the relative experiences from what were once satisfying goods no longer seem adequate. Older cars may accelerate as they always have, but no longer seem fast enough relative to the current offerings. A grill may have the same BTUs and surface area it always had, but compared to the \$10,000 Viking outdoor kitchen, it does not seem to serve the outdoor chef’s needs very well.

Finally, observed purchases from others may be taken as a signal about the economy and the consumer’s future earning environment. In a heterogeneous society the most optimistic or risk-seeking consumers set the “standards” on which these signals are based. If increased spending is entirely driven by a positional arms race, spending by others is not informative about the future. However, consumers rely on such uninformative factors to assess their future income prospects (Soman and Cheema 2002). This self-serving bias of selecting signals that justify optimistic income increases is prevalent. For example, when only 25% of people thought the

economy would do better in the coming year, more than half thought they personally would do better (Gilovich 1991; Weinstein 1980).²¹

5. Further Analyses

Our empirical results can be explained quite well through the escalating effects of conspicuous consumption. While the results are consistent with the argument that debt has been used to maintain relative consumption in order to maintain relative social position, we do not directly examine the effect of income inequality on consumption behavior. One trade-off that arises from our use of aggregated rather than household level data is the incapability of separating conspicuous from non-conspicuous consumption. While this would be more feasible in a controlled experiment, it would then be difficult to assess the economic relevance of such a finding. Thus, a benefit of our approach is the external validity provided by the data.

Overall, it is important to keep in mind that without some sort of social influence on consumption, income inequality due to an income change in the community would not affect an individual's consumption (ignoring possible price changes caused by the change in community consumption patterns). An individual's utility would solely depend on her own effort and access to income and the relative income distribution should not affect her demand for credit. To further strengthen this argument, we provide in this section a number of additional analyses and discuss the issue of aggregation in more detail.

5.1 Consumption Effect of Income Inequality

First, to examine the consumption effect of income inequality, we estimate its effect for two categories of consumption – automobiles and food. For most people, automobiles are more of a conspicuous consumption good than food, leading us to expect a positive effect of income inequality for spending on automobiles as a percentage of total consumption and a negative effect for relative consumption of food. Using a similar equation as discussed in Section 3, which includes among the explanatory variables past consumption, income changes, interest rates, the value of assets and the price index for the respective consumption category, we find

results consistent with our expectations. The effect of income inequality (lagged by one quarter) on the relative consumption of automobiles is positive and highly significant (0.324; $p < 0.01$). The effect on the relative consumption of food is negative but not significant (-0.053; $p = 0.21$). This pattern remains the same when changing model specification or differencing the data as was done for the effect of income inequality on debt. For example, when using the 90th/10th percentile ratio as a measure of income inequality, the negative effect for food consumption becomes significant.

5.2 Alternative Explanations for the Effect of Income Inequality on Debt

Next, we consider a number of alternative explanations that could have resulted in a positive effect erroneously attributed to income inequality. These alternative explanations include effects due to a slow economy, the 1986 tax revision, trends toward more self-employment, and the increase of people in the 18-to-45-age bracket. The results are reported in Table 5.

[INSERT TABLE 5 ABOUT HERE]

The data indicates that income inequality increases during economic expansions while debt-to-income ratios tend to decline during economic downturns. We examine whether the obtained positive income inequality effect could actually be the result of a shift to more cautious behaviors by both lenders and consumers during downturns. Through the addition of a dummy variable to indicate quarters with weak economic conditions (see footnote to Table 5 for details), we tested this explanation. We find the estimated income inequality effect remains important and consistent with prior results.

Next, the 1986 tax law revision removed the deductibility of consumer credit interest payments. To control for this change and any potential effect on the income inequality results, we add a dummy variable for the quarters up to 1986:2. Again, we find that the income inequality effect is largely unaffected.

Anecdotal evidence indicates that people who start their own business increasingly use non-commercial debt, especially credit card debt to finance the start-up of their business. If

entrepreneurial activity leads to higher income inequality due to an unequal distribution of success and failure, this factor could provide an alternative explanation for our results. We test a number of variables to capture this effect and none of them changed our primary results.

A ‘life-cycle’ argument would suggest that a shift in the age distribution of the population due to the baby-boomers could have increased the average willingness to take on more debt. The inclusion of the fraction of the population in the 18-to-45-age bracket does not substantially affect the estimates for income inequality across the various debt measures, although it does reduce the effect of income inequality on mortgage debt.

Finally, Frank and Cook (1995) argue that the importance of conspicuous consumption has increased in recent times. If the effect of income inequality is related to conspicuous consumption, this suggests that the effect of income inequality on household borrowing should have increased over time. To test this conjecture, we estimate our different empirical equations using annual data from 1953 to 2000. Two findings emerge from this dataset (see last section of rows in Table 5). First, the effects of income inequality are fully consistent with those from the quarterly dataset. Second, the effect of income inequality has indeed become stronger over time. The effect is significant for consumer credit and revolving debt.

Other possible explanations are more difficult to examine. For example, Soman and Cheema (2002) find that people use their credit card limits as a signal for their future income prospects. In contrast, we use the average income change as a proxy for this. We do not have appropriate measures for credit card limits. It is also possible that consumers use income changes of higher earners as a signal for their own future income, which would be confounded with income inequality. We tried to test for this possibility by including the past income changes for the 90th decile income group along with our income inequality measure. The effect of this factor is not significant and the effect of income inequality remains unchanged.

5.3 Aggregation and Household Heterogeneity

The use of macroeconomic data poses two additional problems with respect to directly testing the effect of income inequality on debt through conspicuous consumption. First, our empirical analysis could be subject to an aggregation bias. Both variables of primary interest are measured with error relative to our individual level model due to aggregation. Our dependent measure – debt relative to disposable income – is a ratio variable and is thus always smaller than the average or aggregated debt-to-income ratios across households. Income differences in an individual’s particular social network are most likely smaller than income differences in the entire economy. Second, the theory of conspicuous consumption also allows for heterogeneity in how individuals are influenced by their social networks. Unfortunately, it is virtually impossible to obtain measures for the strength of influence, the actual networks, and which products are considered positional for each individual.

Let us assume that the proper individual-level model is $y_{it} = D_{it}/Y_{it} = a + (b + v_i)x_{it} + e_{it}$ and the aggregate level model $\bar{y}_t = a + b\bar{x}_t + \bar{e}_t$, where $\bar{y}_t = 1/n \sum_n D_{it}/Y_{it}$, $\bar{x}_t = 1/n \sum_n x_{it}$ and $\bar{v} = 0$. Due to measurement error from aggregation and the ignored consumer heterogeneity we actually estimate $\bar{y}_t - d_t = a + bx'_t + \omega_t$, where $x'_t = \bar{x}_t + D_t$ and $\omega_t = e - \beta D_t - d_t$. The question then is whether any of the nuisance factors d_t and D_t are correlated with the aggregate income inequality measure x'_t (or other factors that are included in the empirical model). As the average level of debt increases, it is reasonable to assume that its variance increases, too. This increases the nuisance factor d_t . If the income inequality x'_t has a positive effect on debt then d_t increases, which leads to a negative correlation between x'_t and the error term, ω_t . Similarly, the nuisance term D_t also leads to a negative correlation. Such a negative correlation suggests that we underestimate the effect of income inequality due to these problems.

6. Conclusions

Why are Americans, after a long period with an exceptionally strong economy, more highly indebted than ever before and filing for bankruptcy at a record pace? What factors have made

the provision of financing options so attractive to consumers? This “debt puzzle” has attracted much attention, but the incentives for consumers to borrow are only partially understood (Kowalewski 2000). Prior research in this area has suggested a number of factors that could affect household borrowing such as household wealth, availability and price of credit, prior consumption and debt, changes in income, and personal bankruptcy rates. Less obvious, we show that, in addition to changes in real income, relative income (i.e., income inequality) has also strongly contributed to the upswing in debt. As the differential in relative income increases, households are found to take on more debt relative to their incomes. We offer a compelling explanation for this empirical finding – an explanation that is behaviorally and analytically supported by prior research – that assumes consumers do care about their relative standing in society and that consumption of conspicuous goods helps establish and maintain that standing.

This social dependency suggests the role of relative income, which can play an even larger role than absolute levels of income. In the preface to their book on economic inequality and income distribution, Champernowne and Cowell (1998) highlight the importance of the distribution of income, not just whether it is increasing or decreasing (p. xvii),

“...what is improvement for some almost always seems to others to be detrimental. Even if the change in distribution stimulates the growth of income in total, this is unlikely to be perceived by those who are losing or who are falling behind in the race; and even if it is perceived, they will still feel aggrieved that they are getting less benefit than the others.”

To compensate for this perceived loss, consumers are willing to assume more debt (relative to their income) and thus take on much greater financial risk. By offering financing options, firms have been able to benefit from this consumer tendency. Using aggregate U.S. data for 1980-2000, we find strong support for this argument. This finding is robust to the presence of other important factors and to a number of alternative explanations. Importantly, the effect is not only statistically significant; it also has high economic relevance especially for consumer credit (i.e., non-mortgage debt). The social interaction effect is comparable to the theory of new product diffusion. However, the underlying motivation for paying attention to other’s people

consumption is different. In the case of new product diffusion, the primary benefit is information about product performance; in our case, the primary benefit is information about one's own preferences.

6.1 Theoretical Implications

This paper contributes to the growing literature in marketing and elsewhere that examines consumer decisions to finance consumption (e.g., Prelec and Loewenstein 1998; Soman and Cheema 2002). This is an important area since the provision of financing options has become a pervasive marketing tool in many product categories. Importantly, our explanation applies to all types of debt, not just credit cards, which is the focus of most existing research. This is important because credit card debt, although growing rapidly, still accounts for only about 10% of total household debt. Our explanation also allows for some cognitive deficiencies by not requiring that consumers maximize utility over their uncertain lifetime like the life-cycle hypothesis. Consistent with research on complex problem solving, we assume consumers are somewhat myopic and maximize utility period by period, focusing on the near-term rather than the long-term (Hayes-Roth and Hayes-Roth 1979).

Changes to the supply side of debt are part of the overall consideration as well. The results indicate that household debt levels increase even when the extra cost from financing consumption is unchanged. This is important because the extra cost from financing has remained relatively high despite competition among credit suppliers and a declining federal funds rate (Ausubel 1991; Bennett et al. 1998). Combined with the insights from the work of Ausubel (1991, 1999), our findings imply that the surge in household debt can be explained as an equilibrium outcome of rationally (i.e., utility maximizing) behaving lenders and consumers.

The rising personal bankruptcy rates can be explained by a similar argument. Competition among lenders leads to more aggressive lending practices (Ausubel 1999), while the 'winner-takes-all' nature of the economy leads to increased risk taking by consumers to increase conspicuous consumption and thus improve the chances of being among the 'winners' (Frank

and Cook 1995; Gaba and Kalra 1999). Overall, our account for the “debt puzzle” does not replace existing explanations, it complements them. A complex social phenomenon like the surge in household debt is likely the result of numerous contributing factors. For example, our results also indicate the presence of a strong ‘wealth’ effect.

6.2 Managerial and Policy Implications

The effect of income inequality is particularly strong for non-revolving debt, which is the most important type of debt to finance the purchase of consumer durables. Thus, our findings provide an explanation for the rising popularity of financing options in these markets, even, or particularly, in a strong economy. As firms have likely discovered, the provision of financing options is necessary not only to attract customers from lower income brackets, it may be even more important in attracting more affluent customers who are more likely exposed to escalating conspicuous consumption. Moreover, the findings imply that marketers need to pay close attention to understand consumers not only in isolation but also within their social networks.

The strong effect of income inequality also has implications for financial institutions, which need to assess the credit risk of loan applicants. It points to the importance of assessing consumers’ social context to understand their motivation to borrow and accept a higher risk of default. In particular, it implies that income relative to reference groups should also be considered to assess the credit risk of a borrower. Higher income or education alone may be no assurance of the capacity to repay loans. It is interesting to note that the typical bankruptcy filer is a member of the middle class, and filers with 6-digit annual incomes are not uncommon (Sullivan et al. 2000).

Finally, our results add to the growing literature about the implications of income inequality, which has important public policy implications (e.g., Welch 1999). Krueger and Perri (2002) argue that the potential consumption inequality that could have resulted from greater income inequality has been dampened by the willingness of the credit market to expand its offering to the lower end of wage earners. The policy implications of this finding are difficult to

assess. While maintaining consumption inequality levels may be laudable in the preservation of individuals' relative economic well-being, using debt as a means to maintain consumption inequality may be troubling if it involves more long-term risk taking.

6.3 Limitations and Future Research

To our knowledge our research is a first attempt to empirically validate and explain the connection between income distribution and consumer borrowing. We have suggested that the primary reason for this relationship is the need for positional consumption to maintain social status. As an initial study in this area we see a number of areas that could be further explored. In contrast to most existing research on consumer financing decisions in marketing, which rely on experiments, we use field data. While this provides greater external validity and allows us to assess the economic importance of the income inequality effect, it limits our ability to test the entire process that underlies the suggested effect of conspicuous consumption. In other words, while we test the aggregate-level implication of this theory, we are unable to directly trace the effect of income inequality on conspicuous consumption at the individual level. Our comparison of automobile and food consumption is only suggestive. A more detailed process analysis using experimental procedures would be helpful in this respect.

An interesting extension of this study concerns the question of whether consumers are aware of the escalating effect of conspicuous consumption. Wertenbroch (1999) shows consumers engage in activities to limit current consumption of items that could have negative consequences in the future. For example, there are anecdotes of consumers cutting up credit cards or putting them into the freezer to limit consumption. Following the work on cigarette addiction (Becker et al. 1994), one could test whether consumers are forward looking and anticipate the escalating effect of current conspicuous consumption.

Our empirical estimations have focused on the United States, but future research should consider to what extent this is a uniquely American phenomenon. There is some indication of similar debt trends in the U.K. and Australia. Our theory is independent of nationality but it does

hinge critically on the degree of income inequality and the importance of conspicuous consumption. A question that arises from this is whether the income inequality effect is stronger in the U.S., where more people have a chance to be among the economic winners. In societies where lineage and relationships are more important for economic success, the need for conspicuous consumption could be lower and hence the effect of income inequality on household debt weaker. A preliminary analysis of data from Switzerland points in this direction.²² Thus, a cross-cultural examination of these two factors would be productive.

Appendix A

Description of Data and Their Sources

Debt Measures

Mortgage Debt

Federal Reserve Statistical Release Z.1, Federal Reserve Flow of Funds Accounts of the United States - Report L.218.

Consumer Credit – Revolving and Non-revolving

Federal Reserve Statistical Release G.19.

Interest Rates

Mortgage Rates

Federal Reserve Statistical Release H.15.

Credit Card Interest Rates

Federal Reserve Statistical Release G.19.

Benchmark One-year U.S. Government Securities

Federal Reserve Statistical Release G.13.

Consumer Price Index (CPI)

Data is deflated using the CPU-U deflator, 1982-1984 =100. U.S. Department of Labor, Bureau of Labor Statistics.

Population Data

US Census Bureau. Census population estimates for 2000 were determined by a different methodology than all prior years (April 1 decennial census), requiring the authors to estimate state populations in 2000 based on annual growth rates experienced over the prior 10 years.

Income Inequality Data

All inequality measures were constructed from microdata from the National Bureau of Economic Research Extracts of the Current Population Survey (CPS) Outgoing Rotation Group Earnings Files. Hourly wages were available as a directly reported rate of pay or, for non-hourly workers, constructed from a report of usual weekly earnings divided by usual weekly hours. Data only for respondents age 18-64 who were not self-employed.

Per Capita Consumer Bankruptcy Data

Total bankruptcies were compiled by the Administrative Office of the U.S. Courts. This includes filings under Chapters 7, 11, and 13 which were relatively stable as a percentage of the total at approximately 70%, <1%, and 30%, respectively.

GDP & Disposable Personal Income

U.S. Department of Commerce, Bureau of Economic Analysis, National Accounts Data.

Value of Household Assets

Federal Reserve Statistical Release Z.1, Federal Reserve Flow of Funds Accounts of the United States - Report B.100.

Appendix B
A Formal Utility Model with Social Interactions

For reasons of simplification we assume consumer utility to be a function of a single want or commodity, Z , (e.g., an individual's distinction). The model could be considered at the level of a family unit without any loss of generality. For example, individual i 's distinction might be the opinions held by all other persons for individual i . Importantly, those opinions are not fixed and individual i can engage in behaviors that affect Z . For example, he can achieve distinction by working diligently, giving to charity, or living in a beautiful house with an oversized garage. It is further assumed that Z is produced with a single good, x_i , and a single input from others, R_i , leading to the following utility function

$$U_i = Z(x_i, R_i) \tag{B.1}$$

The respect component, R_i , depends on what the rest of the community, j , does and what individual i does, i.e.,

$$R_i = E_i + f(y_i, y_j), \tag{B.2}$$

where E_i is the endowed level of respect when no individual in the community makes any effort. The level of respect in the community, R_i , is influenced by individual i through the consumption of positional goods, y_i . In deviating from Becker's model, we also include the conspicuous consumption of others in the community, y_j , to affect the respect of individual i . The function $f(y_i, y_j)$ specifies how everybody's effort adds to or subtracts from respect for i . In particular, only the relative amount of conspicuous consumption matters. Given the "competitive" nature of conspicuous consumption, we assume that $\partial f_i / \partial y_j < 0$. In other words, conspicuous consumption, y_j , by the community reduces i 's community respect, R_i , and thus utility, U_i , all else equal.

The budget constraint for money income, I_i , is

$$p_x x_i + p_R y_i = I_i, \tag{B.3}$$

where $p_R y_i$ is the amount spent on conspicuous consumption, and p_R the price for a unit of community respect. In this formulation, conspicuous consumption is equivalent to buying

community respect. Given our interest in the incentive to borrow money, we consider x_i to be savings (Frank 1985). An individual can increase conspicuous consumption by reducing savings or borrowing when x_i becomes negative.

Individual i 's money income is augmented by the social endowment, E_i . This augmented income or *social income*, Φ_i , is the sum of money income and the wealth due to current respect in the community, i.e.,

$$p_x x_i + p_R R_i = I_i + p_R (E_i + f(y_i, y_j) - y_i) = \Phi_i. \quad (\text{B.4})$$

If i maximizes the utility-output function (B.1) subject to the constraint on social income (B.4), the equilibrium condition is

$$\frac{\partial U_i}{\partial x_i} \bigg/ \left(\frac{\partial U_i}{\partial R_i} \cdot \frac{\partial f}{\partial y_i} \right) = \frac{p_x}{p_R}. \quad (\text{B.5})$$

In other words, the equilibrium conspicuous consumption, y_i^* , depends not only on i 's own social income, Φ_i , but also on the community's social income, Φ_j , through the community's conspicuous consumption, y_j . The term $r_{ji} = \partial y_j / \partial y_i$ indicates i 's belief about how the community's optimal behavior changes as y_i changes. For example, when $r_{ji} = 0$, i believes that the community's choice is independent of his own and the optimal behavior is characterized by a Nash equilibrium. When $r_{ji} = y_j / y_i$, the optimal behavior maximizes total community respect leading to the cooperative equilibrium.

This model yields several predictions for the changes in conspicuous consumption as a function of income changes (assuming none of the goods are inferior). Becker (1974) shows that the (own) income elasticity of conspicuous consumption is high, even when community respect has a low elasticity (i.e., $n_y = dy_i / dI_i \cdot I_i / y_i > 1$ even when $n_R = dR_i / dI_i \cdot I_i / R_i < 1$). Of course, a high income elasticity for conspicuous consumption implies a low income elasticity for other consumption or savings (i.e., $n_x = dx_i / dI_i \cdot I_i / x_i < 1$).

In addition, our specification implies that the cross income elasticity for conspicuous consumption is positive (i.e., $n_{yc} = dy_i / dI_j \cdot I_j / y_i > 0$) as long as the community's conspicuous

consumption subtracts from the consumer's respect, (i.e., $\partial f / \partial y_j < 0$). On the other hand, the cross income elasticity for savings is negative (i.e., $n_{xc} = dx_i / dI_j \cdot I_j / x_i < 0$). Thus, an income increase in the community leads, through the increase in y_j , to an increase in conspicuous consumption, y_i , and a reduction in savings x_i . This change in the community subtracts from i 's social income through a reduction in community respect, R_i . As a result, i would want to increase his conspicuous consumption, y_i , to counter that loss. Without an equivalent income increase this is only possible by reducing his savings, x_i . The more important the contribution of the social environment to i 's social income, Φ_i , the more a consumer's utility is determined by the behavior of the community rather than by his own income, and thus the greater the effect of an income increase for the community.

In sum, regardless of whether the increase in income inequality is caused by an income increase for individual i or anybody else in i 's community, individual i will increase conspicuous consumption, y_i , and reduce savings, x_i . It is also not necessary to assume that the individual with the income increase is in everybody's relevant network. It is sufficient to assume that social networks overlap. Individuals are influenced locally by those who are near them and higher in the income distribution. At the same time, they influence those in their social network who are lower in the income distribution. An income change for the individual with the highest income would then have a cascading effect that trickles down the entire income distribution.

Endnotes

¹ For example, credit income at Circuit City is expected to account for 100% of fiscal 2003 earnings. The expectation at Sears is 54% (Stires 2003).

² All data are obtained from published government statistics (see Appendix A for details).

³ The Federal Reserve's statistic on household sector debt (Flow of Funds Accounts) also includes about \$1/2 trillion in other loan categories including security credits and loans from the U.S. government as well as debt owed by nonprofit organizations. We exclude this debt.

⁴ The Gini-Index is defined as follows. Consider a plot of the cumulative income distribution where all individuals are sorted by income starting with the lowest income individual. The Gini-Index is then calculated as the area between the diagonal line for an even income distribution and the actual cumulative income distribution divided by the total area below the diagonal line. A value of zero implies that everybody has the same income; a value of 1 or 100% implies that one single individual earns all the income.

⁵ Consumers have a choice between two Chapters of the U.S. Bankruptcy Code, Chapter 7 and Chapter 13. A negligible number of filings also occur under Chapter 11. Over 70 percent of the filings fall under Chapter 7. The principal difference between the two Chapters is that in Chapter 7 debtors surrender all their nonexempt property rights and wealth to the court. Exemption levels vary greatly by state. In return, Chapter 7 debtors are able to keep all future income but cannot re-file for six years. Chapter 13 debtors retain existing property, but restructure repayment of all or a portion of debt out of future income.

⁶ Due to a change in the bankruptcy law in 1979, pre-1980 bankruptcy data are not comparable with post-1979 data.

⁷ Source: www.cardFacts.com.

⁸ See, for example, reports by U.S. Public Interest Research Group (*The Credit Card Trap*, April 5, 2001) or the Consumer Federation of America (*Recent Trends in Bank Credit Card Marketing and Indebtedness*, July 8, 1998).

⁹ Escalation of borrowing based on credit availability may be tempered somewhat by consumer behavior to limit activities with negative future consequences (Wertenbroch 1999).

¹⁰ Alan Greenspan, the nation's chief central banker, stated before Congress: "Personal bankruptcies are soaring because Americans have lost their sense of shame." (quoted in Julie Kosterlitz (1997) "Over the Edge," *National Journal*, p. 871)

¹¹ We denote an unspecified lag as d . The detailed lag structure is determined during estimation.

¹² The quarterly Gini-index is constructed from the income deciles calculated from the Current Population Survey and thus not affected by the methodology changes in the reported Gini Index in 1992.

¹³ Given the presence of autoregressive terms in our estimation equations, we carefully examined the estimation errors for moving average terms. In most cases we find a slightly elevated moving average term for lag 2. The results did not change when removing these effects. For revolving debt we also find relatively large moving average terms for lags 9 to 12. When controlling for these autocorrelation effects, the standard errors significantly decreased. While the effect of income inequality was somewhat lower, its statistical significance actually increased. The remaining factors were virtually unchanged compared to OLS. This pattern held for all models presented in Tables 2 and 3. We therefore only report the OLS estimates.

¹⁴ U.S. Census Bureau report (2001), "Household Net Worth and Asset Ownership".

¹⁵ When we exclude the asset variable, the parameter estimates for a change in income are substantially larger.

¹⁶ Detailed estimation results for this sensitivity analysis are available from the authors.

¹⁷ Prospect theory (Kahneman and Tversky 1979) makes the same prediction as consumers see themselves in a loss position after a neighbor has increased her conspicuous consumption. In contrast, the result of Gaba and Kalra (1999) does not require a convex utility function.

¹⁸ Daspin, Eileen (1999), "Summer Entertaining has Sparked a Wave of Barbecue Buying Binges," *The Wall Street Journal*, July 2, Weekend Section p.1.

¹⁹ Fletcher, June (2000), "Garage Envy Hits Fashionable Homeowners," *The Wall Street Journal*, October 18, Weekend Section p.1.

²⁰ References to conspicuous consumption have been found in the Roman poet Horace and the verse of Alexander Pope (Rae 1905).

²¹ A recent article in the New York Times Magazine has the following statement from an individual on success: "I should be able to buy this stuff ... It just seems to me, well, I'm as smart as my rich friends." (Klam, Matthew (1998), "Some of My Best Friends are Rich," *New York Times Magazine*, June 7, 64-67).

²² Unfortunately, the Swiss data set is not rich enough to allow for an analysis of comparable details.

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Table 1
Augmented Dickey-Fuller Test Results for Different Debt-to-Income Ratios

y	Lags k	Parameter Estimates			F-Test Statistics for Restrictions		
		a_0	a_2	γ	$a_0 = a_2 = \gamma = 0$	$a_2 = \gamma = 0$	$a_0 = \gamma = 0$
D/Y	4	7.513 (4.069)	0.059 (4.185)	-0.140 (4.078)	6.863	8.756	
CD/Y	4	1.305 (4.107)	0.010 (3.221)	-0.103 (4.233)	6.367	9.008	
ND/Y	4	1.182 (3.857)	0.001 (0.388)	-0.106 (3.952)	5.274	7.832	7.865
RD/Y	4	0.107 (3.581)	0.008 (3.650)	-0.084 (3.659)	6.001	6.717	
MD/Y	8	5.881 (3.570)	0.042 (3.343)	-0.140 (3.554)	4.839	6.314	
$\Delta(\text{MD}/Y)$	1	0.223 (2.730)		-0.643 (4.192)			8.797

Results are based on the estimation model: $\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=2}^k \beta_i \Delta y_{t-i+1} + \varepsilon_t$.

Note: The numbers in parentheses are t-values. The critical value for a 95% confidence interval for the t-test of γ is 3.47. The respective critical values for a 95% confidence interval for the restrictions are 4.88 for the 3-way restriction and 6.49 for the two-way restrictions.

Table 2
Detailed Estimation Results For Base Model

	Total Household Debt	Consumer Credit	Non-Revolving Debt	Revolving Debt	Mortgage Debt
Constant	-0.567 (11.622)	-5.035 (3.996)	-5.446 (3.373)	0.390 (1.219)	24.821 ^b (11.344)
Trend t	-0.019 (0.029)	0.005 (0.009)	-0.009 (0.009)	0.005 ^b (0.003)	-0.020 (0.026)
Past Debt-to-Income (D/Y _{t-1})	0.947 ^a (0.033)	0.990 ^a (0.024)	0.968 ^a (0.026)	1.014 ^a (0.027)	0.924 ^a (0.030)
Past Consumption (C/Y _{t-1})	-0.324 ^a (0.084)	-0.069 ^b (0.028)	-0.050 ^b (0.023)	-0.028 ^a (0.010)	-0.306 ^a (0.065)
Interest Rate [†] (r _t)	-0.111 ^a (0.042)	-0.076 ^a (0.027)	-0.076 ^a (0.023)	-0.028 ^b (0.014)	-0.356 ^a (0.131)
Refinancing Incentive (mrg _t)		-0.113 ^a (0.030)	-0.099 ^a (0.026)	-0.015 (0.011)	-0.127 (0.130)
Past Income Change (ΔY _{t-2})	0.005 (0.024)	0.010 ^c (0.006)	0.012 ^b (0.006)	-0.003 ^c (0.002)	-0.012 (0.019)
Past Assets (A/Pop _{t-2})	6.103 ^a (1.363)	0.636 (0.464)	0.992 ^b (0.432)	0.004 (0.138)	5.361 ^a (1.168)
Past Bankruptcy Rate (BR/Pop _{t-1})	-1.647 ^c (0.890)	-1.053 ^a (0.289)	-0.559 ^b (0.235)	-0.540 ^a (0.105)	-1.112 ^c (0.607)
Income Inequality (Gini _{t-2})	0.711 ^a (0.249)	0.300 ^a (0.089)	0.269 ^a (0.077)	0.065 ^b (0.024)	0.341 ^c (0.206)
Durbin-Watson	2.167	2.004	1.824	2.216	2.052
Box-Ljung Q (8)	8.50 (0.386)	9.42 (0.308)	9.67 (0.289)	11.71 (0.164)	7.67 (0.466)
Box-Ljung Q (16)	13.86 (0.609)	13.22 (0.657)	17.19 (0.373)	27.58 (0.035)	16.35 (0.429)

Note: Numbers in parentheses are standard errors. Estimation with Gini-index and level data. Results are based on 82 quarterly observations for 1980:3 to 2000:4.

^a statistically significant at a 0.01-level; ^b statistically significant at a 0.05-level; ^c statistically significant at a 0.1-level (2-tail t-test).

[†] 1-year T-Bill rate except for revolving debt (average credit card rate) and mortgage debt (30-year standard mortgage rate).

Table 3
Summary of Income Inequality Effects

		GINI Index(t-2)		90 th /10 th Income Ratio(t-2)	
		(1)	(2)	(1)	(2)
Total Household Debt:		0.711	0.582	2.170	2.507
Level Data		(0.249)	(0.148)	(0.562)	(0.443)
Total Household Debt:		0.510 [†]	0.596	2.131	2.335
Differenced Data		(0.305)	(0.300)	(0.974)	(0.964)
Consumer Credit:		0.301	0.293	0.755	1.156
Level Data		(0.089)	(0.048)	(0.276)	(0.172)
Consumer Credit:		0.201	0.221	0.840	0.887
Differenced Data		(0.088)	(0.087)	(0.268)	(0.267)
Non-Revolutioning Debt:		0.269	0.203	0.516	0.621
Level Data		(0.077)	(0.042)	(0.256)	(0.140)
Non-Revolutioning Debt:		0.126	0.145	0.539	0.589
Differenced Data		(0.062)	(0.072)	(0.222)	(0.221)
Revolving Debt:		0.065	0.138	0.190	0.369
Level Data		(0.024)	(0.023)	(0.062)	(0.056)
Revolving Debt:		0.063 [†]	0.066	0.281	0.291
Differenced Data		(0.032)	(0.032)	(0.101)	(0.100)
Mortgage Debt:		0.341 [†]	0.310	1.494	1.300
Level Data		(0.206)	(0.116)	(0.476)	(0.362)
Mortgage Debt:		0.309*	0.285*	1.382 [†]	1.358 [†]
Differenced Data		(0.257)	(0.252)	(0.816)	(0.801)

Note: Numbers in parentheses are standard errors. All equations were estimated using 82 quarterly observations for 1980:3 to 2000:4. For each measure of income inequality, the results from two different model specifications are provided: (1) corresponds to equation (6) and (2) represents a simplified specification with the bankruptcy variable and the trend variable excluded from the estimation equation. Estimates for the differenced data are derived from an error-correction model, where the error from the cointegration relationship from the first-stage estimation was added in the second-stage equation. The null hypothesis of no cointegration in the first-stage estimation was in all cases rejected at the 5% level of significance.

[†] statistically significant at 0.1-level; * not statistically significant; all other estimates are statistically significant at a 0.05-level or better (2-tail t-test).

Table 4
Comparison of Effects

	Total Debt	Household Debt	Consumer Credit		Non-Revolving Debt		Revolving Debt		Mortgage Debt	
	Sensitivity [†]	Effect Size ^{††}	Sensitivity	Effect Size	Sensitivity	Effect Size	Sensitivity	Effect Size	Sensitivity	Effect Size
Income Inequality	0.375	2.66	0.679	1.12	1.008	1.01	0.370	0.24	0.234	1.28
Consumption	-0.367		-0.334		-0.404		-0.343		-0.452	
Interest Rate	-0.007	1.13	-0.021	0.78	-0.035	0.78	-0.061	0.03	-0.045	2.81
Income Change	0.001	0.02	0.002	0.05	0.004	0.05	-0.001	0.01	-0.001	0.05
Asset Values	0.099	4.98	0.044	0.52	0.115	0.81	0.001	0	0.135	4.37
Bankruptcy Rate	-0.018	-1.35	-0.056	-0.87	-0.049	-0.46	-0.072	-0.44	-0.018	-0.91

Note: All results based on parameter estimates from Table 2.

[†] Numbers are point elasticities calculated at the average values for 1991:1 to 2000:4.

^{††} Numbers indicate the additional amount of debt in percent of disposable personal income added due to changes of the different factors in 2000 compared to 1980. Over this period, total household debt increased by 27.5, mortgage debt by 24.1, and consumer credit by 3.4 points (non-revolving debt declined by 3.1 and revolving debt increased by 3.5).

Table 5
Assessing Alternative Explanations

	Total Household Debt	Consumer Credit	Non-Revolving Debt	Revolving Debt	Mortgage Debt
Slow Economy [†]	-0.232 (0.232)	-0.052 (0.074)	-0.082 (0.063)	0.041 ^c (0.022)	-0.234 (0.178)
Income Inequality (Gini _{t-2})	0.690 ^a (0.250)	0.279 ^a (0.094)	0.234 ^a (0.081)	0.081 ^a (0.025)	0.392 ^c (0.215)
1986 Tax Revision ^{††}	0.060 (0.410)	0.292 ^a (0.082)	0.285 ^a (0.070)	0.003 (0.026)	-0.549 ^c (0.306)
Income Inequality (Gini _{t-2})	0.725 ^a (0.266)	0.247 ^a (0.083)	0.204 ^a (0.071)	0.065 ^a (0.024)	0.279 (0.231)
%Self Employed _{t-1}	-0.120 (0.088)	-0.090 ^a (0.027)	-0.080 ^a (0.023)	0.001 (0.008)	0.051 (0.086)
Income Inequality (Gini _{t-2})	0.912 ^a (0.288)	0.323 ^a (0.083)	0.278 ^a (0.072)	0.065 ^b (0.026)	0.257 (0.260)
Age 18-45	-0.186 (0.133)	-0.163 ^a (0.043)	-0.144 ^a (0.038)	0.002 (0.015)	0.283 ^c (0.164)
Income Inequality (Gini _{t-2})	0.945 ^a (0.299)	0.331 ^a (0.081)	0.276 ^a (0.070)	0.065 ^b (0.025)	0.090 (0.258)
Annual Data ^{†††} 1953 – 2000	0.717 ^a (0.236)	0.363 ^a (0.118)	0.384 ^a (0.108)	0.073 (0.054)	0.353 ^c (0.193)
1953 – 1984	0.577 ^b (0.263)	0.202 ^{c*} (0.102)	0.310 ^{b*} (0.137)	-0.205 (0.217)	0.276 (0.213)
1985 – 2000	0.782 ^b (0.344)	0.442 ^{b*} (0.191)	0.397 ^{b*} (0.172)	0.137 ^c (0.077)	0.355 (0.253)

Note: Numbers in parentheses are standard errors. Model specification and data as in Table 2; additional factors were included sequentially.

^a statistically significant at a 0.01-level; ^b statistically significant at a 0.05-level; ^c statistically significant at a 0.1-level (2-tail t-test).

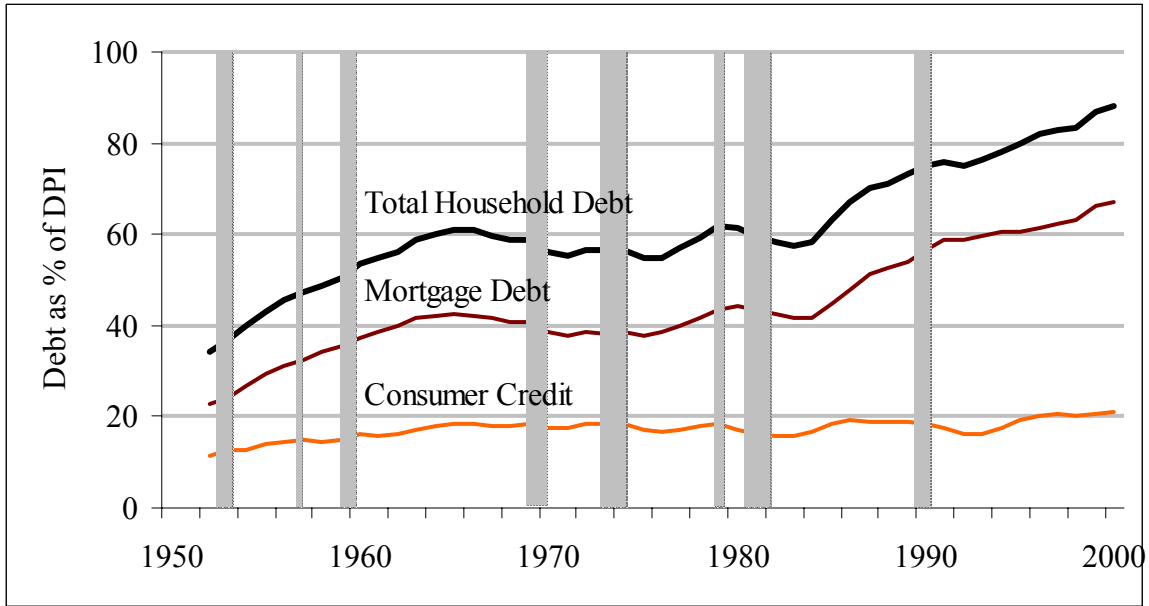
* difference is statistically significant at the 0.05-level.

[†] Dummy variable to indicate two consecutive quarters with GDP growth below 1.7% at a seasonally adjusted annualized rate. For total household and mortgage debt the dummy variable was lagged one period, i.e., it indicated the presence of two quarters with low growth in the immediate past. For consumer credit and its components, the dummy variable was based on the current and the previous quarter.

^{††} Dummy variable for years up to 1986:2.

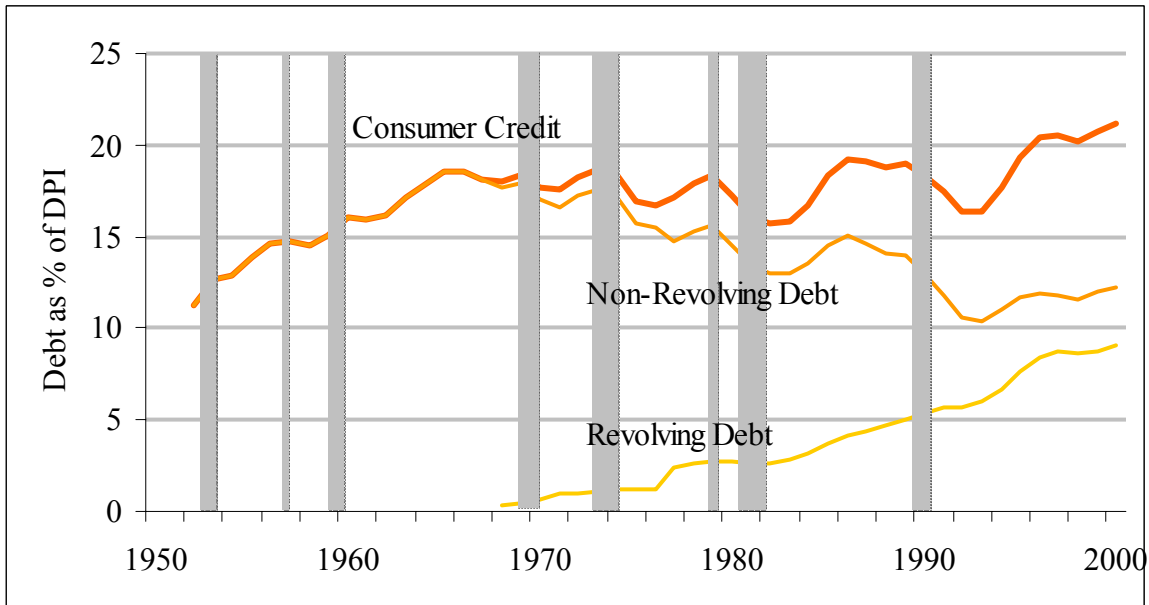
^{†††} We used the same model as for the quarterly data set except that we excluded the bankruptcy variable, only used the T-bill rate, and allowed for different intercept and trends for the years 1985–2000. The estimation for the years 1985–2000 included the bankruptcy variable.

Figure 1a
*Household Debt as a Percentage of Disposable Personal Income:
Total Debt, Consumer Credit and Mortgage Debt**



* Shaded areas indicate recessions as defined by NBER.

Figure 1b
*Consumer Credit as a Percentage of Disposable Personal Income:
Total Credit, Non-Revolving Debt and Revolving Debt**



* Shaded areas indicate recessions as defined by NBER.

Figure 2
Savings Rate as a Percentage of Disposable Personal Income

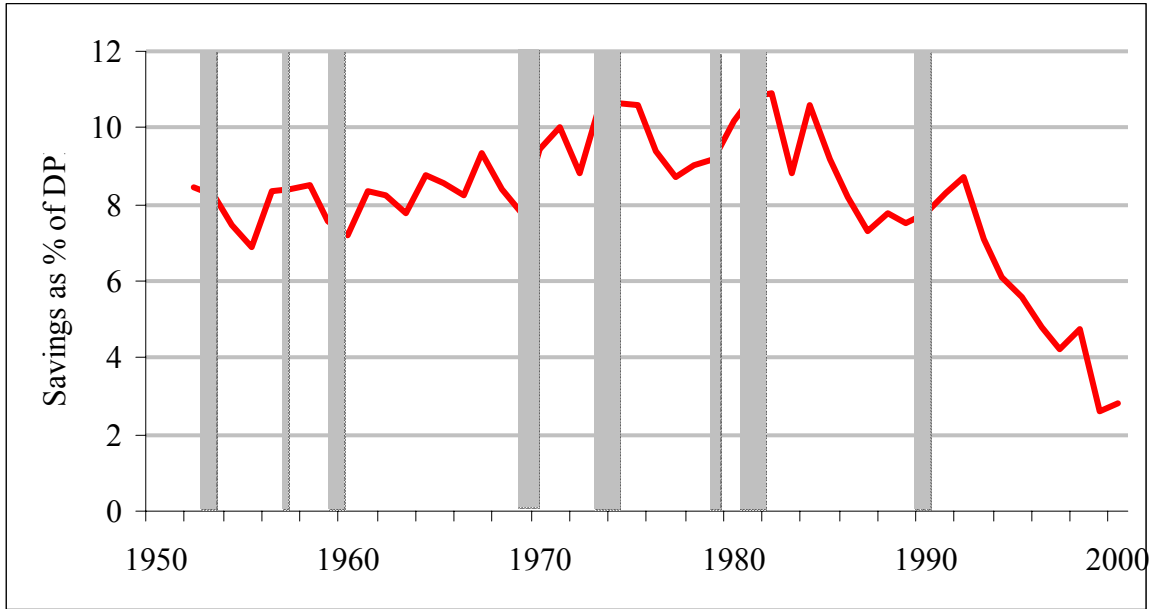
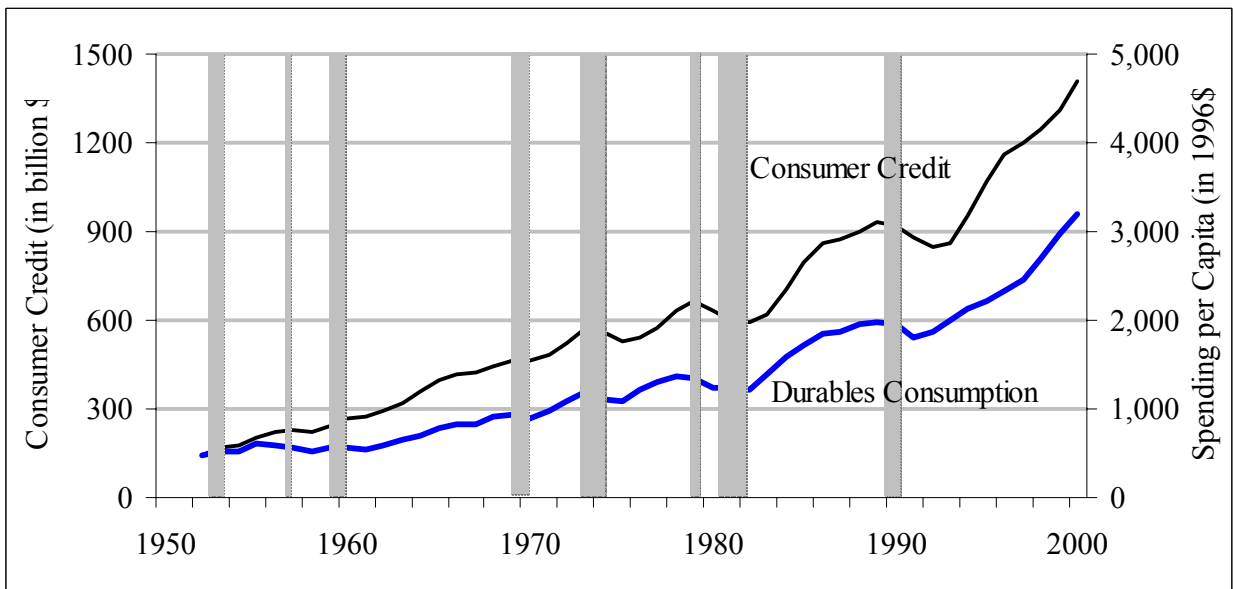
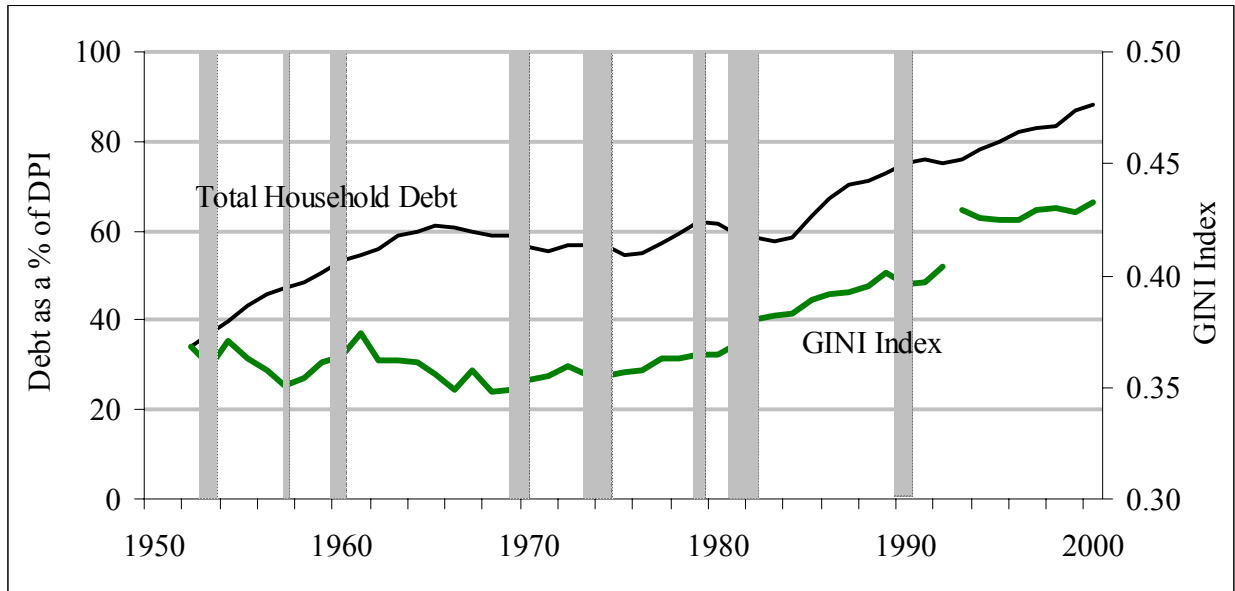


Figure 3
*Household Debt and Durables Consumption per Capita**



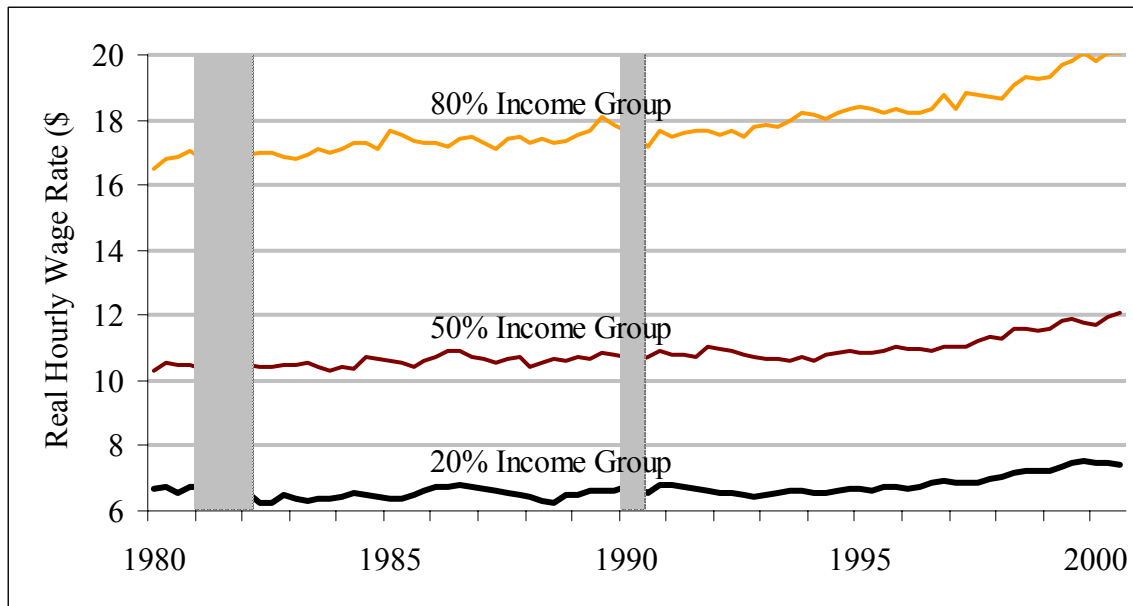
* Shaded areas indicate recessions as defined by NBER.

Figure 4
*Debt-to-Income Ratio and Income Inequality**



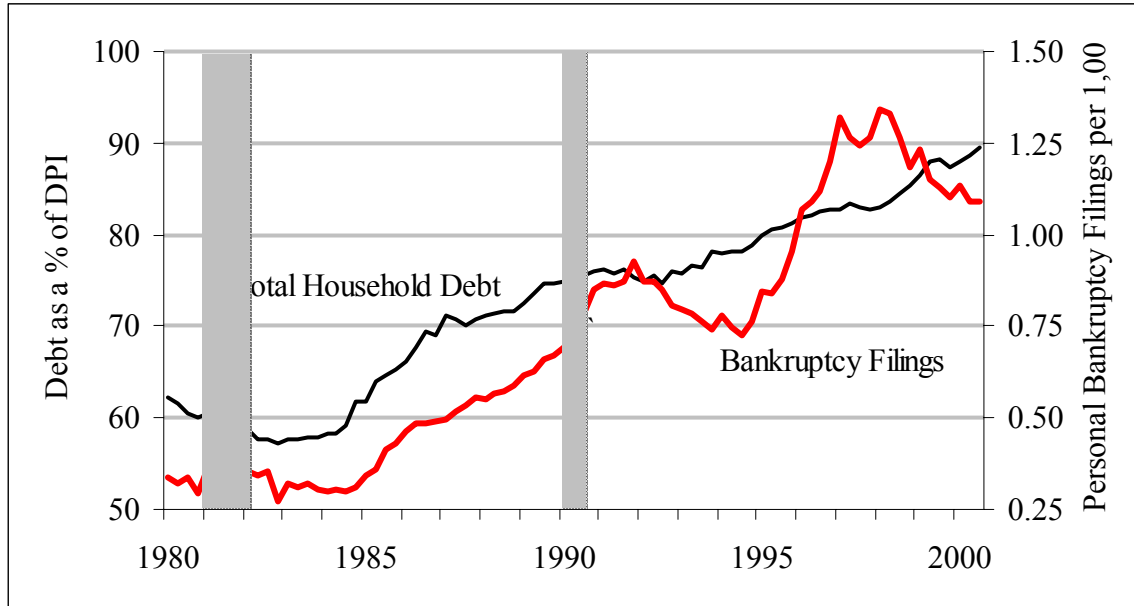
* Shaded areas indicate recessions as defined by NBER. Change in data collection methodology suggests pre-1993 and post-1992 of GINI Index are not comparable.

Figure 5
*Real Wages for Different Income Deciles**



* Shaded areas indicate recessions as defined by NBER.

Figure 6
*Debt-to-Income Ratio and Personal Bankruptcy Filing per 1000**



* Shaded areas indicate recessions as defined by NBER.