

**Greater Access to Consumer Credit:
Who Benefits and How?**

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Plan for Next Step

Greater Access to Consumer Credit: Who Benefits and How?

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ABSTRACT

The availability of consumer credit has expanded greatly during the past twenty years in OECD countries. While higher income groups long had access to credit, the proliferation of credit cards has gradually increased access to credit for a wide range of household income groups and in virtually all regions of the United States. This dissertation searches for econometric evidence on how greater credit access affects savings, investment and consumption patterns across different income groups. Some argue high interest rates and fees hurt poor households disproportionately, and these households wind up over-extended or end up paying high interest rates and fees that may actually reduce their disposable income and savings over the longer term. Wealthy consumers, on the other hand, may have easy access to revolving credit at low and even negative interest rates. Other models of credit constrained consumers suggest greater access to credit should allow low income households to invest more in schooling and housing, and to smooth or shift consumption forward therefore improving their and societies' welfare.

Our preliminary estimates show that while increase in revolving credit reduced savings of the lower middle-income group, but it increased savings of both the low- and high-income groups. Also, revolving credit seems to increase the consumption of durable goods for the upper middle-income groups.

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Chapter One

Introduction and Literature Review

Access to consumer credit has expanded greatly in the past 20 years as a result of financial deregulation for all but lowest income groups in the U.S. Strictly speaking if consumers do not face liquidity constraints, the Permanent Income Hypothesis (PIH) and the Life Cycle Hypothesis (LCH) suggest greater access to credit should have little impact on consumer spending, except to the extent that borrowing costs fall. However, new generation of consumption models argue that many households face borrowing constraints, and they may be liquidity constrained. In this model, financial deregulations, such as that which occurred in 1983 that eases access to consumer credit, are assumed to alter the spending, saving, and investment behavior of liquidity constrained populations. In principle, greater credit access to consumer credit can improve the welfare of the liquidity constrained groups, and if borrowing constraints affect investments such as education and housing, overall economic growth may increase as well.

While some believe that liquidity constraints raise savings and therefore growth rates, others argue that better access to credit increases investment in education and housing and may therefore increase growth. Consumer credit is an important component on household balance sheet and therefore may be correlated with savings, investments, and durable goods consumption. The hypotheses that this paper tries to test are: (1) Is credit a substitute for savings, or does it actual contribute to savings by facilitating investment in human capital and durable goods such as housing and cars for example? (2) Does credit expansion would enhance educational spending, housing, and durable goods consumption, especially for the lower

income groups? (3) Do poor, middle class or wealthy consumers appear to be affected most by greater access to consumer credit?

As more recent consumption models measure only the impact of consumer credit at the aggregate level (Ludvigson, 1999), this paper tests the above hypotheses by looking at populations at different income levels and considering revolving credit in the unsecured consumer credit card market only, as credit card expansion may have had more impact on the low- or high-income groups due to differentiated pricing offers from lenders. In addition, most consumption models were built on non-durable goods only and in this paper, the model incorporates durable goods as well as investments in order to see credit impact on consumption in a longer term. Because distribution of wealth affects aggregate output and investment in short as well as in long run (Galor & Zeira, 1993), identifying the cost and benefit of credit expansion and to which income groups therefore would be a significant contribution to the study of economic growth and in the area of consumption behavior.

Chapter 3 presents a model of consumer behavior and motives in obtaining and utilization of household credit for consumption and determine the benefit and costs of credit use. It then presents empirical findings as results of testing these theories across all income groups. The theoretical portion of the paper includes (I) discussion of existing theories on consumer credit, its motives, and its impact on savings, investments, and growth rates (II) examination of the credit market and the behavior of the borrowers (III) analysis of how different types of consumption resources are intertwined with each other in different time periods and (IV) propose test hypotheses to see whether credit enhances or reduces welfare of the population, defined by their spending on durable goods, home values, educational expenses, overall goods, and changes in savings across five different income groups. The empirical

portion of the paper presents the data result of the test, the interpretations of the result, and the methodologies applied in testing the theoretical model. While the generic consumption resource constraints in stock form comprises the initial wealth A_0 and income Y_t as

$$\sum_{t=1}^T C_t \leq A_0 + \sum_{t=1}^T Y_t, \quad (1.1)$$

the testing model used in this paper further expands from the generic form by including consumer revolving credit (revolving credit balance from credit card only) as an exogenous variable, given the noticeable consumer credit card growth in the U.S. in the last two decades. The model not only incorporates the availability and changes in consumer credit, it also considers the impact of consumption behavior that is generated from credit cost and benefit variables.

More recent consumption models deviate from the PIH/LCH optimizing models by, for example, allowing for liquidity constrained consumers. Campbell and Mankiw (1990) for example empirically test and reject the PIH/LCH for some groups. They argue consumers fall into two distinctive populations: one that behaves as PIH/LCH models predict and liquidity constrained consumers who rely mainly on current income,

$$\Delta C_t = \mu + (1-\lambda)E_{t-1}\Delta Y_t + \lambda E_{t-1}r_t + \varepsilon_t. \quad (1.2)$$

Ludvigson (1999) finds a significant relationship between aggregate consumption and consumer credit and hence enhanced the model by considering outstanding debts:

$$\Delta C_t = \mu + \lambda E_{t-1}\Delta Y_t + \sigma E_{t-1}r_t + \alpha E_{t-1}\Delta d_{t+1} + \varepsilon_t. \quad (1.3)$$

While both Cambell/Mankiw (1990) and Ludvigson (1999) did not specify further the consumption behavior of the $\sigma E_{t-1}r_t$ group and what consumers at different income levels

respond to the differences of saving and lending rates, test in this paper takes a different approach by including these factors. While credit expansion may have benefited some populations, it may also have harmed others. Thus, using the Seemingly Unrelated Regression with restrictions method and Generalized Least Squares regressions on all five income groups, this paper proposes test to see whether (I) increase in credit has affected savings rate (II) increase in revolving credit also increases consumption in durable goods, educational related expenses, and investment such as home values. Model tests are conducted across five income groups and four geographic regions and the models in equation form are as follows:

$$\Delta S_t = \alpha E_{t-1} \Delta Y_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \text{In} D_{t+1} + \varepsilon_t \quad (1.4)$$

$$\Delta G_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \text{In} D_{t+1} + \varepsilon_t \quad (1.5)$$

$$\Delta E_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \text{In} D_{t+1} + \varepsilon_t \quad (1.6)$$

$$\Delta H_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \text{In} D_{t+1} + \varepsilon_t \quad (1.7)$$

$$\Delta C_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \text{In} D_{t+1} + \varepsilon_t \quad (1.8)$$

where S is savings, Y is disposable income, W is wealth, which is cumulative savings, E represents educational spending, G indicates expenditure on durable goods (represented by major appliances), H represents home values, and C is overall consumption including both durable and non-durable goods. Changes in revolving credit D, as debt in the next period, are considered to be non-linear.

Between savings and credit, Jappelli and Pagano (1994) argued that financial deregulation in the 1980s that caused easier credit access has contributed to the decline in national savings and growth rates in OECD countries. Their study showed that liquidity constraints on household actually raise the savings rate, increase the growth rate and therefore may increase welfare. However, Aghion (1999) and others showed that due to capital market

imperfection, redistribution of capital (greater credit access) creates investment opportunities and such redistribution will be growth enhancing.

Frankel and Razin (1996) identified three motives in the credit borrowing market, namely the consumption smoothing, the consumption tilting, and the consumption augmenting. In the case of consumption smoothing, consumers save for "rainy days" and greater access to credit may reduce savings. So one concern is that by reducing private savings, easier access to credit may actually slow economic growth or increase the role of foreign savings in financing investment. For consumption tilting, when households have greater access to credit, they may borrow more when they are young, thereby tilting consumption over the life cycle. Initially this shows up as a drop in savings especially among young consumers.

Since both short term and life cycle consumption smoothing tend to reduce savings when access to credit initially expands, behavior of consumption smoother and tilters may be observationally equivalent. However, by focusing on households or states where income is more volatile, it may help to distinguish between these two motives. If short term consumption smoothing is at work, there should be some positive interaction between credit and income volatility -- where and when income volatility is higher, access to credit should have a greater impact on savings rates.

Credit constrained households may also alter their investment decisions once access to credit improves (and its cost falls). For example, families may keep children in school longer and invest in houses earlier. Borrowers in this case would be the consumption augmenters. Both of these effects would tend to boost economic activity in the short run by stimulating investment in housing and durable goods and over the longer term by increasing human capital.

While this paper testing the opposing theories of Jappelli/Pagano (1994) against that of Aghion (1999) among five income groups, it also takes Frankel/Razin's (1996) three motives of consumption into consideration in searching the causes for borrowing and the welfare of various income groups.

Empirical findings in this paper show that while revolving credit reduced the savings rate of both the low- and high-income groups, it does not play a significant role in increasing the welfare of the lower income groups. Nonetheless, revolving credit did seem to help the increase of savings in the middle-income class and consumptions in durable goods for the lower middle-income class.

Chapter 2

Consumer Credit

The following section introduces and discusses literatures that consider credit as an exogenous variable in consumption and explore the effect of credit on the welfare of the liquidity constrained and growth in the overall economy. It also searches for causes and various motives in consumer borrowing. These theories serve as foundations for the empirical testing that this paper intends to develop.

2.1 Exogenous shifts in Consumer Credit Access

As traditional consumption models do not explicitly include consumer credit as an exogenous variable, Antzoulatos (1994b) and Caballero (1995) suggest from their empirical findings that consumption may exhibit non-linear dynamics characterized by occasional surges. And Antzoulatos (1996) further suggests that rising consumer debt can signal such surges; taking explicitly into account the forward looking nature of consumption. His finding concludes that consumption growth forecasts might be improved by taking the signaling capacity of consumer debt into consideration.

Ludvigson's study (1999) on the relationship between consumption and credit, based on the model of time-varying liquidity constraints, confirmed that predictable credit growth and predictable income growth influence consumption independently. Using the U.S. installment credit data (which comprises mostly the credit cards and auto loans, and applying lagged instrumental variables as conditional expected values of the explanatory variables), Ludvigson concludes that predictable credit growth remains a strongly significant determinant of consumption growth, regardless whether expected income growth and the ex ante real interest

rate are included as additional independent variables. Thus, consumption is ‘excessively sensitive’ to ex ante credit growth (pp.441).

2.2 *The Welfare Gains from Access to Credit: an Overview*

Frankel & Razin (1996) break consumer motives for borrowing into three categories: consumption smoothing, tilting and augmenting. In every case, consumers find it beneficial to incur debt during some periods in their life in order to obtain optimal time profile in consumption. Five factors affect borrowing motives: (I) the subjective discount factor δ , which is associated with time preference of consumption ($\delta = 1/1 + \rho$) (II) the market discount factor α (III) the interest rate r (IV) the income factor Y and (V) the investment opportunity $F_2'(K_1)$. The model involves two periods of consumption and all assume that consumers have no initial debt. While the motive to borrow for consumption smoothers is due to income inequality in period one and period two therefore $Y_1 \neq Y_2$, the consumption tilters borrow due to time preference so $\delta \neq \alpha$, but income in two periods stay the same. As these two types of borrowers have no interest in investment, the consumption augmenters borrow because they see opportunities of investment as $F_2'(K_1) > r_1$. For these three scenarios, households benefit from access to credit. In other words, borrowing allows either retaining a particular life style and fulfilling consumption desires or creating future incomes through productive investment. The following figures illustrate the dynamics of the three types of borrowers.

Chapter 3

Liquidity Constrained Borrowers

This chapter introduces the unsecured consumer credit market. It shows the utility of the lenders and borrower and the incentives for credit supply and demand. It then discusses the cost and benefit or trade offs of utilizing credit vs. savings and the determinants for borrowing. Finally, it shows how financial deregulation changed the unsecured credit market, the cause of the borrowing constrained groups and the model this paper intends to test.

3.1 *The Unsecured Consumer Credit Market*

The following section provides the background information on lenders and borrowers in the credit card market and the description of the credit constrained population. The lender's utility function at time t is to

$$\max u(R_t) \quad \text{s.t.} \quad \varsigma_t \leq \lambda_t \quad (1.9)$$

where R is revenue, which is income from interest rate, annual fees, late/over limit fees, interchange fee, cash advance, transaction and other fees. ς is all costs, which include marketing/operating costs, default losses (charge-offs), and cost of funds for lenders. P_t is profit at time t , which is $R - \varsigma$, and λ is a fraction of R .

The utility of lenders is to maximize revenue over an infinite horizon. However, as revenue increases, costs also increase. Consequently, the marginal utility of lenders first increases and then decreases,

$$\frac{\partial u}{\partial R_t} > 0 \quad \text{and} \quad \frac{\partial^2 u}{\partial R_t^2} < 0. \quad (1.10)$$

On the other hand, the borrower's utility function at time t is

$$\max u(D_t) \quad \text{s.t.} \quad c_t \leq \rho_t \quad (1.11)$$

where D_t is revolving credit (or debt at time t) and the lower case c is credit costs, which is interest and finance charges. ρ is a fraction of D .

Credit users desire to maximize revolving credit for consumption over an infinite time zone. Since credit costs increase as the amount of revolving credit increases, the utility of receiving revolving credit as consumption resource decreases after the initial increase, and the marginal utility of borrowing is

$$\frac{\partial u}{\partial D_t} > 0, \quad c_t \leq \rho_t, \quad \frac{\partial^2 u}{\partial D_t^2} < 0. \quad (1.12)$$

3.2 The Behavior of the Liquidity Constrained Borrowers

Assume that the individual's lifetime utility function is the following:

$$E_t(u) = \max E_t \left\{ \sum_{i=0}^{\infty} \psi^i \left[\frac{C_{t+i}^{1-\gamma}}{1-\gamma} \right] \right\} \quad (1.13)$$

which is the discounted sum of each period's utility over an infinite horizon.

Taking the time preference factor in consumption into account, $\psi = (1+\Phi)/(1+r)$ where Φ is positive rate of time preference, r is the discount factor, $\psi < 1$, and γ is the coefficient of relative risk aversion.

However, the liquidity constrained group faces the problem of budget constraints. In Aghion and Williamson's terms, the budget constraint is to

$$\max_{C_t} \int_0^{\infty} u(C_t) e^{-\rho t} dt \quad (1.14)$$

s.t.

$$W_t + r_t K_t = C_t \quad (1.15)$$

where W is wealth and K is capital stock. From the equation above, budget constraints for consumption are twofold. One is income or savings (and initial wealth if apply), the other is capital stock or access for credit or credit available, which is based on income and other criteria (see equation 1.50 and 1.52 for function of credit granting in unsecured credit market (an asset based lending in the secured credit market is not considered in this paper)).

3.3 *Users of revolving Credit*

Revolvers are those who remain credit balances on their account after each monthly billing period. As revolving credit balance exists only in the consumer credit cards, the analysis below will focus on the credit card market.

Revolvers are the consumers who not only have access to the credit market but also are willing to revolve the credit granted to them; either due to impatience or need. Contrary to non-credit users, who rely their excessive consumption needs on savings when

$$E_{t-1}C_t > E_{t-1}Y_t \tag{1.16}$$

and their expected consumption is $E_{t-1}C_t = f(Y_t, S_t)$. (1.17)

Since current income and savings are the only capital resources for current consumption for the non-credit users, revolvers have a different perspective on utilizing their consumption resources. More optimistic than non-credit users, revolvers perceive credit as an opportunity to gain higher utility and consequently revolve their balances for consumption purposes.

Since lifetime utility of an individual is to maximize consumption (see equation 1.16) and consuming sooner is more attractive and desirable than later [Ainslie, Haslam (1992), Benzion (1989), and Kirby (1997)], the utility of utilizing credit for revolvers resides in the benefit of consuming desired goods at earlier times when cash is not available. Subsequently,

credit user's utility increases as credit allows individuals to consume at an earlier time. In addition, the utility gained by credit users at time t $u_{k,t}^g$ may also extend to periods beyond time t as the utility in consumptions of durable goods lasts more than one period. The following analysis compares the cost and benefit between utilizing savings and credit for consumption.

The loss and gain of utility, $U_{D,t}^L$ and $u_{D,t}^g$, or the cost and benefit of utilizing credit at time t , D_t^c and D_t^b , respectively, are

$$U_{k,t}^L = D_t^c = E_t[\sum_{i=1}^{\infty} \psi^i(D_{t+i})] \quad \text{and,} \quad (1.18)$$

$$U_{k,t}^g = D_t^b = E_t[\sum_{i=0}^{\infty} \psi^i(C_{t+i})] \quad (1.19)$$

where $\psi^i = (1+\Phi_t)/(1+\rho)^i$, Φ is the rate of time preference and ρ is the discount factor.

For credit users, D_t^b is perceived to be greater than D_t^c or $u_{D,t} < u_{D,t}^g$. The utility loss for credit users lies in the D_{t+i} , which is the debt payment. However, the payment is delayed to the next period. On the other hand, the utility gain for credit users resides not only in the current period consumptions, but also extends to additional time periods. In other words, credit users are able to consume the type and amount of goods and services at time t that they are otherwise unable to consume until few periods after time t without borrowing at time t .

Since saving is a form of suppression of consumption and the current savings amount S_t is the cumulative suppression of consumptions in the past, saving is considered loss of utility for goods not consumed from time 0 to time t (as individual's lifetime utility is to consume). However, saving is considered utility gain for time $t + i$. The cost and benefit of savings, S_t^c and S_t^b , or the loss and gain of utility of saving at time t , $U_{s,t}^L$ and $u_{s,t}^g$, respectively, are

$$U_{s,t}^L = S_t^c = E_t[\sum_{i=0}^t \delta^i (E_{t-s-i} C_{t-i} - C_{t-i})] \quad \text{and,} \quad (1.20)$$

$$U_{s,t}^g = S_t^b = E_t \left[\sum_{i=1}^{\infty} \psi^i (C_{t+i}) \right] \quad (1.21)$$

where $\delta^t = (1+r_t)/(1+\Phi_t)$, s after t is additional time period, $E_{t-s-i}C_{t-i}$ is expected or desired consumption level, and C_{t-i} is the actual consumption level. It is considered a utility loss when $C_{t-i} < E_{t-s-i}C_{t-i}$, resulting from consumption sacrifices in the past periods.

It is easy to see that the reason for $D_t^b > D_t^c$ and $S_t^c > S_t^b$ are due to lag in consumption for one period. In addition, if we compare across the cost between utilization of credit and savings, the lag distance could be even greater.

To compare cost of utilizing credit with that of savings, loss of utility in utilizing credit is perceived to be smaller. This perception is due to the arrangement that revolvers do not need to make payments until one period after consumption occurs while savers need to wait long periods of time before consumption occurs:

$$U_{D,t}^L = E_t \left[\sum_{i=1}^{\infty} \psi^i (D_{t+i}) \right] < U_{s,t}^L = E_t \left[\sum_{i=0}^t \delta^i (E_{t-s-i}C_{t-i} - C_{t-i}) \right] \quad (1.22)$$

On the other hand, utility gain of utilizing credit is greater than that of savings as consumption occurs one period earlier, assume there is no preference in interest rate differences:

$$U_{D,t}^g = E_t \left[\sum_{i=0}^{\infty} \psi^i (C_{t+i}) \right] > U_{s,t}^g = E_t \left[\sum_{i=1}^{\infty} \psi^i (C_{t+i}) \right] \quad (1.23)$$

where $\psi^t = (1+\Phi_t)/(1+r_t)$, $\delta^t = (1+r_t)/(1+\Phi_t)$, r_t is interest rate at time t , and Φ_t is positive rate of time preferences.

In summary, the existence of the revolvers is due to perceived higher net benefit or gain in utility in utilizing credit, u_k , compared with that of the savings u_s :

$$E_t[\sum_{i=0}^{\infty} \psi^i U_D(C_{t+i})] > E_t[\sum_{i=1}^{\infty} \psi^i U_s(C_{t+i})] \quad (1.24)$$

where U_D is utility of consumption while utilizing credit, and U_s is utility of consumption while utilizing savings.

The behavior of the revolvers lead to the behavior of dissaving, since the utility gain of utilizing credit is greater than the utility loss as shown above due to time preference. In addition, there is another reason for the dissaving behavior. When D_t , credit at time t, is utilized and the debt is rolled out to the next period,

$$\rho D_t = D_{t+1} \quad (1.25)$$

where,
$$D_{t+1} = \Theta D_t + r_t D_t \quad (1.26)$$

and
$$D_{t+1} < D_t \quad (1.27)$$

where ρ represents a percentage, Θ is a fraction of ρ , and D_{t+1} is debt at time t + 1.

We could see from the above equations that the reason for the increased utility gain of utilizing credit lies in the installment payment arrangement. In other words, the benefit to have the access to consume D_t is greater than the cost of credit D_{t+1} as the repayment for D_t is spread over time. Or the cost of borrowing for revolvers in the next period (D_{t+1}) is smaller than the cost of savings. The dissaving behavior of the revolvers is confirmed by empirical data for the U.S. market in figure 4 and figure 10 below, where credit card volume soared while savings rate decreased.

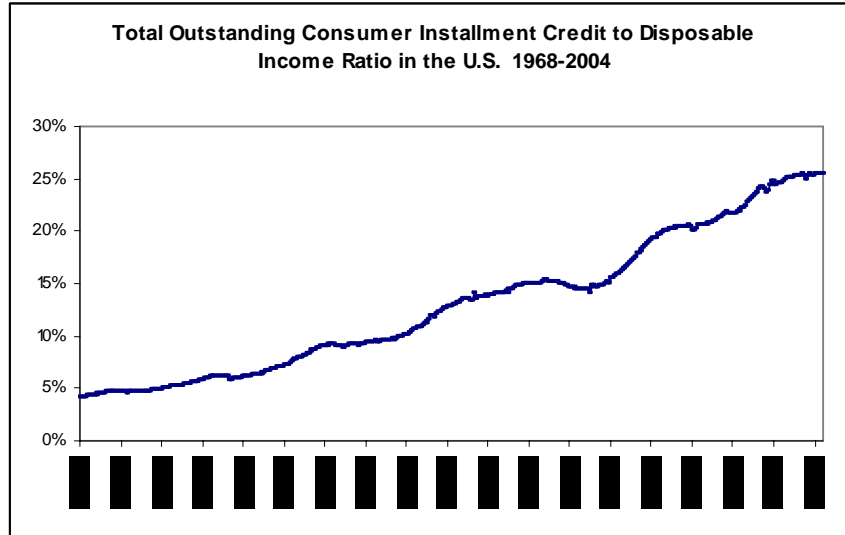


Figure 4

Source: Federal Reserve Bank St. Louis

Now consider a dynamic utility function in two periods, time t and $t+1$, individuals like to

$$\max u(C_t, C_{t+1}) \quad \text{s.t.} \quad (1.28)$$

$$C_t + \frac{C_{t+1} + D_{t+1}}{1+r} = R_t + \frac{R_{t+1}}{1+r} \quad (1.29)$$

or

$$\frac{C_{t+1}}{1+r} = R_t - C_t + \frac{R_{t+1} - D_{t+1}}{1+r} \quad (1.30)$$

where R_t and R_{t+1} are upper limits of resources for consumption at periods t and $t+1$, respectively. At the beginning of the period t , capital resources are

$$R_t^b = Y_t + D_t + S_{t-1}(1+r). \quad (1.31)$$

And at the end of period t , resources becomes

$$R_t^e = Y_t + D_t + S_{t-1}(1+r) - C_t = S_t. \quad (1.32)$$

However, at $t+1$, individual's upper limit consumption resources become

$$C_{t+1} = Y_{t+1} + D_{t+1} + S_t(1+r) - D_{t+1} \quad (1.33)$$

where D_{t+1} is the debt incurred from the previous period (see equation 1.50 and 1.52 for credit supply function), utility at time t is thus

$$u(C_t) = \frac{C_t^{1-\gamma}}{1-\gamma} \quad (1.34)$$

and the marginal utility of consumption is

$$u'(C_t) = C_t^{-\gamma}. \quad (1.35)$$

As Y_{t+1} and D_{t+1} are uncertain at time t , the first order condition for $u(C_t)$ with the constraints of (1.38) in Euler's form becomes

$$C_t^{-\gamma} = \max[R_t^{-\gamma}, \Psi E_t C_{t+1}^{-\gamma}] \quad (1.36)$$

where R_t is total capital resources for consumption and $\Psi = (1+\Phi)/(1+r)$.

In order to maximize consumptions in the next period, buffer-stock saving behavior² is assumed for the revolvers. The Euler's equation above shows that individual intends to maximize current resources and next period consumption while making decisions on current consumption spending.

²According to Carroll & Zeldes (1992), buffer-stock saving behavior emerges from the standard dynamic optimization framework when consumers facing important income uncertainty are both impatient, in the sense that if income were certain, they would like to borrow against future income to finance current consumption, and prudent, in which they have a precautionary motive. The Buffer-stock behavior arises because impatience makes consumers want to spend down their assets, while prudence makes them reluctant to draw down assets too far. Under plausible circumstances this tension will imply the existence of a target wealth stock. When wealth is below the target, fear (prudence) will dominate impatience and the consumer will try to save, while if wealth is above the target, impatience dominates fear and consumers will plan to dissave.

According to Park (1993), when there is a large gap between the interest rate on household liabilities (r^b) and the return on household financial assets (r^s), households may use their assets (S_t) to finance consumption instead of incurring more debt. Thus, on one level, the relative interest rates on assets and liabilities determine the growth of consumer credit market.

Though revolvers do not have the incentive to save due to credit availability, they do not wish to borrow excessively and reserve the amount of savings that enable them to cover the expected debt in the next period such that,

$$E_t\left\{\sum_{i=0}^t \delta^i [S_t(Y_{t-i}, C_{t-i})]\right\} \geq E_t D_{t+1} \quad (1.37)$$

where $\delta^t = (1+r_t)/(1+\Phi_t)$.

To illustrate total resources explicitly, including reserves to cover debt in the next period, R_{t+1} at the beginning of the period available to revolvers are:

$$R_{t+1} = Y_{t+1} + D_{t+1} + S_t(1+r) + D_{t+1}(1+r). \quad (1.38)$$

And to take the buffer-savings behavior into account, when consumers initially maximize resources for current period consumption and then minimize resource for future period consumption, the consumption curve is in convex shape,

$$\frac{\partial E_t C_{t+1}}{\partial C_t} < 0 \quad \text{and} \quad \frac{\partial^2 E_t C_{t+1}}{\partial C_t^2} > 0. \quad (1.39)$$

3.4 Unsecured Credit

As illustrated above, the widely available consumer credit in the deeply penetrated and post-mature capitalist market in the U.S. had changed the behavior of contemporary consumers in the past 20 years. The following section gives an analysis of consumption behavior of credit users in the U.S. market to show why usage of consumer credit could have an impact on the

aggregate consumption level and deviate from the optimization models. The typical revolvers in the credit card market are the (I) The consumption tilters (II) The consumption smoothers, and (III) The consumption augmenters.

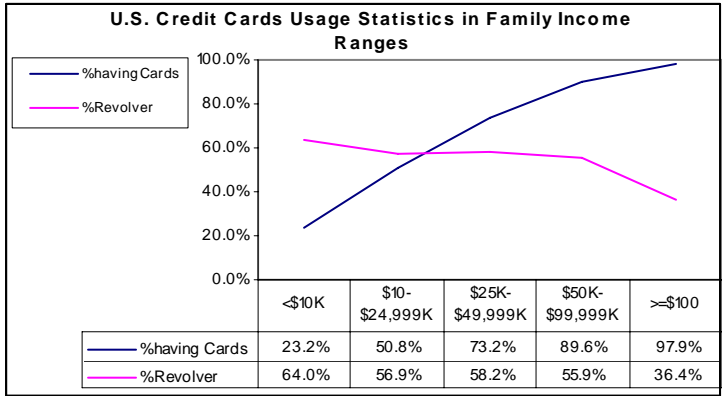
I. Consumption Smoothers

Consumption smoothers are those who are partially liquidity constrained so that their consumption spending depends on both income and credit. Though they are able to obtain credit, the credit available to them is below the desired amount. Unlike the impatient consumers, the consumption needs of consumption smoothers are greater than their labor income ($C_t > Y_t$) due to survival and other needs rather than time preference.

According to Lyons (2003), the credit constrained population is between 16%-20% from 1983-1998 (though the figure may include those who have no access to the capital market at all). Consumption smoothers are mostly the young and the low-income populations. The availability of credit increases the living standard of this population and allows them to consume beyond their current labor income. However, consumption smoothers are the riskier borrowers and the main cause for the sticky interest rate in the consumer credit card market.

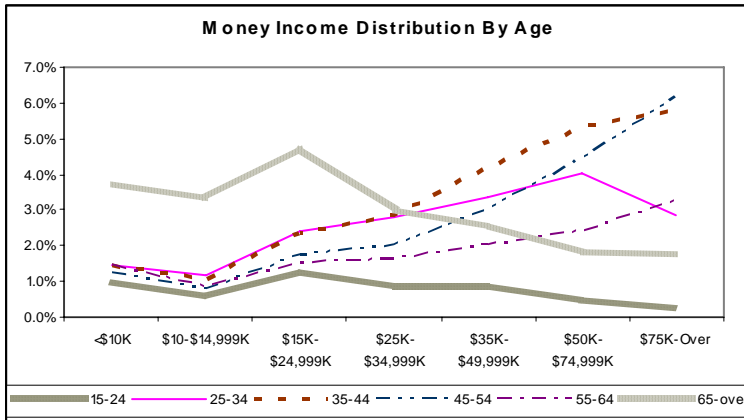
As showing below, most revolvers come from the lower income and younger age populations, though high-income groups hold more credit cards.

Figure 5



Source: US Census Bureau, Statistical Abstract of the US:2000

Figure 6



Source: US Census Bureau, Statistical Abstract of the US:2000

In Callem and Mester’s study (1995) “Consumer Behavior and the Stickiness of Credit-Card Interest Rates”, it showed that during May 1989 – November 1991 in the U.S., the prime rate dropped from 11.5% to 7.5% but credit card rate barely moved, and the largest card issuers holding their rates fixed at 18%-20%. According to Juster (1964), when credit ration³ exists, consumers are unresponsive to interest rate of credit because the contract of the loan is shorter than preferred. Other reasons for the stickiness of the card interest rate relating to this

³ Credit ration occurs when demand exceeds supply at ruling rate.

population are the consumption smoothers' disqualification for other types of credit such as secured loans and the small monthly payment of the credit loan. To many borrowers in this group, the size of monthly payments, rather than the interest rate, is more important.

In addition, the above findings are in resonance with James' conclusion (1991) that it is the assimilation cost that causes the consumption behavior to shift from most consumption models.

II. Consumption Tilting

The consumption needs for the impatient consumers (the tilters) are greater than their current income ($C_t > Y_t$), due to their preference to spend at an earlier time. According to Ainslie, Haslam (1992), Benzion (1989), and Kirby (1997), immediate consumption is always an attractive alternative to future consumption. Also, in Zelenak's finding (1999), 'consumers are prone to magnify the importance of goods in the present and at the same time, they underestimate the importance of cash in the future', in the absence of certainty (Zelenak 1999, pp.154). The impatient consumers are willing to bear the costs of consumption at an earlier time, such as interests. In other words, the satisfaction or pleasure that they receive from consumption ahead of time outweighs the costs that they bear or the utility to consume now exceeds the utility to consume in the future:

$$u(C_t) > E_t u(C_{t+i}). \quad (1.40)$$

For the tilters, credit cards provide an ideal opportunity for them to fulfill their needs and to deviate from their consumption streams as expected from the PIH. The desirable features of credit cards are the lower-costs in obtaining credit for short-term loan and in financing transactions. Since consumer credit card is a type of unsecured loan, there is almost no time needed for the loan application process and the response from the lenders to either

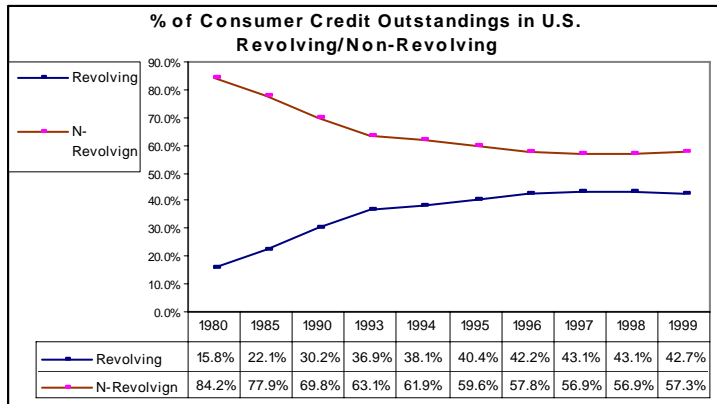
reject or accept the application could be instantaneous. According to Brito & Hartley (1995), even with relatively high interest rates, rational consumers prefer to pay for interests on outstanding credit card balances than to pay for transaction costs associated with arranging other types of loans from banks or financial institutions. On a different dimension, as Park (1993) finds, many households with large bank accounts may still want to finance their consumptions such as automobile with loans that bear higher interest rate than the return on deposits because bank deposits offer financial flexibility.

Similarly, several studies showed that consumers are not sensitive to rate changes in the unsecured credit market. According to Juster (1964), Shay (1970), Smith (1970) and others, consumers are unresponsive to finance rates because they do not have access to a perfect capital market. Other studies also show that the historical slow response of credit card rates is due to imperfect competition.

Confirmed by Calem & Mester (1995), consumers deviate from the perfectly competitive model because cardholders do not conform to the behavioral assumptions of perfect competition. Discrepancies from the outcome of the perfectly competitive model result from (1) consumer face search costs (2) consumer face switch costs (3) firms face adverse-selection⁴ problem if they were to unilaterally reduce their interest rates. Both Brito & Hartley (1995) and Ausubel (1991) had found that in the U.S. market, 75% of consumers pay finance charges on outstanding credit card balances. And the percentage of revolvers in the overall consumer credit market has been increasing since the 1980s, as showing below.

Figure 7

⁴ Adverse selection occurs when lender selected population that was not intended to select, e.g., the population does intend to borrow and is riskier than expected so the interest rate is not properly gauged according to the risk level. Consequently, costs are higher for lenders due to higher probability of default/loan losses.



Source: US Census Bureau, Statistical Abstract of the US:2000

Note: consumer credit showing above may include store-card, installment and non-installment credit.

III. Consumption Augmenters

The consumption augmenters (CAs) are the new wave of revolvers in the consumer credit card market resulting from competitions among lenders. With good credit payment history and medium to high income, consumers often receive promotional interest rates from credit card issuers. In the past five years, the interest rates offers targeted to this population ranges from 0% to rates that are below any other prevailing rates offered in the consumer loan market. Durations for the promotional rates offered ranges from 6 to 18 months and these offers are recursive if balance is paid off at the end of offering period. The promotional rates can either be applied to balance transfers or on purchases.

These extremely competitive interest rates offered by credit card issuers are a result of the fierce competition among lenders and the mature credit card market in the U.S. As card issuers make profits from high interest rates charged for the risky populations as described above, they also attempt to increase their revenue by hoping to earn interest income after the expiration of the promotional rates from the less risky populations.

However, many cardholders took the advantage of these competitive interest rate offers and often switch their cards from one issuer to another in order to keep the low rate. With careful management of these promotional interest rate offers, consumers could either increase their current consumption or savings. Figure 8 below illustrates the consumption gain either in the current period or the future period for the CA group.

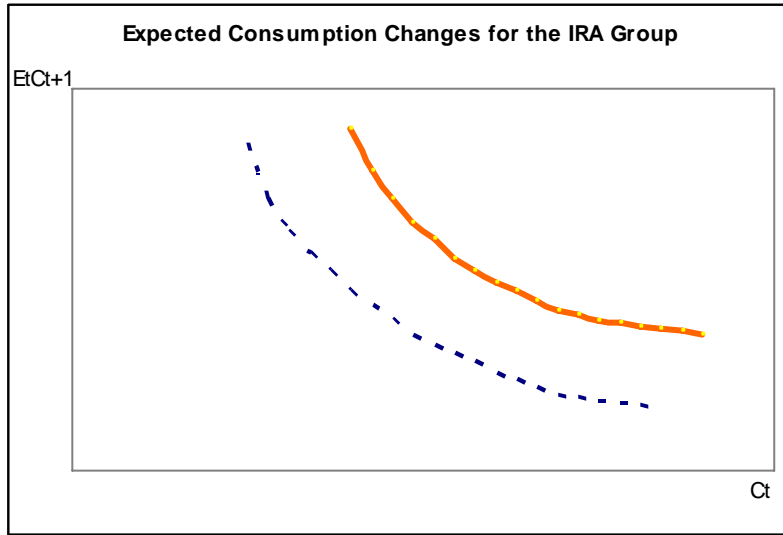


Figure 8

By taking the 0% credit offer, the consumption gain is the distance from the dotted line to the solid line.

When $E_{t-1}C_t < E_{t-1}Y_t$, CAs could take the advantage of the 0% interest rate (or lower than savings rate after allowing for the transaction fee if apply) by earning the interest income on the D_t .

While savings S_t is the accumulation of past income not consumed plus interest earned on the savings

$$S_t = \sum_{i=1}^t (S_i) = \sum_{i=1}^t (Y_i - C_i) \prod_{i=2}^t R_i \quad (1.41)$$

where $R_i = (1+r_i)$, changes in savings at the end of time t is

$$\Delta S_t = (Y_t - C_t)(1 + r^s_t) + r^s_t(S_{t-1} + D_t), \quad (1.42)$$

the portion $r^s_t D_t$ is the extra earnings by utilizing free credit granted. With good savings rate, credit history and mid- to high-income, CAs could continuously increase their savings or resources for future consumption by a meaningful amount.

Carroll & Zeldes (1992) found that when interest rate increases, wealth is reduced and in response consumers would lower current consumption and increase savings. Similarly, Park (1993) finds that higher interest rates on consumer credit mean larger sacrifice of future income for a given level of current consumption financed by future income. Thus, higher interest rates on consumer credit will discourage current consumption in general. Conversely, when interest rate for a balance transfer decreases, wealth increases. In the case of the CAs and when $E_{t-1}C_t > E_{t-1}Y_t$, consumers are willing to increase current consumption amount, as decrease of interest rate creates a discount on consumptions (in the case of 0% interest rate, it would be borrowing for free). So when $E_{t-1}C_t > E_{t-1}Y_t$ and without credit, the expected consumption is

$$E_{t-1}C_t = E_{t-1}Y_t + E_{t-1}\Delta S_t. \quad (1.43)$$

With free or low interest rate credit available, the expected consumption is

$$E_{t-1}C_t = E_{t-1}Y_t + E_{t-1}D_t + E_{t-1}r^s_t\Delta S_t. \quad (1.44)$$

As Park (1993) finds, the price of credit is expected to have an effect on consumers' borrowing decisions. When consumers have more than one financing alternative, they will choose the least costly method. His analysis suggests that the interest rate spread significantly affects borrowing behavior. Confirmed by Gross and Souleles (2001), the interest rate elasticity is higher for cardholders who are offered with promotional rates.

Though the consumption augmenters are considered revolvers, they are not the conventional revolvers described above, who still bear the cost of interest and other finance

charges for utilizing credit. Nonetheless, the buffer-stock savings behavior of the CAs is slightly different from those of the conventional revolvers. Instead, and to avoid high interest rate charges after the promotional period, their savings function is the following:

$$E_t \left\{ \sum_{i=0}^t \delta^i [S_t(Y_{t-i}, C_{t-i})] \right\} \geq E_t \left\{ \sum_{i=0}^t \psi^i [D_t(Y_{t-i}, C_t)] \right\}. \quad (1.45)$$

The equation shows that the cumulative savings for the CA group, which is a function of past income and consumption, should be greater than the credit borrowed in order to avoid high interest and finance charges.

With a small transaction fee and careful management in the credit, consumers in this group could easily increase either future (in the form of savings) or current consumptions. Given the level of competition among credit lenders in the U.S. market, the size of the CA population is expected to increase in the coming years.

3.5 The impact of Financial Deregulation:

Before the financial deregulations in the 1980s, price ceiling, which is the maximum interest rate that lenders can charge, was low and many in the low-income group are either denied absolutely from unsecured credit or offered with low lines of credit, as lenders in the unsecured credit market are concerned with default risks from borrowers in the lower income groups. Subsequently, assignment on credit lines are based on a credit rating system developed by lenders which is based on borrower's self claimed annual income, debt to income/debt to credit ratios, past payment behavior, and other lending criteria. Credit line assignment is also subject to market conditions such as available lending funds from the federal reserves bank and the stage of the competition among lenders. Thus, credit supply in equation is

$$D_t = f(\text{credit rating}_t, \text{market condition}_t)^5 \quad (1.46)$$

where D_t is credit supply.

Borrowing constraints occur when borrowers can only borrow a portion of their income (usually up to 20%) in the unsecured market under an imperfect credit granting system and do not have access to other types of consumer credit such as asset based loans. Since low-income groups do not usually qualify for asset-based credit, unsecured credit such as the credit card market is the only resort for borrowing needs. In addition, because their income is low, credit line that is assigned as a percent of their income usually does not meet the actual needs of these borrowers. So in the unsecured credit market, though most people are credit constrained from the credit supply perspective due to policies from issuers that credit line assignment is based on individual's current income (other factors such as market condition and credit rating system are either reflected in or as a factor of current income) and the credit supply function can be re-interpreted as

$$\bar{D}_t = \lambda Y_t, \quad (1.47)$$

the truly credit constrained populations are those whose

$$D_t < N_t \quad (1.48)$$

where N_t presents needs that would cover living and other expenses for desired life style aside from income. Since credit is a fraction of an individual's income, the lower income groups are likely to be credit constrained.

Though price ceiling was lifted after the deregulation, credit rating system still prevails yet with less stringent criteria in terms of allowing a wider population including people in

⁵ The function is based on actual industry practice for consumer installment credits and loans. Credit rating is an indicator represents consumers' current income, existing debt, past payment history and behavior.

lower income group to have an easier and greater access to credit. Nonetheless, lenders have higher price ceiling and deregulation entails that some would be charged with higher interest rates if they revolve on credit (vs. paying off the balance each month).

Since criteria of credit supply in the unsecured credit market are based either on imperfect information such as borrower's self claimed currently income only or on imperfect market which is subject to competition, the level of availability of funds, and other conditions, borrowers who need credit the most (the revolvers), either due to consumption smoothing, tilting or augmenting, and have no access to other types of consumer credit, are most susceptible and likely to fall in as victims to changes in any of the credit assignment criteria. The consequences could be an imposition of a much higher interest rate on the borrower as the deregulation permits.

Thus, the cost of borrowing could be higher for the lower income groups as they need credit the most and are not qualified for other credit venues. So the cost of credit D_t^c for the truly constrained borrowers could be higher than the cost of savings S_t^c

$$D_t^c = E_t[\sum_{i=1}^{\infty} \psi i(D_{t+i})] > S_t^c = E_t[\sum_{i=0}^t \delta^i (E_{t-s-i} C_{t-i} - C_{t-i})]. \quad (1.49)$$

To test whether greater access to credit yet allow higher interest rate truly benefits the constrained borrowers, the model in this paper intends to see whether the utility of borrowing $U_{D,t}$ is greater than the utility of saving $U_{S,t}$ or

$$U_{D,t} = E_t[\sum_{i=1}^{\infty} \psi i(D_{t+i})] > U_{S,t} = E_t[\sum_{i=0}^t \delta^i (E_{t-s-i} C_{t-i} - C_{t-i})]. \quad (1.50)$$

Here, utility would be represented by changes in either durable goods consumption or investments in educational spending and housing.

Chapter 4

The Benefits of Greater Access to Consumer Credit

The following sections analyze the function and impact of credit use on the consumption behavior. It also discusses theories on the limitations of human ability and rationality in managing and the proper use of credit and presents contradictory theories on the ultimate consequences of credit utilization. Subsequently, test hypotheses are generated and specified.

4.1 The Functions of the Consumer Credit

As mentioned in the previous sections, the functions of consumer credit, credit cards in particular, are few folds. It is useful not only when the individual's transaction demands are uncertain but also when the individual tries to smooth out a consumption stream. It provides insurance against unanticipated shocks to expenditure or income for revolvers and serves as a medium for financing transactions where interest charges can be avoided (credit vs. debit cards or cash) thereby avoids short-term opportunity costs for transactors. In other words, utilization of consumer credit could increase savings or consumptions and provide consumers with the freedom to purchase goods or services at an earlier time period or fulfill various needs when cash is not available.

4.2 The Effect of Credit on Consumption

Several experiments have been conducted to test the effect of credit card use on consumption. Feinberg (1986) studied whether credit cards are spending facilitating stimuli. The findings support the assumptions that 'individuals may be more likely to spend, spend more, or spend more quickly in the presence of credit card'. And 'while people may spend

with credit cards because of the ease of transaction, credit card stimuli acquire the ability to elicit spending behavior as a conditional response'. White's research (1980) confirmed the above findings and concluded that the use of credit cards lowers the perceived cost and begets further use. Further, Hirschman's empirical study (1979) from a sample population in the U.S. shows that possession of a credit card is associated with measurably higher expenditure levels and a greater incidence of in-store purchasing among customers.

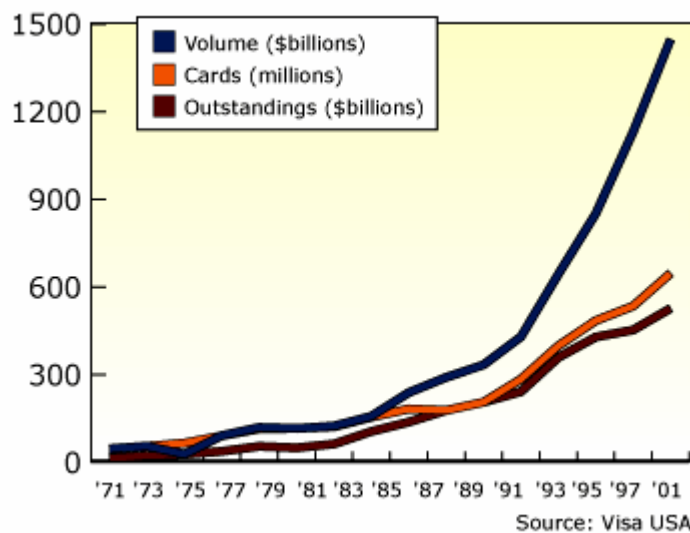
Using U.S. credit card data, Gross and Souleles (2001) studied how consumer debt responds to changes in credit supply. The findings show that increase in credit limit generates significant and immediate rise in debt and that the Marginal Propensity to Consume out of liquidity ($d\text{Debt}/d\text{CreditLimit}$) is approximately 10%-14%.

One point worth noting from Gross and Souleles' findings (2001) is that though the response is consistent with buffer-stock models of precautionary saving (the unused lines serve as precautionary buffer), the result also indicates that if credit limit serves as an indicator for consumers' future stream of income, as suggested by Soman and Cheema (2002), consumers' expected future incomes rely passively on the level of credit granted, which may simply depend on lenders' supply condition or interest rate variations. This finding further confirms that consumers do not have a clear vision about their future income streams, contrary to the assumptions in the PIH.

To translate Gross and Souleles' finding (2001) in quantitative terms for the U.S. credit card market, the line increase of \$2,000, for example, on every account on average would lead to \$200 increase in debt per card. Consider that there are about 2 cards on average per household, it would be over \$40 billion in aggregate. So there is about 10% of the size of annual

increase in aggregate consumption. With the increasing volume of consumer credit in the U.S. today, ignorance of consumer credit in the empirical model analysis, as indicated by Dermot J. Hayes (1989), would be detrimental to the performance of models. The following chart shows the actual credit volume and outstanding balance due to changes in credit supply as a result of price ceiling change in 1987.

Figure 9

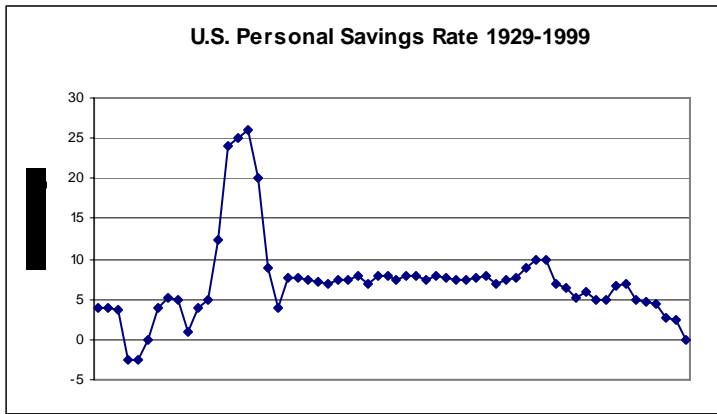


4.3 Credit and Savings

According to Dow and Olson (1991), liquidity constraints induce precautionary saving. So populations with more stringent credit constraints before the financial deregulation tend to save more. On the other hand, greater uncertainty systematically leads to larger current saving (Merrigan & Normandin, 1996) and in addition, households that are less likely to face liquidity constraints are more sensitive to uncertainty. Thus, on both accounts, easier and greater access to consumer credit create short term certainty for the less liquidity constrained as well as eased the level of constraints for the liquidity constrained group; both of which reduce the incentive to save. According to Bayoumi (1993), deregulation lowered savings by about $2^{1/4}$ % points per annum and had made savings significantly more dependent on changes in wealth, income,

and real interest rates. Also, Duca and Whitesell (1995) found out that for every 10% increase in the probability of owning a credit card, checking balances are reduced by 9 % and money fund balances by 11%. Figure 10 shows U. S. savings rate changes in the U.S from 1929-1999.

Figure 10



Source: U.S. Bureau of Economic Analysis, National Income of Product Accounts of the U.S., 1928-94, Vol. 1.

4.4 Savings and Credit, Market Conditions

As demonstrated in Chapter 3, there are costs and benefits involved in accumulating savings as well as credit utilization. While saving requires restraining current consumption, it also creates certainty and future welfare. On the other hand, while revolvers sometimes pay high interests, credit brings future consumption into present and fulfills desires and needs and allows preferences in consumption in timely manner.

However, credit expansion increases the vulnerability (or risk) of borrowers under certain conditions. As illustrated above, borrowing involves taking both present and future income into account and future income streams may not flow as expected due to subjective (rationality/discipline or individual capability) as well as environmental (market conditions) reasons. According to Soman and Cheema (2002), consumers are unable to correctly value their future incomes, and that they lack the cognitive capability to solve the intertemporal

optimization problem (pp.1). In other words, in order to behave in an intertemporally rational manner, individuals need to correctly value their present and future resources and interest rates, perform complicated net present value calculations to compute their future income, and allocate its appropriately interest-adjusted value throughout various time periods.

Experiments conducted by Johnson and others (1987) found that individuals repeatedly made substantial computational errors when they are asked to make preferred consumption choices under hypothetical life-cycle economic conditions. He confirmed that consumers are unable to make coherent and consistent consumption decisions and to discount future income streams properly. A high percentage of tested subjects undervalued future earnings relative to present assets and systematically over-discounted future earnings.

In addition and similarly, James (1991) argues that there are assimilation costs involved in order for the optimization models to be realized. Assimilation costs include costs of gathering and analyzing new information. While the cost of collecting new information may be zero due to advancement of technology, the costs of incorporating new information into one's existing knowledge and changing one's mental structure that are required in the assimilation process could be immeasurable. Because of the demand of high level of mental effort and the stress and discomfort associated with evaluating unpleasant constraints, consumers often ignore or distort new information. And it is this ignorance or distortion of new information causes consumers to be deviated from the optimization models. Thus, two opposing theories on whether consumer credit expansion has increased the welfare of the liquidity constrained group were born.

4.5 *Growth with Liquidity Constraints*

In Jappelli and Pagano's (1994) study on savings, growth and liquidity constraints, it showed that liquidity constraints on households raise the savings rate, strengthen the effect of growth on savings and promote productivity growth. To translate the findings in their study in the environment of easier credit access, household savings go down as the liquidity constrained group at all income levels become less credit constrained. Because households save less, growth rates decline. The argument of Jappelli and Pagano imply that as growth rates go down, the welfare of the liquidity constrained group go down.

On the other hand, Aghion & others (1999) discovered that better access to credit for the liquidity constrained groups who are otherwise denied for credit due to imperfect credit markets along with inequality in asset distribution increases investment, such as in education and housing, and may therefore increase growth.

In light of the above argument, the research questions and test hypotheses in this paper are as follows:

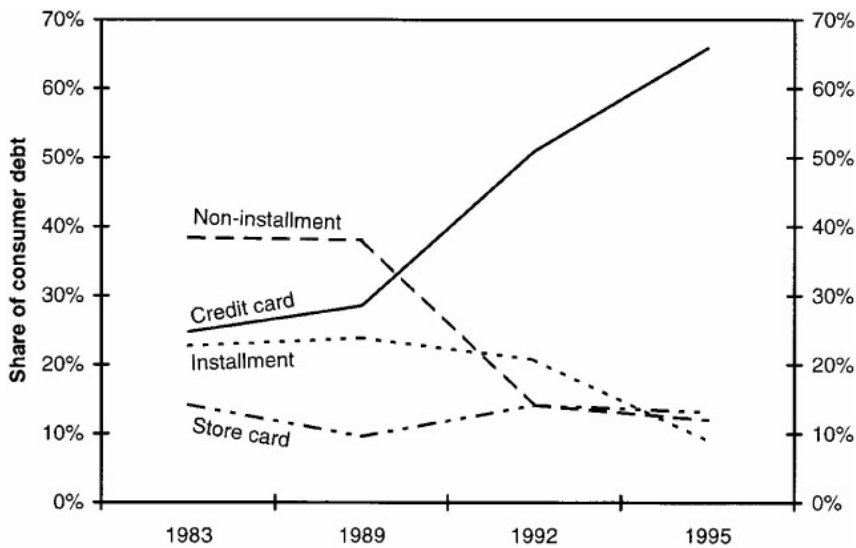
(i) Households use credit to smooth consumption over the business cycle. That is, has consumption become less sensitive to income (as measured by rolling regression coefficients) with greater access to credit, and for which income groups and/or regions of the U.S.

(ii) Do households use credit to invest more in housing, durables and education? If so in which groups and regions of the U.S. is this observed? Higher investment "augments" future consumption, provided it does not lead to a "debt crisis" (bankruptcy and higher interest outlays).

(iii) Do households use credit to shift consumption forward in the life cycle? That is, has increased access to credit contributed to falling savings rates in the U.S. and which income groups are "impatient" and appear to engage in consumption tilting?

Given the rapid growth in the consumer credit card market in the U.S. in the past 20 years and its replacement for other types of consumer credit (see figure 11 below), the model in this paper testing Jappelli's theory against Aghion's in the following sections will base the behavior of consumers mostly from the credit card market.

Figure 11



Source: Surveys of Consumer Finance, 1983-1995

Note: consumer credit includes credit-card, store-card, installment and non-installment credit. It excludes home equity, home mortgage and automobile related loans.

Chapter 5:

Empirical Tests and Findings

This section discusses and provides empirical findings of the model testing results. It intends to test the opposing theories between Japelli/Pagano and Aghion/others to see whether greater credit access benefits all income groups and generates growths in the economy among U.S. households.

Yearly data from the U.S. Bureau of Labor Statistics and Federal Reserve Bank in the period of 1984-2003 are used for testing the model. Data are chained in 2000 US dollars and model variables are in growth form (% change) and credit is in log form. Independent variables include savings rate, disposable income, interest rate (from credit cards), and revolving credit (partially estimated due to data unavailability). Dependent variables are the savings rate, educational expenses, home values (market value of homes), and durable goods represented by consumptions of major appliances.

The models tested are:

$$\Delta S_t = \alpha E_{t-1} \Delta Y_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \ln D_{t+1} + \varepsilon_t \quad (1.51)$$

$$\Delta G_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \ln D_{t+1} + \varepsilon_t \quad (1.52)$$

$$\Delta E_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \ln D_{t+1} + \varepsilon_t \quad (1.53)$$

$$\Delta H_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \ln D_{t+1} + \varepsilon_t \quad (1.54)$$

$$\Delta C_t = \alpha E_{t-1} \Delta Y_t + \beta E_{t-1} \Delta W_t + \sigma E_{t-1} r_t + \lambda E_{t-1} \Delta \ln D_{t+1} + \varepsilon_t \quad (1.55)$$

where S is savings, Y is disposable income, W is wealth, which is cumulative savings, E represents educational spending, G indicates expenditure on durable goods (represented by major appliances), H represents home values, and C is overall consumption including both durable and non-durable goods. Changes in revolving credit D, as debt in the next period, are

considered to be non-linear. The null hypothesis is $\alpha, \beta, \sigma, \lambda = 0$ and the alternative hypothesis is $\alpha, \beta, \sigma, \lambda \neq 0$.

The model applies the SUR (Seemingly Unrelated Regression) method. Models across income groups were run simultaneously. Tests were conducted to see whether slope parameters between equations were equal in magnitude and restrictions were then imposed when F values are significant. The following table shows the results of the findings.

TABLE 5.1

EFFECT OF REVOLVING CREDIT IN U.S. ACROSS INCOME QUINTILE GROUPS

Dependent Variables	Characeteristics /Independent Variables	Income Quintile				
		Q1	Q2	Q3	Q4	Q5
<i>As of Year 2003</i>						
	Number of Consumer Unit	19,455	19,482	19,472	19,481	19,501
	Age of Reference Person	51	51	47	46	46
	Avg Annual Disposable Income	\$8,260	\$20,543	\$36,363	\$58,593	\$119,091
<i>Savings</i>						
	Disp. Income	0.4 (1.53)	0.4 (0.9)	-9.4 (-5.3)	-9.4 (-5.3)	6.9 (2.2)
	Revolving Credit	0.2 (2.7)	-8.0 (-4.5)	0.9 (0.8)	0.8 (0.2)	7.0 (2.3)
	Interest Rate	0.7 (0.7)	-1.4 (-1.3)	4.7 (1.0)	-66.7 (-1.1)	-1.5 (-1.5)
	Durbin-Watson	2.3	1.8	2.1	2.5	3.8
	Number of Observations	20.0	20.0	20.0	20.0	20.0
	First-Order Autocorrelation	-0.13	0.1	-0.2	-0.05	-0.5
	F Value for Cross Equation Restrictions	Income	15.12	Revolving Credit		4.15

Data Source: Bureau of Labor Statistics 1984-2003
Federal Reserves Bank
Statistical Abstract of the U.S.

Note: t values are in parenthesis

TABLE 5.2

EFFECT OF REVOLVING CREDIT IN U.S. ACROSS INCOME QUINTILE GROUPS

Dependent Variables	Characteristics /Independent Variables	Income Quintile				
		Q1	Q2	Q3	Q4	Q5
<i>As of Year 2003</i>						
	Number of Consumer Unit Age of Reference Person	19,455	19,482	19,472	19,481	19,501
	Avg Annual Disposable Income	\$8,260	\$20,543	\$36,363	\$58,593	\$119,091
<i>Educational Spending</i>						
	Disp. Income	0.0 (-0.1)	-1.8 (-1.2)	-0.6 (-0.3)	-1.9 (-1.9)	-9.6 (-1.9)
	Revolving Credit	0.20 (0.8)	-0.7 (-1.3)	0.3 (0.2)	-0.3 (-0.6)	0.4 (0.9)
	Wealth	0.1 (1.13)	0.0 (-0.2)	-0.1 (-0.3)	-1.2 (-1.2)	-4.6 (-0.6)
	Interest Rate	-0.7 (-0.4)	2.7 0.9	-0.9 (-0.2)	2.5 (1.2)	-1.6 (-1.2)
	Durbin-Watson Number of Observations	2.5 20.0	2.5 20.0	2.9 20.0	2.4 20.0	1.7 20.0
	First-Order Autocorrelation	-0.3	-0.4	-0.5	-0.2	0.08
	F Value for Cross Equation Restrictions	Income	2.22	Revolving Credit	0.48	Wealth 1.86

Data Source: Bureau of Labor Statistics 1984-2003
Federal Reserves Bank
Statistical Abstract of the U.S.

Note: t values are in parenthesis

TABLE 5.3

		Income Quintile				
		Q1	Q2	Q3	Q4	Q5
<i>As of Year 2003</i>	Number of Consumer Unit	19,455	19,482	19,472	19,481	19,501
	Age of Reference Person	51	51	47	46	46
	Avg Annual Disposable Income	\$8,260	\$20,543	\$36,363	\$58,593	\$119,091
<i>Home Values</i>	Disp. Income	0.4 (1.7)	0.3 (0.7)	-4.7 (-2.3)	-3.1 (-2.0)	0.7 (1.4)
	Revolving Credit	0.1 (0.8)	0.1 (0.4)	-0.1 (-0.4)	-0.1 (-0.9)	0.1 (0.2)
	Wealth	-0.1 (-1.1)	0.0 (-0.0)	0.0 (-0.5)	0.0 (0.3)	-0.1 (-0.5)
	Interest Rate	0.8 (0.8)	-0.7 (-0.7)	-0.2 (-0.2)	-0.2 (-0.3)	-0.3 (-0.4)
	Durbin-Watson	1.5	2.6	2.0	2.1	1.5
	Number of Observations	20.0	20.0	20.0	20.0	20.0
	First-Order Autocorrelation	0.2	-0.4	-0.1	0.2	0.2
	F Value for Cross Equation Restrictions	Income	3.19	Revolving Credit	0.19	Wealth 0.35

Data Source: Bureau of Labor Statistics 1984-2003
Federal Reserves Bank
Statistical Abstract of the U.S.

Note: t values are in parenthesis

TABLE 5.4

EFFECT OF REVOLVING CREDIT IN U.S. ACROSS INCOME QUINTILE GROUPS

Dependent Variables	Characteristics /Independent Variables	Income Quintile				
		Q1	Q2	Q3	Q4	Q5
<i>As of Year 2003</i>						
	Number of Consumer Unit	19,455	19,482	19,472	19,481	19,501
	Age of Reference Person	51	51	47	46	46
	Avg Annual Disposable Income	\$8,260	\$20,543	\$36,363	\$58,593	\$119,091
<i>Durable Goods</i>						
	Disp. Income	-0.7 (-0.9)	-0.1 (-0.1)	-2.0 (-1.6)	-1.7 (-1.7)	-1.5 (-1.7)
	Revolving Credit	0.1 (0.3)	0.0 (-0.1)	1.0 (1.0)	0.6 (2.4)	0.3 (0.4)
	Wealth	-0.1 (-1.0)	5.6 (1.5)	-0.1 (-0.4)	0.0 (0.7)	0.0 (-0.1)
	Interest Rate	-0.7 (-0.3)	-0.7 (-0.4)	-1.2 (-0.5)	-2.6 (-2.4)	-0.2 (-0.2)
	Durbin-Watson	2.8	2.6	3.2	2.2	2.7
	Number of Observations	20.0	20.0	20.0	20.0	20.0
	First-Order Autocorrelation	-0.4	-0.4	-0.7	-0.1	-0.4
	F Value for Cross Equation Restrictions	Income	0.65	Revolving Credit	0.7	Wealth 2.13

Data Source: Bureau of Labor Statistics 1984-2003
Federal Reserves Bank
Statistical Abstract of the U.S.

Note: t values are in parenthesis

TABLE 5.5

EFFECT OF REVOLVING CREDIT IN U.S. ACROSS INCOME QUINTILE GROUPS

Dependent Variables	Characteristics/ Independent Variables	Income Quintile					
		Q1	Q2	Q3	Q4	Q5	
<i>As of Year 2003</i>							
	Number of Consumer Unit	19,455	19,482	19,472	19,481	19,501	
	Age of Reference Person	51	51	47	46	46	
	Avg Annual Disposable Income	\$8,260	\$20,543	\$36,363	\$58,593	\$119,091	
<i>Consumption</i>							
	Disp. Income	0.3 (3.7)	-11.6 (-2.6)	-2.8 (-0.5)	0.6 (2.3)	0.0 (0.0)	
	Revolving Credit	0.1 (2.3)	0.1 (1.1)	0.1 (0.4)	-4.9 (-1.0)	0.2 (1.6)	
	Wealth	0.0 (-0.5)	0.0 (-0.0)	0.0 (0.3)	0.0 (-1.1)	0.0 (-0.9)	
	Interest Rate	0.8 (1.3)	-0.1 (0.3)	0.2 (0.5)	0.1 (0.2)	0.3 (0.9)	
	Durbin-Watson	2.2	2.0	2.8	2.9	2.0	
	Number of Observations	20.0	20.0	20.0	20.0	20.0	
	First-Order Autocorrelation	-0.1	-0.1	-0.5	-0.5	0	
	F Value for Cross Equation Restrictions	Income	28.69	Revolving Credit	3.06	Wealth	0.29

Data Source: Bureau of Labor Statistics 1984-2003
Federal Reserves Bank
Statistical Abstract of the U.S.

Note: t values are in parenthesis

To see the impact of revolving credit on savings, results in Table 5.1 show that increase in revolving credit has reduced savings on the lower middle-income group. However, revolving credit increased the savings of the low- and the high-income groups. In addition, disposable income seems to help increasing savings for these two groups as well. To relate the theories of three motives of borrowing by Frankel and Razin (1996), the low- and high-income groups seem to be the consumption smoothers and consumption tilters, respectively, while the middle income group populations are the consumption augmenters

Between revolving credit and educational spending, the data outcome in Table 5.2 shows that increase in revolving credit seems to reduce the educational spending for the lower and higher middle-income groups, though they are not significant. While no other factors, wealth or interest rate seem to matter, disposable income is negatively significant for educational spending for the upper income quintile groups.

Disposable income plays a more important role in changes of home values than revolving credit, though negative correlation occurred among the middle class groups.

It is surprise to see that disposable income is not positively correlated with consumptions of durable goods in all income groups. However, revolving credit seems to help consumption of durable goods for the higher middle-income class.

Nonetheless and similar to results of credit impact on savings, revolving credit seems to help consumption of overall goods, durable and non-durable, for the low- and high-income goods, as illustrated in Table 5.5.

Chapter Six:

Summary and Concluding Remarks

This paper tries to test two opposing theories of whether increase in revolving credit also increases the benefit of the liquidity constrained groups measured by their consumption in durable goods, educational expenses, investments (home values), and savings rate. The test results show that while revolving credit increased the savings rate of both the low and high-income groups, it reduced savings on the lower middle-income group. However, revolving credit seems to help consumption of durable goods for the upper middle-income class.

In line other results of other studies that consumption is not affected by interest rate changes (Ludvigson, 1999), the findings in this paper showed interest rate is only significant for durable consumption for the upper middle-income class.

Results in this paper also showed continued existence of ‘excess sensitivity’ to current income as a result of the existence of the low income population who are unable to obtain desired capital (or those who are unwilling to utilize credit on revolving terms). Disposable income has played an important role, especially among higher income groups, in both consumption and investments. In addition, excess sensitivity is also a function of an inefficient credit market due to high assimilation costs on the credit grantor side, particularly for the unsecured consumer credit market. And the credit market is expected to remain its inefficiency due to information asymmetry as a result of fear of competition among lenders (Pagano & Jappelli, 1993). Consequently, some consumers remain liquidity constrained despite increased access to credit.

Thus, current income Y_t remains to be the pivotal and consistent source for consumption because its size relative to those of consumer credit and savings. Moreover, current income

determines the variations in S_t and D_t (as $\Delta S_t = Y_t - C_t$ and $D_t = \lambda Y_t$). While D_t and S_t may be considered as transitory incomes and are relevant to the aggregate consumption (when their sizes are significant relative to a nation's aggregate income), they mostly serve for purposes of economic shocks, retirement and emergency uses or provide opportunities to fulfill consumer preferences from time to time in the case of the U.S. economy. Nonetheless, supply volumes of consumer credit may change overtime due to changes in a nation's economic condition and competitive stages among lenders. In addition, cumulative savings may also vary as a result of demographic shifts as it is related to retirement (e.g., increase in the aging population). Thus, surges of consumption or investment may come from changes in credit and the impact of credit on these factors depends on its size relative to income as well as its changing dynamics.

Data Appendix A ⁶

	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
<u>Total Consumer Units ('000)</u>	1984	16190	16253	16220	16242	16273
	1985	16199	16259	16232	16255	16276
	1986	16884	16915	16913	16918	16936
	1987	16187	16215	16215	16214	16239
	1988	16243	16266	16276	16254	16315
	1989	16558	16584	16592	16607	16620
	1990	16653	16685	16670	16693	16722
	1991	16757	16800	16833	16789	16841
	1992	17241	17281	17283	17274	17315
	1993	17124	17166	17158	17146	17194
	1994	17149	17217	17188	17200	17240
	1995	16662	16688	16689	16691	16725
	1996	16491	16525	16520	16534	16559
	1997	16975	16997	16998	16996	17025
	1998	16782	16838	16820	16816	16860
	1999	16307	16351	16332	16341	16361
	2000	16268	16292	16290	16283	16321
	2001	17715	17751	17744	17749	17775
	2002	18456	18474	18474	18487	18498
	2003	19455	19482	19472	19481	19501

	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
<u>Disp. Income</u>	1984	3137	9751	17068	26247	49871
	1985	3463	10338	18131	28178	54215
	1986	3667	10371	18140	28749	54857
	1987	4494	11424	19500	30373	58477
	1988	4854	12309	21174	32125	60157
	1989	5669	13348	22233	34183	66923
	1990	5553	13429	22678	35049	67835
	1991	5648	14308	23973	37237	72332
	1992	5841	14115	23399	36957	73479
	1993	6285	14606	24290	38432	75707
	1994	5707	15221	25326	39461	79599
	1995	6186	15537	26400	41338	79715
	1996	6365	15796	26544	42447	83003
	1997	7008	16839	28426	44512	86515
	1998	7049	17406	29265	46294	91606
	1999	7101	17576	30186	48607	99656
	2000	7457	18637	31349	49695	100369
	2001	7911	19999	34112	53724	107027
	2002	8323	20859	35817	56497	113044
	2003	8260	20543	36363	58593	119091

⁶ The sources of above data are: Bureau of Labor Statistics, Statistical Abstract of the U.S., Federal Reserve Bank Bulletin Sept 2000, US Bureau of Economic Analysis, Nat'l Income and Product Accounts of the US, 1929-1994, v.2 & Survey of Current Business. Datapedia of US 1970-2000.

<u>Avg. Ann. Consumption</u>	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
	1984	10894	14337	19469	26138	41825
	1985	11417	15092	20374	27760	45166
	1986	11477	14639	21088	28698	46242
	1987	10355	15686	21708	29603	46470
	1988	10893	16880	23290	32084	48718
	1989	12119	17616	24476	34231	53093
	1990	12909	17927	24687	34265	55437
	1991	13464	18986	26144	36151	57597
	1992	12643	19257	26573	36094	57981
	1993	13957	19712	26603	37299	59521
	1994	14356	20891	28513	39033	60803
	1995	14607	22126	29125	39395	62639
	1996	15896	22799	30402	41965	66794
	1997	16008	23558	31447	42846	66800
	1998	16630	23709	31400	43811	70648
	1999	16750	24840	33029	45998	75015
	2000	17940	26550	34716	46794	75102
	2001	18883	26492	35660	48722	77125
	2002	19061	27140	36881	50432	79199
	2003	18492	26729	36213	50468	81731

<u>Avg. Ann. Education Spending</u>	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
	1984	338	156	190	262	543
	1985	260	147	156	328	667
	1986	271	166	187	231	709
	1987	241	168	225	275	714
	1988	254	170	164	310	723
	1989	271	134	200	306	797
	1990	352	181	255	307	904
	1991	347	153	233	439	997
	1992	334	224	187	412	960
	1993	312	255	277	337	1012
	1994	377	257	263	396	1053
	1995	308	189	273	448	1172
	1996	427	236	286	493	1061
	1997	440	277	416	509	1096
	1998	394	284	400	567	1252
	1999	459	265	335	520	1385
	2000	430	290	393	600	1462
	2001	492	317	290	726	1366
	2002	663	364	437	662	1729
	2003	576	287	351	623	2121

	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
<u>% Att. College</u>	1984	31	31	39	48	69
	1985	30	30	41	51	67
	1986	29	27	41	50	68
	1987	28	29	40	50	68
	1988	28	30	42	54	69
	1989	30	31	42	55	72
	1990	30	31	43	53	74
	1991	31	32	45	53	73
	1992	30	34	43	54	72
	1993	32	33	45	55	73
	1994	33	35	46	57	73
	1995	31	33	42	56	73
	1996	35	38	49	59	76
	1997	36	40	52	61	78
	1998	36	40	53	66	79
	1999	38	41	54	65	78
	2000	39	40	54	63	78
	2001	39	41	53	64	81
	2002	40	42	54	65	80
	2003	41	41	55	67	82

	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
<u>Avg. Ann. Mortgage Interest</u>	1984	519	313	690	1567	3236
	1985	460	369	824	1779	3503
	1986	383	373	862	1716	3842
	1987	252	375	846	1832	3795
	1988	285	380	859	2059	4211
	1989	350	433	1019	2228	4687
	1990	309	475	1117	2202	5011
	1991	419	511	1213	2484	5123
	1992	310	614	1128	2545	5314
	1993	316	494	1100	2593	4933
	1994	317	567	1215	2507	5008
	1995	350	649	1416	2523	5638
	1996	335	674	1259	2815	5603
	1997	412	698	1472	3046	5540
	1998	462	742	1613	3167	6333
	1999	463	733	1758	3246	6376
	2000	524	811	1876	3413	6729
	2001	623	926	1948	3562	7043
	2002	552	985	2057	3710	7422
	2003	518	1060	2113	3936	7098

<u>Home Value</u>	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
	1984	26212	29272	34584	47992	92266
	1985	27325	31843	35013	50740	96184
	1986	25113	28896	34567	52544	102295
	1987	24275	31325	39569	56025	102078
	1988	23794	30319	41724	60997	119000
	1989	27337	33800	46056	64670	137854
	1990	29585	36353	46893	65008	141691
	1991	27588	38120	49871	71388	141520
	1992	25125	40795	49135	70279	138402
	1993	26793	39402	48380	72223	140328
	1994	29320	43826	50009	74179	145141
	1995	31084	44711	56746	75207	147789
	1996	32118	46227	56317	79855	147208
	1997	32755	48184	57407	84328	155224
	1998	36513	48885	60383	83331	165642
	1999	37499	52091	65680	87481	177298
	2000	43225	59296	66851	93498	181842
	2001	48910	59886	72269	108197	198898
	2002	47949	62214	77805	111974	219499
	2003	48912	68847	89389	133105	255023

<u>Durable Goods</u>	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
	1984	71	102	125	169	255
	1985	71	77	113	179	240
	1986	72	90	157	189	282
	1987	69	95	141	204	274
	1988	76	101	163	221	303
	1989	49	106	128	200	258
	1990	71	89	141	179	258
	1991	67	92	118	142	240
	1992	56	115	145	165	244
	1993	71	104	137	167	235
	1994	89	109	133	192	238
	1995	80	127	167	166	237
	1996	74	115	165	190	312
	1997	94	124	188	187	277
	1998	81	123	166	176	261
	1999	82	125	169	176	261
	2000	83	128	172	175	261
	2001	85	131	175	174	261
	2002	86	133	178	173	261
	2003	87	136	181	173	262

	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
<u>Revolving Credit (\$mln)</u>	1984	3586	7172	17033	25101	35859
	1985	3679	9131	22526	32798	45654
	1986	3744	10737	27207	39278	53685
	1987	3788	11890	31136	44482	59450
	1988	3844	13576	36656	51861	67878
	1989	3925	15700	41213	58876	78501
	1990	6150	22033	47393	63063	87620
	1991	10437	26711	52986	65252	97622
	1992	12932	29826	57038	68312	102818
	1993	15024	32516	61668	73266	111101
	1994	20834	36766	71030	82272	127041
	1995	24495	57156	85734	93899	146972
	1996	26722	64952	104253	121610	158385
	1997	26271	67775	119793	152500	152922
	1998	28141	73167	129450	163219	163219
	1999	29943	77852	137738	173669	173669
	2000	44362	88724	147662	177447	183785
	2001	54851	102846	163183	185123	198836
	2002	63305	112542	169517	182881	203983
	2003	71236	121102	174529	178091	206585

	YEAR	LOWEST20	SECOND20	THIRD20	FOURTH20	HIGHST20
<u>Cum. Savings (Wealth)</u>	1984	-7757	-4586	-2401	109	8046
	1985	-15711	-9340	-4644	527	17095
	1986	-23521	-13608	-7592	578	25710
	1987	-29382	-17870	-9800	1348	37717
	1988	-35421	-22441	-11916	1389	49156
	1989	-41871	-26709	-14159	1341	62986
	1990	-49227	-31207	-16168	2125	75384
	1991	-57043	-35885	-18339	3211	90119
	1992	-63845	-41027	-21513	4074	105617
	1993	-71517	-46133	-23826	5207	121803
	1994	-80166	-51803	-27013	5635	140599
	1995	-88587	-58392	-29738	7578	157675
	1996	-98118	-65395	-33596	8060	173884
	1997	-107118	-72114	-36617	9726	193599
	1998	-116699	-78417	-38752	12209	214557
	1999	-126348	-85681	-41595	14818	239198
	2000	-136831	-93594	-44962	17719	264465
	2001	-147803	-100087	-46510	22721	294367
	2002	-158541	-106368	-47574	28786	328212
	2003	-168773	-112554	-47424	36911	365572

Northeast

Yr/Regions	NE_Consump	NE_income	NE_Credit	NE_CumSvg	Durable Goods	Edu Spending	Mortgate Int	Home Value	% Att. College
1984	21593	22050	1134	457	139	385	926	46071	42
1985	22808	23463	1428	1112	123	408	1001	52181	44
1986	24905	24334	1659	541	151	409	1341	61146	41
1987	25079	25530	1908	992	174	488	1430	71792	41
1988	26348	27368	2246	2012	162	433	1447	86096	42
1989	28241	30984	2622	4755	149	440	1633	88800	43
1990	29496	32427	3050	7686	145	593	1852	86220	45
1991	31026	33186	3217	9846	127	605	2119	85587	44
1992	31177	33372	3366	12041	135	509	2172	82981	44
1993	31634	34265	3638	14672	134	533	1842	81619	44
1994	32549	36255	4280	18378	130	504	2019	86,594	44
1995	33009	36297	5240	21666	133	577	2210	86,694	46
1996	34163	37538	6204	25041	156	622	2117	81,976	48
1997	36070	40166	6727	29137	145	772	2351	85,578	51
1998	37535	42015	7180	33617	189	815	2616	91,991	54
1999	38403	44488	8043	39702	200	939	2628	96,623	52
2000	38902	44456	8670	45256	179	823	2574	99,034	51
2001	41169	48040	8907	52127	149	729	2750	128,243	53
2002	42390	51578	9187	61315	189	1062	2844	121,812	55
2003	42162	54219	9555	73372	176	1040	2901	144,476	56
2004	43736	52405	10918	82041	176	975	3069	124213	55
2005	44813	53958	11670	91186	178	1008	3167	127636	56
2006	45889	55510	12446	100807	180	1040	3265	131059	57
2007	46966	57063	13246	110905	182	1073	3363	134481	58
2008	48042	58616	14072	121478	184	1105	3461	137904	58

Midwest

Yr/Regions	MW_Consump	MW_income	MW_Credit	MW_CumSvg	Durable Goods	Edu Spending	Mortgate Int	Home Value	% Att. College
1984	21167	20211	1040	0	136	312	1065	43148	40
1985	22664	21869	1331	0	134	299	1224	45697	40
1986	22706	21415	1460	0	155	350	1134	39760	41
1987	23021	23497	1756	0	158	367	1148	40535	40
1988	24763	25165	2065	0	166	337	1311	43283	41
1989	26062	26774	2265	712	146	378	1439	46708	43
1990	25935	26586	2501	1363	131	394	1443	47556	42
1991	27675	29124	2823	2812	131	415	1534	50927	44
1992	28445	29670	2993	4037	139	432	1581	52589	45
1993	28884	30865	3277	6018	152	446	1498	53649	45
1994	30331	30756	3631	6443	142	451	1640	54,949	46
1995	31909	33606	4852	8140	166	492	1899	62,812	46
1996	33025	34921	5771	10036	169	536	1858	67,998	48
1997	33791	35904	6013	12149	160	512	1955	71,719	52
1998	34513	37627	6430	15263	149	598	2168	73,048	53
1999	36302	38832	7020	17793	181	568	2384	79,574	52
2000	39213	40711	7940	19291	198	667	2471	87,132	55
2001	39548	44215	8197	23958	182	689	2742	92,326	55
2002	40601	46370	8259	29727	196	718	2644	96,491	54
2003	40280	49591	8740	39038	195	796	2578	108,966	56
2004	41814	47342	9863	44566	189	736	2724	97925	57
2005	42887	48766	10547	50445	192	760	2814	101257	58
2006	43961	50190	11253	56675	195	783	2903	104588	59
2007	45034	51615	11982	63255	197	807	2992	107920	60
2008	46108	53039	12733	70187	200	831	3082	111251	61

South

Yr/Regions	S_Consump	S_income	S_Credit	S_CumSvg	Durable Goods	Edu Spending	Mortgate Int	Home Value	% Att. College
1984	21587	20499	1054	0	149	239	1385	44475	41
1985	23180	22343	1360	0	137	266	1438	42364	42
1986	22545	22265	1518	0	165	237	1314	41742	41
1987	23292	23960	1790	0	138	254	1403	44798	41
1988	24671	25016	2053	0	177	316	1495	45148	42
1989	26232	27107	2294	0	143	312	1558	49723	43
1990	27020	26884	2529	0	153	319	1506	51298	43
1991	28062	28889	2800	827	118	385	1629	51451	44
1992	27750	28463	2871	1540	129	369	1621	50056	42
1993	29247	29825	3167	2118	139	412	1648	51969	45
1994	30072	31035	3664	3081	151	404	1605	53,975	45
1995	30289	31378	4530	4170	166	436	1631	55,156	43
1996	32871	32869	5432	4168	156	450	1801	57,359	48
1997	32226	33292	5576	5234	187	449	1779	58,943	50
1998	32958	35776	6114	8052	172	409	2051	65,099	51
1999	33303	37903	6852	12652	171	452	2027	70,303	52
2000	34707	39468	7697	17413	168	477	2238	75,145	51
2001	36285	41986	7784	23114	161	483	2363	78,858	53
2002	37281	43617	7769	29450	163	487	2530	82,912	53
2003	37625	44461	7836	36286	179	581	2567	95,801	55
2004	38429	44053	9178	41911	173	550	2416	83049	54
2005	39273	45263	9789	47900	174	565	2477	85403	55
2006	40118	46473	10419	54255	176	581	2538	87757	56
2007	40963	47682	11069	60974	177	596	2598	90112	57
2008	41807	48892	11737	68059	179	612	2659	92466	57

West

Yr/Regions	W_Consump	W_income	W_Credit	W_CumSvg	Durable Goods	Edu Spending	Mortgate Int	Home Value	% Att. College
1984	24238	23034	1185	0	149	311	1652	59353	54
1985	25961	24624	1499	0	138	349	1943	63682	55
1986	26476	25766	1756	0	147	299	2111	63533	51
1987	27309	27351	2044	0	184	281	1983	60675	53
1988	28830	27980	2296	0	166	297	2138	67876	54
1989	32144	30325	2566	0	156	367	2534	82085	55
1990	32461	31595	2972	0	160	375	2747	92373	55
1991	33131	33123	3211	0	164	426	2734	96029	55
1992	33647	33162	3345	0	169	427	2804	93874	56
1993	34348	33958	3605	0	147	460	2756	92213	57
1994	35318	35946	4244	0	172	517	2667	92,232	58
1995	35206	35778	5165	0	144	403	3021	94,904	55
1996	35795	35789	5915	0	169	541	2901	96,480	58
1997	39037	39839	6672	0	173	647	3143	102,082	60
1998	38938	39921	6822	0	145	622	3259	102,796	61
1999	42335	43301	7828	0	189	728	3474	115,613	64
2000	41328	43088	8403	0	221	674	3498	120,468	62
2001	43261	46164	8559	2903	225	798	3886	135,841	63
2002	44728	49008	8729	7183	222	947	4088	142,879	64
2003	45381	49667	8753	11469	240	875	4020	158,816	64
2004	46279	49420	10296	14610	214	856	4077	143134	64
2005	47354	50748	10976	18005	217	889	4192	147557	65
2006	48429	52077	11676	21653	221	921	4307	151981	66
2007	49503	53405	12397	25555	225	953	4423	156404	66
2008	50578	54734	13140	29711	229	986	4538	160827	67

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VITA

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Continued her music education as a scholarship student at the Manhattan School of Music (MSM), she had served as Concertmistress of the Manhattan Symphony Orchestra and performed with the American Symphony Orchestra, the Brooklyn Philharmonic and other music groups in Carnegie Hall and Lincoln Center for the Performing Arts. She was also the winner of the 26th Congress of Strings.

Pursuing an MM program at MSM and an MA degree at Columbia University (Magna Cum Laude), she had studied with members of the New York Philharmonic and the Philadelphia Orchestra and served as Deputy and Assistant Principal for the Northeastern Pennsylvania Philharmonic, represented the U.S. for the 1988 Summer Olympics Arts Festival in Korea, and toured nationally and internationally with the New York City Symphony and the New York City Opera Orchestra. She was named in the International Who's Who in Music in the mid-90s.

Ms. Chang enrolled in the Ph.D. program in Economics at Fordham University in the fall of 1999 after receiving an MBA from the Zicklin School of Business. She had since worked as a Credit Risk Policy Analyst at JPMorgan Chase & Co. While still pursuing music as a passion and had given recitals at the Donnell Library of the New York Public Library and the House of the Association of the Bar of the City of New York, Ms. Chang is currently a Vice President and an Economist in Citi Analytics at Citigroup.