Leveraging the American Dream:

Explaining the Shift Towards Mortgage Debt since the 1970's

James Robert Melnick and James Colin Montupet

Professor Emma Rasiel, Faculty Advisor

Honors Thesis submitted in partial fulfillment of the requirements for Graduation with Distinction in Economics in Trinity College of Duke University

Duke University
Durham, North Carolina
April 15, 2009

Acknowledgements

We would like to thank Dr. Emma Rasiel for invaluable advice on everything from financial theory to proper academic writing; this research would not have been possible without her consistent and patient help. In addition, we would like to thank Dr. Lori Leachman for her input on econometric techniques and macroeconomic concerns. Finally, we would like to thank Dr. Ted Bos (University of Alabama at Birmingham) for his help in locating and citing scarce data sources.

Abstract

We show that the determinants of mortgage borrowing and other forms of consumer credit differ: borrowers tend to consider asset holdings when taking out a mortgage, but focus on short-term economic expectations when borrowing other consumer credit. We hypothesize that this "mortgage wealth effect" occurs in part due to a borrower's ability to collateralize real estate assets, and a growing perception of the house as an investment as well as a residence. Further, we propose that this wealth effect contributed to an increase in mortgage debt from the 1970s forward, and that legislative changes and the growth of securitization in the 1990s magnified this effect.

Introduction

The extent and composition of debt held by the household sector has changed dramatically since the 1970s, especially over the past 15 years, with a significant shift towards mortgage debt relative to other forms of consumer credit. Specifically, real (inflation adjusted) mortgage liabilities have increased to 6.4x 1972 levels over the last 35 years. Shorter term secured and unsecured real consumer borrowing (including credit card debt, student loans, and auto loans) has increased only 3.2x over the same period (see Figure 1 below). In this paper, we identify the separate determinants of mortgage loans versus all other forms of secured and unsecured consumer credit (which we categorize as "other consumer credit" throughout the paper). We hypothesize that borrowing decisions regarding mortgages and consumer credit differ on the basis of both endogenous and exogenous factors. [1] By identifying the factors which influence the decision to take on each type of debt, we attempt to explain the observed trend of shifting borrower preference towards mortgage debt, as well as the rapid relative growth in mortgage liabilities.

[1] To avoid confusion: we use the terms "endogenous" and "exogenous" throughout the paper in reference to their economic definitions (that is, external to the system) as opposed to their statistical or econometric definitions regarding correlation between an independent variable with the error term.

Growth in Real Mortgage Debt v. Consumer Credit, 1972-Present

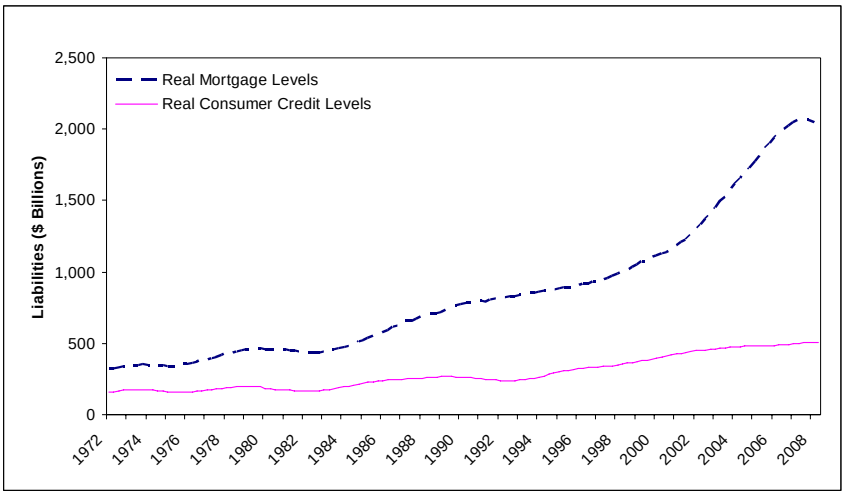

Figure 1

Endogenously, mortgages and consumer credit differ in time horizon, size, and the collateral provided by the underlying asset (provided that one exists). The weighted average maturity on auto loans from 1971 forward is only 50.7 months, while the maturity of most mortgages is 30 years. Although the average life of a mortgage is far shorter than the full maturity, with loans typically paid off in 10 years, the time horizon is still substantially longer than that of other consumer loans. Maturity of loans is not the only factor influencing the time horizon considered by the borrower. The two types of borrowing can be further distinguished in terms of loan size; because mortgages typically represent a consumer's single largest loan obligation, borrowers must be more considerate of the long-term ramifications of taking on this form of debt.

Differing time horizons serve to change both interest rate sensitivity and the relative importance of income statement versus balance sheet factors. Consumers may be more responsive to interest rate changes for mortgages, as a longer time horizon and larger loan means this rate has a greater influence on the cash flow of the household.

Consumer credit borrowers will be less responsive to interest rate changes since the shorter life of the loan and the smaller loan size result in a less sizable stream of expected future interest payments. The relative "stickiness" of credit card rates provides further support for this hypothesis; lenders may manipulate rates less aggressively if borrowers tend not to respond to adjustments[2]. Thus, we hypothesize that due to the differing time horizons the repayment consideration made by the consumer credit borrower is focused more on principal repayment than the mortgage borrower, who might more strongly consider the influence of both principal repayment and the stream of future interest payments.

As a further result of these differing time horizons, we expect that mortgage borrowers base their decision to borrow on longer term asset holdings while consumer credit borrowers consider shorter term expected income. In the short term, borrowers will decide based on an ability to repay debt with income; however, due to the difficulty of predicting future income in the long run, mortgage borrowers will make a decision based on an assessment of their ability to bear the debt relative to asset holdings. In other words, mortgage borrowers should exhibit a wealth effect while consumer credit borrowers should exhibit an income effect.

The effect of expected income on borrowing and consumption is clearly explained by the permanent income/life cycle hypotheses (PI/LCH). Briefly, according to the PI/LCH a consumer anticipates total future income, and then employs debt as a means of smoothing consumption over his lifetime in accordance with this expected income. However, the long term horizons considered when making mortgage borrowing decisions

[2] The correlation between credit card interest rates and the prime rate was only 0.09 in the 1980's and early 1990's, implying little variation relative to the cost of funds. See Johnson, 2005.

might influence mortgage borrowers to consider assets, instead of income. In particular, predicting expected income over a longer time horizon may be difficult for consumers.[3] This may force potential mortgage borrowers to rely on more predictable long-term asset holdings as a reference for their ability to bear debt.

Furthermore, these assets may be more liquid in the long-run, and thus increases in value of these assets may correctly be interpreted as rising permanent income by a long-term borrower. This increase in real estate holdings could represent a real increase in permanent income so long as a family was intending to eventually downsize their home, and had no intention of fully passing on real estate assets or gains on real estate assets to children.[4] If these conditions are met, a family could feasibly capture the increase in net worth in the form of future liquid income, resulting in greater present consumption and borrowing according to the PI/LCH. It should be noted, however, that some of these interpreted gains to permanent income may be nominal rather than real (see Figure 2 below).

While we expect that consumer credit adheres more closely to a traditional income-based trend than mortgages, real future income, as described by contemporaneous or lagged DPI, may not accurately represent a consumer's expected future income in the current period. As stated above, borrowers may well be poor predictors of true future income. We hypothesize that consumer sentiment acts as a better proxy for expected income because this will take into account factors like current and expected income, buying and selling conditions of durables, credit availability and terms,

[3] A study by Das and van Soest of households in the Netherlands from 1984-2004 indicates that consumer are not meeting the rational expectations hypothesis with respect to predicting income. Specifically, households predicted income falls with much higher frequency than they actually occurred. See Das and van Soest, 2001.
[4] See Dynan and Kohn, 2006.

etc., that a basic income measure misses. However, even though the short-term borrower may rely on this broad measure of economic expectations, we still expect it will be less relevant than asset-holdings to the long-term mortgage borrower.

In addition to time horizon considerations, mortgage borrowers may rely on asset holdings when making borrowing decisions based on the collateral provided by the underlying asset. Specifically, mortgage debt finances the purchase of an asset (real estate) which tends to appreciate over time, while other consumer credit is generally secured by depreciating assets or nothing at all. Since mortgages make a long-term contribution to the asset side of the borrower's balance sheet, he may be more likely to consider assets than a consumer credit borrower who sees no such long-term gain. The increasing value of the underlying asset in the long run will make borrowers more comfortable with holding larger amounts of debt, as the purchased asset itself provides long-term collateral for the loan.

The size of real estate assets in the context of the average household's total asset holdings indicate that this net worth effect on mortgage borrowing should be quite large. According to the 2001 Survey of Consumer Finance, real estate assets constitute 55% of total assets for the average homeowner and 80% of total assets for more than half of homeowners.[5] Given the size of real estate asset holdings in an individual family's portfolio, an increase in real estate values would produce a significant wealth effect. Variations in the level of real estate assets are influenced by two factors; both the introduction of new residential real estate, and the rise and fall of home prices. The relationship between real estate assets and fluctuations in the housing price index is of particular significance, as the increase in value of currently held real estate would be the

[5] See Li, 2005 in references.

source of any wealth effect. Unsurprisingly, household real estate assets are 73% correlated with the inflation-adjusted housing price index from 1975 forward. As households observe an increase in value to their single largest asset holding, they likely feel wealthier, and as a result may aspire to larger homes and thus larger mortgages.

Due to the relatively high proportion of assets held in the form of real estate, households likely view these assets at least in part as a form of financial investment on which a return is expected. Furthermore, the nearly monotonic increase in nominal house prices over the past 30 years (see the left hand graph in Figure 2) may cause a shift in perspective from the house as shelter to the house as a financial investment with potential future gains. In effect, homes have represented a no-lose investment in nominal terms. This concept of the house as a financial investment is supported by previous empirical research; according to a 2005 study conducted by Alan Greenspan, "Net changes in mortgage debt from the turnover of existing homes… has been closely correlated with realized capital gains on the sale of homes."[6] Thus, capital gains from real estate asset holdings may be boosting future mortgage debt through increased turnover of homes. Given this perspective, the borrower's appetite for mortgage debt will be amplified as they equate larger loans with greater potential future return. Another logical reason for viewing the home as an investment could be the size of real estate relative to other asset holdings in the average family's portfolio, as discussed above. If households view increases in real estate assets as not only an increase in net worth, but further as return on investment, higher asset values will attract more mortgage borrowers.

With regard to the view of the house as a financial investment, it should be noted that some of the perceived returns over this time period may be nominal rather than real,

[6] See Greenspan, 2005 in References.

resulting in a form of money illusion. As can be seen in Figure 2, real house prices are historically relatively cyclical, while nominal house prices increase almost monotonically until recently. If households consider nominal effects on house prices they could be exaggerating returns from real estate holdings when making consumption and borrowing decisions. The consistent increase in nominal house prices could then disproportionately increase the demand for mortgages as households perceive inflated returns. The trend of rising house prices may have an effect on the lending side of the equation as well. A higher loan-to-value ratio at origination may be considered acceptable, because consistently rising house prices would inevitably reduce this ratio over time.

Nominal and Real House Price Indices, 1975-2008

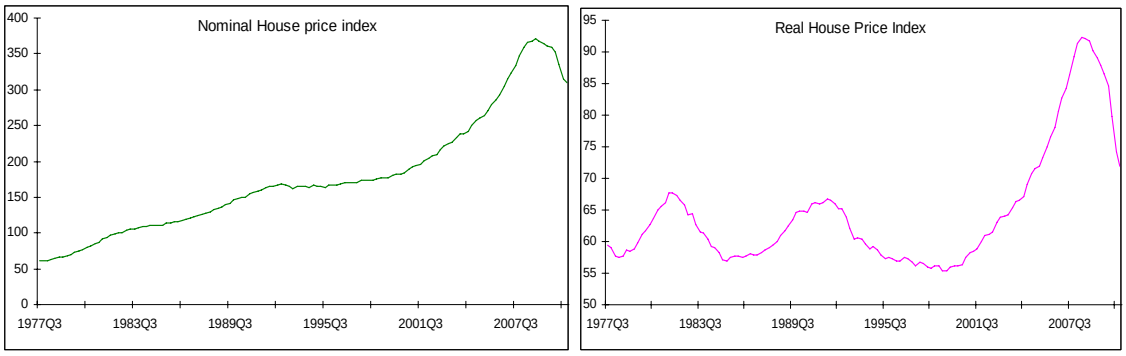

Figure 2

In addition to these endogenous borrowing factors, several significant exogenous changes occurred that altered the lending and borrowing environment during this time period that may have further influenced the household liability preference. These fall primarily into two categories. First, legislature regarding lending standards and practices was extensively modified and relaxed. Second, the growing presence and popularity of pooled debt securities, especially those backed with mortgages, removed risk from the

balance sheet of lenders. Both changes resulted in significant weakening of lending standards and an accompanying growth in debt. We expect that the weakening of lending standards and the acceptance by lenders of higher debt-to-asset ratios will disproportionately affect mortgage borrowing. Since mortgages represent by far the largest household liability, mortgage borrowing is likely to be more liquidity constrained than other consumer credit, and the removal of these constraints will primarily boost mortgages.

The most prominent legislative change regarding lending for mortgages occurred in 1995 with adjustments to the Community Reinvestment Act (CRA) governing lending behavior. The CRA was put into place in 1977, with the intent of eliminating a practice known as "redlining", where banks rejected loan applications from all candidates in certain neighborhoods or regions. This statute established that federally insured financial institutions have an obligation to meet the credit needs of the entire community, including low and medium income borrowers and regions. If a bank was found to be negligent in this respect, applications for mergers or creation of new bank branches could be denied.

The changes in 1995 resulted in a more stringent review of lending restrictions on low and moderate income (LMI) communities for all financial institutions with more than $250 million in assets, and a streamlined review for smaller institutions. A household falls within the LMI bracket if its income is less than eighty percent of the local median family income. A study conducted by the Treasury department in 2000 highlights the influence of these changes. Between 1993 and 1998, $467 billion in mortgages were issued by CRA-covered lenders to LMI households.[7] Loans originated by CRA-covered lenders to LMI households grew at 39% over this period, while loans to medium and high

[7] See Belsky, E., Litan, R., Haag, S. and Retsinas, N. (2000) in References.

income households only grew 17%. Thus, the adjustments to the CRA legislation contributed to a shift in lending behavior towards riskier LMI households.

Further, the influence of the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (FHEFSSA) influenced mortgage lending through the middle of the decade. This act set in place several specific goals for mortgage expansion by the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) throughout the mid-1990's; specifically, that 30% of total housing units financed by Freddie Mac and Fannie Mae had to go to LMI purchases. In addition to this, there were specified yearly minimums of $3.5 billion for "special affordable housing" mortgages.

There may also be significant legislative impact in the consumer credit market. In 1978, the Supreme Court did away with interest rate ceilings on credit cards in the ruling of *Marquette National Bank of Minneapolis v. First of Omaha Service Corp.* (Brady, 2008). Both the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) of 1980 and the Garn-St. Germain Depository Institutions Act of 1982 helped further eliminate interest rate control by the government. The DIDMCA dealt specifically with usury provisions and restrictions for mortgages and business/agricultural loan interest rates. The Garn-St. Germain Act significantly deregulated the S&L industry by getting rid of interest rate ceilings on deposits, eliminating a maximum legal loan-to-value ratio and allowing federally chartered S&L's more choice in the composition of assets held. We hypothesize, however, that the 1978 ruling, the DIDMCA, and the Garn-St. Germain Act will not be particularly significant in our models, as we expect the impact of such legislation is not strong enough to alter the pre-existing relationship

between interest rates and other consumer credit borrowing. Further, all of this legislation intersects with extreme actions taken by Fed Chairman Paul Volcker with respect to interest rates, so it may be difficult to ascertain any specific influence. Thus, we expect mortgage borrowing legislation to have more of an effect than legislation surrounding other consumer credit because mortgage legislation focused on the reduction of liquidity constraints and increasing homeownership, while consumer credit legislation focused on interest rate deregulation.

We also hypothesize that securitization will influence mortgages to a greater extent than consumer credit. Securitization, or the packaging of interest and principal payments on loans into investment securities, became increasingly prominent throughout the 1990s and especially into the beginning of the 21st century

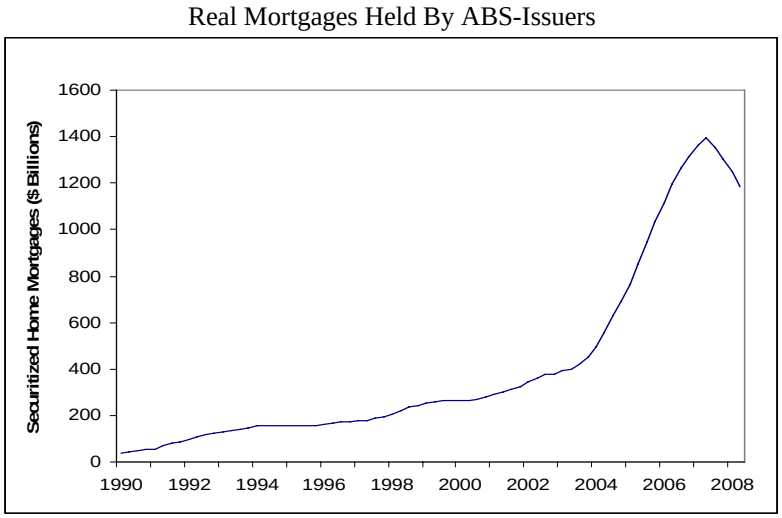

Figure 3

Securitization changes the perspective of the lender with regard to mortgage liabilities by removing balance sheet risk. The originator of the loan sells the payment streams to institutions that create pools of mortgages with the intention of selling these

pooled securities to investors. This fundamentally changes the role of the lender with respect to the borrower, effectively lessening the pressure on the originator to uphold stringent borrowing requirements by removing default risk from the originator. Therefore, we hypothesize that increasing rates of securitization should have two effects. The first will be to decrease the spread charged by lenders over underlying risk-free Treasury rates. This would indicate that lenders became more and more risk tolerant as securitization increased, due mostly to the advantage of shifting loans off their balance sheets. Second, through these lower rates and looser standards, we expect to observe a resultant increase in mortgage borrowing. We propose that as investor appetite grew for high-yielding, low-risk pools of mortgages, the issuers of these securities would seek to meet increasing demand. Given that interest rates fell during the 1990's, making the yield on mortgage-backed securities relatively more attractive, we hypothesize that lenders would further depress the spread and extend loans to riskier (and thus higher yielding) borrowers, thereby increasing total liabilities.

It could also be possible for securitization to impact mortgage borrowing through the relaxation of liquidity constraints. Similar factors apply here as in the interest rate argument: greater risk tolerance and a desire for higher yielding investments could increase willingness-to-lend and relieve constraints. Again, due to the size of mortgage borrowing relative to other forms of debt, this liability is likely to define a household's balance sheet, and as a result determine its ability to access credit. Therefore, external changes to the lending environment that relax liquidity constraints are likely to increase use of larger liabilities, such as mortgages.

Literature Review

Numerous recent papers have highlighted debt growth in the last 50 years (and particularly in the last 10 years), as well as the shift in debt composition towards mortgage borrowing. With regards to debt growth, analysis by Weinberg (2006) describes the increase in the ratio of debt to income, and Kish (2006) frames this growth in debt to net worth terms. From these papers, we learn that debt growth is not simply due to inflation, real income increases, and/or population growth. In addition, there is a large set of papers focusing on the implications of this debt growth, ranging from changes in delinquency and default rates to consumption behavior. For instance, Krueger and Perri (2005) show that lesser borrowing constraints allow consumers to better smooth consumption and Maki (2000) finds that high debt growth is positively correlated with higher future consumption. Kish highlights these points as well, but also provides the perspective of high borrowing leading to periods of greater financial stress (and sub-optimal consumption decisions as a result), with an 87% correlation between consumer debt and bankruptcy rates (from 1991-2004) as evidence.

Several theoretical and empirical analyses attempt to explain the observed debt growth. A key starting point for many of these papers seems to be the permanent income/life cycle hypothesis (PI/LCH), which implies that debt is used to smooth consumption, and thus will respond to changes in expected income. In 2000, Park and Rodrigues conducted an analysis on consumer credit excluding mortgages to test for consistency with the PI/LCH. Their results showed that consumers borrow more in high-income periods than in low income periods. This may not seem initially consistent with the PI/LCH, given the intuitive thought that consumers would borrow in bad times to

maintain consumption levels. However, they point out that high-income periods are also periods associated with higher expected permanent income, and thus borrowing should increase in these periods. This leads to a confirmation of consumption smoothing and the PI/LCH. Similarly, Maki (2000) finds that measures of personal financial stress (e.g, debt service burden or delinquency rates) do not have predictive power on consumption behavior. So, according to this result, consumers are not cutting back on consumption as a result of holding and servicing significant amounts of debt. This ties in with the Park and Rodrigues result, indicating that greater borrowing smoothes consumption through the mechanism of expected income, not current financial hardship. This result is confirmed by Barbosa and Filho (2008), whose analysis showed that private sector borrowing is a clearly pro-cyclical phenomenon.

Many attempts at describing this debt growth have taken a slight tweak to the PI/LCH approach: rather than analyze expected income, a broader look at economic expectations is taken. Though it is slightly difficult to generalize, the key idea held here is that consumers may not confidently predict future income, and that perception of general factors (state of the economy, governmental action, buying conditions of durables, etc.) will impact borrowing behavior. Das and Van Soest (2001) highlight this uncertainty in future income prediction, and find that the rational expectations hypothesis likely does not apply here. Their analysis of income and survey data in the Netherlands finds that consumers predicted income shocks with much higher frequency than they actually occurred.

Analyses of borrowing behavior using expectations have been quite successful for both mortgages and consumer credit. In 2008, Brown found that higher expectations

positively influence both the size of mortgage debt and the proportion of mortgage debt relative to home value in the UK. Lamdin (2008) conducts a similar analysis on consumer credit: he finds that consumer sentiment (as measured by the University of Michigan Index of Consumer Sentiment) is correlated with and Granger Causes revolving credit use. In addition, to confirm the direction of this causality, Lamdin finds that revolving credit does not directly Granger Cause this index of consumer sentiment.

The relevance of an asset effect, however, is relatively more contested. In fact, a number of papers argue that consumers do not incorporate an increase in real estate asset values into consumption behavior. Buiter (2008) provides evidence and theoretical analysis for the idea that there is no direct wealth effect. Buiter frames this analysis in terms of a zero sum game: those looking to "trade up" their house for a more expensive home in the future are hurt by increasing house prices, while those who will downsize in the future are benefited by increasing home prices, and that these effects will cancel out on the aggregate level. However, Buiter does acknowledge the possibility of the presence of an indirect housing wealth effect, based on collateral: increased collateral could reduce liquidity constraints, and thus allow homes to better optimize consumption and borrowing. Further, some, such as Carrol, Otsuka, and Slacalek (2006), argue that even if the wealth effect of real estate assets exists, households may only incorporate the increase in asset wealth into consumption very slowly.

There are arguments, however, that support the existence of a wealth effect (in addition to or as a substitute for an income effect) on *borrowing*, even if one does not necessarily exist for consumption. Several papers have focused on the predictive power of asset holdings and net worth on borrowing behavior. In particular, both Greenspan

(2004) and Kish (2006) highlight the importance of debt to net worth ratios, as opposed to debt to income ratios. This argument hinges on the idea that net worth can be liquidated and used to service debt. As Greenspan stated in 2004, "without an examination of what is happening to both assets and liabilities, it is difficult to ascertain the true burden of debt service."[8]

Several other analyses offer alternative hypotheses as to why asset holdings, and real estate asset holdings in particular, are superior measures when it comes to predicting debt growth. Dynan and Kohn (2007) state that a wealth effect associated with an increase in house prices will boost borrowing and consumption. They also hypothesize that when house prices rise, expenditures are more "front-loaded" relative to income, increasing borrowing levels. The mechanism for this result is that a house is purchased long before its "consumption", unlike many other goods. Finally, they show that a change in house prices results in a different mix in a household's investment portfolio and may result in a debt increase to reach the desired household balance sheet. Weller (2007) has a similar hypothesis when analyzing the recent severe up-tick in debt growth. Using Survey of Consumer Finances (SCF) panel data, Weller finds that this debt increase was not necessarily based on consumption spending needs; rather, this growth was rooted primarily in real estate investment.

Most, if not all, papers discussing the determinants of both mortgage and other consumer credit growth also highlight the presence of exogenous factors. Many papers on this topic discuss the broad concepts of "financial innovation" and "democratization of credit" , which relaxed liquidity constraints and reduced interest rates. A study by Cox and Jappelli (1983) uses SCF data to show the importance of financial innovation and

[8] See Greenspan, 2004 in References.

wider availability of debt, in finding that desired debt for the liquidity-constrained group in this set was 75% higher than reported debt. Other papers describe additional exogenous factors: Brady (2007) investigates structural breaks in other consumer credit trends. He finds breaks in 1995 for total credit, and breaks in 1983 and 1998 for revolving credit. Brady then attempts to explain these shifts, with the core explanation being legislative changes affecting both mortgage and other consumer credit borrowing standards.

There is a noticeable lack of papers addressing the determinants of mortgages *versus* other consumer credit, especially in the context of the observed divergence in borrowing habits over the past thirty years. Furthermore, there is considerable debate regarding the relative importance of expectations, income, and assets on the borrowing decision, and we seek to define the most relevant approach for each of the two separate forms of borrowing.

Data

The data for our analysis consists of both aggregate household time series data and macroeconomic indicators from 1972-2008. Some key events over this time period include:

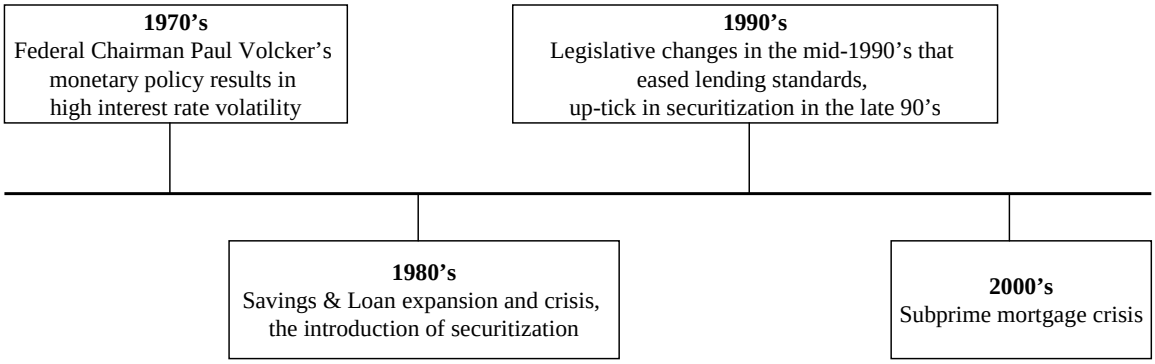

Figure 4

All data is on a quarterly basis, and both seasonally-adjusted and inflation-adjusted. The inflation adjustment used throughout is based on the Consumer Price Index (CPI) from the Bureau of Labor Statistics[9]. Some data were seasonally-adjusted from the source (such as the Federal Reserve), while other data sets were not available in seasonally-adjusted form. For these data sets, we used a simple four quarter moving average (the quarter prior, the current quarter and two quarters post) to seasonally-adjust. For instance, for Q2 data, we used the average of Q1 – Q4.

For aggregate household data, the primary source was the Federal Reserve statistical release database; in particular, we used the Flow of Funds data set extensively. The Flow of Funds[10] is a quarterly report of sources and uses of funds within the United States economy. In particular, this provides a focus on spending, borrowing and lending within

[9] http://www.bls.gov/cpi
[10] http://federalreserve.gov/releases/z1/

and between sectors. We also made use of the Consumer Credit release (G.19)[11], which provides changes in both revolving and nonrevolving consumer credit levels, financing and credit card rates and debt holders for credit other than mortgages.

Our mortgage analysis made use of mortgage liability and real estate asset flows from the Flow of Funds. Our analysis was on a per household basis; the data set used for this adjustment was the US Census Bureau Housing Vacancies and Homeownership Survey (CPS/HVS)[12]. We created a mortgage liabilities securitization ratio from the Flow of Funds database, defined as the proportion of securitized mortgage liabilities flows over total mortgage liabilities flows. In addition, this model included data on 10 year US Treasury yields, from a Federal Reserve database (Selected Interest Rates – H.15)[13]. A 30 year fixed mortgage rate was also obtained from this interest rate data.

For the model of other consumer credit, we used consumer credit flows data from the Flow of Funds as the dependent variable[14]. Our proxy for a measure of short-term consumer expectations was the University of Michigan Index of Consumer Sentiment[15]. The University of Michigan survey consists of 50 questions, including: current and expected income data, attitudes towards business conditions in the long and short term, expectations of inflation, unemployment and interest rates and perception of governmental action. The survey encompasses responses for a minimum of 500 households monthly. The Consumer Sentiment index itself is calculated from five specific questions on these topics.

[11] http://federalreserve.gov/releases/g19/current/g19.htm
[12] http://www.census.gov/hhes/www/housing/hvs/hvs.html
[13] http://federalreserve.gov/releases/h15/update/
[14] http://federalreserve.gov/releases/z1/20080918/z1r-3.pdf, see table 100, line 49.
[15] http://www.sca.isr.umich.edu/main.php

Numerous interest rates were considered for the analysis on other consumer credit, such as Treasury rates, credit card rates and 24 month finance rates. All of these rates were taken from Federal Reserve databases, either the Consumer Credit release or the Selected Interest Rates release.

Additional variables taken into consideration were GDP and disposable personal income, both from the Bureau of Economic Analysis (BEA) National Income and Product Accounts (NIPA)[16]. Unemployment data was obtained from the Bureau of Labor Statistics Current Population Survey (CPS.)[17]

[16] http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N
[17] http://www.bls.gov/CPS/

Time Period: 1973-2008, unless otherwise noted				
All Data Seasonally-Adjusted and Inflation-Adjusted				
Variable	**Mean**	**Standard Deviation**	**Range**	
Mortgage Liabilities Flows Per Household (Annualized, $)	528.1	306.5	89.6	1448.2
Real Estate Asset Flows Per Household (Annualized, $)	140.3	167.2	-375.3	495.0
Other Consumer Credit Flows Per Household (Annualized, $)	219.0	128.9	-167.2	514.1
GDP Year-on-Year Changes Per Household (Annualized, $)	172.4	83.6	-26.3	556.4
DPI Year-on-Year Changes Per Household (Annualized, $)	56.5	89.6	-236.3	315.2
Number of Households in United States (Millions)	92.9	12.8	68.4	111.4
Mortgage Liabilities Flows to ABS Issuers (Annualized, $Millions)*	12233	23620	-36945	83367
Mortgage Securitization Ratio (Flows to ABS/Total Flows)*	0.11	0.41	-3.14	0.60
10 Year US Treasury Yield (%)	7.51	2.63	3.33	15.32
30 Year Fixed Mortgage Yield (%)	9.23	2.82	5.23	18.16
University of Michigan Index of Consumer Sentiment	86.16	12.34	54.40	110.10
24 month finance rate (%)	14.03	1.68	11.14	19.21
Unemployment Rate (%)	6.17	1.44	3.90	10.80

* 1985 forward

Table 1.

Methodology

Mortgage Model

In this model, we attempt to identify the determinants of mortgage borrowing from 1972-2008. Our dependent variable is mortgage liabilities flows per household (*MortLiabFlowsPerHouse)* which we regress on 3 quarter lagged real estate flows per household (*LagRealEstateFlows*), 10 year US Treasury rates (*10YrUST),* and a period dummy for 1996-2008 (*Post1995).*

We use Mortgage Debt flows rather than levels for our dependent variable to remove issues regarding stationarity. Non-stationary data can result in a spurious relationship between two variables when one does not actually exist. To avoid this problem, we conducted an augmented Dickey-Fuller (ADF) test of our dependent variable. First of all, the ADF test on real mortgage levels showed that a unit root clearly exists for this data, and thus real mortgage levels are not stationary. As a result, we found it necessary to conduct our analysis based on mortgage flows. The ADF test for real mortgage flows per household gave a p-value of 0.20, and thus rejected the hypothesis that a unit root exists with 80% confidence. Thus, this ADF test rejects the hypothesis that this data set is non-stationary with 80% confidence. We chose to adjust this mortgage flows measure to per household data for ease of comparison to the Other Consumer Credit model.

For independent variables, our focus is on the influence of real estate assets on mortgage liabilities. Given that mortgage liabilities are adjusted to flows per household, our real estate assets take the same form. A simple univariate plot highlights the empirical connection between real estate and mortgages:

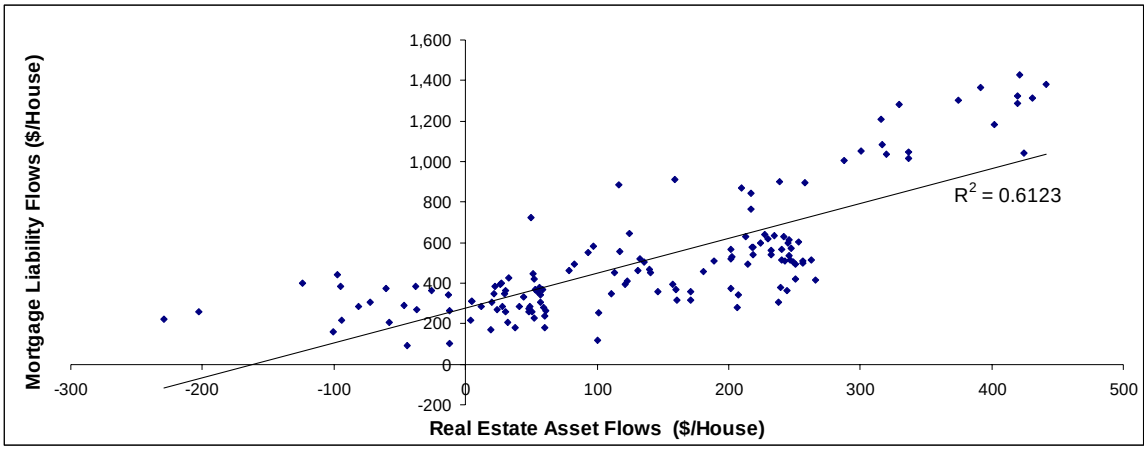

Figure 5.

In our regression, we use a 3 quarter lagged term for real estate. We define lags as regressing current mortgage liabilities on previous real estate assets. We use a lagged indicator based on the hypothesis that households are likely slow to internalize the increased wealth and collateral from their appreciating real estate into their borrowing decisions. We tested correlations between mortgage liabilities and real estate assets with lags of 1, 2, 3, and 4 quarters on the real estate asset term. The 3 quarter lag proved to be the most highly correlated with mortgage liability flows. To further verify that real estate assets are more relevant to the long-term borrower than economic expectations, we test contemporaneous and lagged terms of consumer sentiment, income, and GDP as well.

The link between borrowing and interest rates is clear, but the choice of interest rate maturity is not so straightforward. This is especially true for mortgages given the diversity of available interest rate terms, in particular the differences between variable and fixed rate loans. We use the 10 year US Treasury yield as the interest rate proxy, as this is a typical benchmark rate that banks use when setting mortgage rates.

In our initial analysis, we tested three period dummies: for 1978-1983, 1984-1995 and 1996-2008. The first period (1978-1983) includes Paul Volcker's extreme actions as

Fed Chairman, during which time interest rates and inflation were extremely (and abnormally) volatile. The second period pertains to the years following Volcker's interest rate experiments, but prior to the significant changes in the lending environment due to securitization and legislative changes in the 1990's. The final period includes all years following 1995, chosen to highlight the implications of these structural and regulatory changes on the lending environment. While we initially ran the model including all three dummies, only the final post-1995 period proved significant. As a result, the other two periods are omitted from the final model. We estimated the following model using Ordinary Least Squares for the time period of 1972-2008:

$$MortLiabFlowsPerHouse = \beta_1 Lag\,\mathrm{Re}\,alEstateFlows + \beta_2 10YrUST + \beta_3 Post1995 + cons \quad (1)$$

Additionally, we estimated a similar model to (1), but for the period from 1990-forward. The period dummy for 1995 forward was excluded, given the shorter time horizon of the total data set. We continued to include 10-year US Treasury yields as our interest rate proxy, as well as 3-quarter lagged real estate asset flows. A new variable for the ratio of securitized home mortgage flows over total mortgage liability flows (*ABSratio)* was introduced to proxy for the influence of the increasing popularity and packaging of mortgage-backed securities during this time period. This variable was not included in the analysis from 1972 forward due to the absence of securitization until the mid to late 1980's. We evaluated an interaction term between *ABSratio* and the 1995-period dummy, but found it to be insignificant. The model was again estimated using Ordinary Least Squares as follows:

$$MortLiabFlowsPerHouse = \beta_1 Lag\,\mathrm{Re}\,alEstateFlows + \beta_2 10YrUST + \beta_3 ABSRatio + cons \quad (2)$$

OCC Model

We estimated a similar model for the influence of various factors on Other Consumer Credit (OCC). The dependent variable in this model is real consumer credit flows per household (*CCFlowsPerHouse*), which we regress on one quarter lagged consumer sentiment (*LagSentiment*), the 24 month finance rate (*24MonthFinanceRate*) and period dummies from 1978-1983, 1983-1995 and 1995-2008 (*Post1978, Post1983* and *Post1995*). We attempted different lags for the consumer sentiment variable, and selected a single-quarter lag because it proved most significant. It also seems reasonable that borrowers would adjust their short-term borrowing decisions relatively more quickly and frequently than mortgage borrowing decisions in response to external signals, so the single quarter lag may be more relevant than the three-quarter lag used in the previous model. As in the mortgages analysis, flows were used here to ensure stationarity, confirmed by an ADF test; in this case, consumer credit flows per household were found to be stationary with 99% confidence. We also test a total asset holdings and financial assets variable to assess whether or not wealth considerations are relevant for the short-term borrower.

The 24 month finance rate (a rate on personal loans issued by commercial banks) is used as a proxy for other secured and unsecured borrowing rates, including those for credit cards**.** The correlation between the 24 month rate and credit card rates after 1994 (the start date of credit card rates recorded by the Federal Reserve in the Consumer Credit data set) is 97%, so this appears to be a satisfactory proxy for consumer credit rates in general. The period dummies used signify breaks for the Volcker period which had

unstable interest rates and consumer borrowing, and the 1995 empirical and legislative shift in mortgage borrowing, as noted earlier.

We estimated the following model using Ordinary Least Squares:

$$CCFlowsPerHouse = \beta_1 24MonthFinanceRate + \beta_2 LagSentiment + \beta_3 Post1978 + \beta_4 Post1983 + \beta_5 Post1995 + cons \quad (3)$$

Mortgage-to-OCC Ratio Model

Our third model attempts to directly identify the determinants for the change in debt composition (the ratio of mortgages to other consumer credit) from 1990-2008. The dependent variable is the change in the ratio of mortgage levels to other consumer credit levels (*MortOCCRatioFlow*); this specific ratio was chosen to avoid inconsistencies within the data. For instance, if a ratio of direct flows had been used, the dependent variable could be negative if *either* mortgages or consumer credit exhibited negative flows. The change in the ratio of levels avoids this problem, as the ratio of levels is always positive. An ADF test indicates that this flow of a ratio of levels is stationary with 86% confidence.

Our choice of independent variables was guided by our previous models for mortgages and other consumer credit. Thus, we include a number of previously discussed variables, including the ratio of securitized mortgages to total mortgages (*ABSRatio)*, a lagged measure of consumer sentiment (*LagSentiment*) and a lagged measure of real estate asset flows (*LagRealEstateFlows*). We hypothesize that these variables are affecting both the composition of debt in addition to its magnitude, and this model is a way to directly assess preferences. In addition, a new variable for the spread of the 24

month finance rate over the 30 year fixed mortgage rate (*RateSpread*) is introduced. We choose this spread as opposed to the rates themselves because the movement of interest rates relative to one another should affect the debt mix.

We estimated the following model using Ordinary Least Squares:

$$MortOCCRatioFlow = \beta_1 ABSRatio + \beta_2 LagSentiment + \beta_3 Lag\,\mathrm{Re}\,alEstateFlows + \beta_4 RateSpread + cons \quad (4)$$

Results

Mortgage Model

The results for our mortgage liabilities model are in Table 2, as follows:

Table 2.

Mortgages Liabilities: 1973-2008

			Observations=	142
			R^2 =	0.7012
			Root MSE=	169.36
	Coefficient	*Standard Error*	*T-Stat*	*P>|t|*
RE assets (3q lag)	1.36	0.14	9.70	0.000
10 year UST	-18.22	6.20	-2.94	0.004
Period dummy: 1995-2008	132.56	43.29	3.06	0.003
Constant	427.18	61.34	6.96	0.000

This model exhibits fairly strong explanatory power with regards to mortgage liabilities, with an R^2 of 0.70. As anticipated, the primary driver of this relatively high R^2 is the lagged real estate assets variable. The chart below compares the model's predicted mortgage liabilities flows with the true values from 1973 to 2008.

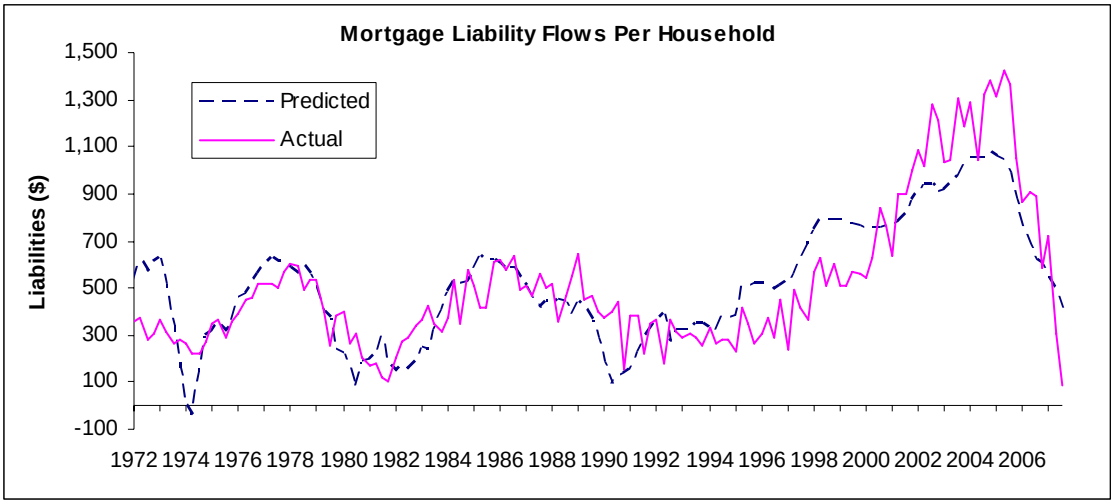

Figure 6.

The results are consistent with our hypothesis that lagged real estate asset flows are the key driver of mortgage liability flows. The (relative and absolute) significance of this lagged indicator is consistent with our hypothesis that households, having observed the change in value of their real estate assets, require a certain amount of time to incorporate that information into an important borrowing decision. This is further confirmed by univariate regression between lagged real estate flows and mortgage liabilities, which results in an R^2 value of .61.

The significance of the real estate flows in general confirms our key hypothesis: that households will respond to increased real estate asset holdings by increasing mortgage borrowing, due to a combination of increased household wealth, available mortgage collateral, and a view of the house as an investment. There are a few caveats to this result, however. There could be a feedback effect here, in that future mortgage liabilities will reflect rising real estate prices. Simply put, more expensive houses will likely mean new home buyers require larger mortgages. In addition, this result does not provide information regarding which of the two effects (a wealth effect or an increase in potential collateral for future loans) is dominant.

To confirm the importance of asset considerations as opposed to short-term economic-expectations, we also ran the model with contemporaneous and various lagged measures of consumer sentiment. None of these sentiment measures proved significant, and none added explanatory power to the model.[18]

The second variable included on the explanatory side of the regression is the yield on 10-year U.S. Treasury securities. The coefficient on this variable is both negative and

[18] The highest t-statistic found for any variable of consumer sentiment was .27 for a one-quarter lagged measure. Also, this measure boosted the R^2 by only 0.0003 over a regression including only the 10 year US Treasury yield and the 1995 period dummy.

significant. The significance and direction on the variable is hardly surprising, given that the rate on U.S. Treasuries is a commonly used benchmark for the interest rate on 30-year fixed-rate mortgages. As a result, Treasury rate fluctuations represent changes in the cost of borrowing for mortgage holders. As the cost of borrowing decreases, mortgage borrowers are willing to take on increasingly large loans, and vice versa.[19]

While the significance and direction of the coefficient can be adequately explained through the above reasoning, the magnitude remains unexpectedly small. The coefficient is -$18.22, implying that a 1% increase in the rate on U.S. Treasuries results in a $18.22 decrease in the annualized mortgage liability flow per household. Given that these annualized liability flows reach magnitudes as high as $1400, and the annualized standard deviation of U.S. Treasury yields is only ~2.6% over the full time period, large fluctuations in U.S. Treasuries appear to result in only minor relative changes in mortgages liability magnitudes. That being said, the time period for this model (1972 to 2008) includes a period of unusual and extraordinary interest rate volatility, during the Volcker experiment from 1979 to 1982. Assuming that the demand for mortgage liabilities may have become disassociated from variations in interest rates during this time period due to extreme volatility, this might explain the coefficient's surprisingly low magnitude.[20] An identical model run from 1990-forward, in order to eliminate the influence of the Volcker period, results in a (more significant) $50.08 decrease in mortgage borrowing for a 1% increase in the 10 year Treasury rate.

[19] Note that some of the direction could possibly be a result of investment substitution between real estate assets and treasury securities: previous studies have found that interest rate volatility results in disinvestment in government securities in favor of real assets (Hillebrand, 2008).

[20] Interest rates certainly moved with abnormal volatility during this period. Note that the standard deviation for annualized 10 year treasury yields in the 1980's is 2.06, versus 1.36 in the 1990's and .77 in the 1970's. Note that these are slightly different than annualized volatility numbers for Treasuries.

The interpretation of the period dummy from 1996-2008 is relatively straightforward, since this coefficient represents the difference in mortgage liabilities flows before and after 1995, holding all else constant. The direction and magnitude of the coefficient supports our hypotheses regarding the importance of securitization and relaxed lending regulation during the 1990's. Given that the difference is $133 per household, versus an average liability flow of $528, a key break in the lending environment is evident.

When we estimate the model for mortgage liabilities from 1990-forward, and introduce a variable for securitization, we obtain the following results:

Table 3.

Mortgages Liabilities: 1990-2008

			Observations=	74
			R^2 =	0.801
			Root MSE=	170.77
	Coefficient	*Standard Error*	*T-Stat*	*P>|t|*
ABS Ratio	117.79	39.43	2.99	0.004
RE Assets (3q lag)	1.72	0.22	7.91	0.000
10 year UST	-50.08	21.72	-2.31	0.024
Constant	633.81	146.50	4.33	0.000

All variables are significant, with the model producing a somewhat larger R^2 than in the model running from 1972-2008. The first notable result is the significant positive coefficient on securitization, which confirms our hypothesis that the increase in the proportion of mortgages securitized and sold to investors influenced, at least in part, the observed increase in total mortgage liabilities during this time period. It is notable that an interaction variable between the *ABSratio* variable and the *Post1995* period dummy proved insignificant. In other words, the legislative changes effective after 1995 do not

seem to have changed the relationship between securitization and mortgage origination. We had hypothesized that there may have been a feedback effect between the two, with looser lending regulation resulting in a stronger positive relationship between securitization and lending, but this does not seem to be the case.

The coefficient on *LagRealEstateFlows* in this model increases to 1.72 from 1.36 in the 1973-forward model. Since this implies an increase in the value of mortgage liabilities held per dollar of real estate assets, we can infer that the leverage employed by the aggregated mortgage borrower increased during the 1990's. At this time, banks may have become willing to accept less collateral per loan (i.e., we might observe an increase in loan-to-value, or LTV, ratios). This is consistent with a visible change in the average LTV for conventional single-family mortgages over this time period. From 1973-1990, the average LTV for these loans was just .74, rising to .77 for 1990-2008. The shift in this *LagRealEstateFlows* variable also coincides with a sharp increase in both real and nominal house prices. This can be explained in part as a result of the perception of the house as a financial investment: as households gained confidence in the extremely consistent returns on their homes, they were willing to take on more leverage and larger mortgages.

OCC model

The results from the model of determinants for OCC borrowing help to distinguish the consumer's motivation for taking on this form of debt as opposed to employing mortgage borrowing.

Table 4.

Consumer Credit Flows: 1973-2008

			Observations=	142
			R^2 =	0.4008
			Root MSE=	101.63
	Coefficient	*Standard Error*	*T-Stat*	*P>|t|*
24mo. Finance Rate	-33.65	8.50	-3.96	0.000
Cons. Sent, 1Q lag	9.18	0.89	10.32	0.000
Period dummy: 1978-1983	111.08	44.02	2.52	0.013
Period dummy: 1984-1995	-73.27	28.07	-2.61	0.010
Period dummy: 1996-2008	-145.10	25.36	-5.72	0.000
Constant	-41.26	116.49	-0.35	0.724

Although the R^2 of 0.40 implies relatively low explanatory power of this model, the significance of individual variables and Figure 7 below provide some intuition about factors driving for this type of borrowing. The observed consumer credit flows are more volatile than mortgages, which may explain the inability of our model to match these flows (see Figure 7*)*. This volatility is not unexpected; in fact, the volatile, cyclical behavior of the consumer credit flows supports the hypothesis that borrowers respond to short-term economic expectations. Given the smaller size and shorter loan terms of consumer credit borrowing, these adjustments may also be more drastic and rapid than similar adjustments made by mortgage borrowers.

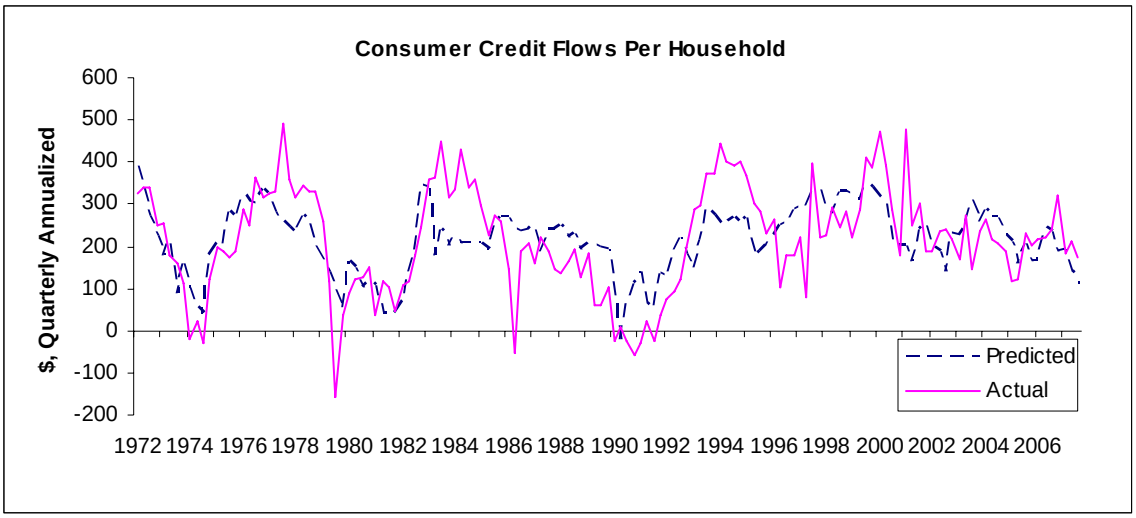

Figure 7.

For this model, we use a one-quarter lagged measure of sentiment, which increased the R^2 of the model by 7% relative to contemporaneous sentiment, and proved more significant than two, three and four quarter lagged variables. This implies that other consumer credit borrowers take time to respond to changes in economic expectations, but not as long as it takes to factor asset changes into a mortgage borrowing decision. We interpret this to mean that short term economic expectations drive non-mortgage consumer credit, while this factor was insignificant in the mortgage model. Contemporaneous disposable income was far less significant than consumer sentiment when included in this model. When a measure of DPI was substituted for sentiment, the coefficient was statistically insignificant, and the R^2 of the overall model decreased by more than 0.30. This confirms that (1) consumers predict future income poorly, and/ or (2) that other factors included in economic expectations measured by sentiment significantly influence the borrowing decision.

To confirm the significance of sentiment as opposed to asset considerations for a short-term borrower, we tested the model with several measures of asset holdings. A

measure of contemporaneous total assets proved insignificant when added to the model including 1 quarter lagged consumer sentiment. In a model excluding consumer sentiment, this variable was significant but reduced the explanatory power of the model by almost .30.[21]

Since short-term economic expectations significantly influence other consumer credit borrowing, we can conclude that consumers are using this type of debt to smooth consumption in the short-term. When borrowers anticipate growing income, and a positive economic climate, they increase borrowing levels, likely to accommodate current and (short-term) future consumption. This implies a very different decision-making process for the two types of debt: consumer credit is based on short-term expectations, while mortgages are based on a view of net worth (and especially real estate) over a longer period.

Finally, the negative and significant coefficient on the final period dummy (*Post1995)* implies that other consumer credit use is below that predicted by interest rates and consumer sentiment during that time period. This provides evidence for our hypothesis that legislative changes in both the mortgage and consumer credit markets resulted in a shift in debt preferences towards mortgages.

[21] A net investment in consumer durables variable was also included, and proved significant. That being said, this result is likely due to a correlation between durables spending and consumer sentiment (a correlation of .67). This is logical given our hypothesis that short-term borrowing is used to smooth consumption (especially that of durables) according to expectations.

Mortgages-to-OCC Ratio model

In this model, we regress the ratio of mortgages to other consumer credit on various factors, to find the determinants for the change in debt composition from 1990 – 2008. This dependent variable is the change in the ratio of levels of mortgage liabilities over levels of other consumer credit.

Table 5.

Mortgages/Consumer Credit Ratio, 1990-2008

			Observations =	74
			R^2 =	0.468
			Root MSE=	0.03542
	Coefficient	*Standard Error*	*T-Stat*	*P>|t|*
InterestRateSpread	0.0139	0.0097	1.44	0.16
ABSratio	0.0206	0.0086	2.40	0.02
Consumer Sentiment (1q lag)	-0.0024	0.0004	-6.59	0.00
RE Assets (3q lag)	0.0002	0.0000	5.95	0.00
Constant	0.1285	0.0565	2.27	0.03

The interest rate spread result is straightforward. Despite an insignificant coefficient, the direction is logical. As the cost of borrowing shifts to favor one form of debt or the other, borrowing preference shifts to reflect these different costs.

The positive and significant coefficient on *ABSratio* implies that securitization of mortgages not only induces greater mortgage borrowing, but further influences a shift in debt mix towards greater relative mortgage debt. This confirms the significance of securitization in predicting mortgages in our post-1990 model, as well as providing evidence that the positive shift in the basic mortgage model in 1995 is driven (at least in part) by the growth of securitization. Furthermore, when we included a variable for securitized OCC, it proved insignificant at usual levels. Therefore, we find that securitization was a key factor in the shift in debt mix towards mortgages in the 1990's.

Securitization can disproportionately affect mortgage borrowing through two key mechanisms: by reducing interest rates and by alleviating liquidity constraints. Securitization should reduce interest rates by making loan originators less sensitive to risk, and thus reduce the spread of the mortgage rate over a risk-free rate. To further explore this issue, we created a model with the spread of the 30-year-fixed-mortgage-rate over the 10-year-UST as the dependent variable. Since this spread represents the excess charged by mortgage issuers over risk-free debt, we use it to proxy for lenders' perceived risk in issuing mortgage debt. This model did exhibit a negative and significant coefficient on the *ABSratio* variable, implying that increased rates of securitization lower the risk-premium charged by mortgage lenders. Our results indicate (1) that, according to our mortgage to consumer credit ratio model, securitization shifts preferences towards mortgages and (2) that, according to our spread model, securitization in the mortgage market significantly reduces interest rates. Accordingly, it seems reasonable to conclude that securitization is operating through an interest rate mechanism to shift preferences towards mortgages.

However, our baseline models for mortgages and OCC do not necessarily confirm this result. We had thought that short-term borrowers would be less sensitive to interest rate fluctuations, but OCC borrowers do in fact appear to be influenced by interest rate changes. It is thus difficult for us to conclude exactly how securitization and interest rates are operating to shift debt preferences. Another mechanism may be present to create this shift: the relaxation of liquidity constraints for mortgage borrowers. The significance of *ABSratio* in this final model could be explained if increased risk tolerance by lenders allowed a large pool of potential mortgage borrowers to access credit markets.

The negative and significant coefficient on consumer sentiment implies that when consumer sentiment increases, borrowers substitute away from mortgage debt and into shorter term liabilities. This could be explained by increased short-term consumption spending as a result of higher expectations. This also ties back to the volatility of OCC discussed previously. Due to the smaller size and shorter-term nature of OCC, borrowers may substitute into and out of these liabilities more nimbly.

The positive and significant coefficient on lagged real estate assets provides evidence for the influence of asset holdings in terms other than a traditional pure wealth effect. That is, if asset holdings created a wealth effect for borrowing in general, we would expect the coefficient on the ratio of borrowing *types* to be insignificant, as this would increase the magnitude of borrowing but not the mix. Due to the significance of this coefficient, however, the implication is that asset holdings disproportionately affect mortgage borrowing. This provides evidence that this wealth effect likely operates through the collateral effect hypothesized above. Specifically, consumers likely rely on real estate asset holdings to provide collateral for future mortgage loans, and increased collateral results in increased mortgages relative to consumer credit. This result also provides evidence for the hypothesis that households may be viewing the house as a financial investment, as rising real estate values make mortgage debt more appealing.

Conclusion

Our results provide ample evidence for several key hypotheses. First, the baseline mortgage and consumer credit models show that mortgage borrowers base decisions on asset holdings, while other consumer credit borrowers base decisions on short-term economic expectations. Real estate assets in particular define mortgage borrowing patterns for several reasons: a generic wealth effect, growing collateral used to secure mortgages and a view of the house as a financial investment. Thus, as real estate assets grew, the preferred debt mix shifted towards mortgages. We also find that consumer sentiment is a far better predictor of other consumer credit borrowing than income, likely due to difficulties in predicting future income and the importance of other economic factors (buying conditions, governmental action, etc.) in the borrowing decision.

Regarding exogenous factors, increased securitization and legislative changes resulted in weakened lending standards, which relaxed liquidity constraints and brought down interest rates. These effects were stronger for mortgages than for other consumer credit, and thus factored in to the shift in debt composition as well.

This paper leaves several areas open to further investigation. One such area is the interaction of interest rates and securitization, and its affect on debt preferences. Our findings here were inconclusive, implying that securitization certainly depressed interest rates but that this interest rate effect did not necessarily drive a shift in preferences. Analysis on the differences in interest rate sensitivity between secured and unsecured debt (as opposed to mortgages versus other consumer credit) may prove more fruitful here. Another area of interest could be the differences in behavior between revolving and non-revolving types of other consumer credit; this could highlight key differences in

credit use for consumption purchases versus durables, and may provide further insight into secured versus unsecured borrowing decisions.

References

Antoniewicz, R. (1996) A Comparison of the Household Sector from the Flow of Funds Accounts and the Survey of Consumer Finances. *Federal Reserve Board Finance and Economics Discussion Series, 1996.* http://www.federalreserve.gov/Pubs/feds/1996/199626/199626pap.pdf

Barbosa-Filho, N.H., von Arnim, C.R., Taylor, L., and Zamparelli, L. (2008). Cycles and trends in U.S. net borrowing flows. *Journal of Post Keynesian Economics, 30*(4). Retrieved from EconLit database.

Belsky, E., Litan, R., Haag,S. and Retsinas, N. (2000) The Community Reinvestment Act After Financial Modernization: A Baseline Report. *United States Treasury Press Releases.* http://www.treas.gov/press/releases/docs/crareport.pdf

Brady, R. (2008). Structural breaks and consumer credit: is consumption smoothing finally a reality? *Journal of Macroeconomics, 30*. Retrieved from Elsevier Science Direct.

Brown, S., Garino, G., and Taylor, K. (2008). Mortgages and financial expectations: a household-level analysis. *Southern Economic Journal*, *74*(3), Retrieved from EconLit database.

Buiter, Willem M. (2008). Housing wealth isn't wealth. *NBER Working Paper Series*. Retrieved from http://www.nber.org/papers/w14204

Carrol, C.D., Otsuka, M., and Slacalek, J. (2006). How large is the housing wealth effect? *NBER Working Paper Series.* Retrieved from http://www.nber.org/papers/w12746

Das, M. and van Soest, A. (2001). Expected versus realized income changes: a test of the rational expectations hypothesis. *Tilburg University Center for Economic Research Discussion Papers*. Retrieved from http://greywww.kub.nl:2080/greyfiles/center/2000/doc/105.pdf

Del Rio, A., and Young, G. (2006). The determinants of unsecured borrowing: evidence from the BHPS. *Applied Financial Economics, 16.* Retrieved from EconLit database.

Dutt, A.K. (2006). Maturity, stagnation, and consumer debt: a Stendlian approach [Electronic version]. *Metroeconomica, 57*(3), 339-364.

Dynan, K. and Kohn, D. (2007) The Rise in U.S. Household Indebtedness: Causes and Consequences. . *Federal Reserve Board Finance and Economics Discussion Series, 2007.* http://www.federalreserve.gov/Pubs/feds/2007/200737/200737pap.pdf

Elmer, P. and Seelig, S. (1998) The Rising Long-Term Trend of Single-Family Foreclosure Rates. *FDIC Working Papers Series.* http://www.fdic.gov/bank/analytical/working/98-2.pdf

Greenspan, A. (2004) Understanding Household Debt Obligations. *Federal Reserve Board Speeches of Officials,* http://www.federalreserve.gov/boarddocs/speeches/2004/20040223/

Greenspan, A. and Kennedy, J. (2005) Estimates of Home Mortgage Originations, Repayments and Debt on One-to-Four Family Residences. *Federal Reserve Board Finance and Economics Discussion Series,* http://www.federalreserve.gov/Pubs/feds/2005/200541/200541pap.pdf

Hillebrand, E., and Koray, F. Interest Rate Volatility and Home Mortgage Loans. *Applied Economics, forthcoming.* Retrieved from http://ssrn.com/abstract=923358

Hurst, E. and Willen, P. (2004). Social security and unsecured debt. *NBER Working Paper Series.* Retrieved from http://www.nber.org/papers/w102882

Johnson, K. (2005) Recent Developments in the Credit Card Market and the Financial Obligations Ratio. *Federal Reserve Bulletin, Autumn 2005.* http://www.federalreserve.gov/pubs/bulletin/2005/autumn05_lead.pdf

Kish, A. (2006) Perspectives on Recent Trends in Consumer Debt. *Federal Reserve Bank of Philadelphia Discussion Series, 2006.* http://www.philadelphiafed.org/payment-cards-center/publications/discussion-papers/2006/D2006JuneConsumerDebtCover.pdf

Kolari, J.W., Fraser, D., and Anari, A. (1998). The effects of securitization on mortgage market yields: a cointegration analysis. *Real Estate Economics, 26*(4). Retrieved from EconLit database.

Krueger, D. and Perri, F. (2005). Does income inequality lead to consumption inequality? Evidence and Theory. *NBER Working Paper Series*. Retrieved from http://www.nber.org/papers/w9202.pdf

Li, W. (2005). Moving up: trends in homeownership and mortgage indebtedness. *Federal Reserve Bank of Philadelphia Business Review*, 26-34. Retrieved from http://www.phil.frb.org/files/br/brq105wl.pdf

Lamdin, D.J. (2008). Does consumer sentiment foretell revolving credit use? *Journal of Family and Economic Issues, 29.* Retrieved from SpringerLink.

Lowe, P. and Rohling, T. (1992). Loan rate stickiness: theory and evidence. *Reserve Bank of Australia: Research Discussion Paper Series.* Retrieved from http://www.rba.gov.au/rdp/RDP9206.pdf

Maki, D. (2000). The Growth of Consumer Credit and the Household Debt Service Burden. *Federal Reserve Board Finance and Economics Discussion Series, 2000.* http://www.federalreserve.gov/Pubs/feds/2000/200012/200012pap.pdf

Palley, T. (1994). Debt, aggregate demand, and the business cycle: in analysis in the spirit of Kaldor and Minsky [Electronic version]. *Journal of Post Keynesian Economics, 16*(3), 371-389.

Park, S. and Rodrigues, A.P. (2000). Is aggregate consumer borrowing consistent with the permanent income hypothesis [Electronic version]? *The Manchester School, 68*(3), 301-320.

Weinberg, J.A. (2006) Borrowing by U.S. Households. *Federal Reserve Bank of Richmond Economic Quarterly, 92/3.* http://www.richmondfed.org/publications/research/economic_quarterly/2006/summer/weinberg.cfm

Weller, C.E. (2007). Need or want: what explains the run-up in consumer debt. *Journal of Economic Issues, 41(*2). Retrieved from EconLit database.