Mortgage Choice

Sumit Agarwal∗, Brent W. Ambrose†, Bulent Guler‡ and Yildiray Yildirim§

Current version: October 30, 2012

Abstract

Prior research on borrower choice of mortgage contract indicates that borrowers rationally price the interest rate risk inherent in adjustable rate contracts and that borrowers react rationally to changes in the relative pricing of ARM and FRM contracts. We re-examine consumer choice of fixed- and adjustable-rate debt contracts in the context of the home equity lending market. Our results confirm the findings in the literature that consumers react rationally to changes in the relative pricing of debt contracts. In addition, our study documents that borrower intended use of debt proceeds significantly impacts consumer choice.

Key words: Mortgage Choice; FRM; ARM

JEL Classification:
One way homeowners attempt to manage their payment risk is to use fixed-rate mortgages, which typically allow homeowners to prepay their debt when interest rates fall but do not involve an increase in payments when interest rates rise. Homeowners pay a lot of money for the right to refinance and for the insurance against increasing mortgage payments. Calculations by market analysts of the “option adjusted spread” on mortgages suggest that the cost of these benefits conferred by fixed-rate mortgages can range from 0.5 percent to 1.2 percent, raising homeowners’ annual after-tax mortgage payments by several thousand dollars. Indeed, recent research within the Federal Reserve suggests that many homeowners might have saved tens of thousands of dollars had they held adjustable-rate mortgages rather than fixed-rate mortgages during the past decade, though this would not have been the case, of course, had interest rates trended sharply upward.

Remarks by Chairman Alan Greenspan

Understanding household debt obligations
At the Credit Union National Association
2004 Governmental Affairs Conference, Washington, D.C.
February 23, 2004

1 Introduction

As the above quote indicates, consumer choice of fixed (FRM) versus floating (ARM) mortgage interest rate contracts can have a substantial impact on the overall cost of home financing. The historic decline in interest rates between 2000 and 2003 resulted in a dramatic decline in mortgage costs for ARM borrowers as payments were reset to lower index levels, and thus prompted Greenspan’s suggestion that homeowners may have incorrectly preferred fixed-rate mortgages over adjustable-rate mortgages.

Yet, prior research on borrower choice of mortgage contract indicates that borrowers rationally price the interest rate risk inherent in adjustable-rate contracts. For example, Brueckner and Follain (1988) examined borrower choice for first mortgage contracts and found that the rate differential between fixed- and adjustable-rate mortgages and the interest rate level for fixed-rate mortgages are the primary factors explaining why borrowers choose fixed versus adjustable contracts. This result suggests that borrowers react rationally to changes in the relative pricing of ARM and FRM contracts when originating mortgage debt. In this paper, we examine the consumer choice of fixed- versus variable-rate debt in the home equity lending market.
The market for home equity credit in the form of home equity loans and home-equity lines-of-credit represents a large segment of the consumer credit market. Evidence from the Survey of Consumer Finances suggests that the home equity lending market increased over 26 percent between 1998 and 2001 to $329 billion.\textsuperscript{1} By the end of 2005, home equity lending had increased to over $702 billion.\textsuperscript{2} Thus, understanding consumer choice of fixed versus adjustable contracts in this segment of the market is important for lenders seeking to identify profit opportunities in the growing home equity market. To date, few studies have examined this important sector of consumer lending and none have examined the choice consumers make regarding the decision to originate a fixed-rate loan or adjustable-rate line-of-credit.

The rest of the paper proceeds as follows. Section 2 provides a literature Review, section 3 presents a simple model to motivate the empirical analysis, section 3 outlines the data and the methodology, section 4 discusses the results, and section 5 concludes.

2 Literature Review

The theoretical literature on mortgage choice offers a number of alternative hypotheses concerning the determinants of contract type. For example, Alm and Follain (1987) and Brueckner (1986) suggest that borrower risk aversion is a primary factor determining the ARM/FRM choice. These models indicate that borrowers with low risk aversion and high discount rates should prefer the higher interest rate risk associated with adjustable contracts while borrowers with high relative risk aversion and/or lower discount rates prefer fixed-rate contracts. Campbell (2006) also finds that ARM share is directly proportional to the both the FRM-ARM interest rate differential and the level of the FRM interest rate. We find similar results for our dataset and note that the correlation between the ARM share and the interest rate differential is 0.67 and the correlation between the ARM share and the fixed-rate mortgage interest rate is 0.88. Similarly, Dhillion, Shilling and Sirmans (1987) find that loan pricing factors are the primary determinants of borrowers choosing ARMs over FRMs in the first mortgage market. Furthermore, Campbell and Cocco’s (2003) analysis of optimal mortgage choice implies that borrower choice between second mortgage products

\textsuperscript{1}http://www.federalreserve.gov/pubs/oss/oss2/2004/scf2004home.html
\textsuperscript{2}See Inside Mortgage Finance, an industry publication.
(variable-rate credit lines versus fixed-rate loans) may also reveal unobserved heterogeneity in borrower risk profiles.\(^3\)

Unfortunately, the empirical analysis of mortgage choice has necessarily relied on the use of originated loans. However, recent analysis of the home equity lending market by Agarwal et al. (2011) reveals that lenders can alter loan contract terms during the underwriting process and thus impact the observed “choice” of fixed versus adjustable contracts. Thus, by focusing on the borrower’s application, we are able to isolate the factors impacting borrower choice free of any bias introduced through subsequent lender screening and underwriting.\(^4\)

### 2.1 Differences Between Home Equity Lines and Loans

As discussed in Agarwal et al. (2006), home equity credit falls into two categories: home equity loans (i.e. “spot” loans) and home equity lines (i.e. credit lines or lines of credit). Agarwal et al. (2006) note that “a spot loan is a closed-end loan extended for a specified length of time requiring repayment of interest and principal in equal monthly installments.” The interest rate on home equity loans is set at loan origination. In contrast, Agarwal et al. (2006) define a credit line as “an open-ended, variable rate, revolving credit facility that permits the consumer to borrow up to a predetermined amount (the line amount).” They note that borrowers usually are required to pay interest only on the used portion of the line during the first five years, after which the line becomes a fully amortizing loan.

Significant differences exist between borrowers who choose lines versus loans, with line borrowers having greater wealth, as indicated by their having relatively more expensive homes, higher incomes, and greater home equity (see Canner et al., 1998). For example, Canner et al. (1998) document that the median home equity for credit line borrowers is $41,000 greater than spot loan borrowers ($76,000 versus $35,000) and that the median household income for spot loan borrowers is $10,000 less than the median household income.

---

3See Sa-Aadu and Shilling (1995), Sa-Aadu and Sirmans (1995) and Chiang, Chow and Liu (2002). In addition, borrower mobility may play a role in contract choice (see Chan, 1996; Gabriel and Rosenthal, 1993). Furthermore, borrower perceptions of default risk could also impact contract choice (see Posey and Yavas, 2001).

4See Sa-Aadu and Shilling (1995), Sa-Aadu and Sirmans (1995) and Chiang, Chow and Liu (2002). In addition, borrower mobility may play a role in contract choice (see Chan, 1996; Gabriel and Rosenthal, 1993). Furthermore, borrower perceptions of default risk could also impact contract choice (see Posey and Yavas, 2001).
of credit line borrowers. Canner et al (1998) also note a significant difference in the ages of line and loan borrowers with 23 percent of the loan borrowers versus 6 percent of line borrowers below the age of 34. In addition, the 1997 Survey of Consumers shows that 49 percent of the households who prefer loans over lines are relatively more sensitive to interest rates and that “ease of use” is the primary motivation for credit line borrowers.

We use the same sample of home equity loan and credit line contracts as in Agarwal et al (2006 and 2011). As discussed in Agarwal et al (2006) and indicated in Table 1, our sample mirrors the patterns reported by Canner et al. (1998). As noted in Agarwal et al (2006), home equity loan borrowers are riskier (i.e. they have significantly lower credit quality scores and less equity). In addition, Agarwal et al (2006) report that “credit line borrowers have significantly greater access to credit with a mean credit line of $70,029 versus a mean loan amount of $59,325.”

3 Model

In this section, we present a simple model of borrower choice of fixed or adjustable rate debt. Although highly stylized, the model presents key insights regarding the economic conditions that should affect borrower credit choice.

3.1 Households

The economy is populated by infinitely many households (borrowers) and banks (lenders). Households live for two periods, and they discount the future at the rate $\beta$. Their preferences are defined over a general consumption good. However, they also value housing, and we assume they strictly prefer owning over renting, and all households buy their houses at the beginning of first period. They are credit constrained, and they need to make the house purchase through a mortgage delivered by a lender.\footnote{Strictly speaking, we assume they start the economy with zero wealth, and they need to obtain the total house price through a mortgage. We make this assumption to avoid the choice problem of the down payment.} Households’ preferences are linear over the consumption good, and they are heterogeneous in their discount factors, $\beta$, with a cumulative distribution function $F$. Since households have linear preferences over consump-
tion, the consumption/saving choice is not a crucial problem here. However, we assume that households’ labor income is sufficient to make the necessary mortgage payments to the lender in each period. Lastly, we do not allow default or prepayment on the mortgages.  

### 3.2 Lenders

Lenders are also assumed to be risk-neutral, but they discount the future at the market interest rate, $r_t$ at time $t$, which is assumed to be the risk-free interest rate. Lenders offer two types of interest-only mortgages to the home buyers: a two-period fixed-rate mortgage (FRM) with a balloon payment at the end of the second period, and a two-period adjustable-rate mortgage (ARM) with a mortgage interest rate adjusting to the market interest rate. We assume the market interest rate, $r_t$, is stochastic. Given that there is no default and no prepayment on a mortgage, we can easily formulate the terms of the two types of mortgage contracts.

#### 3.2.1 FRM contract

The FRM contract is specified by the mortgage interest rate, $r_{m}^{F}$, and the corresponding mortgage payment, $m^{F}$. Since the mortgages are interest only, the periodic mortgage payment, $m^{F}$, becomes $d r_{m}^{F}$ for a given loan amount, $d$. By assuming perfect competition among lenders, we can determine the mortgage interest rate, $r_{m}^{F}$, through a no-arbitrage condition, i.e. the present value of the mortgage contract to the lender should be equal to the loan amount. As a result, the present value of an FRM contract to the lender becomes the following:

$$
\begin{align*}
    d &= \frac{d r_{m}^{F}}{1 + r} + \frac{d r_{m}^{F}}{(1 + r) E(1 + r'|r)} + \frac{d}{(1 + r) E(1 + r'|r)}.
\end{align*}
$$

---

6These assumptions are easily satisfied given some restrictions on preferences and labor income of the households.

7The results can easily be extended to a full amortization mortgage rather than an interest-only mortgage. For clarity of the exposition we choose to restrict the space of the contract to interest-only mortgages.

8Implicit in this specification is the fact that mortgage payments are due by the end of the period. We need this assumption to make a difference between FRM and ARM in a two-period setting.
Solving for $r_m^F$ yields:

\begin{equation}
1 + r_m^F = E(1 + r'|r) \frac{2 + r}{1 + E(1 + r'|r)}.
\end{equation}

It is easy to see from this expression that if $E(r'|r) > r$, then we have $r < r_m^F < E(r'|r)$. The opposite is true if $E(r'|r) < r$.

### 3.2.2 ARM contract

In the ARM contract, the mortgage interest rate, and correspondingly the mortgage payments change with the market interest rate. These rates correspond to the market interest rate with a given premium. However since there is no default or prepayment option available for the households, this premium is zero in our setting, and the mortgage interest rate is simply the market interest rate. Notice that if $E(r'|r) > r$, then the mortgage interest rate will be increasing over time employing an increasing mortgage payment schedule.

### 3.3 Households’ Problem

Using the risk-neutrality assumption for the households, we can simplify the choice of mortgage contract for a household into a present value comparison for both mortgages. Notice that since households are heterogenous in their discount factors, and this discount factor is potentially different from the market interest rate, households have different valuations for each contract.

In the case of an FRM contract, the present value of the contract, $PV^F$, to a household with a discount factor $\beta$ is

\begin{equation}
PV^F = \beta dr_m^F + \beta^2 dr_m^F + \beta^2 d
\end{equation}

Similarly, the present value of the ARM contract ($PV^A$) to a household with a discount
factor $\beta$ is

$$PV^A = \beta dr + \beta^2 dE(r'|r) + \beta^2 d$$

(4)

$$= \beta d ((r + \beta E(r'|r) + \beta)$$

Thus, the choice of the contract simplifies to the comparison of $r^F_m (1 + \beta)$ and $r + \beta E(r'|r)$, which are basically the present value of mortgage payments of the household. Thus, we can state the following proposition.

**Lemma 1** If the market interest rates are expected to increase (decrease), i.e. $E(r'|r) > (<) r$, households with a discount factor $\beta > (<) \beta^*$ choose the FRM contract, and those with a discount factor $\beta < (> ) \beta^*$ choose the ARM contract, where $\beta^*$ solves $\beta^*(1 + E(r'|r)) = 1$ for a given market interest rate $r$.

**Proof** Define the function $f(\beta) = r^F_m (1 + \beta) - r - \beta E(r'|r) = r^F_m - r + \beta (r^F_m - E(r'|r))$ as the difference of the present value of mortgage payments between FRM and ARM contract. Clearly $f(\beta^*) = 0$. Recall that if market interest rate is expected to increase, i.e. $E(r'|r) > r$, then we have $r < r^F_m < E(r'|r)$. As a result, $f(\beta)$ is a decreasing function of $\beta$, which in turn implies $f(\beta) < f(\beta^*)$ for $\beta > \beta^*$. Since households choose the contract with the minimum present value payment, we have the stated result.

Having established the cutoff discount factor for the ARM and FRM choice, it is clear to see that the proportion of the households who choose the ARM contract is $F(\beta^*)$ when the market interest rate is expected to increase, and it is $1 - F(\beta^*)$ when the market interest rate is expected to decrease. Assuming $E(r'|r)$ increases as $r$ increases, we have $\beta^*(r)$ decreasing in $r$. Thus, we can state the following lemma:

**Lemma 2** If $E(r'|r)$ is increasing in $r$, the share of FRM contracts is increasing in $r$ as long as the market interest rate is expected to increase, i.e. $E(r'|r) > r$.

**Proof** Directly follows the previous Lemma.

Finally, we can show how the share of FRM contracts respond to the interest rate difference between FRM and ARM contracts. Notice that we can simplify the difference
between the current period mortgage interest rate between an FRM contract and ARM contract given the market interest rate \( r \) as follows:

\[
(5) \quad r_m^F - r = \frac{E(r'\mid r) - r}{2 + E(r'\mid r)}.
\]

Then, we can state the following Lemma regarding the response of households to the FRM-ARM rate difference.

**Lemma 3** Suppose \( E(r'\mid r) \) is increasing in \( r \) and \( \frac{dE(r'\mid r)}{dr} < 1 \), then the rate between FRM and ARM contract, defined as \( r_m^F - r \) given the current period market interest rate \( r \), decreases as \( r \) increases. If, furthermore, the market interest rate is expected to increase, the share of FRM contracts increases as the market interest rate increases, which results in a decrease in the FRM-ARM rate difference.

**Proof** Given that \( E(r'\mid r) \) is increasing in \( r \) and \( \frac{dE(r'\mid r)}{dr} < 1 \), the FRM-ARM rate difference decreases as \( r \) increases. From the previous Lemma we also know that the share of the FRM contracts increases as long as the market interest rate is expected to increase, which is the case as stated in the Lemma. So, we have the desired result.

Lemma 3 shows that in the specified range of parameters, we will have the share of the FRM contracts increasing as the rate difference between the FRM and ARM contract decreases. Notice that if we assume that the market interest rate follows a mean-reverting process, the stated conditions will be satisfied as long as the market interest rate is below the mean of the market interest rate. This result is intuitive. If the market interest rate is below the mean, this actually means the market interest rate is expected to increase in the next period. Thus, the current mortgage interest rate on an FRM contract is higher than the current mortgage interest rate on an ARM contract. The reason for some households choosing the ARM contract is the fact that their discount factor is smaller than the market discount factor, so they want to get the benefit of the lower first period mortgage payment. The reason for some households choosing the FRM contract is just the opposite. Their discount factor is higher than the market discount factor, so they want to get the benefit of lower second period mortgage payment. However, as the market interest rate increases,
the rate difference between FRM and ARM contracts decreases, which implies a lower first period mortgage payment advantage. As a result, the share of the FRM holders increases.\textsuperscript{9}

4 Data and Econometric Method

4.1 Data

As discussed in Agarwal (2007) and Agarwal and Ambrose (2012), the data was provided by a large financial institution (proprietary in nature) and consists of 80,338 variable-rate credit lines and 27,779 fixed-rate credit loans issued to owner-occupants from March 2002 to December 2002.\textsuperscript{10} The credit lines are open for the first five years and the borrower is only required to make interest payments on the utilized line balance during this period. After the fifth year, the line is closed and is converted to a fully amortizing, fixed-rate term loan with a remaining term of 5 to 15 years.

The majority of the credit loans and lines in our sample are originated in eight North-eastern states; however, 1.53 percent originated in Florida, 1.38 percent in California, and 4.04 percent in 28 other states. Table 1 reports the descriptive statistics for the loans and lines at origination.

Examining the key differences in the summary statistics, we see that the average house value of the home equity line borrowers is $60,000 more than the home equity loan borrowers. We also note that the line borrowers requested an average of $9,400 more than the loan borrowers and that the line borrowers are less risky than the loan borrowers, as measured by the FICO scores, the average difference is 16 points. We also see that the average income of the line borrowers is 20 percent higher than the loan borrowers. In addition, we find that line borrowers are more likely to use the funds for consumption purposes and the loan borrowers are more likely to originate the loan to refinance and use the funds for home improvement. Finally, we find that the interest rate differential between the loans and lines

\textsuperscript{9}Notice that we have not specified what happens if the market interest rate is above the mean rate. In this range, the rate on an FRM contract is lower than the rate on an ARM contract. However, this is not empirically relevant.

\textsuperscript{10}Agarwal and Ambrose (2012) conduct an analysis of the role of advertising on the choice of mortgage product using a subset of the data described in this paper. Agarwal (2007) also uses a subset of the data to analyze whether borrowers systematically mis-estimate the value of their homes.
is over 300 basis points.

4.2 Methodology

Following Brueckner and Follain (1988), we estimate the following probit model of borrower home-equity choice:

\[ P_i = x_i' \beta - \varepsilon_i \]

Where \( P_i \) takes the value of one if the borrower chooses an adjustable rate line-of-credit and zero if the borrower chooses a fixed-rate home equity loan, \( x_i \) is a matrix of explanatory variables, \( \beta \) is a set of coefficients, and \( \varepsilon \) is a standard error term.

As discussed by Brueckner and Follain (1988), the key factors impacting the fixed versus adjustable debt choice are the level of interest rates at origination and the relative difference between interest rates for fixed and adjustable rate contracts. Thus, we include the difference in interest rates between fixed-rate home equity loans and adjustable-rate home equity lines of credit and the level of the fixed-rate home equity loan at the origination date. Unlike Brueckner and Follain (1988), who were unable to observe both fixed and adjustable interest rates offered to the borrowers, we know both rates offered to the borrower at the time of origination. As a result, we do not face the selectivity bias of Brueckner and Follain (1988) and can follow the simple probit method outlined by Dhillon, Shilling and Sirmans (1987).

5 Results

Overall, the estimated coefficients reported in Table 2 confirm prior research about the decision to choose between a variable and fixed rate contract. Given the large number of observations included in the analysis, it is not surprising that almost all of the variables are statistically significant at the 10 percent level.\(^{11}\) Thus, we focus on the variables’ marginal impacts to provide guidance as to the relative importance of the factors in impacting the borrower’s decision. Interestingly, the variables related to interest rates (FRM/ARM rate

\(^{11}\)The exception is the number of years the borrower has been employed, which is not statistically significant at any meaningful level.
differential and FRM rate level) and the variables denoting the borrowers declared intended use of the funds (consumption or refinancing) are the only variables that have marginal impacts greater than 10 percent.

The borrower’s declared use of the debt proceeds clearly has a strong impact on choice of contract. The marginal impacts indicate that a borrower that intends to use the funds for consumption is 14.9 percent more likely to select the adjustable-rate line-of-credit while borrowers intending to refinance existing debt are 22.3 percent less likely to select the adjustable-rate line-of-credit. Clearly borrowers prefer the flexibility associated with the adjustable-rate line-of-credit when using home-equity to smooth consumption while preferring the certainty of fixed-rate contracts when refinancing (or consolidating) existing debt.

We find that the impact of market interest rates in influencing the borrower choice of contract is consistent with the theoretical predictions of Alm and Follain (1987) and Brueckner (1986) as well as the previous empirical evidence presented in Brueckner and Follain (1988). For example, borrowers with high relative risk aversion and low discount rates are more likely to prefer fixed-rate contracts. Consistent with this theory regarding borrower risk aversion, we find that every one percentage point increase in the difference between the fixed- and adjustable- interest rates results in a 13 percent increase in the probability that the borrower will select the adjustable rate contract. Furthermore, every one percentage point increase in the home equity loan interest rate (the fixed-rate product) raises the probability that the borrower will select the adjustable-rate line-of-credit by 17.8 percent.

To highlight the impact of interest rate movements on borrower contract choice, we calculate the probabilities of selecting a home equity loan and home equity line-of-credit for two hypothetical borrowers based on the short term (three months) and long term (five years) daily treasury bill rates observed between January 2003 and December 2004. We construct our hypothetical borrowers assuming that each borrower had values for the variables in $x_i$ equal to the sample means and that one borrower indicated that she would use the debt proceeds for consumption while the other would use the debt proceeds to refinance. Based on these values and the estimated coefficients in Table 2, we calculate the time-varying probabilities that each borrower would select an adjustable-rate line-of-credit.
Obviously, the probability of selecting the fixed-rate home equity loan is simply one minus the adjustable-rate probability.

Figure 1 shows the FRM interest rate and interest rate differential over the period between January 2003 and December 2004. Figure 2 shows the probability of selecting an ARM for borrowers with consumption and refinancing motives. Consistent with the marginal effects, the probability that a borrower with a consumption motive would select the adjustable rate product is clearly greater than the probability of the borrower with a refinancing motive. However, the figure also reveals that borrowers with refinancing motives are more sensitive to changes in the underlying yield curve than borrowers with consumption motives. For example, during the period between March 9, 2004 and May 13, 2004, the five-year Treasury rate increased from 2.68 percent to 4.01 percent and the yield curve (interest rate differential) increased from 1.72 to 3.01 percent. As a result of this dramatic increase in longer term interest rates, the probability that a refinancing borrower would select an adjustable-rate product almost doubled, from 28 percent to 46 percent. However, during the same period, the probability that a consumption motivated borrower would select an adjustable-rate product only increased from 79 percent to 89 percent.

6 Conclusion

In this paper, we examine consumer choice of fixed versus adjustable rate debt contracts in the home equity lending market. Our dataset allows us to observe the fixed-rate and adjustable-rate terms offered to borrowers at the time of origination, and thus it eliminates the bias inherent in previous studies that only observed the borrowers’ selected contracts. By focusing on borrower choice revealed in the credit application we are able to isolate the factors impacting borrower choice free of any bias that may be introduced through subsequent lender screening and underwriting.

The results from this study confirm previous findings that the interest rate levels and the slope of the yield curve are the primary factors influencing borrower choice of debt type. Furthermore, we find that borrower declared use of funds significantly impacts the contract choice decision. For example, we find that borrowers who declare that they intend to utilize
the debt for consumption purposes have a significantly greater probability of selecting the adjustable-rate product than borrowers who are refinancing existing debt. Furthermore, these borrowers are less sensitive to changes in interest rates. Thus, the results from this study indicate that borrower contract choice is dependent upon both the state of the economy (as reflected in the cost of borrowing) as well as the borrower’s endogenous use of the funds.
7 References


Figure 1: Daily Short-Term (Three Month) and Long-Term (Five Year) Treasury Rates
Figure 2: Probability of Choosing an ARM for Borrowers with Consumption and Refinancing Motives with varying FRM APR and Rate Differentials
<table>
<thead>
<tr>
<th>Variables</th>
<th>Fixed Rate Home Equity Loans</th>
<th>Variable Rate Home Equity Lines</th>
<th>T-test for the means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std</td>
<td>Mean</td>
</tr>
<tr>
<td>Customer LTV</td>
<td>63.85</td>
<td>27.06</td>
<td>61.20</td>
</tr>
<tr>
<td>Appraised LTV</td>
<td>66.54</td>
<td>30.54</td>
<td>64.04</td>
</tr>
<tr>
<td>Borrower Estimated Home Value</td>
<td>$284,999</td>
<td>$162,692</td>
<td>$344,915</td>
</tr>
<tr>
<td>Appraised Home Value</td>
<td>$277,993</td>
<td>$132,409</td>
<td>$332,495</td>
</tr>
<tr>
<td>Requested Loan Amount</td>
<td>$59,644</td>
<td>$49,354</td>
<td>$69,091</td>
</tr>
<tr>
<td>Loan Amount Approved</td>
<td>$59,325</td>
<td>$49,254</td>
<td>$70,029</td>
</tr>
<tr>
<td>APR</td>
<td>7.66</td>
<td>1.18</td>
<td>4.70</td>
</tr>
<tr>
<td>FICO Score</td>
<td>716.09</td>
<td>52.68</td>
<td>732.15</td>
</tr>
<tr>
<td>Debt to Income</td>
<td>41.86</td>
<td>18.89</td>
<td>36.89</td>
</tr>
<tr>
<td>No First Mortgage</td>
<td>16%</td>
<td>43%</td>
<td>18%</td>
</tr>
<tr>
<td>Consumption</td>
<td>13%</td>
<td>39%</td>
<td>35%</td>
</tr>
<tr>
<td>Refinancing</td>
<td>67%</td>
<td>47%</td>
<td>39%</td>
</tr>
<tr>
<td>Years on the Job</td>
<td>7.62</td>
<td>8.67</td>
<td>7.93</td>
</tr>
<tr>
<td>Income</td>
<td>$110,111</td>
<td>$146,363</td>
<td>$126,435</td>
</tr>
<tr>
<td>Borrower Age</td>
<td>44.61</td>
<td>12.87</td>
<td>47.16</td>
</tr>
<tr>
<td>First Mortgage Balance</td>
<td>$128,204</td>
<td>$89,278</td>
<td>$148,602</td>
</tr>
<tr>
<td>Months at Address</td>
<td>93</td>
<td>128</td>
<td>101</td>
</tr>
<tr>
<td>Self Employed</td>
<td>6%</td>
<td>23%</td>
<td>8%</td>
</tr>
<tr>
<td>Retired</td>
<td>9%</td>
<td>26%</td>
<td>8%</td>
</tr>
<tr>
<td>Home Maker</td>
<td>1%</td>
<td>11%</td>
<td>1%</td>
</tr>
<tr>
<td>Married</td>
<td>55%</td>
<td>50%</td>
<td>52%</td>
</tr>
<tr>
<td>Frequency</td>
<td>27779</td>
<td>80338</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Consumer Choice Model Between an Fixed Rate and Adjustable Rate Home Equity Credit

<table>
<thead>
<tr>
<th></th>
<th>Coeff. Val.</th>
<th>Std. Err.</th>
<th>P-value</th>
<th>Marg Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-5.6984</td>
<td>0.8324</td>
<td>&lt;.0001</td>
<td>2.33%</td>
</tr>
<tr>
<td>Log(Borrower Estimate of the House Value)</td>
<td>0.0011</td>
<td>0.0001</td>
<td>&lt;.0001</td>
<td>3.58%</td>
</tr>
<tr>
<td>Log(Loan Amount Requested)</td>
<td>0.0026</td>
<td>0.0003</td>
<td>&lt;.0001</td>
<td>3.58%</td>
</tr>
<tr>
<td>FICO</td>
<td>0.0044</td>
<td>0.0001</td>
<td>&lt;.0001</td>
<td>0.06%</td>
</tr>
<tr>
<td>Rate Difference (FRM% - ARM%)</td>
<td>0.2233</td>
<td>0.0640</td>
<td>0.0007</td>
<td>13.03%</td>
</tr>
<tr>
<td>FRM APR%</td>
<td>0.3889</td>
<td>0.0140</td>
<td>&lt;.0001</td>
<td>17.83%</td>
</tr>
<tr>
<td>Debt to Income</td>
<td>-0.0039</td>
<td>0.0005</td>
<td>&lt;.0001</td>
<td>-0.05%</td>
</tr>
<tr>
<td>No First Mortgage</td>
<td>0.5350</td>
<td>0.0229</td>
<td>&lt;.0001</td>
<td>7.83%</td>
</tr>
<tr>
<td>Log(Income)</td>
<td>0.0035</td>
<td>0.0010</td>
<td>0.0005</td>
<td>8.23%</td>
</tr>
<tr>
<td>Borrower Age</td>
<td>0.0083</td>
<td>0.0016</td>
<td>&lt;.0001</td>
<td>0.22%</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.7350</td>
<td>0.0200</td>
<td>&lt;.0001</td>
<td>14.89%</td>
</tr>
<tr>
<td>Refinancing</td>
<td>-1.5350</td>
<td>0.0235</td>
<td>&lt;.0001</td>
<td>-22.29%</td>
</tr>
<tr>
<td>Years on the Job</td>
<td>0.0014</td>
<td>0.0014</td>
<td>0.5733</td>
<td>0.29%</td>
</tr>
<tr>
<td>Log(First Mortgage Balance)</td>
<td>0.0046</td>
<td>0.0002</td>
<td>&lt;.0001</td>
<td>6.59%</td>
</tr>
<tr>
<td>Log(Months at Address)</td>
<td>0.0182</td>
<td>0.0055</td>
<td>&lt;.0001</td>
<td>5.60%</td>
</tr>
<tr>
<td>Self Employed</td>
<td>0.3035</td>
<td>0.0320</td>
<td>&lt;.0001</td>
<td>4.30%</td>
</tr>
<tr>
<td>Retired</td>
<td>-0.0844</td>
<td>0.0346</td>
<td>0.0104</td>
<td>-1.93%</td>
</tr>
<tr>
<td>Home Maker</td>
<td>-0.1350</td>
<td>0.0739</td>
<td>0.0898</td>
<td>-0.22%</td>
</tr>
<tr>
<td>Married</td>
<td>-0.0744</td>
<td>0.0135</td>
<td>&lt;.0001</td>
<td>-1.13%</td>
</tr>
<tr>
<td>CT Dummy</td>
<td>-0.1935</td>
<td>0.0357</td>
<td>&lt;.0001</td>
<td>-2.82%</td>
</tr>
<tr>
<td>ME Dummy</td>
<td>0.3350</td>
<td>0.0555</td>
<td>&lt;.0001</td>
<td>4.89%</td>
</tr>
<tr>
<td>NH Dummy</td>
<td>-0.0640</td>
<td>0.0535</td>
<td>0.4882</td>
<td>-1.05%</td>
</tr>
<tr>
<td>NJ Dummy</td>
<td>0.4335</td>
<td>0.0235</td>
<td>&lt;.0001</td>
<td>6.24%</td>
</tr>
<tr>
<td>NY Dummy</td>
<td>0.1924</td>
<td>0.0210</td>
<td>&lt;.0001</td>
<td>2.82%</td>
</tr>
<tr>
<td>PA Dummy</td>
<td>-0.2535</td>
<td>0.0460</td>
<td>&lt;.0001</td>
<td>-3.33%</td>
</tr>
<tr>
<td>RI Dummy</td>
<td>-0.0930</td>
<td>0.0560</td>
<td>0.06039</td>
<td>-1.42%</td>
</tr>
</tbody>
</table>

Month Loan Origination Dummies: Yes
Number of Observations: 108117
Pseudo R-sq: 13.39%