PARTICIPATION IN MORTGAGE PROGRAMS

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The federal role in capital markets is an area of major national concern. Questions raised include: are federal credit activities a reasonable approach or are they an intrusion into well-functioning credit markets? Are they an appropriate response to legitimate needs or politically favored aid to selected persons? Who is served by federal credit programs? This paper is concerned only with residential, single-family mortgage programs. It addresses the issue of who participates in federal home mortgage loan programs and how these purchasers differ within programs as well as compared to conventional mortgage loan holders.

Federal Credit Programs

Since the 1930's the role of the federal government in the allocation of mortgage credit has increased considerably. Federal credit programs are usually justified by the existence of imperfections in the private capital market. The imperfections include incorrect perception of risk by lender, imperfect knowledge by borrowers, and regulations. The social benefits of home ownership is another rationale.

Silber and Black identify two goals of federal credit programs: "(1) the reallocation of credit and resources toward a particular activity; (2) the redistribution of income towards particular borrower classes in the form of lower interest payments on certain types of loans."[4]

The three major federal, single-family loan programs are: the Federal Housing Administration (FHA), the Veteran's Administration (VA), and the Farmers Home Administration (FmHA). These loan programs contain some institutional constraints which will somewhat determine the characteristics of the borrowers. The following sections briefly highlight each of the programs.

Federal Housing Administration. FHA/HUD insured mortgage loans are made by banks, savings-and-loan associations and other lending institutions. The mortgage terms paid by borrowers will vary by lender. However, FHA establishes ceilings on the value of the house to be financed and interest rates. Minimum downpayments are set by a formula --three percent of the first $25,000 and five percent of the value in excess of $25,000. At the time of data collection, the dollar limit on FHA loans was $67,500 except in high cost areas. The limit could also be increased up to 20 percent if the cost was for the installation of a solar energy system. For the period under study,

September 1978 to December 1979, FHA interest rates ranged from 9.50 to 11.50 percent. Borrowers pay a 0.5 percent mortgage insurance premium on the outstanding principal balance. This fee is the main source of FHA funds.

Veterans Administration. The objective of the VA home loan program is to facilitate the extension of credit on favorable terms by private lenders to eligible veterans. VA loans may be insured, guaranteed or direct. The loan guaranty program provides a federal guaranty that the mortgage will be paid. The insurance program operates through an insurance fund set aside by VA to cover defaults. It has not been used much in recent years. Direct loans are primarily used in areas where mortgage credit is not otherwise available. There is no statutory maximum for VA guaranteed loans. However, the lender will only be guaranteed $27,500 or 60 percent of the mortgage, whichever is less. There is no charge to the borrower for a VA guarantee or insurance. As with FHA loans, the VA interest rate ranged from 9.50 to 11.50 in the period under study.

Farmers Home Administration. Farmers Home Administration is the primary housing credit agency for nonmetro areas. FmHA serves areas up to 10,000 in population and areas between 10,000 and 20,000 population located outside SMSA's which lack credit. FmHA both guarantees and insures loans. FmHA has an income eligibility limit. In 1979, adjusted family income could not exceed $11,200 in all States and territories except Hawaii, Guam, and Alaska for interest subsidized loans and $15,600 for moderate income loans. Borrowers must also have not been able to receive credit elsewhere.

Data

The 1979 Annual Housing Survey is the source of data used in this study. Data were collected between September 1979 and December 1979 by the Bureau of the Census for the Department of Housing and Urban Development. The sample consisted of approximately 73,300 housing units including units sampled in 1978 and a selection from new building permits and updated listings in areas not having building permit data. Interviews were not conducted in 4,300 of the cases either because of respondent refusal or vacancies.

From this large sample, the present study used data on recent movers only. A recent mover is a household that moved in to their present unit within the 12 months prior to the date of the interview. The restriction to recent movers allows for the examination of current choices based on the current socioeconomic status of

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the household. The sample was further restricted to single family detached owner occupants. This further increases the homogeneity of the sample. Mobile home financing contracts differ in terms and little is known about condominium/ cooperative financing.

The sample consists of 2060 recent mover owners of single-family detached units with a mortgage. Of these, 67.7 percent have a conventional mortgage, 15.4 percent an FHA mortgage, 13.7 percent a VA mortgage, and 3.2 percent an FmHA mortgage.

Characteristics of the respondents and the housing they occupy will be highlighted here. Particular attention will be given to characteristics in which differences among the four groups of borrowers were observed (Tables 1 and 2).

The average household head was in his thirties, was white and male. FmHA borrowers were somewhat younger and more likely to be females than other borrowers. The average household size was about three persons. Average household income ranged from $14,445 for FmHA borrowers to $25,697 for conventional borrowers. Most borrowers had more than one source of income. The average borrower, regardless of mortgage type, spent slightly more than one-quarter of their income for housing. This home was the first one owned for 62 percent of the FmHA borrowers compared to 35 percent for conventional borrowers.

Average house size ranged from 5.7 rooms for FmHA borrowers to 6.4 rooms for conventional borrowers. Except for FmHA homes which had an average age of 11 years, the average house age was approximately 15 years. Mean house value ranged from $43,617 for FmHA homes to $67,595 for conventionally financed homes. Monthly housing costs, including mortgage, real estate taxes, property insurance, utilities and garbage and trash collection ranged from $296 for FmHA borrowers to $522 for conventional borrowers.

For 80 percent or more of all borrowers, the mortgage on the house was originated and not assumed. Whether the borrower made a downpayment varied considerably by mortgage type—half of FmHA borrowers and one-third of VA borrowers made no downpayment, whereas, only 2.3 percent of conventional and 5.4 percent of FHA borrowers made no downpayment. Sale of real property including a previous home, and savings were the primary source of the downpayment.

One-third of conventionally financed homes were outside SMSAs, whereas one-quarter of VA and FHA were so situated. As would be expected, 80 percent of FmHA mortgaged homes were outside SMSAs. Using size of place as a measure, the area outside SMSAs could be divided into places less

than 5,000 population and between 5,000 and 49,999. Fewer housing units fell in the latter category for all mortgage types than in the less than 5,000 group.

The distribution of housing units by region indicated more housing units were financed in the South regardless of mortgage type although for conventionally financed housing the edge over the Northcentral region was slight. For FHA and VA mortgages, the Western region followed the South in terms of percent of homes financed. Outside the Southern region, FmHA loans were somewhat equally distributed.

Technique

In the purchase of a house, households are faced with a set of possible choices which are mutually exclusive alternatives. For example, the choice of a FHA mortgage precludes any other alternative. The choice that the household will make depends on the characteristics of the alternative and attributes of the household and house.

Multinomial logit analysis is a technique for handling such a data problem. The multinomial logit model provides a set of coefficients which indicate the rate of change in the probability that a mortgage alternative is chosen. In addition, it is possible to calculate predicted probabilities for a range of household or housing types. For example, one can predict the probability of choosing a FHA mortgage for the "average" household in the sample, that is, one having as its vector of characteristics the mean value for each characteristic.

The multinomial logit equation specified later in the paper determines the probability that a given household with a given set of characteristics, both personal and housing- related, received a specific mortgage type. The households are partitioned among the four mutually exclusive mortgage types which are not assumed to be ordered. The N-1 equations, plus the requirement that the probabilities sum to one, determine the selection probabilities uniquely.

"Each equation presumes that the logarithm of the odds of one choice relative to a second choice is a linear function of the attribute x. These odds are dependent on the odds associated with the remaining two equations only in the sense that the system must be constrained so that the sum of the individual probabilities equals 1." [3:258].

There are several assumptions in the model to be noted:

(1) the disturbance terms are Weibull distributed,

TABLE 1

DISTRIBUTION OF SELECTED CHARACTERISTICS BY MORTGAGE TYPE

		MORTGAGE TYPE							
VARIABLE	:	Conventional :		FHA :		VA :		FmHA :		Total Sample
	:	n	%	:	n	%	:	n	%	:	n	%	:	N	%

VARIABLE	:	n	%	:	n	%	:	n	%	:	n	%	:	N	%
Inside SMSA	:	892	63.9	:	241	76.0	:	212	75.2	:	13	19.7	:	1358	65.9
Outside SMSA	:	503	36.1	:	76	24.0	:	70	24.8	:	53	80.3	:	702	34.1
White	:	1318	94.5	:	274	86.4	:	250	88.7	:	58	87.9	:	1900	92.2
Non-white	:	77	5.5	:	43	13.6	:	32	11.3	:	8	12.1	:	160	7.8
Male Head	:	1320	94.6	:	289	91.2	:	271	96.1	:	49	74.2	:	1929	93.6
Female Head	:	75	5.4	:	28	8.8	:	11	3.9	:	17	25.8	:	131	6.4
First Home Owned	:	484	34.7	:	179	56.5	:	126	44.7	:	41	62.1	:	830	40.3
Mortgage Originated[a]	:	1143	81.9	:	269	84.9	:	230	81.6	:	58	87.9	:	1700	82.5
Source of Downpayment[b]	:			:			:			:			:		
Real Property	:	641	45.9	:	89	28.1	:	68	24.1	:	7	10.6	:	805	39.1
Savings	:	425	30.5	:	153	48.3	:	88	31.2	:	12	18.2	:	678	32.9
Other	:	297	21.3	:	58	18.3	:	38	13.5	:	14	21.2	:	407	19.8
None	:	32	2.3	:	17	5.4	:	88	31.2	:	33	50.0	:	170	8.3
Size of Place	:			:			:			:			:		
1-4,999	:	384	27.5	:	56	17.7	:	49	17.4	:	45	68.2	:	534	25.9
5,000-49,999	:	119	8.5	:	20	6.3	:	21	7.4	:	8	12.1	:	168	8.2
50,000+	:	892	63.9	:	241	76.0	:	212	75.2	:	13	19.7	:	1358	65.9
Outside Income[c]	:	1011	72.5	:	192	60.6	:	194	68.8	:	35	53.0	:	1432	69.5
Region	:			:			:			:			:		
Northeast	:	230	16.5	:	26	8.2	:	21	7.4	:	8	12.1	:	285	13.8
Northcentral	:	423	30.3	:	58	18.3	:	52	18.4	:	11	16.7	:	544	26.4
South	:	444	31.8	:	124	39.1	:	125	44.3	:	36	54.5	:	729	35.4
West	:	298	21.4	:	109	34.4	:	84	29.8	:	11	16.7	:	502	24.4

[a] Excludes assumptions

[b] Real property includes sale of previous home or other real estate. Other includes borrowing, gift and land as sources.

[c] In addition to their main source of income, borrower had other income; sources include dividends, interest, and alimony.

TABLE 2

MEANS AND STANDARD DEVIATIONS OF SELECTED CHARACTERISTICS BY MORTGAGE TYPE

VARIABLE	Conventional n=1395		FHA n=317		VA n=282		FmHA n=66		Total Sample N=2060	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age of Household Head	35.7	10.7	32.7	9.6	36.7	9.1	31.8	11.0	35.2	10.4
Size of Household	3.2	1.4	3.3	1.4	3.3	1.4	3.2	1.3	3.2	1.4
Income	$25,697	$11,588	$20,801	$8,848	$24,498	$10,133	$14,445	$8,178	$24,419	$11,197
Monthly Housing Costs[a]	$522	$259	$453	$150	$515	$186	$296	$165	$503	$237
Housing Costs as % of Income	26.9	12.4	28.8	11.0	27.9	11.2	26.0	7.9	27.3	11.9
Number of Rooms	6.4	1.6	5.8	1.2	6.3	1.4	5.7	1.5	6.3	1.6
Property Value	$67,595	$42,823	$51,475	$21,710	$55,643	$24,445	$43,617	$36,426	$62,710	$38,619
Age of House	15.5	15.0	15.2	13.9	15.0	13.4	11.2	14.4	15.3	14.6

[a] Includes mortgage, real estate taxes, property insurance, utilities, and garbage and trash collection.

(2) bivariate interaction effects are
    constant,

(3) interaction effects of order higher
    than two are absent,

(4) main effects are linear functions
    of the explantory variables.

The model is estimated by maximum likelihood
methods using the computer program, known as
CRAWTRAN, developed by Robert B. Avery [1]. The
maximum-likelihood procedure guarantees consis-
tent parameter estimates and correct large-
sample statistics [3:260].

Estimates of the parameters for the logit equa-
tion are presented in Table 6 in the Appendix.
Asymptotic t- statistics are reported in paren-
theses. The coefficients are the logarithms of
the odds of an event occurring over the range
negative infinity to positive infinity. They
can be interpreted as follows: a one unit
increase in a given independent variable,
holding all other variables in the equation
constant, results in a percentage change in the
odds of an event occurring of the amount and
direction indicated by the logit coefficient.

Analysis

Because of the high cost of logit analysis,
regressions were performed to examine alter-
native variable forms and variance in effects.
In addition to the thirteen variables selected
for the logit analysis, variables considered in
the regression equations were: number of
sources of income, household size, monthly
housing costs, housing costs as a percent of
income, was the mortgage originated, source of
downpayment, and size of community in which
house was located. The majority of these
variables had no significant effect. If a
variable was significant in any equation, there
was no pattern of significance except that
having more than one source of income was signi-
ficant for all equations relating to FHA
mortgages.

For this paper, the variables selected, the mea-
sure used, and rationale are detailed in Table
3. The group of conventional mortgage holders
were used as the normalizing group.

A discussion of the significant variables and
direction of the effect on the probability of
receiving mortgage type are examined for each
federal mortgage program as compared to conven-
tional mortgages (Table 4).

FmHA

Compared to the base group, two household char-
acteristics significantly affected the proba-
bility of being an FmHA mortgage holder. As in-
come decreased, the probability of borrowing

from FmHA increased. This is as would be
expected given the income constraints on FmHA
borrowers. A more interesting result is that
being a female headed household increased one's
probability of receiving an FmHA loan relative
to conventional borrowers. The descriptive
data had indicated that this might be expected.

Purchasing a newer home increased the pro-
bability of receiving an FmHA mortgage. There
has been some concern that FmHA leans toward
financing new construction so that this result
was expected. The lack of a downpayment
increased the probability of being an FmHA
borrower. Since the program requires no down-
payment while most conventional lenders require
at least five percent, this result was
expected.

Given FmHA regulations, it was expected that
the purchase of a house outside an SMSA would
increase the probabilty of receiving an FmHA
loan. This was the case.

VA

Compared to the base group, the probability of
having a VA mortgage increased significantly
with age of the head and if the head was non-
white. The former is to be expected since
eligible veterans are more likely to be older.

A higher value house was less likely to have a
VA loan, however, a larger house was more
likely. Since there are program limits on the
amount of mortgage VA will guarantee the former
might be expected. The latter result is hard
to explain. Lack of a downpayment increased
the probability of being a VA mortgage holder.
This is to be expected since VA requires no
downpayment.

Location of a house inside an SMSA increased
the probability of being in the VA program.
Why this should be so is not clear.

FHA

Relative to conventional borrowers, the prob-
ability of having an FHA mortgage decreased as
age and income increased and if the borrower
had previously owned a home.

Being non-white increased the probability of
being an FHA borrower. Boehm and McKenzie
reported that nonwhites have a lower
probability of owning [2:9]. As value and age
of the home increased, the probability of there
being an FHA mortgage on it decreased. Given
that FHA limits the amount of mortgage that it
will finance, the results were expected.

The probability of having an FHA mortgage
increased if the house was located inside an

SMSA. Homes located in the Northeast and North central regions were less likely to have an FHA mortgage, whereas homes located in the West were more likely to have an FHA mortgage.

Prediction

To judge how well the model was predicting the ex-post probabilities of purchasing a certain type of mortgage, mean probability equations were constructed and solved. These equations were constructed using the estimated coefficients for each group along with the mean values of the continuous independent variables and the modal values of the dichotomous independent variables. The equations predict the probabilities, and thus determine which type of mortgage the "average" buyer for each group will purchase. The results are presented in Table 5.

The model correctly predicted that the average FmHA borrower would purchase an FmHA mortgage (prob=.385) and that the average conventional borrower would purchase a conventional mortgage (prob=.734). However, the model did not correctly predict for the VA and FHA groups. This could in part be caused by the similarities between these two groups and the conventional group. Preliminary regression results suggested that this might occur.

Summary and Implications

This study examined the characteristics of households who financed the purchase of a single family house in 1979. It also looked at location and characteristics of the housing. Using multinomial logit analysis, the probability of participating in one of three federal credit programs was examined. Mean probability equations were calculated to test whether the model would accurately predict mortgage choice.

Of the 2060 respondents in the sample, 67.7 percent had a conventional mortgage, 15.4 percent had an FHA mortgage, 13.7 percent had a VA mortgage, and 3.2 percent had an FmHA mortgage. The average household head was white, male and in his thirties. Household size averaged about three persons. Most borrowers spent slightly more than one-quarter of their income on housing. For 80 percent of the borrowers, the mortgage on the house was originated, not assumed.

Differences among the groups were found for income, house value, monthly housing costs, downpayment, and location.

FmHA borrowers were fairly distinct from conventional borrowers. Since the mean probability equations indicated the model was only accurate for predicting FmHA and conventional borrowers, the results for FHA and VA will not be summarized here.

The probability of being an FmHA mortgage holder increased as income decreased, if the household head was female, if the borrower did not make a downpayment, if the house was newer, and if it was located outside an SMSA.

The results suggest that FmHA serves a distinct population group and that program criteria are meeting the established targets. FHA and VA borrowers are more like conventional borrowers and although selected factors increased the probability of participating in one of these programs, the present model cannot predict so with much accuracy. This is either an indication of inaccurate model specification or that FHA and VA borrowers are fairly indistinguishable from conventional borrowers.

The effect of changes in program criteria can be related to the model. For example, requiring FmHA borrowers to make a downpayment could eliminate many households from participating in the program. Likewise putting more stringent requirements on the FHA program might target it to a different group from that currently served. Further model refinements are needed as well as testing over time to see if the results will hold.

References

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3. Robert S. Pindyck and Daniel L. Rubenfeld. Econometric Models and Economic Forecast. NY: McGraw-Hill Book Company, 1976.

4. William L. Silber and Deborah G. Black. "Subsidies in Government Credit Programs: General Theory with Illustrations from the Mortgage Market", in Conference on the Economics of Federal Credit Activity. Part II. Congressional Budget Office, 1980, p. 122.

TABLE 3

MEASUREMENT OF VARIABLES

Variable	:	Measurement	:	Rationale
DEPENDENT	:		:	
Mortgage Type	:	VA, FmHA, FHA, and Conventional	:	
INDEPENDENT	:		:	
Household Characteristics	:		:	
Age of Head	:	Years	:	Housing demand may vary with stage of life cycle, proxy for wealth, expected mobility
Income	:	Household income including wages & salaries, self employment income, Social Security, railroad retirement, public assistance, and all other money income	:	FmHA restricts imcome level of borrowers
White	:	0 = head white 1 = head non-white	:	Different preferences, discrimination
Sex of Head	:	0 = male 1 = female	:	Different preferences, discrimination
First Home Owned	:	0 = not first home ever owned 1 = first home ever owned	:	Expected mobility, proxy for wealth
Housing & Mortgage Characteristics	:		:	
Rooms	:	Number of rooms in the home	:	Measure of quantity; reflection of family size needs
Value	:	Respondent's estimate of how much the property would sell for it it were for sale	:	Loan limits on FHA; FmHA limited to moderate income housing
Age of Home	:	Years	:	Measure of quality
Downpayment	:	0 = made a downpayment 1 = no downpayment made	:	Requirements vary; measure of wealth
Location	:		:	
Met	:	0 = inside an SMSA 1 = outside an SMSA	:	FmHA programs restricted in availability
Region	:		:	
NE	:	0 = no 1 = Northeast census region	:	Reflect program targeting, distribution of funds, house price differences
NC	:	0 = no 1 = North central census region	:	
W	:	0 = no 1 = Western census region	:	
S	:	0 = no 1 = Western census region	:	

TABLE 4

MULTINOMIAL LOGIT RELATIONSHIPS[a]

SIGN AND STATISTICAL SIGNIFICANCE

DEPENDENT VARIABLE	n	Constant	Rooms	Value	Age Head	Income	Age Home	Met	White	Sex Head	First Home	Down-Pay	NE	NC	W
VA	282	- **	+ **	- **	+ **	+	-	- **	+ *	-	+	+ **	- **	- **	+ **
FmHA	66	- *	+	-	-	- **	- **	+ **	+	+ **	+	+ **	-	-	+
FHA	317	+ *	-	- **	- *	- **	- **	- **	+ **	+	+ **	+	- **	- **	+ **
Conventional[b]	1395														

[a] Statistical significance of estimated coefficients is indicated * p < .05, ** p < .01 for a two-tail t-test

[b] The coefficients of the conventional mortgage group were normalized by setting them to zero.

TABLE 5

PREDICTED MORTGAGE GROUP
(rows sum to 1)

		VA	FmHA	FHA	CONV
	VA	.152	.004	.164	.680
Actual	FmHA	.352	.385	.085	.178
Mortgage	FHA	.137	.007	.272	.584
Group	CONV	.127	.003	.136	.734

TABLE 6

MULTINOMIAL LOGIT ESTIMATES AND ASYMPTOTIC t-RATIOS[a]

COEFFICIENT OF

DPNDNT VARABL	Constant	Rooms	Value (000S)	Age Head	Income (000S)	Age Home	Met	White	Sex Head	First Home	Down-Pay	NE	NC	W
VA n=282	-2.355 (-4.750)	0.167 (2.937)	-0.021 (-5.810)	0.025 (3.399)	0.009 (1.192)	-0.011 (-1.874)	-1.009 (-5.692)	0.607 (2.397)	-0.634 (-1.709)	0.181 (1.023)	3.036 (12.463)	-0.866 (-3.208)	-0.727 (-3.533)	0.566 (2.900)
FMHA n=66	-2.210 (-2.173)	0.150 (1.298)	-0.006 (-0.712)	-0.016 (-1.033)	-0.096 (-4.024)	-0.042 (-3.468)	1.418 (3.942)	0.602 (1.191)	1.098 (2.627)	0.374 (1.095)	2.968 (8.472)	-0.431 (-0.888)	-0.551 (-1.313)	0.121 (0.289)
FHA n=317	1.168 (2.527)	-0.016 (-0.297)	-0.020 (-5.392)	-0.015 (-2.035)	-0.022 (-2.654)	-0.017 (-3.332)	-0.938 (-5.944)	0.775 (3.464)	0.044 (0.168)	0.425 (2.750)	0.575 (1.789)	-0.843 (-3.458)	-0.706 (-3.753)	0.679 (3.771)

[a] Log Likelihood -1560.97