Institute of Business and Economic Research
University of California, Berkeley

CENTER FOR REAL ESTATE AND URBAN ECONOMICS
WORKING PAPER SERIES

WORKING PAPER 81-34

NEW MORTGAGE INSTRUMENTS: A SOLUTION TO THE BORROWER'S AND LENDER'S PROBLEMS

BY
KENNETH T. ROSEN

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

CENTER FOR REAL ESTATE AND URBAN ECONOMICS
UNIVERSITY OF CALIFORNIA, BERKELEY

The Center was established in 1950 to examine in depth a series of major changes and issues involving urban land and real estate markets. The Center is supported by both private contributions from industry sources and by appropriations allocated from the Real Estate Education and Research Fund of the State of California.

INSTITUTE OF BUSINESS AND ECONOMIC RESEARCH
J. W. Garbarino, Director

The Institute of Business and Economic Research is a department of the University of California with offices on the Berkeley campus. It exists for the purpose of stimulating and facilitating research into problems of economics and of business with emphasis on problems of particular importance to California and the Pacific Coast, but not to the exclusion of problems of wider import.

NEW MORTGAGE INSTRUMENTS: A SOLUTION TO THE BORROWER'S AND LENDER'S PROBLEMS

Kenneth T. Rosen

Working Paper 81-34

September 1981

This research was funded in part by a grant from the State of California Department of Real Estate and in part by a grant from the Twentieth Century Fund.

New Mortgage Instruments: A Solution to the Borrower's and Lender's Problems

In the spring of 1981 major changes in the type of mortgage instruments allowed by federally chartered financial institutions were authorized by federal regulatory action. In March of 1981 the Comptroller of the Currency allowed national banks to make an adjustable rate mortgage (ARM) loan in which interest rates could be raised or lowered, according to a change in a specified index, by 1 percent every six months (2 percent per year). There was no limit on the cumulative change in interest rates over the life of the loan. In April 1981, Richard Pratt, the newly appointed chairman of the Federal Home Loan Bank Board, and a strong advocate of free market principals, far exceeded the Comptroller's efforts of a month before and completely deregulated the mortgage instrument. The adjustable mortgage loan (AML) was authorized in which no limits were placed on payments or interest rate adjustments on an annual or cumulative basis. Any index readily verifiable by consumers and outside of the control of the lender could be used for interest rate or payment adjustments. In July 1981, the FHLBB also authorized a combined graduated payment and adjustable mortgage loan with no limit on negative amortization.

The revolution that these three changes in federal regulations (especially the latter two) will bring forth in the housing finance system cannot be underestimated. Prior to this time only limited experimentation with alternative mortgages was allowed. Only the graduated payment mortgage and several highly constrained versions of the variable rate mortgage

were in use. The new mortgage instruments just authorized promise, in my view, a resurrection of the housing finance system. These changes in regulations for federally chartered institutions will be quickly reflected in changes in state laws granting parity to state chartered institutions. This, of course, has already occurred in California. In addition, it is likely that the Comptroller of the Currency will revise the regulations effecting national banks to make them consistent with those impacting savings and loans.

We now proceed to briefly examine the rational for new mortgage instruments and then to examine each major new instrument type in detail using computer simulations of alternative economic environments.

1. Rational for New Mortgage Loan Instruments

The fixed payment-fixed interest rate mortgage which has been the mainstay of the housing finance system for nearly 30 years has, in the present environment of volatile and high interest and inflation rates, created a serious "profitability crisis" for lenders and an "affordability crisis" for home buyers. In this type of economic environment, the fixed payment-fixed interest rate mortgage serves neither the borrower nor lender well.

On the lender's side, the main impetus for change has come from changes in federal regulations of deposit interest rates. These changes assure that the 1980s will be a decade in which the depository institutions will be forced to compete for liabilities in a deregulated environment. The introduction of the MMC and other variable rate certificates

means that the financial institutions have to pay market rates for nearly all short and intermediate term liabilities. It is quite likely that variable rate certificates will be authorized for the full spectrum of maturities in the near future.

While deposit rate flexibility on all maturity classes would move a long way towards a competitive deposit market, a key issue concerns the ability of financial institutions to pay market returns on assets without causing massive failures of institutions. The only way financial institutions can afford to pay market rates on liabilities is if they are also allowed to receive market rates on all their assets. As a result, the movement toward market rates on liabilities has required regulators to introduce a fully variable rate mortgage instrument.

Thus, from the lender's perspective a fully variable rate mortgage is essential to lenders with a fully variable rate liability structure.

From the borrower's perspective, high inflation rates have also made the fixed payment-fixed interest mortgage outdated. The interest rate on the mortgage loan is crucially affected by the rate of inflation. The mortgage interest rate is a function of the expected inflation rate and a real interest component. The high inflation rates of the past several years have raised the contract interest rate and so raised the monthly carrying costs of a conventional mortgage by over 100 percent. Compared with a 1-2 percent inflation world, the present monthly carrying costs of a conventional mortgage are over <u>five times</u> higher than would be expected in a low inflation economy. This rise in mortgage payments, and the corresponding rise in the initial yearly payments/income

ratio is, of course, the genesis of the "affordability crisis." In fact, it is not high nominal mortgage rates that have created the crisis but rather it is high mortgage rates juxtaposed with the archaic institutional mechanisms of the mortgage market that has created the problem. If the institutional arrangements of the mortgage market were flexible, then as long as the "real" mortgage rate had not risen dramatically, there would be no affordability problem. Unfortunately, however, the institutional arrangements in the mortgage market today were basically established for a low inflation world. The standard mortgage instrument is basically a level payment, amortized loan. This loan is not well adapted to an inflationary environment. It takes no account of inflationary induced rises in money income or inflationary induced increases in the underlying value of the property. Thus, from the borrower's viewpoint, the standard mortage instrument completely ignores the positive inflation induced dynamics of the housing market. In an inflationary environment, it makes no sense to use a criteria for loan qualification based on an inflation bloated interest rate but a noninflated income.

It is this situation which has created a dynamic mismatch between the cost of the mortgage loan to the borrower and the borrower's ability to pay. This dynamic mismatch is caused by the failure of the standard mortgage instrument, and the standard mortgage qualifying criteria to adapt to an inflationary environment. It is these archaic institutions which are a major element of the housing crisis.

Thus, it is these substantial institutional difficulties for both the borrower and lender of the existing mortgage instrument that has led

to the development of alternative instruments which should alleviate many problems for most lenders and borrowers.

2. Description of New Mortgage Loan Instruments

There are essentially four major classes of new mortgage loans, other than the fixed rate-fixed payment loan, which will be used by the mortgage market in the 1980s. The first type is the variable rate mortgage which includes the adjustable mortgage loan, the adjustable rate mortgage, the roll over mortgage, and the renegotiable rate mortgage. In all these instruments the interest rate can be adjusted based on the movement of a market interest rate index. The second type of new mortage is the graduated payment mortgage (actually authorized in 1977) in which payments in the early years of a loan are substantially lower than those necessary to amortize the loan, and in which payments rise gradually at a preset rate for a number of years. The third category of loans, shared appreciation mortages, while not yet authorized for use by regulated financial institutions, are becoming increasingly popular with the private market. The final type of mortgage, which combines aspects of the variable rate and graduated payment features, can best be described as a dual rate mortgage loan.

a. Variable Rate Mortgages (VRM)

The new federal regulations have in essence created two types of variable rate mortgages. The Comptroller's regulations which apply to national banks, have created an adjustable-rate mortgage loan known as

an ARM. The ARM allows the interest rate on the mortgage loan to be adjusted by 1 percent every six months (2 percent every year). These rate adjustments must be tied to one of three indices: (1) the Federal Home Loan Bank Board's national mortgage rate closing index, (2) the 3-year Treasury securities rate, or (3) the 6-month Treasury bill rate. If rate changes, as calculated by the change in the index rate, exceed the "1 percent every six-month cap rule," the implied change can be carried over and used in the next adjustment period. There is no cumulative rate cap on the interest rate adjustment though the six-month cap implies a 59 percent rate increase cap for a thirty year mortgage. In terms of payment changes, the only restriction comes indirectly through the limitation on accumulated negative amortization. Negative amortization, which involves the adding of interest to the principal outstanding of the loan when monthly payments do not cover the interest payments due, is permitted under the ARM regulations as long as it is not in excess of 10 percent of the principal loan balance at the beginning of any five-year period. Thus, a very substantial interest rate rise could induce a payment increase to avoid violating the negative amortization rule.

The adjustable mortgage loan (AML) regulation issued by the Federal Home Loan Bank is far more liberal. It provides virtually complete flexibility for the thrift institutions in designing various types of mortgage instruments. It essentially sets no ceiling on interest rate or payment adjustments either annually or on a cumulative basis. It also has no restrictions on the cumulation of negative amortization including negative amortization prior to the first rate adjustment (thus allowing the GPM-AML combination). The only requirement is that the

index used for rate adjustment be readily verifiable by the borrower and not be under the control of the lender. Thus, any of the Comptroller suggested indices would be acceptable, as well as a wide range of market rates including the Federal Home Loan Bank cost of funds index.

The rational behind allowing such a large amount of flexibility is that market competition would force both prudent and efficient limitations on the mortgage instrument. From both the lender's and borrower's viewpoint, some form of payment cap seems essential. The lender wants to reduce the risk of default and so would want to limit payment changes to some reasonable amount, say 10-15 percent per year. The borrower also would want to limit payment changes so that they relate roughly to expected income changes. A popular alternative to the semi-annual payment adjustment mechanism appears to be the use of a fixed payment instrument for three to five years with a full payment adjustment at the third or fifth year mark (like a roll over mortgage--ROM). Any of these payment capped (or fixed payment) instruments might be subject to substantial negative amortization. Thus lenders, secondary market purchasers, and private mortgage insurers, would all want to limit the loan to current market value ratio to something less than 100 percent. In extremely unusual circumstances it is possible that the loan to current value ratio cap and the annual payment cap could come into conflict causing either a payment increase greater than 10 - 15 percent or a potential default on the property. We would consider this to be unlikely under most economic scenarios and under any reasonable set of initial pricing schemes.

b. Graduated Payment Mortgage (GPM)

Since the essence of the borrower's problem is the upward shift in mortgage payments required in the early years of the mortgage loan due to the inflation premium in the interest rate, the obvious solution to this problem is a graduated payment mortgage (GPM). The GPM reduces payments in early years of the mortgage while allowing gradually increasing payments over time. Presumably the increasing payments would be matched by increasing income due to the impact of inflation and real wage growth on worker earnings. Thus, by taking advantage of the positive aspects of inflation's effect on income there is a better match over time between mortgage loan payments and borrower's income. By alleviating the dynamic mismatch caused by the fixed payment-fixed interest rate mortgage a good portion of the affordability crisis could be solved.

The GPM was first authorized for FHA mortgages in 1977 under the FHA-245 program. The FHA GPM sets limits on the amount of graduation and limits the period of graduated payments to ten years. The maximum graduation rate is 7.5 percent for five years or 3 percent for ten years. These provisions are highly restrictive and are in the process of being liberalized.

The GPM can also be issued on conventional mortgages, but as of this writing their use has not been widespread--primarily because of lower cash flow in early years and a perception of greater risk of default by the lender. On the other hand, all consumer surveys show borrowers strongly desire this type loan.

c. Shared Appreciation Mortgages (SAM)

In response to the highly volatile interest rate and inflation environment and the perception that housing has been a remarkably good investment in the past five years, there has been some growth in the use of an equity participation mortgage, known as a SAM, by noninstitutional lenders. A proposal to allow savings and loans to issue SAM mortgages was made by the FHLBB in the fall of 1980. Comments were taken from the public, but as of the fall of 1981 this type of instrument cannot be made by regulated financial institutions.

The SAM offers the borrower a below market rate of interest over a certain period in return for a specified percentage share of the property's appreciation. The borrower and lender are required to determine the trade-off between interest rate and equity percentage, along with the term of the loan. The lender's share of appreciation would be payable at the end of the term or upon the sale or transfer of the property. If the property was not sold prior to loan maturity, the amount of appreciation would be determined by an appraisal process. Since the actual appreciation rate is not known at the time the loan is made, the actual rate of return for the lender and the actual interest expense for the borrower are also not known in advance. The SAM, as in the case of the GPM, lowers the monthly payment of the houshold, thus allowing households to qualify for home mortgages. Using a SAM the homeowner is, in essense, borrowing against expected home appreciation as a means of entering the housing market. The SAM would be most appealing to first time home buyers who are willing to give up a piece of their potential

appreciation to get into their first home.

d. Equity-Adjusted Mortgage (EAM)

The mechanism for obtaining an equity-adjusted mortgage would be as follows. The individual would contract with the mortgage lender to borrow on the identical terms that now pertain. There would, however, be a provision in the agreement to allow the borrower to receive automatically, an additional loan each year equivalent to one-half the rate of inflation in the previous year multiplied by the amount of the mortgage principal outstanding at that time. This loan could then be applied directly to his annual payments due in that year, thereby reducing his monthly payments by the amount of the incremental loan (after the additional amount necessary to amortize the additional annual loans has been taken into account). The additional loan would, of course, be made at current market rates. Alternatively this equity withdrawal could be used for any other purpose.

If the EAM is used to reduce monthly payments it might be thought of as a graduated payment mortgage in which the rate of graduation is variable depending on the appreciation of the property. Again as in the case of the GPM and SAM, this mortgage might be very appealing to first time buyers because of its reduction in payments in early years.

The alternative use of EAM in which one could automatically withdraw equity for nonhousing purposes might be attractive to a wide range of households and institutions. In essence it would be an automatic home equity plan that would possibly reduce some of the transaction costs of originating a second mortgage.

e. The Dual Interest Rate Mortgage (DIM)

The DIM is really just a generalized version of the VRMs and GPMs previously discussed. The DIM sets two interest rates, one for the accrual rate by lenders on the mortgage debt, and one that determines the borrower's payment rate. The difference in the two rates would be added or subtracted from the principle balance of the loan. To handle the lender's problem concerning the volatility and trend of interest rates, the accrual rate would be variable with changes in the rate tied to changes in a short or medium term Treasury obligation. To handle the borrower's problem, the payment rate could be set on a graduated basis--starting at, say, 10 percent and then rising 100 basis point per year. Depending on the time path of the accrual rate, the graduation period might last for five to ten years. In essence, the DIM being proposed here is really a variation of the Graduated Payment Adjustable Rate Mortgage authorized in July by the Federal Home Loan Bank Board.

The DIM with a graduated payment rate appears in my view to be the mortgage instrument with the best chance to solve both the lender's future profitability problems and the borrower's current affordability crisis.

3. Comparative Simulations of New Mortgage Instruments in Alternative Economic Environments*

In order to test the impact of the new mortgage instruments, simulation experiments were done with seven commonly used or proposed

---

*I would like to thank Karen Alpert for her assistance in running these simulations.

instruments. Two simulations were run over historical time, 1967-1980 and 1975-1980, to see the effects on the consumer and lender if these instruments had been in existence over the past decade. Three forecast simulations were run over the decade of the 1980s using three different sets of economic assumptions--all starting from actual 1981 values. The base scenario assumes a cyclical but essentially trendless pattern of inflation over the next decade (average 10 percent), and a cyclical and slightly declining trend in interest rates from their present record level.

An accelerating inflation scenario assumes that short-term interest rates and inflation rates rise by 1 percent per year during the decade, to 26 percent by 1990. A deflationary scenario, whereby interest rates and inflation rates drop by 500 basis points over the decade, is also simulated.

Seven mortgages, including the traditional fixed payment-fixed rate mortgages were simulated. The mortgages include:

1. A variable rate mortgage in which the interest rate is indexed to the 6 month Treasury bill rate and allowed to move without a cap.
2. The variable rate, with a cap, in which the index and accrual rate are the same as for the regular variable rate mortgage, but payments may rise no more than 10 percent per year.
3. The graduated payment mortgage in which payments increase at a constant rate of 10 percent for the first 10 years of the contract.
4. The shared appreciation mortgage in which the lender receives 50 percent of the appreciation in the value of the property in return for

reducing the interest rate by 40 percent.

5. The dual rate GPM mortgage in which the payments are calculated as for the graduated payment mortgage. The accrual rate is 2 percent over the 6 month Treasury bill rate.

6. The dual rate standard payment mortgage which is the same as the dual rate mortgage above, but payments are calculated as for the standard fixed rate mortgage.

The simulations are displayed in Tables 7-1 to 7-5 and in graphic form in Charts 1-8 that follow. The key data to examine in calculating the effectiveness and riskiness of the mortgage are the payment income ratio (column 6) and the loan to current value ratio (column 7).

Examining first the long historical simulations, we see that for the fixed rate mortgage written at 6.5 percent in 1967, the payment income ratio dropped from an initial modest 16.5 percent to a minimal 6.5 percent by 1980. With the variable rate mortgage both with and without a cap, the payment income ratio declines less rapidly reflecting the upward trend in market rates. Still the ratio never exceeds 18 percent and declines to 10.5 percent by 1980 even with the sharp upward trend in mortgage rates. The graduated payment mortgage starts in 1967 with a much lower payment income ratio, 8.2 percent, which moves up as high as 11 percent but settles back to 8.4 percent by 1980. The SAM mortgage has initial payments of 12.2 percent declining to 5 percent by 1980, with additional lump sum payment of $21,500 due, representing half the appreciation over the decade. The dual rate-GPM mortgage shows a low

Table I

COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

HISTORICAL SIMULATION (1967-1980)

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
FIXED RATE MORTGAGE									
67	15,234	19,267	6.46	6.46	7,143	16.46	79.07	1,175	0
68	15,043	20,292	6.46	6.46	7,743	15.18	74.13	1,175	0
69	14,839	21,825	6.46	6.46	8,389	14.01	67.99	1,175	0
70	14,622	22,983	6.46	6.46	8,734	13.46	63.62	1,175	0
71	14,391	24,775	6.46	6.46	9,028	13.02	58.09	1,175	0
72	14,145	26,833	6.46	6.46	9,697	12.12	52.72	1,175	0
73	13,884	28,900	6.46	6.46	10,512	11.18	48.04	1,175	0
74	13,605	31,942	6.46	6.46	11,197	10.50	42.59	1,175	0
75	13,309	35,300	6.46	6.46	11,800	9.96	37.70	1,175	0
76	12,993	38,100	6.46	6.46	12,686	9.27	34.10	1,175	0
77	12,657	42,900	6.46	6.46	13,572	8.66	29.50	1,175	0
78	12,299	48,700	6.46	6.46	15,064	7.80	25.25	1,175	0
79	11,918	55,500	6.46	6.46	16,730	7.03	21.47	1,175	0
80	11,512	62,200	6.46	6.46	18,155	6.47	18.51	1,175	0
VARIABLE RATE MORTGAGE									
67	15,234	19,267	6.46	6.46	7,143	16.46	79.07	1,175	0
68	15,069	20,292	7.31	7.33	7,743	16.55	74.26	1,281	0
69	14,929	21,825	8.62	8.69	8,389	17.29	68.40	1,450	0
70	14,768	22,983	8.34	8.39	8,734	16.18	64.26	1,413	0
71	14,531	24,775	6.45	6.35	9,028	13.01	58.65	1,175	0
72	14,278	26,833	6.42	6.31	9,697	12.07	53.21	1,171	0
73	14,092	28,900	8.79	9.01	10,512	14.00	48.76	1,472	0
74	13,909	31,942	9.43	9.76	11,197	13.92	43.54	1,558	0
75	13,657	35,300	7.92	7.96	11,800	11.52	38.69	1,359	0
76	13,357	38,100	7.25	7.13	12,686	10.04	35.06	1,273	0
77	13,044	42,900	7.43	7.36	13,572	9.55	30.40	1,296	0
78	12,773	48,700	9.00	9.42	15,064	9.96	26.23	1,500	0
79	12,540	55,500	10.82	11.87	16,730	10.45	22.60	1,748	0
80	12,314	62,200	11.89	13.32	18,155	10.45	19.80	1,897	0
VARIABLE RATE WITH CAP									
67	15,234	19,267	6.46	6.46	7,143	16.46	79.07	1,175	0
68	15,069	20,292	7.31	7.33	7,743	16.55	74.26	1,281	0
69	14,980	21,825	8.23	8.69	8,389	16.67	68.64	1,398	0
70	14,819	22,983	8.38	8.39	8,734	16.24	64.48	1,418	0
71	14,479	24,775	7.31	6.35	9,028	14.19	58.44	1,281	0
72	14,226	26,833	6.39	6.31	9,697	12.03	53.02	1,167	0
73	14,235	28,900	7.25	9.01	10,512	12.11	49.26	1,273	0
74	14,235	31,942	8.16	9.76	11,197	12.41	44.56	1,389	0
75	13,977	35,300	8.17	7.96	11,800	11.79	39.59	1,391	0
76	13,670	38,100	7.48	7.13	12,686	10.27	35.88	1,303	0
77	13,349	42,900	7.67	7.36	13,572	9.78	31.12	1,327	0
78	13,155	48,700	8.64	9.42	15,064	9.64	27.01	1,453	0
79	13,126	55,500	9.67	11.87	16,730	9.50	23.65	1,590	0

(1) See Notes on page 25.

Table 1 (continued)

COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

HISTORICAL SIMULATION (1967-1980)

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
80	13,134	62,200	10.77	13.32	18,155	9.59	21.12	1,741	0
GRADUATED PAYMENT MORTGAGE									
67	15,822	19,267	0.88	6.46	7,143	8.22	82.12	587	0
68	16,199	20,292	1.54	6.46	7,743	8.34	79.83	646	0
69	16,535	21,825	2.23	6.46	8,389	8.47	75.76	710	0
70	16,822	22,983	2.95	6.46	8,734	8.94	73.19	781	0
71	17,050	24,775	3.70	6.46	9,028	9.52	68.82	859	0
72	17,206	26,833	4.49	6.46	9,697	9.75	64.12	945	0
73	17,277	28,900	5.32	6.46	10,512	9.89	59.78	1,040	0
74	17,250	31,942	6.20	6.46	11,197	10.21	54.00	1,144	0
75	17,106	35,300	7.13	6.46	11,800	10.66	48.46	1,258	0
76	16,827	38,100	8.11	6.46	12,686	10.91	44.17	1,384	0
77	16,392	42,900	9.16	6.46	13,572	11.22	38.21	1,522	0
78	15,928	48,700	9.16	6.46	15,064	10.11	32.71	1,522	0
79	15,435	55,500	9.16	6.46	16,730	9.10	27.81	1,522	0
80	14,910	62,200	9.16	6.46	18,155	8.39	23.97	1,522	0
SHARED APPRECIATION MORTGAGE									
67	15,133	19,267	3.88	3.88	7,143	12.29	78.54	878	0
68	14,842	20,292	3.88	3.88	7,743	11.34	75.67	878	513
69	14,539	21,825	3.88	3.88	8,389	10.47	72.48	878	1,279
70	14,224	22,983	3.88	3.88	8,734	10.05	69.98	878	1,858
71	13,898	24,775	3.88	3.88	9,028	9.73	67.21	878	2,754
72	13,558	26,833	3.88	3.88	9,697	9.05	64.63	878	3,783
73	13,206	28,900	3.88	3.88	10,512	8.35	62.36	878	4,817
74	12,840	31,942	3.88	3.88	11,197	7.84	60.04	878	6,338
75	12,459	35,300	3.88	3.88	11,800	7.44	58.01	878	8,017
76	12,064	38,100	3.88	3.88	12,686	6.92	56.38	878	9,417
77	11,654	42,900	3.88	3.88	13,572	6.47	54.71	878	11,817
78	11,228	48,700	3.88	3.88	15,064	5.83	53.27	878	14,717
79	10,785	55,500	3.88	3.88	16,730	5.25	52.07	878	18,117
80	10,325	62,200	3.88	3.88	18,155	4.84	51.11	878	21,467
DUAL RATE MORTGAGE - GPM									
67	15,846	19,267	0.88	6.61	7,143	8.22	82.24	587	0
68	16,344	20,292	1.98	7.48	7,743	8.86	80.55	686	0
69	16,958	21,825	3.44	8.84	8,389	9.91	77.70	831	0
70	17,422	22,983	4.84	8.54	8,734	11.27	75.81	984	0
71	17,542	24,775	5.09	6.50	9,028	11.21	70.81	1,012	0
72	17,590	26,833	5.72	6.46	9,697	11.20	65.55	1,086	0
73	17,983	28,900	6.81	9.16	10,512	11.59	62.23	1,218	0
74	18,296	31,942	8.77	9.91	11,197	13.12	57.28	1,469	0
75	18,136	35,300	10.06	8.11	11,800	13.93	51.38	1,644	0
76	17,667	38,100	11.11	7.28	12,686	14.10	46.37	1,789	0
77	17,057	42,900	12.16	7.51	13,572	14.27	39.76	1,937	0
78	16,712	48,700	12.45	9.57	15,064	13.13	34.32	1,977	0

(1) See notes on page 25.

Table 1 (continued)
COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

HISTORICAL SIMULATION (1967-1980)

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
79	16,581	55,500	13.57	12.02	16,730	12.79	29.88	2,139	0
80	16,399	62,200	15.47	13.47	18,155	13.31	26.37	2,417	0
DUAL RATE MORTGAGE - STD PYMT									
67	15,516	19,267	4.23	6.61	7,143	12.82	80.53	916	0
68	15,690	20,292	4.86	7.48	7,743	12.74	77.32	987	0
69	16,016	21,825	5.50	8.84	8,389	12.65	73.38	1,061	0
70	16,221	22,983	6.35	8.54	8,734	13.31	70.58	1,163	0
71	16,077	24,775	6.65	6.50	9,028	13.28	64.89	1,199	0
72	15,948	26,833	6.40	6.46	9,697	12.05	59.43	1,169	0
73	16,219	28,900	6.57	9.16	10,512	11.31	56.12	1,189	0
74	16,457	31,942	8.00	9.91	11,197	12.23	51.52	1,369	0
75	16,255	35,300	9.27	8.11	11,800	13.02	46.05	1,537	0
76	15,899	38,100	9.28	7.28	12,686	12.13	41.73	1,539	0
77	15,644	42,900	8.61	7.51	13,572	10.68	36.47	1,449	0
78	15,705	48,700	8.52	9.57	15,064	9.54	32.25	1,437	0
79	16,005	55,500	9.65	12.02	16,730	9.49	28.84	1,587	0
80	16,359	62,200	11.21	13.47	18,155	9.93	26.30	1,803	0

Table 2

COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

HISTORICAL SIMULATION (1975-1980)

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
FIXED RATE MORTGAGE									
75	28,033	35,300	9.01	9.01	11,800	23.32	79.41	2,751	0
76	27,808	38,100	9.01	9.01	12,686	21.69	72.99	2,751	0
77	27,562	42,900	9.01	9.01	13,572	20.27	64.25	2,751	0
78	27,294	48,700	9.01	9.01	15,064	18.26	56.05	2,751	0
79	27,002	55,500	9.01	9.01	16,730	16.44	48.65	2,751	0
80	26,684	62,200	9.01	9.01	18,155	15.15	42.90	2,751	0
VARIABLE RATE MORTGAGE									
75	28,033	35,300	9.01	9.01	11,800	23.32	79.41	2,751	0
76	27,772	38,100	8.19	8.17	12,686	20.13	72.89	2,553	0
77	27,500	42,900	8.41	8.41	13,572	19.21	64.10	2,607	0
78	27,290	48,700	10.37	10.47	15,064	20.51	56.04	3,089	0
79	27,134	55,500	12.67	12.92	16,730	22.01	48.89	3,682	0
80	26,993	62,200	14.03	14.37	18,155	22.26	43.40	4,041	0
VARIABLE RATE WITH CAP									
75	28,033	35,300	9.01	9.01	11,800	23.32	79.41	2,751	0
76	27,772	38,100	8.19	8.17	12,686	20.13	72.89	2,553	0
77	27,500	42,900	8.41	8.41	13,572	19.21	64.10	2,607	0
78	27,527	48,700	9.42	10.47	15,064	18.93	56.52	2,852	0
79	27,958	55,500	10.52	12.92	16,730	18.68	50.37	3,126	0
80	28,542	62,200	11.72	14.37	18,155	18.92	45.89	3,434	0
GRADUATED PAYMENT MORTGAGE									
75	29,339	35,300	3.02	9.01	11,800	12.25	83.11	1,445	0
76	30,393	38,100	3.78	9.01	12,686	12.53	79.77	1,590	0
77	31,383	42,900	4.57	9.01	13,572	12.88	73.15	1,748	0
78	32,288	48,700	5.41	9.01	15,064	12.77	66.30	1,923	0
79	33,081	55,500	6.29	9.01	16,730	12.65	59.61	2,116	0
80	33,734	62,200	7.23	9.01	18,155	12.82	54.24	2,327	0
SHARED APPRECIATION MORTGAGE									
75	27,844	35,300	5.41	5.41	11,800	16.30	78.88	1,923	0
76	27,426	38,100	5.41	5.41	12,686	15.16	75.66	1,923	1,400
77	26,986	42,900	5.41	5.41	13,572	14.17	71.76	1,923	3,800
78	26,522	48,700	5.41	5.41	15,064	12.77	68.22	1,923	6,700
79	26,032	55,500	5.41	5.41	16,730	11.49	65.10	1,923	10,100
80	25,517	62,200	5.41	5.41	18,155	10.59	62.65	1,923	13,450
DUAL RATE MORTGAGE - GPM									
75	29,086	35,300	3.02	8.11	11,800	12.25	82.40	1,445	0
76	29,629	38,100	3.69	7.28	12,686	12.40	77.77	1,573	0
77	30,150	42,900	4.36	7.51	13,572	12.56	70.28	1,705	0
78	31,093	48,700	5.50	9.57	15,064	12.90	63.85	1,943	0
79	32,453	55,500	7.44	12.02	16,730	14.21	58.47	2,378	0

(1) See Notes on page 25.

Table 2 (continued)
COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

HISTORICAL SIMULATION (1975-1980)

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
80	33,765	62,200	10.26	13.47	18,155	16.86	54.29	3,060	0
DUAL RATE MORTGAGE - STD PYMT									
75	28,164	35,300	7.39	8.11	11,800	20.05	79.78	2,366	0
76	27,847	38,100	7.39	7.28	12,686	18.65	73.09	2,366	0
77	27,742	42,900	6.65	7.51	13,572	16.19	64.67	2,197	0
78	28,231	48,700	6.51	9.57	15,064	14.38	57.97	2,166	0
79	29,186	55,500	7.70	12.02	16,730	14.57	52.59	2,438	0
80	30,289	62,200	9.33	13.47	18,155	15.59	48.70	2,830	0

Table 3

COMPARATIVE SIMULATION OF VARIOUS ALTERNATIVE MORTGAGE INSTRUMENTS(1)

BASE FORECAST SCENARIO

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
FIXED RATE MORTGAGE									
81	54,651	68,420	17.00	17.00	19,517	48.11	79.88	9,390	0
82	54,553	74,337	17.00	17.00	21,493	43.69	73.39	9,390	0
83	54,437	82,932	17.00	17.00	23,622	39.75	65.64	9,390	0
84	54,301	94,050	17.00	17.00	25,681	36.56	57.74	9,390	0
85	54,143	106,858	17.00	17.00	28,053	33.47	50.67	9,390	0
86	53,958	119,841	17.00	17.00	30,970	30.32	45.02	9,390	0
87	53,741	135,054	17.00	17.00	34,184	27.47	39.79	9,390	0
88	53,487	153,597	17.00	17.00	38,051	24.68	34.82	9,390	0
89	53,190	175,883	17.00	17.00	42,421	22.13	30.24	9,390	0
90	52,843	198,480	17.00	17.00	45,999	20.41	26.62	9,390	0
VARIABLE RATE MORTGAGE									
81	54,651	68,420	17.00	17.00	19,517	48.11	79.88	9,390	0
82	54,484	74,337	14.27	14.25	21,493	37.01	73.29	7,955	0
83	54,285	82,932	14.02	14.00	23,622	33.14	65.46	7,827	0
84	54,124	94,050	15.97	16.00	25,681	34.45	57.55	8,846	0
85	53,952	106,858	16.46	16.50	28,053	32.45	50.49	9,102	0
86	53,718	119,841	15.50	15.50	30,970	27.76	44.82	8,597	0
87	53,353	135,054	13.61	13.50	34,184	22.28	39.51	7,617	0
88	52,994	153,597	14.54	14.50	38,051	21.28	34.50	8,096	0
89	52,657	175,883	15.91	16.00	42,421	20.78	29.94	8,816	0
90	52,185	198,480	14.56	14.50	45,999	17.62	26.29	8,107	0
VARIABLE RATE WITH CAP									
81	54,651	68,420	17.00	17.00	19,517	48.11	79.88	9,390	0
82	53,972	74,337	15.25	14.25	21,493	39.40	72.60	8,467	0
83	53,774	82,932	13.88	14.00	23,622	32.82	64.84	7,754	0
84	53,874	94,050	15.32	16.00	25,681	33.11	57.28	8,504	0
85	53,703	106,858	16.38	16.50	28,053	32.30	50.26	9,060	0
86	53,470	119,841	15.42	15.50	30,970	27.63	44.62	8,557	0
87	52,967	135,054	13.81	13.50	34,184	22.59	39.22	7,721	0
88	52,611	153,597	14.43	14.50	38,051	21.12	34.25	8,037	0
89	52,276	175,883	15.79	16.00	42,421	20.63	29.72	8,752	0
90	51,808	198,480	14.45	14.50	45,999	17.50	26.10	8,049	0
GRADUATED PAYMENT MORTGAGE									
81	58,348	68,420	9.77	17.00	19,517	29.17	85.28	5,693	0
82	62,004	74,337	10.93	17.00	21,493	29.14	83.41	6,263	0
83	65,656	82,932	12.19	17.00	23,622	29.16	79.17	6,889	0
84	69,239	94,050	13.54	17.00	25,681	29.51	73.62	7,578	0
85	72,674	106,858	15.00	17.00	28,053	29.71	68.01	8,336	0
86	75,860	119,841	16.59	17.00	30,970	29.61	63.30	9,169	0
87	78,670	135,054	18.31	17.00	34,184	29.51	58.25	10,086	0
88	80,948	153,597	20.19	17.00	38,051	29.16	52.70	11,095	0
89	82,505	175,883	22.24	17.00	42,421	28.77	46.91	12,204	0

(1) See Notes on page 25.

Table 3 (continued)
COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

BASE FORECAST SCENARIO

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
90	83,107	198,480	24.49	17.00	45,999	29.18	41.87	13,425	0
SHARED APPRECIATION MORTGAGE									
81	54,416	68,420	10.20	10.20	19,517	30.25	79.53	5,903	0
82	54,063	74,337	10.20	10.20	21,493	27.47	76.71	5,903	2,959
83	53,674	82,932	10.20	10.20	23,622	24.99	73.47	5,903	7,256
84	53,245	94,050	10.20	10.20	25,681	22.99	70.24	5,903	12,815
85	52,772	106,858	10.20	10.20	28,053	21.04	67.37	5,903	19,219
86	52,252	119,841	10.20	10.20	30,970	19.06	65.05	5,903	25,711
87	51,678	135,054	10.20	10.20	34,184	17.27	62.93	5,903	33,317
88	51,046	153,597	10.20	10.20	38,051	15.51	60.96	5,903	42,589
89	50,349	175,883	10.20	10.20	42,421	13.92	59.18	5,903	53,732
90	49,581	198,480	10.20	10.20	45,999	12.83	57.74	5,903	65,030
DUAL RATE MORTGAGE - GPM									
81	56,979	68,420	9.77	14.50	19,517	29.17	83.28	5,693	0
82	58,682	74,337	8.28	11.75	21,493	23.23	78.94	4,992	0
83	60,272	82,932	8.64	11.50	23,622	21.84	72.68	5,159	0
84	62,741	94,050	9.72	13.50	25,681	22.07	66.71	5,668	0
85	65,150	106,858	11.16	14.00	28,053	22.72	60.97	6,374	0
86	66,742	119,841	12.17	13.00	30,970	22.21	55.69	6,878	0
87	66,922	135,054	12.72	11.00	34,184	20.95	49.55	7,161	0
88	67,361	153,597	13.56	12.00	38,051	19.95	43.86	7,591	0
89	67,955	175,883	15.31	13.50	42,421	20.04	38.64	8,500	0
90	66,913	198,480	16.63	12.00	45,999	19.99	33.71	9,197	0
DUAL RATE MORTGAGE - STD PYMT									
81	57,439	68,420	8.80	14.50	19,517	26.82	83.95	5,234	0
82	58,878	74,337	8.96	11.75	21,493	24.70	79.20	5,310	0
83	60,482	82,932	8.66	11.50	23,622	21.87	72.93	5,167	0
84	63,116	94,050	9.43	13.50	25,681	21.54	67.11	5,531	0
85	65,813	106,858	10.68	14.00	28,053	21.88	61.59	6,139	0
86	67,893	119,841	11.36	13.00	30,970	20.91	56.65	6,476	0
87	68,805	135,054	11.52	11.00	34,184	19.18	50.95	6,556	0
88	70,490	153,597	11.55	12.00	38,051	17.27	45.89	6,572	0
89	72,931	175,883	12.55	13.50	42,421	16.68	41.47	7,075	0
90	74,111	198,480	13.52	12.00	45,999	16.46	37.34	7,572	0

Table 4
COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

ACCELERATING INFLATION SCENARIO

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
FIXED RATE MORTGAGE									
81	54,651	68,420	17.00	17.00	19,971	47.02	79.88	9,390	0
82	54,553	75,946	17.00	17.00	22,167	42.36	71.83	9,390	0
83	54,437	85,060	17.00	17.00	24,827	37.82	64.00	9,390	0
84	54,301	96,118	17.00	17.00	28,055	33.47	56.49	9,390	0
85	54,143	109,574	17.00	17.00	31,983	29.36	49.41	9,390	0
86	53,958	126,010	17.00	17.00	36,780	25.53	42.82	9,390	0
87	53,741	146,172	17.00	17.00	42,665	22.01	36.77	9,390	0
88	53,487	171,021	17.00	17.00	49,918	18.81	31.28	9,390	0
89	53,190	201,805	17.00	17.00	58,903	15.94	26.36	9,390	0
90	52,843	240,147	17.00	17.00	70,094	13.40	22.00	9,390	0
VARIABLE RATE MORTGAGE									
81	54,651	68,420	17.00	17.00	19,971	47.02	79.88	9,390	0
82	54,570	75,946	18.00	18.00	22,167	44.75	71.85	9,919	0
83	54,490	85,060	18.99	19.00	24,827	42.08	64.06	10,448	0
84	54,410	96,118	19.97	20.00	28,055	39.13	56.61	10,978	0
85	54,329	109,574	20.95	21.00	31,983	35.98	49.58	11,507	0
86	54,245	126,010	21.93	22.00	36,780	32.72	43.05	12,036	0
87	54,158	146,172	22.91	23.00	42,665	29.45	37.05	12,564	0
88	54,065	171,021	23.88	24.00	49,918	26.22	31.61	13,091	0
89	53,965	201,805	24.85	25.00	58,903	23.12	26.74	13,617	0
90	53,854	240,147	25.81	26.00	70,094	20.17	22.43	14,141	0
VARIABLE RATE WITH CAP									
81	54,651	68,420	17.00	17.00	19,971	47.02	79.88	9,390	0
82	54,570	75,946	18.00	18.00	22,167	44.75	71.85	9,919	0
83	54,490	85,060	18.99	19.00	24,827	42.08	64.06	10,448	0
84	54,410	96,118	19.97	20.00	28,055	39.13	56.61	10,978	0
85	54,329	109,574	20.95	21.00	31,983	35.98	49.58	11,507	0
86	54,245	126,010	21.93	22.00	36,780	32.72	43.05	12,036	0
87	54,158	146,172	22.91	23.00	42,665	29.45	37.05	12,564	0
88	54,065	171,021	23.88	24.00	49,918	26.22	31.61	13,091	0
89	53,965	201,805	24.85	25.00	58,903	23.12	26.74	13,617	0
90	53,854	240,147	25.81	26.00	70,094	20.17	22.43	14,141	0
GRADUATED PAYMENT MORTGAGE									
81	58,348	68,420	9.77	17.00	19,971	28.51	85.28	5,693	0
82	62,004	75,946	10.93	17.00	22,167	28.25	81.64	6,263	0
83	65,656	85,060	12.19	17.00	24,827	27.75	77.19	6,889	0
84	69,239	96,118	13.54	17.00	28,055	27.01	72.04	7,578	0
85	72,674	109,574	15.00	17.00	31,983	26.06	66.32	8,336	0
86	75,860	126,010	16.59	17.00	36,780	24.93	60.20	9,169	0
87	78,670	146,172	18.31	17.00	42,665	23.64	53.82	10,086	0
88	80,948	171,021	20.19	17.00	49,918	22.23	47.33	11,095	0
89	82,505	201,805	22.24	17.00	58,903	20.72	40.88	12,204	0

(1) See Notes on page 25.

Table 4 (continued)

COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

ACCELERATING INFLATION SCENARIO

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
90	83,107	240,147	24.49	17.00	70,094	19.15	34.61	13,425	0
SHARED APPRECIATION MORTGAGE									
81	54,416	68,420	10.20	10.20	19,971	29.56	79.53	5,903	0
82	54,063	75,946	10.20	10.20	22,167	26.63	76.14	5,903	3,763
83	53,674	85,060	10.20	10.20	24,827	23.78	72.88	5,903	8,320
84	53,245	96,118	10.20	10.20	28,055	21.04	69.80	5,903	13,849
85	52,772	109,574	10.20	10.20	31,983	18.46	66.94	5,903	20,577
86	52,252	126,010	10.20	10.20	36,780	16.05	64.32	5,903	28,795
87	51,678	146,172	10.20	10.20	42,665	13.84	61.95	5,903	38,876
88	51,046	171,021	10.20	10.20	49,918	11.83	59.84	5,903	51,301
89	50,349	201,805	10.20	10.20	58,903	10.02	58.00	5,903	66,693
90	49,581	240,147	10.20	10.20	70,094	8.42	56.40	5,903	85,864
DUAL RATE MORTGAGE - GPM									
81	56,979	68,420	9.77	14.50	19,971	28.51	83.28	5,693	0
82	59,695	75,946	10.64	15.50	22,167	27.59	78.60	6,116	0
83	62,912	85,060	11.68	16.50	24,827	26.71	73.96	6,632	0
84	66,661	96,118	12.92	17.50	28,055	25.88	69.35	7,261	0
85	70,968	109,574	14.40	18.50	31,983	25.09	64.77	8,025	0
86	75,853	126,010	16.18	19.50	36,780	24.34	60.20	8,954	0
87	81,317	146,172	18.30	20.50	42,665	23.64	55.63	10,085	0
88	87,332	171,021	20.88	21.50	49,918	22.97	51.07	11,468	0
89	93,815	201,805	24.02	22.50	58,903	22.35	46.49	13,167	0
90	100,596	240,147	27.87	23.50	70,094	21.78	41.89	15,265	0
DUAL RATE MORTGAGE - STD PYMT									
81	57,439	68,420	8.80	14.50	19,971	26.21	83.95	5,234	0
82	60,832	75,946	9.38	15.50	22,167	24.86	80.10	5,510	0
83	65,113	85,060	9.90	16.50	24,827	23.19	76.55	5,757	0
84	70,013	96,118	11.40	17.50	28,055	23.15	72.84	6,494	0
85	75,621	109,574	13.08	18.50	31,983	22.97	69.01	7,345	0
86	82,196	126,010	14.68	19.50	36,780	22.22	65.23	8,171	0
87	89,551	146,172	17.20	20.50	42,665	22.26	61.26	9,495	0
88	97,971	171,021	19.70	21.50	49,918	21.70	57.29	10,833	0
89	107,617	201,805	22.60	22.50	58,903	21.05	53.33	12,397	0
90	118,676	240,147	25.97	23.50	70,094	20.30	49.42	14,231	0

Table 5

COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)
DECELERATING INFLATION SCENARIO

YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
FIXED RATE MORTGAGE									
81	52,167	65,310	17.00	17.00	19,971	44.88	79.88	8,963	0
82	52,073	68,412	17.00	17.00	21,868	40.99	76.12	8,963	0
83	51,962	71,491	17.00	17.00	23,836	37.60	72.68	8,963	0
84	51,833	74,529	17.00	17.00	25,862	34.66	69.55	8,963	0
85	51,682	77,510	17.00	17.00	27,931	32.09	66.68	8,963	0
86	51,505	80,417	17.00	17.00	30,026	29.85	64.05	8,963	0
87	51,298	83,232	17.00	17.00	32,127	27.90	61.63	8,963	0
88	51,056	85,937	17.00	17.00	34,216	26.19	59.41	8,963	0
89	50,772	88,515	17.00	17.00	36,269	24.71	57.36	8,963	0
90	50,441	90,949	17.00	17.00	38,263	23.42	55.46	8,963	0
VARIABLE RATE MORTGAGE									
81	52,167	65,310	17.00	17.00	19,971	44.88	79.88	8,963	0
82	52,063	68,412	16.50	16.50	21,868	39.84	76.10	8,712	0
83	51,931	71,491	16.01	16.00	23,836	35.50	72.64	8,463	0
84	51,763	74,529	15.52	15.50	25,862	31.77	69.45	8,217	0
85	51,552	77,510	15.03	15.00	27,931	28.55	66.51	7,975	0
86	51,290	80,417	14.56	14.50	30,026	25.77	63.78	7,737	0
87	50,967	83,232	14.08	14.00	32,127	23.36	61.23	7,504	0
88	50,571	85,937	13.62	13.50	34,216	21.26	58.85	7,276	0
89	50,092	88,515	13.17	13.00	36,269	19.45	56.59	7,054	0
90	49,516	90,949	12.73	12.50	38,263	17.87	54.44	6,838	0
VARIABLE RATE WITH CAP									
81	52,167	65,310	17.00	17.00	19,971	44.88	79.88	8,963	0
82	52,063	68,412	16.50	16.50	21,868	39.84	76.10	8,712	0
83	51,931	71,491	16.01	16.00	23,836	35.50	72.64	8,463	0
84	51,763	74,529	15.52	15.50	25,862	31.77	69.45	8,217	0
85	51,552	77,510	15.03	15.00	27,931	28.55	66.51	7,975	0
86	51,290	80,417	14.56	14.50	30,026	25.77	63.78	7,737	0
87	50,967	83,232	14.08	14.00	32,127	23.36	61.23	7,504	0
88	50,571	85,937	13.62	13.50	34,216	21.26	58.85	7,276	0
89	50,092	88,515	13.17	13.00	36,269	19.45	56.59	7,054	0
90	49,516	90,949	12.73	12.50	38,263	17.87	54.44	6,838	0
GRADUATED PAYMENT MORTGAGE									
81	55,696	65,310	9.77	17.00	19,971	27.21	85.28	5,435	0
82	59,186	68,412	10.93	17.00	21,868	27.34	86.51	5,978	0
83	62,671	71,491	12.19	17.00	23,836	27.59	87.66	6,576	0
84	66,092	74,529	13.54	17.00	25,862	27.97	88.68	7,233	0
85	69,371	77,510	15.00	17.00	27,931	28.49	89.50	7,957	0
86	72,411	80,417	16.59	17.00	30,026	29.15	90.04	8,753	0
87	75,094	83,232	18.31	17.00	32,127	29.97	90.22	9,628	0
88	77,269	85,937	20.19	17.00	34,216	30.95	89.91	10,591	0
89	78,755	88,515	22.24	17.00	36,269	32.12	88.97	11,650	0

(1) See Notes on page 25

Table 5 (continued)

COMPARATIVE SIMULATION OF VARIOUS
ALTERNATIVE MORTGAGE INSTRUMENTS(1)

DECELERATING INFLATION SCENARIO

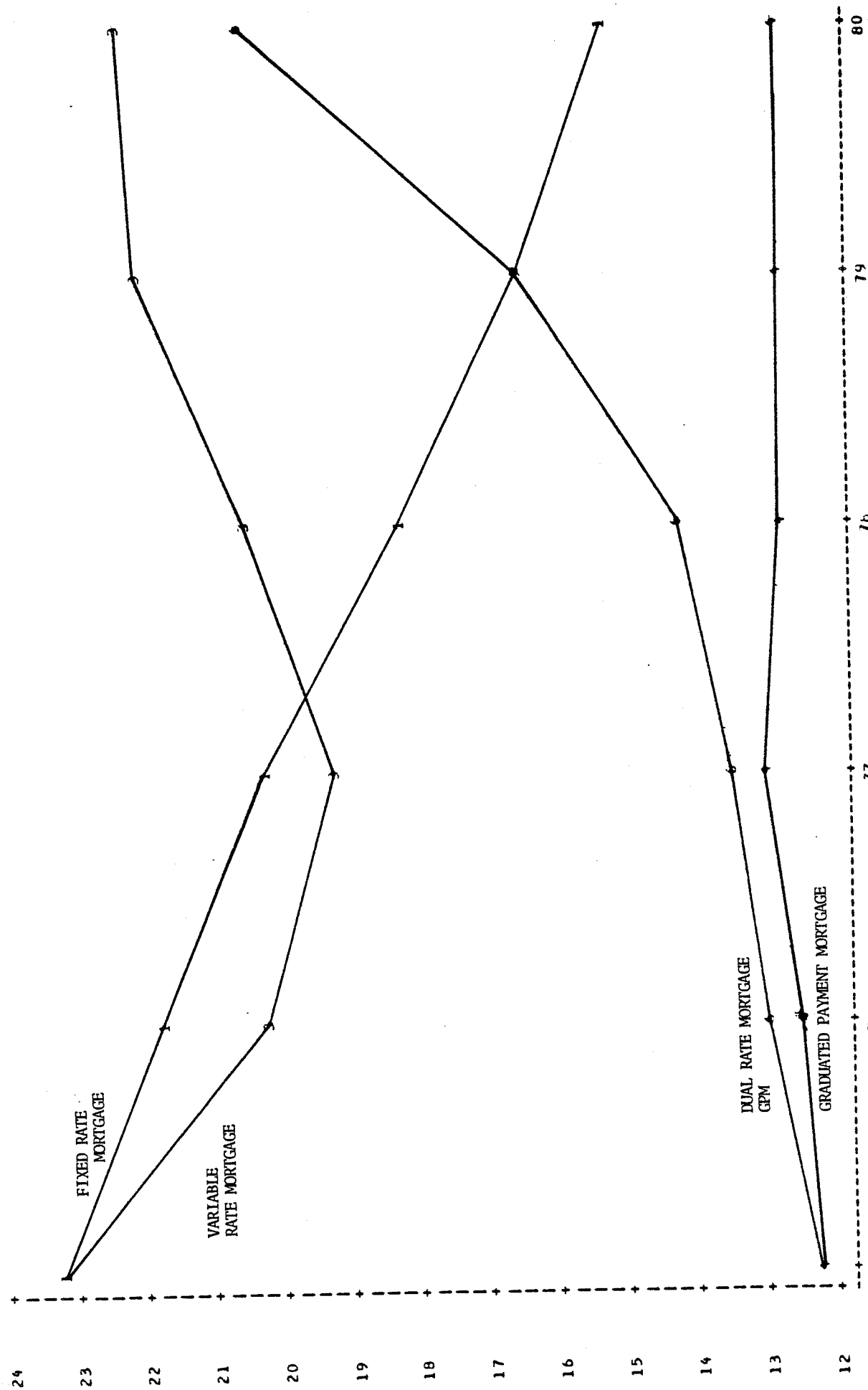
YEAR	OUTSTANDING PRINCIPAL	HOUSE VALUE(2)	PAYMENT RATE(3)	ACCRUAL RATE(4)	INCOME(5)	PAYMENT AS % OF INCOME	LOAN TO VALUE RATIO(6)	PAYMENTS	APPRECIATION DUE LENDER
90	79,329	90,949	24.49	17.00	38,263	33.49	87.22	12,815	0
SHARED APPRECIATION MORTGAGE									
81	51,942	65,310	10.20	10.20	19,971	28.22	79.53	5,635	0
82	51,605	68,412	10.20	10.20	21,868	25.77	77.70	5,635	1,551
83	51,234	71,491	10.20	10.20	23,836	23.64	75.99	5,635	3,091
84	50,825	74,529	10.20	10.20	25,862	21.79	74.38	5,635	4,610
85	50,374	77,510	10.20	10.20	27,931	20.18	72.86	5,635	6,100
86	49,877	80,417	10.20	10.20	30,026	18.77	71.42	5,635	7,554
87	49,329	83,232	10.20	10.20	32,127	17.54	70.03	5,635	8,961
88	48,725	85,937	10.20	10.20	34,216	16.47	68.70	5,635	10,314
89	48,060	88,515	10.20	10.20	36,269	15.54	67.40	5,635	11,603
90	47,327	90,949	10.20	10.20	38,263	14.73	66.13	5,635	12,820
DUAL RATE MORTGAGE - GPM									
81	53,606	65,310	9.77	13.00	19,971	27.21	82.08	5,435	0
82	54,553	68,412	10.46	12.50	21,868	26.31	79.74	5,754	0
83	55,038	71,491	11.11	12.00	23,836	25.43	76.99	6,061	0
84	55,015	74,529	11.72	11.50	25,862	24.56	73.82	6,352	0
85	54,443	77,510	12.29	11.00	27,931	23.71	70.24	6,623	0
86	53,291	80,417	12.79	10.50	30,026	22.88	66.27	6,869	0
87	51,534	83,232	13.24	10.00	32,127	22.05	61.92	7,085	0
88	49,162	85,937	13.61	9.50	34,216	21.24	57.21	7,268	0
89	46,175	88,515	13.90	9.00	36,269	20.44	52.17	7,412	0
90	42,586	90,949	14.11	8.50	38,263	19.64	46.82	7,513	0
DUAL RATE MORTGAGE - STD PYMT									
81	54,045	65,310	8.80	13.00	19,971	25.01	82.75	4,996	0
82	55,730	68,412	8.96	12.50	21,868	23.18	81.46	5,070	0
83	57,489	71,491	8.65	12.00	23,836	20.68	80.41	4,929	0
84	59,076	74,529	8.86	11.50	25,862	19.43	79.27	5,025	0
85	60,463	77,510	9.05	11.00	27,931	18.30	78.01	5,111	0
86	61,623	80,417	9.23	10.50	30,026	17.28	76.63	5,188	0
87	62,530	83,232	9.37	10.00	32,127	16.36	75.13	5,256	0
88	63,158	85,937	9.50	9.50	34,216	15.53	73.49	5,313	0
89	63,482	88,515	9.60	9.00	36,269	14.78	71.72	5,360	0
90	63,482	90,949	9.68	8.50	38,263	14.10	69.80	5,396	0

NOTES TO TABLES 1-5

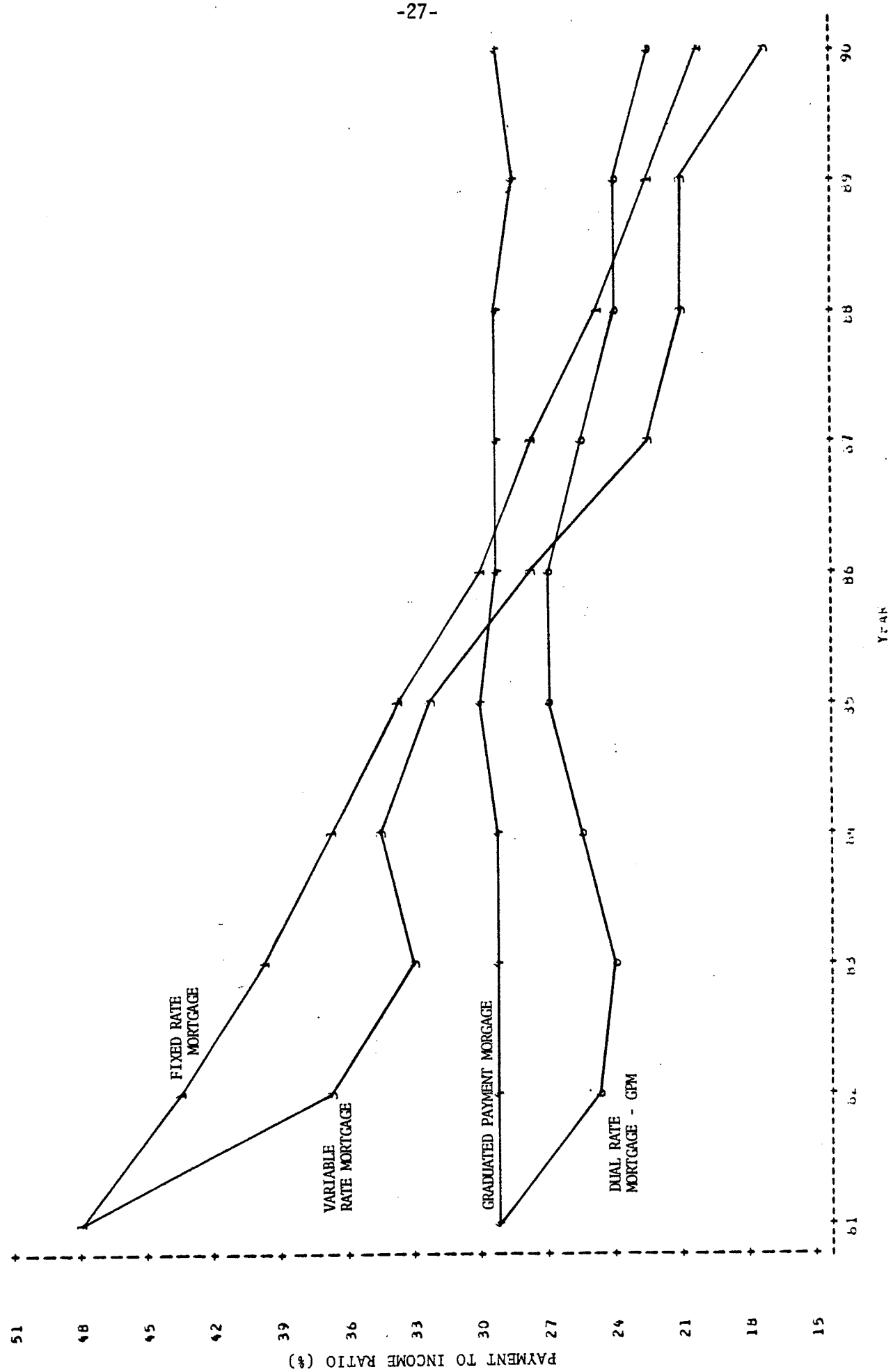
Comparative Simulation of Various Alternative Mortgage Instruments
(Notes)

1. This is a simulation of six alternative mortgage instruments. Each mortgage has an original loan to value ratio of 80 percent calculated on the median existing home price for the first year of the simulation. The original maturity length of all mortgages is 30 years.
2. House value is the median price of existing homes. Source: National Association of Realtors.
3. The payment rate is the rate used to calculate monthly payments.
4. The accrual rate is the rate used to calculate the outstanding balance of the loan.
5. Income is the median household income from the Bureau of the Census.
6. For the shared appreciation mortgage the balance used in calculating the loan to value ratio includes the lender's share of home price appreciation.

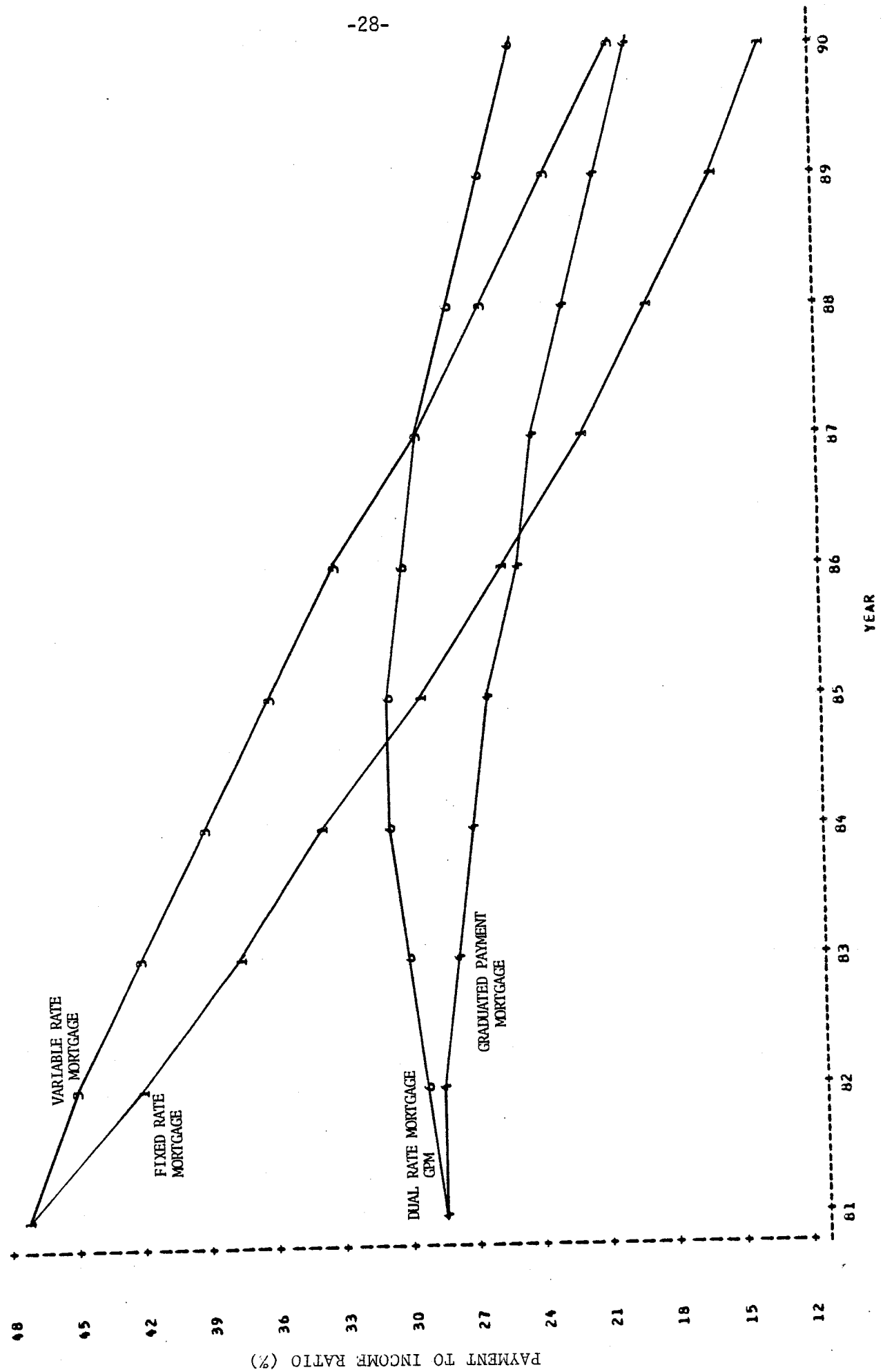
Graph 1
PAYMENT TO INCOME RATIOS
HISTORICAL SIMULATION 1975 - 1980



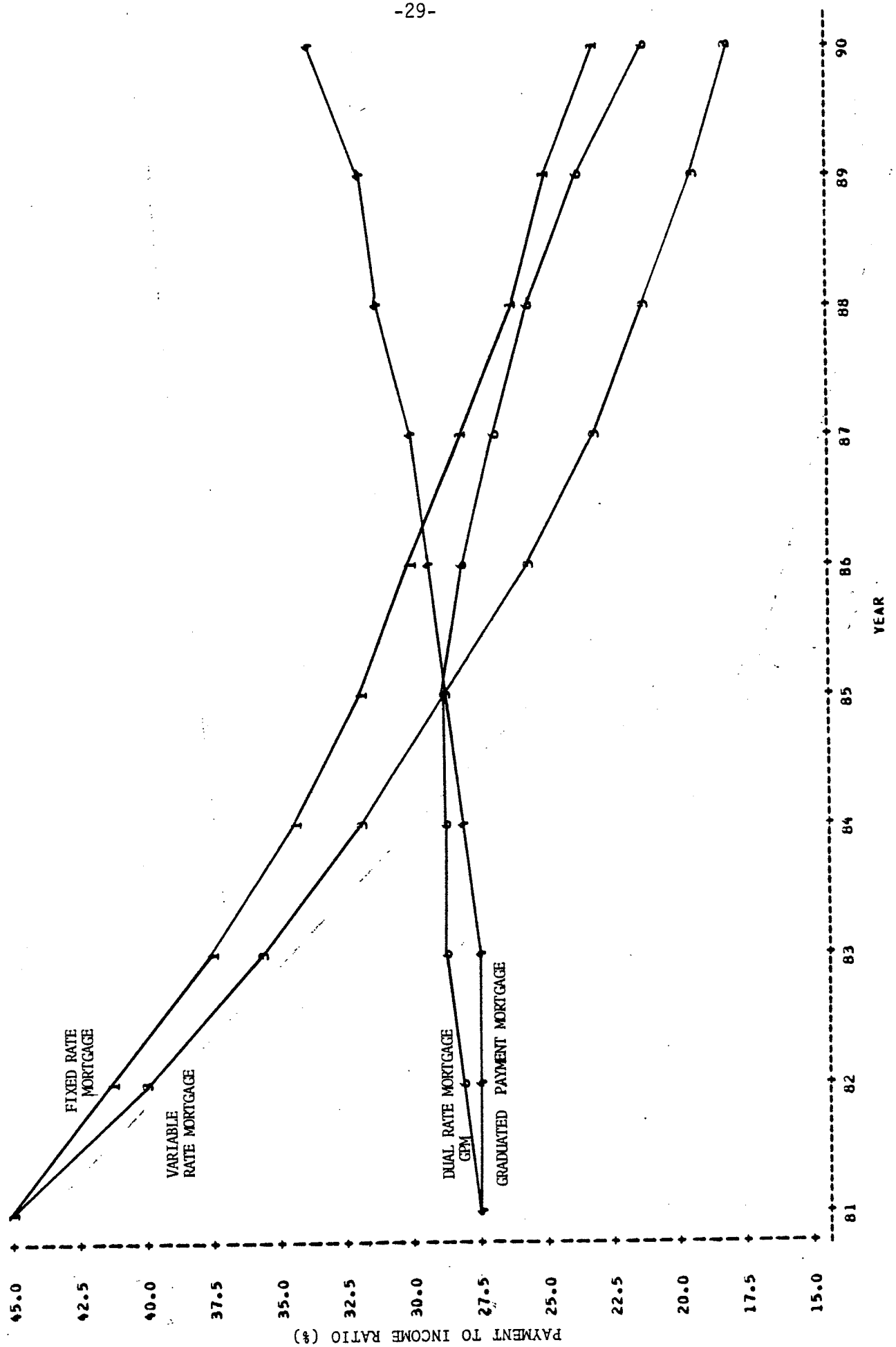
Graph 2
PAYMEMT TO INCOME RATIOS
BASE FORECAST SCENARIO



Graph 3
PAYMENT TO INCOME RATIOS
ACCELERATING INFLATION SCENARIO

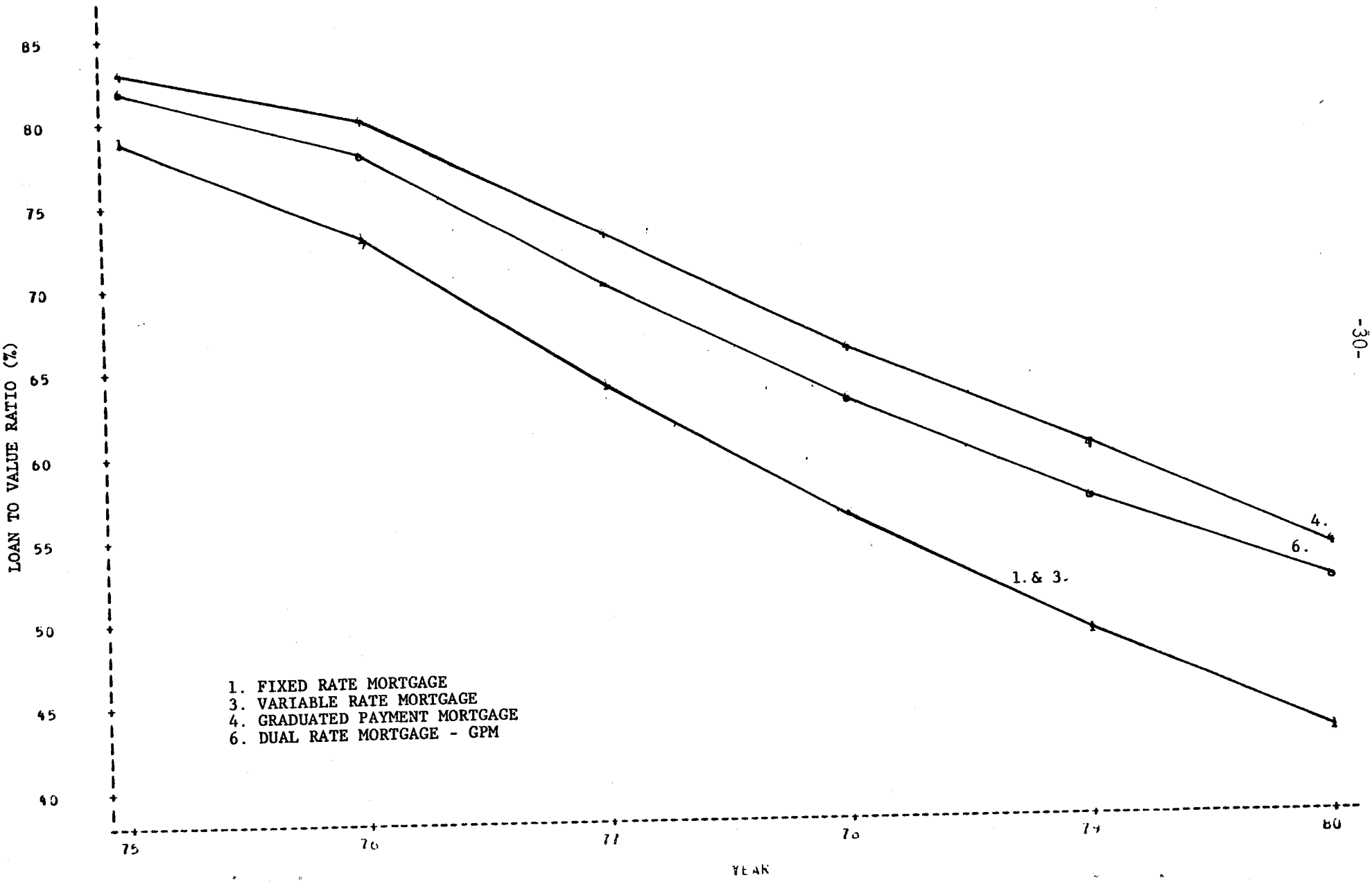


Graph 4
PAYMENT TO INCOME RATIOS
DECELERATING INFLATION SCENARIO



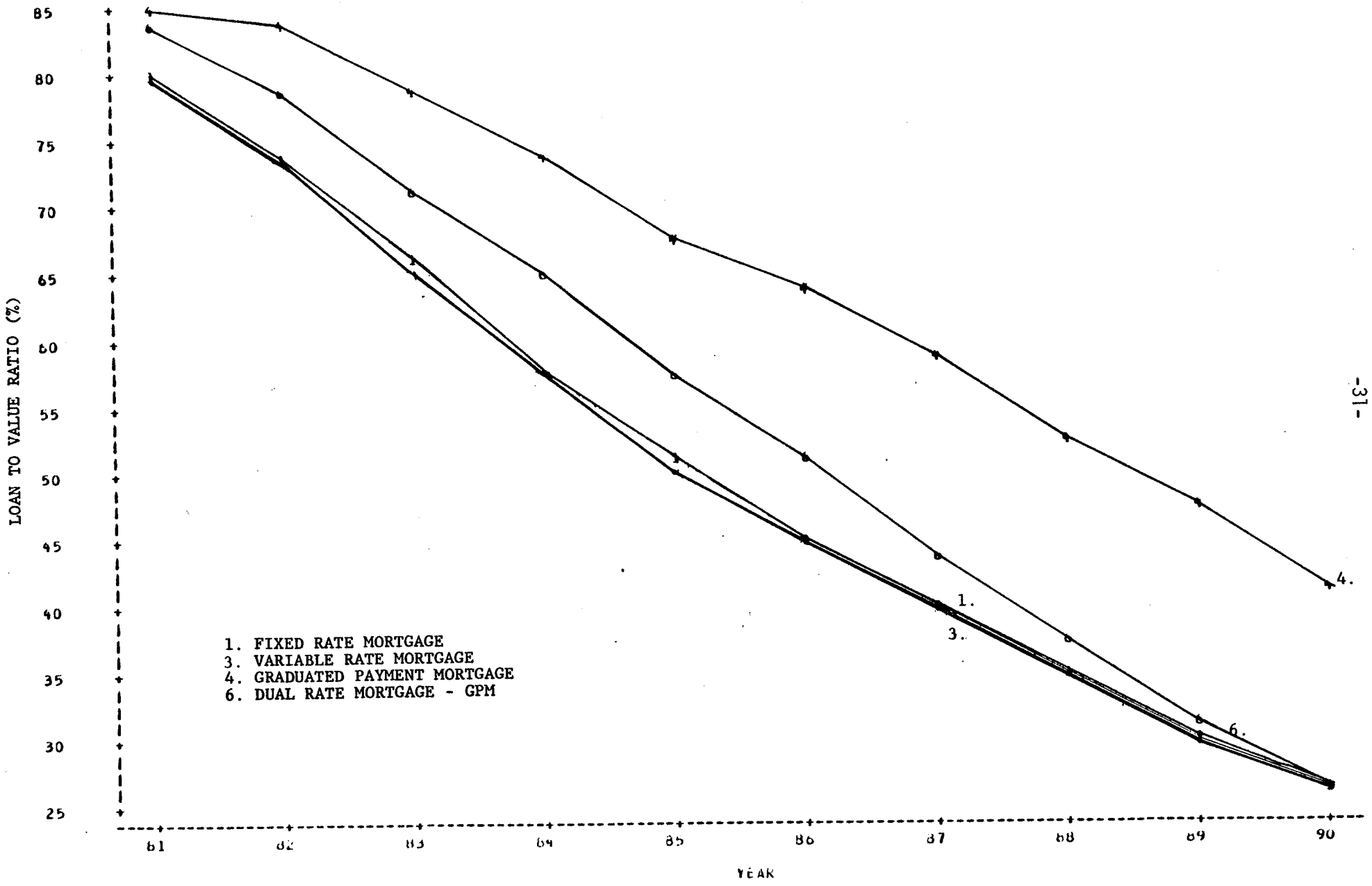
Graph 5
LOAN TO VALUE RATIOS

HISTORICAL SIMULATION 1975 - 1980



Graph 6
LOAN TO VALUE RATIOS

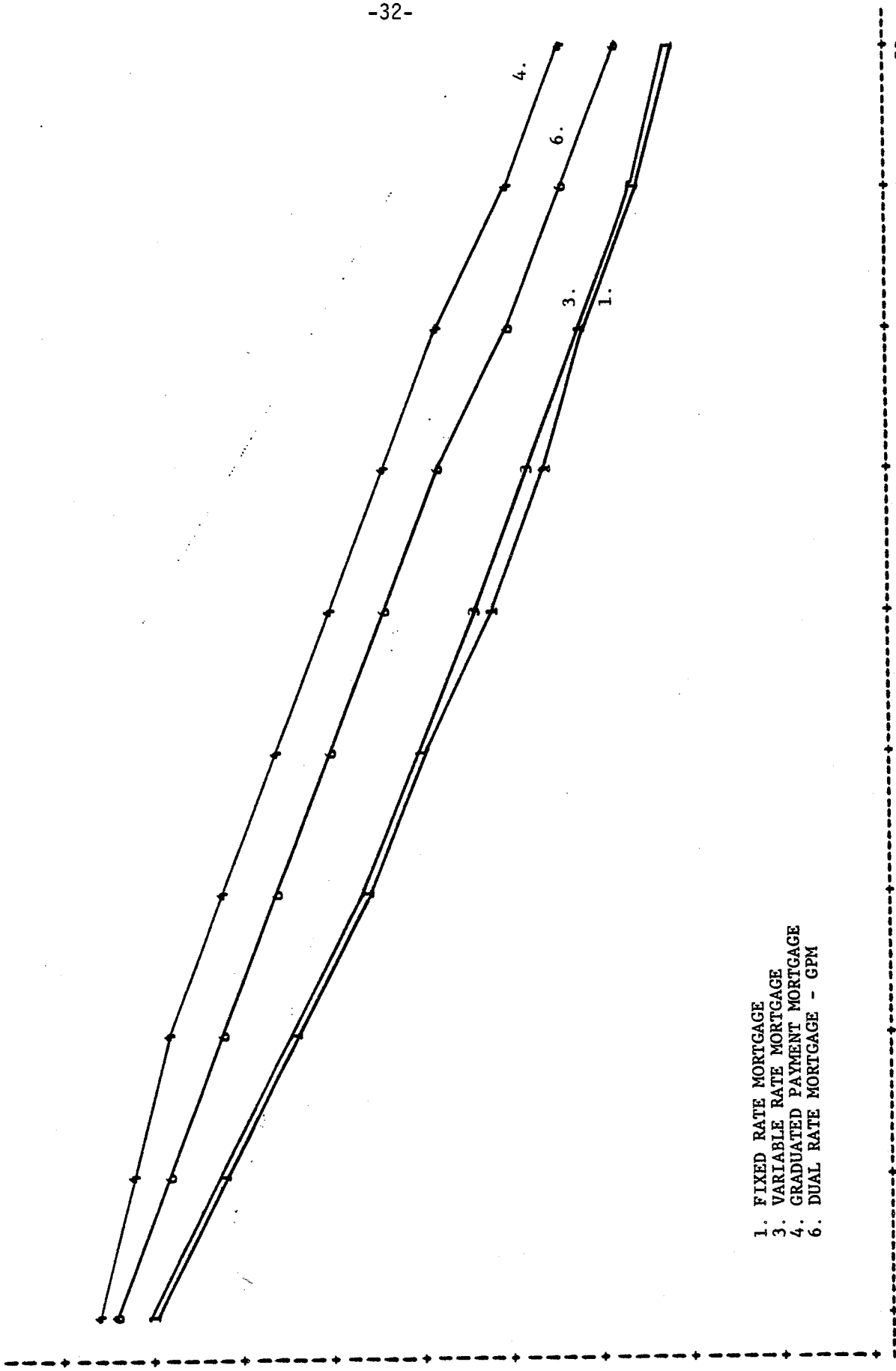
BASE FORECAST SCENARIO



Graph 7

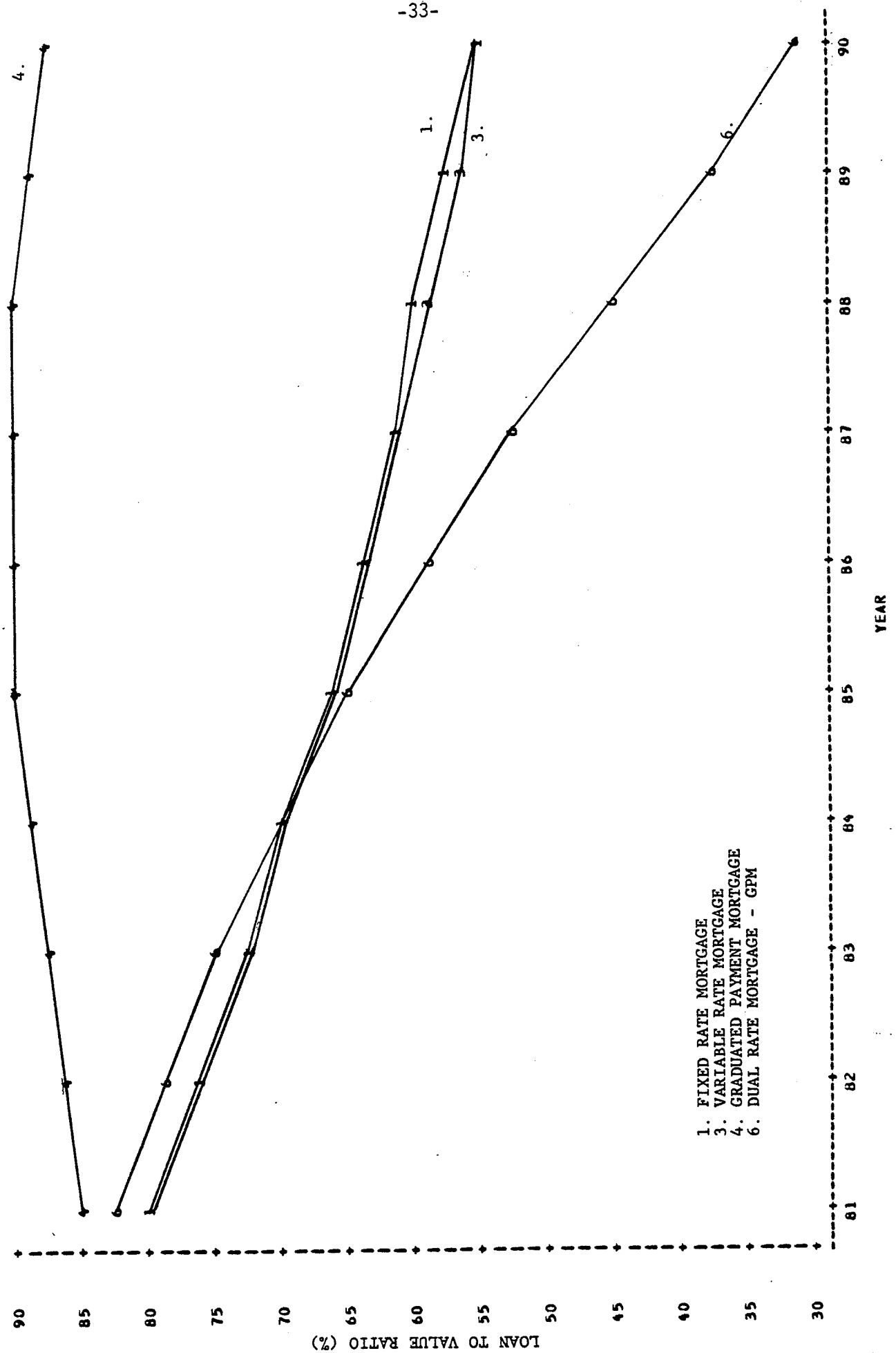
LOAN TO VALUE RATIOS

ACCELERATING INFLATION SCENARIO



Graph 8
LOAN TO VALUE RATIOS

DECELERATING INFLATION SCENARIO



initial payment rate, as it is based on the graduated payment formula. As open market interest rates rise during the decade, the payment income ratio rises from 8 percent to a still easily affordable 13 percent reflecting an increasing inflation premium in interest rates.

The loan to current value ratio shows the sharpest decline for the fixed rate mortgage from 80 percent to 18.5 percent in 1980. This reflects the large capital appreciation in housing. The negative amortization mortgages, the GPM and DIM-GPM show a slower fall in the loan to value. However, neither instrument shows more than 3 percent negative amortization.

The shorter historical simulation shows essentially the same results despite the dramatic rise in mortgage rates during this period. Even the uncapped variable rate mortgage shows the payment income ratio remaining below that in the first year. Again, negative amortization never rises over 3 percent and loan to current value fall sharply.

Turning to the forecast simulations somewhat more volatile results emerge. First, in the base scenario it is quite clear that the GPM, SAM, and the GPM-DIM mortgage can greatly improve the affordability of housing. Payment income ratios are reduced from 48 percent for the fixed payment mortgage (FPM) to 29 percent, 30 percent, and 29 percent, respectively, for the GPM, SAM, and GPM-DIM mortgages. The dynamic time path indicates that by the end of the decade the payment income ratio of the FPM would fall to 20 percent, the GPM would remain at 29 percent, the SAM would fall to 12.8 percent along with a $65,000 cash payment on

on sale, and the DIM-GPM payment would fall to 20 percent reflecting the reduction in interest rates inherent in this instrument. The VRM mortgage shows declining payments due to the forecast stable and declining interest rate environment. The negative amortization looks somewhat more dramatic, but still never exceeds 4 percent, well within an acceptable risk level for an 80 percent down loan.

Turning to our postulated accelerating inflation environment, some problems begin to surface with the GPM instruments. The combination of relentless rising interest rates and the need to pay back all the initial negative amortization, which lasts for two years in this case, leads the loan to value ratio to rise from 80.0 percent in 1980 (versus 80 percent for the FPM) to 84.0 percent in 1981 (versus 79.9 percent for the FPM). In essence, we have created a small negative amortization situation which may cause some problem if interest rates were to rise by 1,000 basis points over the decade. This problem could be removed by decreasing allowed graduation from 10 percent to 5 percent per year. In this same environment, the VRM shows a declining payment income ratio as income growth more than keeps pace with payment increases. Of course, the initial 48 percent payment income barrier for the VRM makes some type of GPM essential.

Finally, in the deflationary environment some unexpected results surface. With a drop of inflation to the 5 percent level, property value growth is less than early year negative amortization growth for both GPM instruments. As a result, negative amortization gets as high as 11.0 percent, still safe on a 80 percent loan. This does imply, however, that

a low downpayment GPM loan with 10 percent graduation per year in a deflationary environment could increase default risk. Thus the downpayment constraint may outweigh the payment advantages of a GPM or DIM-GPM for some families. Again, the solution would be a somewhat slower graduation rate than the 10 percent we have used in our simulations.

4. Macro Impact of New Mortgage Instruments

It is quite clear that the new mortgage instruments, especially the GPM, DIM-GPM, and SAM, will have a strong positive effect on the ability of first time home buyers to obtain mortgages. The VRM is neutral to slightly positive in this regard depending on where the initial payment rate is set. So far VRM rates are being set between 100-150 basis points below the FPM rate making it easier to qualify for mortgage loans.

The VRM instrument also appears to be having a positive supply effect on the mortgage market. Since this instrument allows mortgage rates to adjust more rapidly to changes in overall market interest rates, it lets the mortgage market clear through changes in prices, rather than through credit rationing. Also, since the return on the outstanding portfolio of mortgage holdings of lenders adjusts to changing open market rates, the risk of capital gains and losses on such a portfolio is substantially reduced. As a result of these impacts, the variable rate mortgage could cause a substantial moderation in cyclical fluctuations in the mortgage and housing markets due to an increase and more stable supply of mortgage credit.

There are, however, several potential macro problems which may be induced by widespread use of VRMs and DIM-GPMs. First, there may be a crucial demand side influence of a more flexible mortgage interest rate. Since there is a fairly high demand elasticity of housing starts with respect to mortgage interest rates, the greater variance of mortgage rates in the variable rate world might increase cyclical instability. Second, since mortgage interest rates on existing as well as new loans would be flexible, the demand for the entire housing stock would be subject to fluctuations. While it is too early to assess the extent of these potential macro problems, in my view the advantages of these new instruments to alleviate the affordability and profitability problems outweigh the potential risks.

In conclusion, the deregulation of the mortgage instrument promises a solution to several vital problems facing the housing finance system. It can be stated without doubt that the expansion of choice of mortgage instruments improves the welfare of both the consumer and the lender. Choosing among these new instruments, with full information and a competitive market environment will increase housing opportunities for all consumers.

APPENDIX

MORTGAGE PAYMENT FORMULAS

Symbols

- A = appreciation due to lender
- B_0 = original loan balance
- B_t = loan balance end of period t
- d = mortgage rate discount for Shared Appreciation Mortgage
- g = payment growth rate for GPM
- i = interest rate used to calculate payments
- k = payment growth period for GPM
- n = amortization period in years
- $Pymt_t$ = payment in period t
- r = interest rate used to calculate new balance
- s = percentage of total appreciation that goes to lender
- V_t = value of house in period t

Note: All payments are calculated on an annual basis.

Fixed Rate Mortgage

$$Pymt = B_0 \times \frac{i}{1 - (1+i)^{-n}}$$

$$B_t = B_{t-1} \times (1+r) - Pymt \qquad i = r$$

Variable Rate Mortgage

$$Pymt_t = B_{t-1} \times \frac{i_t}{1 - (1+i_t)^{-(n-t+1)}}$$

$$B_t = B_{t-1} \times (1+r) - Pymt_t \qquad i = r$$

Variable Rate with Cap

same as variable rate except

$Pymt_t$ is constrained by

$$0.9 > \frac{Pymt_t}{Pymt_{t-1}} > 1.1$$

Graduated Payment Mortgage

$$Pymt_1 = B_0 \div \left(\frac{1 - (1+i)^{-1}}{i} \times \frac{1 - \left(\frac{1+i}{1+g}\right)^{-k}}{\frac{1+i}{1+g} - 1} \times \frac{1+i}{1+g} + \frac{1 - (1+i)^{-(n-k)}}{i} \times \frac{(1+g)^k}{(1+i)^k} \right)$$

for $1 > t > = 11$ $\quad Pymt_t = Pymt_{t-1} \times (1+g)$

for $t > 11$ $\quad Pymt_t = Pymt_{t-1}$

Dual Rate - GPM

i = long-term rate

r = short-term rate

for $t < = k + 1$

$$Pymt_t = B_{t-1} \div \left(\frac{1 - (1+i_t)^{-1}}{i_t} \times \frac{1 - \left(\frac{1+i_t}{1+g}\right)^{-(k-t+1)}}{\frac{1+i_t}{1+g} - 1} \times \frac{1+i_t}{1+g} + \frac{1 - (1+i_t)^{-(n-k)}}{i_t} \times \frac{(1+g)^{(k-t+1)}}{(1+i_t)^{(k-t+1)}} \right)$$

for $k+1<t<n$ $\quad Pymt_t = B_{t-1} \times \frac{i_t}{1 - (1+i_t)^{-(n-t+1)}}$

$$Pymt_n = B_{n-1} \times (1+r_t)$$

$$B_t = B_{t-1} \times (1+r_t) - Pymt_t$$

Shared Appreciation Mortgage

$$i = \text{mortgage rate} \times (1-d)$$

$$\text{Pymt} = B_0 \times \frac{i}{1 - (1+i)^{-n}}$$

$$B_t = B_{t-1} \times (1+r) - \text{Pymt} \qquad i = r$$

$$A_t = (V_t - V_0) \times s$$

Dual Rate - Std

i = long-term rate

r = short-term rate

$$\text{Pymt}_t = B_{t-1} \times \frac{i_t}{1 - (1+i_t)^{-(n-t)}} \qquad t < n$$

$$\text{Pymt}_n = B_{n-1} \times (1+r_t)$$

$$B_t = B_{t-1} \times (1+r_t) - \text{Pymt}_t$$

CENTER FOR REAL ESTATE AND URBAN ECONOMICS

Institute of Business and Economic Research
156 Barrows Hall
University of California, Berkeley, CA 94720

The following working papers in this series are available from the above address at a charge of $5.00 each, which partially covers the cost of reproduction and postage. Checks should be made out to the Regents of the University of California.

* - *

79-1. *Kenneth T. Rosen* and *David E. Bloom.* "A Microeconomic Model of Federal Home Loan Mortgage Corporation Activity." April 1979

80-2. *Kenneth T. Rosen* and *Mitchel Resnick.* "The Size Distribution of Cities: An Examination of the Pareto Law and Primacy." July 1979.

80-3. *Jennifer R. Wolch.* "Residential Location of the Service-Dependent Poor." August 1979.

80-4. *Stuart Gabriel, Lawrence Katz,* and *Jennifer Wolch.* "Local Land-Use Regulation and Proposition 13: Some Findings from a Recent Survey." September 1979.

80-5. *David Dale-Johnson.* "Hedonic Prices and Price Indexes in Housing Markets: The Existing Empirical Evidence and Proposed Extensions." January 1980.

80-6. *Susan Giles Levy.* "Consumer Response to High Housing Prices: The Case of Palo Alto, California." January 1980.

80-7. *Dwight Jaffee* and *Kenneth Rosen.* "The Changing Liability Structure of Savings and Loan Associations." February 1980.

80-8. *Dwight Jaffee* and *Kenneth T. Rosen.* "The Use of Mortgage Passthrough Securities." February 1980.

80-9. *Stuart A. Gabriel.* "Local Government Land-Use Allocation in the Wake of a Property Tax Limitation." May 1980.

80-10. *Kenneth T. Rosen.* "The Affordability of Housing in 1980 and Beyond." June 1980.

80-11. *Kenneth T. Rosen.* "The Impact of Proposition 13 on House Prices in Northern California: A Test of the Interjurisdictional Capitalization Hypothesis." June 1980.

80-12. *Kenneth T. Rosen.* "The Federal National Mortgage Association, Residential Construction, and Mortgage Lending." August 1980.

80-13. *Lawrence Katz* and *Kenneth T. Rosen.* "The Effects of Land Use Controls on Housing Prices." August 1980.

80-14. *Kenneth T. Rosen.* "The Demand for Housing Units in the 1980s." September, 1980.

80-15. *Konrad Stahl.* "A Note on the Microeconomics of Migration." October 1980.

80-16. *John T. Rowntree* and *Earl R. Rolph.* "Efficient Community Management." August 1980.

80-17. *John M. Quigley.* "Non-linear Budget Constraints and Consumer Demand: An Application to Public Programs for Residential Housing." September 1980.

80-18. *Stuart A. Gabriel and Jennifer R. Wolch.* "Local Land-use Regulation and Urban Housing Values." November 1980.

80-19. *F.E. Balderston.* "The Structural Option for the Savings and Loan Industry." November 1980.

80-20. *Kristin Nelson.* "San Francisco Office Space Inventory." November 1980.

80-21. *Konrad Stahl.* "Oligopolistic Location under Imperfect Consumer Information." December 1980.

80-22. *Konrad Stahl.* "Externalities and Housing Unit Maintenance." December 1980.

81-23 *Dwight M. Jaffee and Kenneth T. Rosen.* "The Demand for Housing and Mortgage Credit: The Mortgage Credit Gap Problem." March 1981.

81-24 *David E. Dowall and John Landis.* "Land-Use Controls and Housing Costs: An Examination of San Francisco Bay Area Communities." March 1981.

81-25 *Jean C. Hurley and Constance B. Moore.* "A Study of Rate of Return on Mortgage Pass Through Securities." March 1981.

81-26 *Kenneth T. Rosen.* "The Role of Pension Funds in Housing Finance." April 1981.

81-27 *John M. Quigley.* "Residential Construction and Public Policy: A Progress Report." April 1981.

81-28 *Kenneth T. Rosen.* "The Role of the Federal and 'Quasi-Federal' Agencies in the Restructured Housing Finance System." June 1981.

81-29 *Diane Dehaan Haber and Joy Hashiba Sekimura.* "Innovations in Residential Financing: An Analysis of the Shared Appreciation Mortgage and a Comparison of Existing Alternative Mortgage Instruments." June 1981.

81-30 *Diane Dehaan Haber and Joy Hashiba Sekimura.* "Alternative Mortgages Consumer Information Pamphlet." June 1981.

81-31 *Jean C. Hurley.* "A Model for Pricing Pass-Through Securities Backed by Alternative Mortgage Instruments." June 1981.

81-32 *Kenneth T. Rosen.* "The Affordability of Housing in California." September 1981.

81-33 *Kenneth T. Rosen and Lawrence Katz.* "Money Market Mutual Funds: An Experiment in Ad Hoc Deregulation." September 1981.

81-34 *Kenneth T. Rosen.* "New Mortgage Instruments: A Solution to the Borrower's and Lender's Problem." September 1981.

81-35 *Konrad Stahl.* "Toward a Rehabilitation of Industrial, and Retail Location Theory." September 1981.

81-36 *Frederick E. Balderston.* "S&L Mortgage Portfolios: Estimating the Discount from Book Value." October 1981.

81-37 *Kenneth T. Rosen.* "A Comparison of European Housing Finance Systems." October 1981.

81-38 *Frederick E. Balderston.* "Regression Tests of the Relationship between Book Net Worth and Revised Net Worth of S&Ls." October 1981.