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ADJUSTABLE-RATE CONSUMER LOANS: A TRADE-OFF

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ABSTRACT Adjustable-rate automobile and other consumer loans are being offered more frequently. A series of simulations test the risk-return tradeoff faced by consumers and the interest-rate risk v. credit risk faced by lenders. These risks are shown to be related to the initial contract rate and maturity; timing and amount of rate increase; and form of contract adjustment.

While adjustable-rate mortgage loans have been available for quite some time and now comprise a significant portion of the residential mortgage market, adjustable-rate consumer loans are of more recent origin and currently make up only a small portion of the consumer credit market. Nonetheless, the increasing use of adjustable-rate consumer loans (ARLs) raises many of the same issues associated with adjustable-rate mortgages (ARMs).

THE BASIC ISSUES

There are two primary issues: first, the risk return trade-off faced by consumers contemplating ARMs and ARLs; and, second, the interest-rate risk v. credit risk trade-off faced by lenders. As we shall see, the two risks are closely related, although credit grantors also have another source of risk arising from features of ARMs and ARLs that narrow or eliminate the margin between the unpaid balance on the loan and the value of the collateral.

Risk v. Return Trade-Off of Consumers

Both ARMs and ARLs permit the rate charged consumers to vary from time to time in accordance with movements in some prescribed index. Consequently, depending upon the specific contract terms, some portion of the interest rate risk is borne by the consumer borrower. In return for shouldering this risk, the consumer is typically offered a lower initial rate on an ARL than on a fixed-rate loan (FRL). (In theory, the rate on the ARL should exceed that on the FRL when there is a downward sloping yield curve; in practice such a rate difference would probably not be acceptable to consumers.)

Concerns about the consumers' risk-return tradeoff on ARMs have led to the adoption of interest rate and payment caps. A common restriction is a limit on the annual rate change to two percentage points or on the annual payment change to 15 percent. [1,p.HE17]. These limitations reflect concerns that consumers were assuming too great a risk or were simply unaware of the extent of their exposure to rising interest rates. The intent was to limit the risk assumed by consumers--with the obvious result that the return gained by consumers from assuming the market would in turn, limit the risk.

The size of the interest-rate risk assumed by consumers with ARLs is also relevant to the future of this type of contract in consumer credit. Consumers are generally less able to hedge this risk than are credit grantors. Few consumers have access to futures contracts or have the facilities to match the durations of their assets and liabilities. While some creditors have been notably inept in hedging their interest-rate risk, they are probably better able than consumers to do so. Consequently, if consumers ultimately perceive that there is a substantial interest-rate risk, they will demand a larger discount from FRLs to assume that risk. Since creditors are more

efficient at hedging that risk than consumers, creditors will be unwilling to grant the discount demanded by consumers. In that event, ARLs would largely disappear from the market. Thus, our interest in the degree of interest-rate risk relates not only to the possible need for legislation to limit the risk, but also to whether risky ARLs will persist in the marketplace.

Interest Rate Risk v. Credit Risk Trade-Off of Creditors

To the extent that concerns about the risks borne by consumers are warranted, they suggest that lenders have merely substituted an increased credit risk for a reduced interest-rate risk. Whether consumers unwisely, but knowingly, assume the interest-rate risk or discover the nature of their commitment only when monthly payments rise beyond their capacity to meet them, the level of costly delinquencies and defaults experienced by lenders is likely to rise. That significant losses can result from this "payment shock" is attested by mortgage insurers. Mortgage Guarantee Insurance Corporation (MGIC) reported in its year-end 1983 review of claims and defaults that the default incidence on graduated payment mortgage loans was 34 percent higher than on all loans.

Lenders also face a "collateral risk"--the risk that the unpaid balance on the loan may approach or even exceed the value of the collateral. In such a case, the consumer has little or no equity to lose through default, while the lender will stand to lose a higher portion of the unpaid loan.

This risk arises from the nature of adjustments made in adjustable-rate contracts in response to increases in interest rates. In many ARMs increases in monthly payments are capped at 7.5 percent in order to acquire mortgage insurance. Many short-term ARLs maintain a fixed monthly payment, but increase the number of payments in response to increases in interest rates. As a result, the monthly payment may not be adequate to pay even the finance charges due. The interest unpaid is added to the principal amount of the loan; thus, negative amortization occurs. Even if negative amortization does not occur, extending the maturity of a ARL reduces the rate at which the unpaid balance on the loan declines in relation to the value of the collateral.

In some states negative amortization may involve not only a credit risk, but also a loss of income. Some state laws prohibit the collection of interest on interest. Since the unpaid interest is capitalized and becomes part of the principal, it is evidently not clear in some states whether a lender would be permitted to earn interest on those capitalized amounts.

ORGANIZATION

To address these issues, the remainder of the paper is divided into three parts. In the next part, we trace the growth of ARLs and explain their principal features that bear on the issues set forth above. Next, we analyze the features of ARLs that bear on their potential for payment shock and collateral shock. Simulations are based on a 48-month, new automobile loan and a 15-year second mortgage loan. The results of these simulations are then reviewed to assess the likelihood that consumers face a significant potential for payment shock or a lengthening of maturities that might drastically reduce their equity in assets serving as collateral for a loan. We conclude with a section appropriately named, "Summary and Conclusions."

GROWTH AND FEATURES OF ARLS

Origins and Growth

While ARMs had been employed for many years by scattered lenders, most particularly in the northeast, Ohio, and California, they gained markedly in 1980. In that same year, a few banks began to experiment with various forms of ARLs. The Union Planters Bank in Memphis is generally credited with being the first bank in the nation to experiment with ARLs. Other innovating banks were the Merchants National Bank (Indianapolis), Huntington National Bank, Central Bank of Birmingham, Maryland National Bank, and Peoples Trust of Ft. Wayne [2].

Although ARMs came to gain a majority share of new residential mortgages written, the growth rate of ARLs was much slower. The Consumer Bankers Association surveyed 168 member banks in February 1982, and found that only 16 (9.5 percent) were offering ARLs, although four-fifths were studying the possibility of developing plans to enter the field.

While the number of banks offering ARLs increased sharply in 1983, they still comprised a minority of the total banking community. In 1983, 34.7 percent of banks with assets of \$500 million and over provided ARLs, up from 17.8 percent in 1982. Whereas only three percent of the smallest banks had plans to offer ARLs in the future, 40 percent of the large banks had such plans [3,p.56].

Moreover, use of ARLs was restricted primarily to loan products with relatively long maturities—boats, automobiles, home equity (often on a revolving credit basis). The longer the maturity, the more the lender was exposed to the interest rate risk, and the more likely was there an effort to share the risk with the borrower.

Characteristic Terms

The terms of ARLs vary quite widely among lenders. Since we will be testing the effects of different terms on the payment patterns of ARLs in the following section, it will be helpful first to review the general nature of their terms.

Adjustments in response to changes in interest rates are based on a defined index, plus or minus a specified percentage. Indices commonly used are the prime rate, the rates on six-month money market certificates, six-month U.S. treasury bills, moving averages of three-month treasury bills, or an index of a lender's money and operating costs.

The frequency of adjustment ranges from monthly to quarterly; some may make adjustments less frequently. The form of adjustment to a change in the index may be to change the amount of monthly payment, the number of monthly payments (maturity), or some combination. For example, one bank adjusts the number of payments on loans with maturities of five years or less, but the amount of the monthly payment on longer loans. The purpose of this latter arrangement is to reduce the risk of negative amortization.

These critical features of an ARL are exemplified in the excerpts below from a note and security agreement of the Maryland National Bank:

The "index Rate" for this Note and Security Agreement ("Agreement") is the Prime Rate published in the "Money Rates" section of The Wall Street Journal on the last business day upon which such publication is made in each calendar quarter during the term of this Agreement. If a range of Prime Rates is published, the applicable

rate shall be the higher rate. A "Change Date" is the first business day of each calendar quarter during the term of this Agreement, except that the first such day following the date of this Agreement will not be a Change Date. If the number of payments originally scheduled under this Agreement is more than 60, the amounts of payment which Borrower agrees to make may change if the Rate changes. Whenever the Rate is increased or decreased, in the aggregate by at least a 1% increment relative to the original simple interest rate on this loan, Bank may make a corresponding increase or decrease in the amount of the scheduled payment for each 1% per annum increment in the Rate relative to the original simple interest rate.

SIMULATION TESTS OF PAYMENT SHOCK AND COLLATERAL SHOCK

The following simulations are based on two hypothetical loans: (1) an \$8,000 new car loan with an initial annual percentage rate (APR) of 15 percent; and (2) a second mortgage loan for \$15,000 with an initial APR of 15 percent and maturity of 15 years. Were these fixed-rate loans, their respective fixed, monthly payments would be \$222.65 and \$209.94. It should be noted that these simulations do not contemplate prepayments of these loans, a fairly common occurrence with both types of loan. Only the impact of rate increases are shown, since public concern focuses on that aspect of ARLs.

Consider first the effect of the timing of an increase in the "Index Rate" upon the amount of payment or the number of fixed payments. The longer an installment contract is outstanding, the smaller the proportion of the sum of the remaining interest payments to the sum of the ensuing payments on principal. It follows that the later an adjustment is made to a ARL, the smaller its effect on the amount or number of payments. The anticipated result is documented in Tables 1 and 2. A 500-basis point (five percentage points) increase in the contract rate raises the monthly payment by 9.17 percent if the increase applies to the second and subsequent payments, but only a 1.23 percent increase if the change occurs after the 42nd month.

TABLE 1. Effect of Timing of Increase in APR on Amount and Number of Fixed Payments on New Automobile Loan*

Increase of 500 Basis Points After Month	Amount of Adjusted Payment	Percent Increase	Number of Added Payments	Percent Increase
0	\$243.06	9.17	7.26	15.1
6	240.70	8.11	5.25	10.9
12	238.29	7.02	3.66	7.6
18	235.81	5.91	2.42	5.0
24	233.28	4.77	1.48	2.4
30	230.70	3.62	.81	1.7
36	228.06	2.43	.35	0.7
42	225.38	1.23	.09	0.2

*Initial terms: \$8,000 loan for 48 months, 15 percent and rate and initial monthly payment of \$222.65; 500 basis point Increase occurring after month shown.

TABLE 2. Effect of Timing of Increase in APR on Amount and number of Fixed Payments of Second Mortgage Loan*

Increase of 500 Basis Points After Month	Amount of Adjusted Payment	Percent Increase	Increase of 500 Basis Points After Month	Number of Added Payments	Percent Increase
0	\$263.29	25.41	130	8.04	4.5
6	262.31	24.95	136	5.87	3.3
12	261.29	24.46	142	4.14	2.3
18	260.22	23.95	148	2.79	1.6
24	259.09	23.41	154	1.76	1.0
30	257.92	22.85	160	1.0	0.6
36	256.69	22.27	166	0.48	0.3
42	255.41	21.66	172	0.16	0.1

*Initial terms: \$15,000 loan for 15 years, 15 percent rate, and rate and initial monthly payment of \$209.94; 500 basis point Increase occurring after month shown.

The effect of an adjustment to the contract rate is also a function of the maturity of contract. The longer the contract, the greater the ratio of the sum of finance charges to the amount financed. Hence, we would expect that the impact of a given change in the applicable APR would affect the amount or number of monthly payments more on long-term contracts than on short-term contracts. As shown in Table 3, the impact of a 500-basis point change upon the size of the monthly payment is almost five times greater for a five-year loan-as for a one-year loan, and the extension of maturities on a five-year loan is over 12 months. Conversion of a 60-month contract to a 72-month contract could expose a lender to considerable collateral risk. The same effect may be noted in Table 4, although the time of adjustment was necessarily at the end of the 130th month in order to avoid negative amortization.

**TABLE 3
Effect of 500 Basis Point Increase in &DR After First Month of Contract on Amount and Number of Fixed Payments, Given Differences in original Maturity of New Automobile Loan***

Initial Maturity (Years)	Amount of Adjusted Payment	Percent Increase	Number of Added Payments (Months)	Percent Increase
1	\$739.64	2.43	.30	2.50
2	406.43	4.78	1.35	5.63
3	296.80	7.02	3.43	9.53
4	243.06	9.17	6.89	14.35
5	211.64	11.20	12.38	20.63

*Initial terms: \$8,000 loan with maturity shown; initial rate of 15 percent; 500 basis point increase at the end of the first month, effective for the second monthly payment and beyond.

TABLE 4
Effect of 500 Basis Point Increase in APR After First Month of Contract on Amount and Number of Fixed Payments, Given Differences in Original Maturity of Second Mortgage Loan.*

Initial Maturity (Years)	Amount of Adjusted Payment	Percent Increase	Number of Added Payments (Months)	Percent Increase
10	\$289.60	19.67	0.0	+
11	281.54	21.02	.03	+
12	275.27	22.27	.55	+
13	270.33	23.42	1.92	1.23
14	266.41	24.46	4.40	2.61
15	263.29	25.41	8.46	4.70
16	260.78	26.27	14.82	7.72
17	258.76	27.05	24.89	12.20
18	257.13	27.77	41.72	19.31
19	255.81	28.40	74.89	32.85
20	254.74	28.97	252.11	105.05

*Initial terms: \$15,000 loan, with maturity shown; initial rate of 15 percent; 500 basis point increase occurring at the end of the 130th month, effective for the 131st payment and beyond.

+ Less than .005 percent.

It should come as no surprise that the amount of rate increase is directly associated with higher or more monthly payments. Tables 5 and 6 show “worst cases” in that the rate increase is assumed to occur effective with the second monthly payment.

TABLE 5
Effect of Amount of Increase in APR After First Month of Contract on Amount and Number of Fixed Payments On New Automobile Loan.*

Initial Maturity (Years)	Amount of Adjusted Payment	Percent Increase	Number of Added Payments (Months)	Percent Increase
16	\$226.65	1.79	1.18	2.46
17	230.69	3.61	2.45	5.10
18	234.77	5.44	3.81	7.94
19	238.89	7.29	5.29	11.02
20	243.06	9.17	6.89	14.35
21	247.26	11.05	8.65	18.02
22	251.50	12.96	10.58	22.04
23	255.78	14.88	12.71	26.48
24	260.09	16.82	15.10	31.46
25	264.45	18.77	17.79	37.06

*Initial terms: \$8,000 loan for 48 months, 15 percent initial rate, and initial monthly payment of \$222.65; rate increase occurring at end of first month, effective for second monthly payment and beyond.

TABLE 6
Effect of Amount of Increase in APR After First Month of Contract on Amount and
Number of Fixed Payments on Second Mortgage Loan*

Initial Maturity (Years)	Amount of Adjusted Payment	Percent Increase	Number of Added Payments (Months)	Percent Increase
16	\$220.27	4.92	1.42	0.79
17	210.79	9.93	2.96	1.64
18	241.47	15.02	4.63	2.57
19	252.30	20.18	6.45	3.58
20	263.29	25.41	8.46	4.70
21	274.40	30.70	10.68	5.93
22	285.64	36.06	13.17	7.32
23	297.00	41.47	15.97	8.87
24	308.46	46.93	19.18	10.65
25	320.02	52.43	22.91	12.73

*Initial terms: \$15,000 loan for 15 years; 15 percent initial rate, and initial monthly payment of \$209.94; rate increase occurring at end of first month, effective for second monthly payment and beyond.

The effect of an increase in the APR is also a function of the initial rate on a contract. Tables 7 and 8 demonstrate both the effects of the timing of an increase and the initial rate on the automobile contract. Here we concentrate on the influence of initial rates ranging from ten percent to 25 percent; that is, the increases in the amount (Table 7) and number (Table 8) of payments as shown in the rows of the two tables. The higher the initial rate, the less a 500-basis point increase is adding to the total rate charges. Hence, we would expect to find a diminishing effect on the amount of monthly payments as the initial rate rises from ten percent to 25 percent. Happily, that is the result we discover in this table, as well as in Table 9, which demonstrates the effects on the amounts of monthly payments if the APR on a second mortgage loan is increased by 500 basis points.

TABLE 7
Effect of 500 Basis Point Increase in APR on Amount of Payments, Given
Differences in Original APR on New Automobile Loan*

	INITIAL ANNUAL PERCENTAGE RATE (APR)							
	10%		15%		20%		25%	
Increase of 500 Basic Pints After Month	Amount of Adj. Payment	Percent Increase	Amount of Adj. Payment	Percent Increase	Amount of Adj. Payment	Percent Increase	Amount of Adj. Payment	Percent Increase
0	222.26	9.54	243.06	9.17	264.87	8.80	287.66	8.44
6	219.94	8.40	240.70	8.11	262.50	7.83	285.29	7.55
12	217.59	7.24	238.29	7.02	260.03	6.81	282.79	6.61
18	215.20	6.06	235.81	5.91	257.48	5.77	280.17	5.62
24	212.79	4.87	233.28	4.77	254.84	4.68	277.42	4.58
30	210.36	3.68	230.70	3.62	252.11	3.56	274.55	3.50
36	207.89	2.46	228.06	2.41	249.30	2.41	271.51	2.38
42	205.41	1.24	225.38	1.23	246.41	1.22	268.47	1.21

*Initial terms: \$8,000 loan for 48 months, with initial APRs as shown, 500 basis point increase occurring after month shown.

TABLE 8
Effect of 500 Basis Point Increase in APR on Number of Fixed Payments,
Given Differences in Original APR on New Automobile Loans.*

Increase of 500 Basic Pints After Month	10%		15%		20%		25%	
	No. of Added Payments	Percent Increase	No. of Added Payments	Percent Increase	No. of Added Payments	Percent Increase	No. of Added Payments	Percent Increase
0	6.66	13.88	7.26	15.13	7.97	16.60	8.79	18.31
6	4.88	10.17	5.25	10.97	5.66	11.79	6.12	12.75
12	3.45	7.19	3.66	7.63	3.88	8.08	4.13	8.60
18	2.31	4.81	2.42	5.04	2.54	5.29	2.66	5.54
24	1.43	2.98	1.48	3.08	1.54	3.21	1.59	3.31
30	0.79	1.65	0.91	1.69	0.83	1.73	0.85	1.77
36	0.35	0.70	0.35	0.70	0.36	0.73	0.36	0.73
42	0.09	+	0.09	+	0.09	+	0.09	+

*Initial terms: \$8,000 loan for 48 months. with initial APRs as shown; 500 basis point increase occurring after month show.

+ Less than .005 percent

TABLE 9
Effect of 500 Basis Point Increase in APR on Amount of Payments, Given Differences in Original APR on
Second Mortgage Loan.*

Increase of 500 Basic Pints After Month	10%		15%		20%		25%	
	Amount of Adj. Payment	Percent Increase	Amount of Adj. Payment	Percent Increase	Amount of Adj. Payment	Percent Increase	Amount of Adj. Payment	Percent Increase
0	209.75	30.15	263.29	25.41	320.21	21.55	379.37	18.43
6	208.57	29.39	262.31	24.95	319.46	21.26	378.83	18.26
12	207.36	28.64	261.29	24.46	318.65	20.96	378.23	18.08
18	206.12	27.87	260.22	23.95	317.79	20.63	377.58	17.87
24	204.85	27.09	259.09	23.41	316.87	20.28	376.87	17.65
30	203.55	26.28	257.92	22.85	315.88	19.91	376.09	17.41
36	202.21	25.45	256.69	22.27	314.83	19.51	375.23	17.14
42	200.84	24.60	255.41	21.66	313.71	19.08	374.30	16.85

*Initial terms: \$15,000 loan for 15 years, with initial APRs as shown; 500 basis point increase occurring after month shown.

However, if the number of payments are adjusted, instead of the amount of payment, the percentage increase in the number of payments is higher, the greater the initial rate charged on the contract (Table 8). Unless the increase in the APR occurs early in the contract, the percentage increase in the number of payments is not great and should have only slight effect on the ratio of unpaid principal balance to the market value of and collateral securing the loan.

Finally, we examine the increase in APR necessary to generate negative amortization, given an increase at various points in time (Table 10). The example, of course, applies only to arrangements where the number of

fixed payments increase in response to an increase in the APR. The table demonstrates that both the timing of the increase and the original maturity of the loan significantly influence the likelihood of negative amortization. In the case of the specified automobile loan, negative amortization is very unlikely. Even if the rate were to increase by 18 percentage points after the first month (making a total rate of 33 percent), negative amortization would not occur. The later in the contract life the adjustment occurs, the less likely negative amortization becomes.

TABLE 10
Increase in Finance Rate for Negative Amortization of New Automobile Loan and
Second Mortgage Loan,* Given a Permanent Increase in APR at Different Point in Time

Required Percentage Point Increase In APR for Negative Amortization
 Throughout Remaining Term of Loan

Increase in APR After Month	Automobile Loan	Second Mortgage Loan
0	18.92	1.83
6	21.90	1.96
12	26.60	2.13
18	33.22	2.32
24	43.19	2.53
30	59.87	2.76

*Initial terms for auto loan: \$8,000 loan for 48 months, 15 percent rate, and monthly payments of \$222.65. Initial terms of second mortgage 1-in: \$15,000 Loan for 15 years, 15 percent rate, and monthly payments of \$209.94. Increase in APR assumed to occur after month shown.

The same protection from negative amortization does not characterize the 15-year second mortgage loan. Were the effective rate to rise after the sixth month by two percentage points to 17 percent, negative amortization would occur. It is this danger that has apparently caused most lenders to require an adjustment in the amount of monthly payment on long-term ARLs. However, as shown in Table 6, consumers and lenders are still exposed to potential payment shock the greater is the increase in the APR and the earlier in the contract life that it occurs (Table 2).

SUMMARY AND CONCLUSIONS

The potential for payment shock or collateral shock on four- and five-year automobile loans appears relatively slight for consumers. Consequently, lenders offering these loans are probably not adding much credit risk for the interest-rate risk transferred in part to consumers. If consumers appear to be reasonably aware of the potential adjustments in their ARL contracts on automobiles, there appears to be little justification for government intervention in this market.

In contrast, there is an opportunity for considerable payment shock in the case of 15-year adjustable-rate second mortgages. However, this conclusion relates only to the possibility, not to the likelihood. To judge the likelihood of payment shock, it is necessary to test what would have happened over the period 1974-1984 had 15 year ARLs been written monthly, based on various indices. This period is appropriate because it includes the most rapid increases in interest rates in recent history, as well as widely varying interest rates. To the extent that these simulations reveal a potential for payment shock, it may be thought desirable to limit the potential fluctuations in consumers' monthly payments as a "consumer protection" measure. However, we must recognize that such regulatory limits also cause lenders to bear a higher portion of the interest rate risk, thereby leading

them to increase the initial APR on adjustable-rate loans. As a result, those consumers who would have preferred to bear the risk in return for a lower APR are forced to take what is for them, a less-desirable contract.

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