WORKING PAPERS

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WORKING PAPER NO. 99

May 1983

BUREAU OF ECONOMICS
FEDERAL TRADE COMMISSION
WASHINGTON, DC 20580

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This paper does not reflect the opinions or official position of the Federal Trade Commission or any of its Commissioners. The outstanding and invaluable research assistance of Patrick Mason, Department of Economics, University of Michigan and Marsha Harris, Department of Public Policy, University of Rochester, is gratefully acknowledged. I alone am responsible for any errors.

I. INTRODUCTION

A stunning conclusion of a recent investigation of prejudicial discrimination in credit markets is that even before federal legislation was enacted banning it, systematic patterns of discrimination against at least one "protected" group did not exist. Although it was the powerful lobbying of women's groups that led to the passage of equal credit opportunity legislation (Gelb and Palley, 1979), Peterson (1981) found in his analysis of 30,000 commercial bank consumer loans no evidence of illegal discrimination against females long before the enactment of the federal Equal Credit Opportunity Act (ECOA).

Other groups, of course, are protected by ECOA. The act, passed in 1975 and amended in 1976 by implementing Federal Reserve Board Regulation B essentially makes it unlawful for any creditor to discriminate against any applicant in any aspect of a credit transaction on the basis of race, color, religion, national origin, sex, or marital status. While evidence suggests there is (or was) no sex discrimination in credit markets (Ladd, 1982), virtually no evidence of any kind exists concerning possible credit discrimination against a second powerful lobbying group instrumental in ECOA's passage: the elderly. Is that because there is no credit discrimination against elderly borrowers either?

Older consumers, having already accumulated assets and durable goods, are less likely than younger consumers to purchase commodities by assuming additional debt. Tabulations from the raw data used in the Federal Reserve Board's 1977 Consumer Credit Survey (Durkin and Elliehauser, 1978) illustrate this. Of 459 respondents over the age 62 who had made a recent $200 purchase, 309 paid for it in cash. In contrast, of the 1,841 nonelderly respondents who had made a recent $200 purchase, only 478 used cash: The rest used some form of credit. This finding is consistent with life-cycle models of income and expenditures that show the demand for loans falls after some peak age. Note that this finding does not prove that there is a lower availability of credit to the elderly. Observation of a low level of credit use does not always indicate credit discrimination.

Intuition suggests, in any event, that there might be a variety of reasons for restricting the availability of loans to elderly borrowers. Admittedly ad hoc explanations include these: Elderly persons are likely to die and thereby to default on their loans; they are likely to receive diminishing labor earnings; they are unlikely to renew their loans repeatedly over a span of years; and they pose added collection costs associated with delinquency, which often is precipitated either by illness or by mere forgetfullness. Any or all of these explanations may be valid. It is an empirical exercise to support or refute them. Yet, in the total absence of court precedent, it is impossible to tell which

of these explanations would justify discriminatory treatment and thus be lawful practices. Obviously, though, the question is moot if no disparity between nonelderly and elderly borrowers can be found.

Are there disparities in credit outcomes between elderly borrowers and nonelderly borrowers? If so, can the disparities be "explained" by the cost-justified factors? This paper, using a unique data set on personal loan contracts from the nine largest consumer finance companies in the United States, addresses these two questions. A simple model of the supply and demand for credit is presented. Conditions are established demonstrating when discrimination can be inferred simply from knowledge of changes in equilibrium values of interest rates and amounts lent. Next, these equilibrium values are estimated as reduced-form equations for elderly and nonelderly borrowers. Proxies for delinquency cost and default probabilities are estimated and subsequently are used as controls in the reduced-form equations. Moreover, these equations are estimated for contracts before and after the effective date of the amended Regulation B. For each of the estimates the equilibrium amounts lent to and interest rates received by elderly borrowers are predicted. Predictions also are provided for what the equilibrium amounts lent to and interest rates received by elderly borrowers would have been had the elderly faced the same supply and demand schedules as similarly situated nonelderly borrowers.

Simply stated, the results indicate that elderly borrowers could expect to pay lower interest rates and to receive larger loans should they face the same supply and demand curves as similarly situated nonelderly borrowers. If, however, the supply and demand schedules are "well behaved," then the differentials in interest rates and loan amounts cannot be attributable only to differences in tastes or preferences by borrowers. In other words, differences must exist in the availability of credit. This finding is repeated whether one controls for the default costs or one separates the contracts before ECOA from those entered after ECOA. At least some fraction of the disparity is a result of lender decisions not explained by our measures of cost-justified factors. Our findings thus underscore the possibility of unlawful credit discrimination on the basis of age.

II. MODEL

Supply and demand for loans are essential ingredients of our model. The demand for loans is assumed to depend upon the rate of interest, characteristics of the borrower, and characteristics of the loan, described by

$$L^d = L^d (r, X, Z) \qquad (2.1)$$

where r denotes the rate of interest, X is a vector of borrower characteristics and Z is a vector of loan characteristics. It is possible to derive this basic equation from any number of postulates. Myers (June 1981) assumes a two-period model: The

borrower maximizes the sum of the single-period expected utilities of consumption subject to single-period expenditure constraints. In contrast, Barth and Yezer (1980) assume that the borrower maximizes a single expected utility function, which depends on consumption in periods one and two, subject to a two-period budget constraint. Both authors, nonetheless, are able to demonstrate that under fairly innocuous restrictions the demand for loans is a declining function of the interest rate, expressed by

$$\frac{\partial L^d}{\partial r} < 0. \qquad (2.2)$$

The supply price of loans, r^s, is assumed to depend on the level of loan, L, a vector of characteristics of the loan, Z, and a vector of characteristics of the lender, W. This totally general characterization of loan supply,

$$r^s = r^s (L, Z, W), \qquad (2.3)$$

is consistent with a variety of models of lender behavior. Lenders might maximize their expected profits from loans or, if portfolio holders, they may attempt to allocate their wealth among consumer loans and other income-producing assets. The market supply price of loans depends on the cost of lending, on the opportunity cost of funds, and on the administrative costs associated with reviewing the loan application, making determinations on the terms and conditions of the loan, and monitoring the loan throughout its life. We assume that Z captures most of these phenomena.

The lender's decision to make a loan depends on an assessment of risk. The lender's anticipated return is a function of the likelihood that borrowers repay the loan and fulfill their obligations in a timely manner. Lenders who underestimate the risks will experience below-normal profits and will be rewarded with declining shares of the market, if the market is competitive.

If it is possible to segment risks in the borrower population such that those who present unacceptable anticipated net returns are excluded and those who present acceptable net returns are offered loan terms of varying levels of attractiveness, then among loans actually granted the characteristics of the loan, Z, would measure most of the varying levels of risk. For loans of $1,000, for example, there may be various supply prices (interest rates). For an unsecured, long-term loan for personal debts the rate might be 30 percent. For a short-term, secured automobile loan the rate might be 15 percent. The justification for such a differential might be the higher costs of servicing unsecured personal loans compared to automobile loans, coupled with the higher probability that such loans are never repaid. In this instance the differing risks are captured in the vector Z.

Perhaps the segmentation among risks is based on characteristics of the borrowers, X, and not upon Z. Loans made to elderly borrowers, for example, may be made at higher interest rates--and in lower amounts--than those made to nonelderly borrowers in otherwise similar circumstances, simply because elderly borrowers

are more likely to die and thus pose greater risks. The justification for the resulting differential is apparent. In such a world the supply function would be

$$r^S = r^S (X, Z, W, L). \tag{2.4}$$

In order to isolate the "justified" and "unjustified" differentials arising from attempts to segment risks it is useful to include explicitly a measure of default risk. Let D_i be an unobserved measure of the actual performance on a given loan by an individual i with characteristics X_i and for the loan with characteristics Z_i. Define $\hat{D}_i$ as the predictor of D_i, given X_i and Z_i, and some vector of parameters $\hat{\beta}$ such that

$$E (D_i) = \hat{D}_i, \tag{2.5}$$

where

$$\hat{D}_i = g (X_i, Z_i; \hat{\beta}). \tag{2.6}$$

The expected performance on any loan, given characteristics X and Z, can then be placed into the supply equation to isolate the effects of X and Z that are unrelated to risk, and the supply equation can be rewritten

$$r^S = r^S (X, Z, W, L; \hat{D}). \tag{2.7}$$

The effect on r^S of some variable x, where x is an element of the vector X or Z, is given by

$$\frac{\partial r^S}{\partial x} = \frac{\partial r^S}{\partial x}\bigg|_{d\hat{D} = 0} + \frac{\partial r^S}{\partial \hat{D}} \cdot \frac{\partial \hat{D}}{\partial x}, \tag{2.8}$$

with the last product in the above expression representing the "justified" portion of the supply differential. If $\partial\hat{D}/\partial x$ is zero, then the total effect of x on supply price is captured by the effect obtained by partially differentiating r^s in equation (2.3) with respect to x, save for any bias introduced by D's omission. (Moreover, if D is measured by something other than X or Z, this bias could be substantial.)

It is convenient to solve the demand and supply equations simultaneously to yield the following reduced-form equations:

$$r = r(X, Z, W) \qquad (2.9)$$
$$L = L(X, Z, W)$$

or

$$r = r(X, Z, W, \hat{D}) \qquad (2.10)$$
$$L = L(X, Z, W, \hat{D}).$$

Note that it is now ambiguous whether $\partial r/\partial x > 0$ means characteristic x raises <u>supply</u> price. This is true in both versions of the reduced-form equations. The factor x may affect demand or it may affect supply. In most instances the ability to decipher these separate effects depends on knowledge about the underlying structural demand and supply equations. We shall adopt the following assumptions that provide sufficient conditions for the determination of comparative static effects:

$$\text{(a)} \quad \partial r^s/\partial L > 0 \qquad (2.11)$$
$$\text{(b)} \quad \partial L^d/\partial r < 0.$$

Then, whenever

$$\partial r/\partial x > 0 \text{ and } \partial L/\partial x < 0, \qquad (2.12)$$

it must be the case that $\partial r^S/\partial x > 0$. In other words, if the demand curve is downward sloping and the supply curve is upward sloping, then a finding from the reduced-form equations that the factor x raises interest rates and lowers loan sizes implies that the supply curve has shifted up to the northwest. Obviously, these conditions are not necessary for the supply curve to shift; but if these conditions are met, one can rule out the possibility that all of the rising in equilibrium interest or fall in the level of loans is due to demand shifts alone.

In principle, a test of lender discrimination on the basis of, say, factor x--age, race, sex, or whatever--is a test that $\partial r^S/\partial x \neq 0$. Advantageous discrimination would be that $\partial r^S/\partial x < 0$ and disadvantageous discrimination would be that $\partial r^S/\partial x > 0$. It would be unjustified, moreover, if $\partial D/\partial x = 0$. The factor x, however, often interacts with numerous other factors, making the derivation of $\partial r^S/\partial x$ laborious. Garfinkel and Haverman (1979) formalize an elegant yet simple measure of discrimination. Their method has come to be known as "residual discrimination" analysis because it computes the residual gap in the dependent variable as a consequence of differential treatment that cannot be attributed to justified factors.

Let the factor x denote elderly or nonelderly status. A sample can be partitioned between those who are elderly and those who are not. The reduced-form interest rate and loan-size equations for the elderly can be given as

$$L^x = L(X_1^x, Z^x, W^x, \hat{D}^x; \phi^x), \text{ and}$$

$$r^x = r(X_1^x, Z^x, W^x, \hat{D}^x; \theta^x) \tag{2.13}$$

where the superscript x denotes the partition of elderly borrowers and where ϕ^x and θ^x are vectors of effects or impacts that the exogenous variables have on the interest rate and loan size. Similarly for the nonelderly partition, $\tilde{x}$,

$$L^{\tilde{x}} = L(X_1^{\tilde{x}}, Z^{\tilde{x}}, W^{\tilde{x}}, \hat{D}^{\tilde{x}}; \phi^{\tilde{x}}),$$

$$r^{\tilde{x}} = r(X_1^{\tilde{x}}, Z^{\tilde{x}}, W^{\tilde{x}}, \hat{D}^{\tilde{x}}; \theta^{\tilde{x}}), . \tag{2.14}$$

Note that X_1 is a subset of X; the variable x is excluded in those equations. What would the equiblibrium interest rate and loan size be if the elderly were treated like nonelderly borrowers? Of course, elderly characteristics would remain the same. Only the <u>effects</u> of their characteristics or outcomes would differ. Then their outcomes would be

$$\hat{L}^x = L(X_1^x, Z^x, W^x, \hat{D}^x; \phi^{\tilde{x}}) \text{ and}$$

$$\hat{r}^x = r(X_1^x, Z^x, W^x, D^x; \theta^{\tilde{x}}). \tag{2.15}$$

Disadvantagous discrimination is said to exist when

$$\hat{L}^x - L^x > 0 \text{ and}$$

$$\hat{r}^x - r^x < 0, \tag{2.16}$$

where both equalities cannot simultaneously hold, and when the conditions of equation (2.11) are met. One readily sees that the above characterization of discrimination is analogous to that contained in inequalities (2.12).

The model of credit-market equlibrium sketched here has two important limitations: First, since the model ignores usury ceilings and other regulations of the supply or price of loans, the possibility that "discrimination" is merely a form of nonprice rationing is not considered. (John Marshall [1982] in a provocative analysis concludes that "viewing discrimination as a form of nonprice rationing is the appropriate approach" to follow, at least in the case of consumer credit.) Second, default risk is assumed to be independent of interest rates or loan level. It is therefore assumed that default risk is exogenous. Whether default risk is exogenous or whether usury ceilings are binding, of course, are merely twists in the model that essentially affect the equation specifications and the method of estimation. Yet these twists, which usually require the estimation of the underlying structural parameters, can affect the interpretation of the "discrimination" measure derived from reduced form equations. For the present paper these twists are sidestepped in the interest of simplicity.

III. SPECIFICATION AND ESTIMATION OF MODEL

In the course of deliberations on the proposed Federal Trade Commission Credit Practices Rule, the National Consumer Finance

Association sampled the files of active accounts of its nine largest members. The firm Ernst and Ernst provided the sampling design to assure a representative and unbiased national random sample. The resulting data set is described in great detail by Joan Duncan and Anthony Yezer (1980). The data set was used in preparing the principal econometric analysis upon which the FTC Staff report (1980) was based. The present sample consists of 13,588 observations from 46 states. of these, 25 percent represent sales finance contracts, while the rest are cash loans.

Each file contains information on the date of birth of the borrower, marital status, family characteristics, income and debt, type of borrower (new, former, or present), purpose of the loan, type of security used, contract provisions (including creditor remedies) as well as the amount financed, the annual percentage rate of interest, and information on delinquency. Computed from this information are: the age of the borrower, monthly income net of other debt payments (disposable income), the percentage of family members who are income earners, delinquency status (if more than 30, 60 or 90 days), and a delinquency cost variable.

The delinquency cost measure deserves special comment. The files contain a wealth of information on a variety of activities that lenders frequently engage in when attempting to collect on delinquent loans. All of these activities involve costs; yet it is difficult to create a uniform measure that combines the cost of, say, telephoning a delinquent debtor and of, say, sending the

debtor a letter. In fact, some communications with the debtor may be unrelated to delinquency and the cost of these should not be imputed as a delinquency cost. A variable that measures the probability of the lender incurring an out-of-pocket expense associated with debtor delinquency or of having to pursue a greater than average number of normal dunning activities was created by assigning a variable delinquency cost equal to one if

- the borrower had a positive contract balance when repossession or foreclosure took place,
- the loan security had to be sold,
- a wage assignment had to be taken on the account,
- the number of telephone calls made to the debtor exceeded the average number of eight,
- the account had to be sent to an attorney for collection,
- the account was sent to a small claims court or collection agency, or
- a judgment had to be obtained on the account.

Otherwise the variable delinquency cost is equal to zero. For the entire sample the average value of this variable is approximately equal to .32.

The convention established by Barth and Yezer (1980) is useful in specifying the demand and supply equations in our model. The demand for loans (the amount financed) is assumed to be a function of the effective annual percentage rate (APR), characteristics of the borrower, contract provisions (credit remedies) and the purpose of the loan. The supply price of credit, or APR, is

assumed to be a function of the amount financed, characteristics of the borrower, contract provisions, and the type of security used.

Ideally one would want to estimate the structural parameters of the supply and demand functions discussed above. As Sickles and Yezer (1981) have shown, however, obtaining the structural parameters in a model constrained by usury ceilings is an extremely complicated and often indeterminate process. The switching regression results of Avery (1981), moreover, confirm that attempts to obtain structural parameters in such models frequently end in frustrated ambiguity.

The convenient assumptions can dramatically simplify the estimation problem. First, it is assumed that the demand and supply schedules are "well-behaved." Second, it is assumed that the usury ceilings are not binding. Together these assumptions permit us to derive reduced form equations for the APR and amount financed, to estimate them using ordinary least squares, and to infer from the estimated coefficients shifts in the underlying structural equations.

IV. THE RESULTS

Table 1 presents estimates of the coefficients of the APR and amount-financed equations for elderly and nonelderly borrowers. Generally, secured loans raise the equilibrium level of credit and lower the APR. For nonelderly applicants, in addition, use of the

TABLE 1

OLS Reduced-Form Regression for the Demand and Supply of Credit for Elderly and Nonelderly Subgroups

Independent Variable	Dependent Variables			
	Elderly*		Nonelderly	
	APR	Amount Financed	APR	Amount Financed
	Coefficient (Std. Error) (Means)		Coefficient (Std. Error) (Means)	
Late charges on precomputed accounts	-.0003 (.0047) (5.0956)	.9617 (.7027)	.0001 (.0014) (5.0503)	1.3766 (.2347)
Disposable income	-.0002 (10.0023) (442.3874)	-.0116 (.0344)	.0000 (.0000) (394.5581)	.0000 (.0062)
Former borrower	1.6954 (.7870) (.0881)	43.5910 (117.2720)	1.3142 (.1725) (.0858)	93.4031 (27.3480)
Present borrower	-.1157 (.5087) (.6013)	360.7160 (75.8094)	-.4063 (.1086) (.4495)	407.9419 (17.2126)
Unmarried	1.0283 (.4317) (.2868)	-288.4094 (64.3276)	1.2214 (.1009) (.2753)	-272.1967 (16.0052)
Separated	.5326 (1.3314) (.0214)	-392.9752 (198.4014)	1.2794 (.2639) (.0293)	-251.2892 (41.8363)
Other charge method for late charges	-.4427 (.8998) (.0503)	89.0497 (134.0799)	.3484 (.1912) (.0603)	149.2448 (30.3103)
Advance waiver exemptions in contract	-.1104 (.4256) (.3107)	-40.5307 (63.4230) (63.4230)	.1125 (.1033) (.2774)	-131.8313 (16.3815)

Continued

TABLE 1--(Continued)

OLS Reduced-Form Regression for the Demand and Supply of Credit for Elderly and Nonelderly Subgroups

Independent Variable	Dependent Variables			
	Elderly*		Nonelderly	
	APR	Amount Financed	APR	Amount Financed
	Coefficient (Std. Error) (Means)		Coefficient (Std. Error) (Means)	
Confession of judgment provision in contract	3.5777 (1.3779) (.0226)	47.1108 (205.3179)	.1125 (.2852) (.0278)	-131.8313 (45.2004)
Attorney's fees provision in contract	-.3837 (.4268) (.4855)	35.4019 (63.6066)	-.4061 (.0990) (.5298)	-.0666 (15.6996)
Wage assignment taken on contract	-1.2053 (.6521) (.5535)	119.7338 (100.6851)	-.1248 (.1508) (.116)	-53.8991 (23.9001)
Provision for deferring past-due installments	1.5623 (.5296) (.5535)	180.881 (78.9178)	2.0435 (.1190) (.5274)	57.2626 (18.8609)
Late charges in contract	-1.4131 (.6065) (.7434)	-272.0918 (90.3816)	-1.8970 (.1466) (.7975)	-175.3448 (23.2458)
Credit use to purchase				
Named items	.7286 (.8419) (.2981)	-46.5941 (125.4568)	-.2423 (.1737) (.4145)	45.9612 (27.5365)
Real property	-3.0118 (2.2292) (.0075)	654.9881 (332.1776)	-1.0046 (.4331) (.0108)	189.1548 (68.6476)

Continued

TABLE 1--(Continued)

OLS Reduced-Form Regression for the Demand and Supply of Credit for Elderly and Nonelderly Subgroups

Independent Variable	Dependent Variables			
	Elderly		Nonelderly	
	APR	Amount Financed	APR	Amount Financed
	Coefficient (Std. Error) (Means)		Coefficient (Std. Error) (Means)	
Credit use to purchase--(Continued)				
Mobile home	3.2499 (5.5519) (.0013)	68.8524 (827.7620)	-2.1935 (1.1424) (.0016)	642.2494 (181.0531)
Auto rectional-tional vehicle	-2.2345 (1.0997) (.0629)	455.2315 (163.8633)	-.1114 (.2050) (.1158)	169.5679 (32.4937)
Household goods	-3.3474 (.9613) (.1019)	-307.2248 (143.2415)	-1.3854 (.1922) (.1557)	-284.3937 (30.4622)
Other goods	-2.2756 (.8357) (.1862)	36.7265 (124.5322)	-1.2970 (.1800) (.2151)	-195.2431 (28.5365)
Security used				
Real property	-1.9245 (1.0073) (.0440)	1922.612 (150.1056)	-4.0361 (.3145) (.0212)	2840.065 (49.8456)
Mobile home	-2.5904 (3.2181) (.0038)	3453.003 (479.5326)	-2.3468 (.9008) (.0025)	1394.284 (142.7595)
Household goods	-.1030 (.8847) (.5572)	175.9750 (131.8290)	-.7704 (.1909) (.5188)	479.8583 (30.2645)

Continued

TABLE 1--(Continued)

OLS Reduced-Form Regression for the Demand and Supply of Credit for Elderly and Nonelderly Subgroups

Independent Variable	Dependent Variables			
	Elderly*		Nonelderly	
	APR	Amount Financed	APR	Amount Financed
	Coefficient (Std. Error) (Means)		Coefficient (Std. Error) (Means)	
Security used--(Continued)				
Other goods	-1.5436 (1.0205) (.1610)	-117.1823 (152.0714)	-.7704 (.1909) (.2365)	205.3788 (34.5003)
Cosigner: not spouse	1.7669 (1.4379) (.0201)	-458.0957 (214.2629)	.1246 (.2306) (.0441)	139.8349 (36.5494)
Unsecured	1.4654 (.9964) (.2264)	-184.5845 (148.4767)	1.1017 (.2216) (.1362)	31.4029 (35.1328)
Auto	-1.1223 (.7011) (.1107)	418.9155 (104.4698)	-1.6726 (.1518) (.1362)	771.0263 (24.0655)
Constant	24.0725	1047.475	24.3381	845.3443
Number of Cases	795	795	12792	12792
R^2	.1649	.4094	.2054	.4403
F	5.8354	20.4757	126.9140	386.2419
Standard Error	5.3315	794.4420	4.9778	788.8677

* Elderly age 58 and above.

loan to buy real property, a mobile home, or an automobile lowers APR and raises the loan amount. Being a present customer as opposed to being a new borrower means paying a lower interest rate and receiving a larger loan. The effects of creditor remedies, however, are mixed and often insignificant. While having late charges in the contract lowers the equilibrium interest rate, it also lowers the loan amount for both elderly and nonelderly borrowers. In contrast, having an attorney's fee provision in the contract raises the level of loan for elderly borrowers, without significantly affecting the rate of interest, and lowers the interest rate for nonelderly borrowers, without significantly affecting the level of loans. At the very least these results suggest that the determinants of supply and demand credit differ between elderly and nonelderly borrowers.

The equilibrium APR and amount lent predicted by the elderly equations in the first two columns of Table 1 are found to be 22.97 percent and $1,242.31. If the nonelderly coefficients from the last two columns of Table 1 are used to predict what APR elderly borrowers would pay and how much they would be lent when they face the same credit supply and demand schedules as nonelderly borrowers, then the resulting predictions are 22.771 percent and $1,357.76. As is seen in the first column of Table 7, the mean differences are statistically significant: Elderly borrowers would pay lower interest rates and receive larger loans if they faced the same market conditions as nonelderly borrowers.

From our earlier theoretical discussion it is clear that--for well-behaved supply and demand--this cannot be a result of lower elderly demand for credit alone.

We have estimated the residual or gap--discrimination, if you will--without considering the possibility that elderly borrowers may be riskier prospects than nonelderly borrowers. It is therefore plausible that any discriminatory treatment of elderly borrowers is perfectly justified on legitimate business grounds. To explore this further, we estimate in Tables 2 and 3 logistic functions for the probability of delinquency and the probability of default cost.

Three measures of delinquency are explored in Table 2. More than 30 days delinquency is Default 1. As can be expected, more stringent creditor remedies in the loan contract generally lower delinquency rates, while unsecured loans are associated with higher delinquency rates. The larger the fraction of the loan paid off, the lower the delinquency rate. Similarly, the larger the fraction of wage earners in the family, the lower the 30-day delinquency rate. While marital status and type of borrower appear to affect delinquency, age does not. Both age and age squared are entered as determinants of the 30-day delinquency rate in order to capture the expected nonlinearities in the effects of age. More than 60 days delinquency is Default 2 and more than 90 days is Default 3. Similar results emerge using these alternative measures with the exception of the effect of age. Now there is

TABLE 2

Logit Analysis of the Probability of Default

Independent Variables	Dependent Variables		
	Default 1 coef. (t-value)	Default 2 coef. (t-value)	Default 3 coef. (t-value)
Age of borrower	.0201 (.5128)	-.0874 (-1.7719)	-.1164 (-1.6363)
Age squared	-.0004 (-.9265)	.0008 (1.3416)	.0009 (1.0488)
Late charges on precomputed accounts	.0071 (2.545)	.0085 (2.7183)	.0112 (3.1934)
Disposable income	.0000 (.1085)	-.0000 (-.5105)	-.0002 (-.8718)
Former borrower	-.6187 (-2.175)	-.0137 (-2.2233)	-1.6246 (-1.5589)
Present borrower	.1604 (1.066)	-.0798 (-.3413)	.0450 (.1384)
Unmarried	.1565 (1.033)	.0246 (.1001)	.0954 (.2798)
Separated	.6143 (1.648)	.0127 (2.6724)	1.1109 (1.6508)
Other charge method for late charges	-.2413 (-.7572)	-.3294 (-.6392)	-.1433 (-.2158)
Advance waiver exemptions in contract	-.8301 (-5.047)	-.8334 (-2.9347)	-.7065 (-1.7465)
Confession of judgment provided in contract	+.3545 (.9647)	.3088 (.5557)	.6638 (1.0093)
Attorney's fees provided in contract	-.1502 (-1.076)	-.2502 (-1.1168)	-.6362 (-1.9895)

Continued

TABLE 2--(Continued)

Logit Analysis of the Probability of Default

Independent Variables	Dependent Variables		
	Default 1 coef. (t-value)	Default 2 coef. (t-value)	Default 3 coef. (t-value)
Wage assignment taken on contract	-.3914 (-1.693)	-.0191 (-.0555)	.1035 (.3687)
Provision for deferring past-due installments	-.1760 (-1.693)	.0649 (.2446)	-.1224 (-.3339)
Late charges in contract	.0057 (.0291)	.2253 (.6940)	.5158 (1.1052)
Credit used to purchase named items, real property, or household goods	-.4231 (-2.927)	-.7808 (-3.2155)	-.3784 (-1.1644)
Percentage of wage earners in family	-.4298 (-3.109)	-.4201 (1.9289)	-.6729 (-2.2212)
Percentage of loan paid to date	-.3244 (-2.25)	-.9604 (-4.4777)	-.9495 (-3.187)
Unsecured loan	.2382 (1.453)	.1121 (.4382)	.2208 (.6247)
Constant	-.4391 (-.5666)	.6973 (.6899)	.5820 (.4102)
X^2	93.60	79.43	57.24

TABLE 3

Maximum=Likelihood Estimates of Logistic Model of Default Costs

Independent Variable	Means		Probability of Default Cost	
	D cost = 1	D cost = 0	Coefficient	T-Statistic
Age	35.60	35.78	-.0049	-.1462
Age squared	14.08	14.29	-.0000	-.0825
Percentage of loan paid	.73	.86	-.6723	-4.5543
Late charge	1.01	1.88	.0841	8.3708
Disposable income	411.32	372.25	.0000	.3644
Former borrower	.10	.09	.4590	1.9849
Present borrower	.51	.412	.4239	2.7960
Unmarried	.28	.25	.3399	2.2479
Separated	.03	.02	.3194	.8006
Loan used to purchase named items, real property, or household goods	.38	.47	-.0677	-.4823
Other charge method for late charges	.08	.05	.2568	.9617
Unsecured loan	.21	.19	-.0972	-.5761

Continued

TABLE 3--(Continued)

Maximum=Likelihood Estimates of Logistic Model of Default Costs

Independent Variable	Means		Probability of Default Cost	
	D cost = 1	D cost = 0	Coefficient	T-Statistic
Percentage of family members wage earners	.57	.62	-.1893	-1.3742
Advance waiver of exemptions in contract	.27	.30	.0055	.0386
Confession of judgment in contract	.05	.01	-1.2622	-1.1924
Attorney's fees in contract	.45	.57	-.1635	-1.1217
Late charge in contract	.79	.78	-.3176	-1.6555
Provision for deferring past=due installment	.56	.49	.0271	.1702
Constant			-.4371	
X^2			618.90	

observed a convex-quadratic relationship between age and delinquency. First, as one ages delinquency rates fall. However, after some critical age delinquency then begins gradually to creep upward. This upward creep is not quite statistically significant at the weak 10-percent level for Default 2 and is statistically insignificant at the most liberal levels for Default 3. But it is worth noting when this upward creep begins in any event. The age that minimizes 60-day delinquency--the "optimal age"--is 53. The age that minimizes 90-day delinquency is 61. Before and after these peak years, delinquency rates are higher. Elderly borrowers do appear to become more delinquent in their payments as they become older, but even at the ripe age of 70 their expected delinquency rates are far lower than those of average 35-year-olds.[1]

Table 3 presents the estimates of the coefficients in still another measure of default, the probability of default costs. Age is found to have no statistically significant effect on default, and even so the estimated signs suggest that elderly borrowers are probably lower credit risks than younger borrowers. The statistically significant effects on the default cost probability are the

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[1] Note that $\frac{\partial P}{\partial age} = p\ (1 - p)\ (B_1 + 2\ B_2\ Age)$

Where B_1 = coefficient on age and B_2 = coefficient in Age^2. Assuming that $p > 0$, we can solve for the optimal age by setting $B_1 + 2\ B_2$ Age equal to zero. If $p = 1$ or $p = 0$, of course a unique otpimum is no longer assured.

percentage of loan paid, late charges, borrower type, and marital status. As can be expected, the larger the fraction of the loan paid off, the lower the probability of default cost. Unmarried borrowers, as compared to married borrowers, tend to induce higher default cost probabilities. Former and present borrowers, as opposed to new borrowers, tend to have higher default cost probabilities. And, unexpectedly, larger late charges are associated with higher default cost probabilities, even though the existence of a late charge in the contract has the anticipated effect of reducing the default cost probability.

The four measures of default cost and delinquencies are simply proxies for the more conventional notion of default. Since the data set does not include charged-off loans it is not possible to estimate this variable directly. One can argue, moreover, that of the three delinquency measures only the 90-day rate is a suitable substitute for default. In our subsequent analysis the 90-day delinquency rate and the default cost rate will be used to control for default risk.

Table 4 presents reestimations of the reduced-form loan and APR equations controlling for predicted 90-day delinquency rates and predicted default cost rates. The predictions are derived from the estimates provided in Tables 2 and 3. Neither the predicted delinquency rate nor the predicted default cost rate appears to exhibit a strong statistical effect on the amount lent or the APR for elderly borrowers. In contrast, both affect the

TABLE 4

OLS Reduced Form Regressions for the Demand and Supply of Credit: Controls for Default Risk
(Standard errors in parentheses)

Independent Variable	Dependent Variables: Elderly				Nonelderly			
	Amount Financed		APR		Amount Financed		APR	
Age	-230.64	-220.07	1.6404	1.5956	29.34	18.15	-.2092	-.2215
	(142.18)	(142.18)	(.9620)	(.9602)	(4.94)	(5.09)	(.0312)	(.0322)
Age squared	1.52	1.45	-.0116	-.0113	-.27	-.17	.0022	.0023
	(1.09)	(1.09)	(.0074)	(.0074)	(.06)	(.06)	(.0004)	(.0004)
Late charges on Precomputed accounts	1.37	2.97	-.002	.0206	.70	4.36	.0018	.0027
	(.76)	(2.18)	(.0051)	(.0147)	(.23)	(.39)	(.0017)	(.0025)
Disposable income	-.02	-.03	-.0002	-.0002	-.00	-.02	.0001	.0001
	(.03)	(.03)	(.0002)	(.0002)	(.01)	(.01)	(.0000)	(.0001)
Former borrower	57.60	34.47	1.6954	1.8590	47.49	68.22	1.4999	1.4501
	(117.66)	(116.64)	(.7961)	(.7877)	(27.21)	(27.21)	(.1737)	(.720)
Present borrower	375.76	384.28	-.1741	-.0533	355.54	375.60	-.1930	-.2495
	(76.86)	(75.02)	(.5202)	(.5066)	(17.23)	(17.17)	(.1122)	(.1089)
Unmarried	-251.81	-265.37	.8871	.9892	-244.69	-249.46	1.0378	1.0045
	(64.33)	(63.89)	(.4353)	(.4315)	(16.17)	(16.18)	(.1028)	(.1026)
Separated	-340.91	-365.06	.3272	.2627	-270.06	-257.40	1.3429	1.3069
	(196.86)	(196.41)	(1.3320)	(1.3265)	(41.54)	(41.40)	(.2631)	(.2625)
Other charge	117.40	67.34	-.5806	-.5058	138.01	134.42	.3716	.3309
	(134.84)	(133.01)	(.9124)	(.8983)	(30.09)	(30.04)	(.1907)	(.1905)

Continued

TABLE 4--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Controls for Default Risk
(Standard errors in parentheses)

Independent Variable	Dependent Variables: Elderly				Nonelderly			
	Amount Financed		APR		Amount Financed		APR	
Contract provisions								
Advance waivering exemptions	-8.73 (63.21)	-31.28 (65.52)	-.1806 (.4276)	-.3721 (.4425)	-137.17 (16.27)	-187.52 (17.62)	.1451 (.1028)	.1087 (.1080)
Confession of judgment	3.61 (204.86)	38.31 (207.47)	3.8987 (1.3861)	4.2003 (1.4012)	88.76 (44.87)	162.88 (45.59)	1.5894 (.2837)	1.6805 (.2891)
Attorney's fees	55.64 (63.16)	41.61 (65.93)	.4753 (.4274)	-.6846 (.4452)	1.83 (15.59)	-48.41 (16.42)	-.4151 (.0985	-.4563 (.1041)
Wage assignment	436.15 (218.91)	123.08 (99.84)	-2.5172 (1.4812)	-1.1351 (.6743)	-264.61 (44.80)	-42.27 (23.77)	.4108 (.2833)	-.0498 (.1508)
Deferring past-due installments	167.31 (78.21)	162.40 (78.65)	1.5930 (.5292)	1.5042 (.5312)	57.35 (18.72)	46.82 (18.70)	2.0358 (.1183)	2.0243 (.1186)
Late charges	-275.74 (89.75)	-250.45 (90.21)	-1.3826 (.6073)	-1.3237 (.6092)	-169.34 (23.08)	-149.97 (23.14)	-1.9146 (.1459	-1.8869 (.1469)
Credit used to purchase								
Named items	-59.54 (124.07)	-62.17 (124.32)	.8104 (.8394)	.7401 (.8396)	55.39 (27.35)	30.09 (27.38)	-.2863 (.1728)	-.3035 (.1736)

Continued

TABLE 4--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Controls for Default Risk
(Standard errors in parentheses)

Independent Variable	Dependent Variables: Elderly				Dependent Variables: Nonelderly			
	Amount Financed		APR		Amount Financed		APR	
Credit used to purchase--(Continued)								
Real property	539.33	547.46	-2.5521	-2.6652	181.67	168.89	-.9593	-.9646
	(328.86)	(329.15)	(2.2251)	(2.2230)	(68.16)	(67.94)	(.4307)	(.4308)
Mobile home	-52.25	-58.36	3.6950	3.9162	674.94	631.00	-2.3574	-2.3710
	(818.45)	(819.36)	(5.5378)	(5.5337)	(179.76)	(179.20)	(1.1358)	(1.1362)
Auto, Rec. vehicle	435.22	443.34	-2.1735	-2.2411	186.73	172.01	-.2026	-.2045
	(162.06)	(162.12)	(1.0965)	(1.0949)	(32.28)	(32.19)	(.2040)	(.2041)
Household goods	-342.07	-340.27	-3.2319	-3.2802	-279.53	-287.99	-1.4005	-1.3954
	(141.84)	(141.99)	(.9597)	(1.9590)	(30.24)	(30.15)	(.1912)	(.1917)
Other goods	31.10	29.00	-2.2549	-2.3142	-199.62	-207.07	-1.2544	-1.2455
	(123.01)	(123.22)	(.8323)	(.8322)	(28.34)	(28.25)	(.1792)	(.1791)
Security used								
Real property	1898.48	1872.76	-1.8156	-1.8143	2798.98	2791.16	-3.7432	-3.8677
	(148.98)	(148.91)	(1.0080)	(1.0057)	(49.56)	(49.42)	(.3132)	(.3133)
Mobile home	3207.62	3235.54	-1.4679	-1.7225	1338.64	1344.51	-2.1029	-2.1476
	(476.71)	(476.77)	(3.2255)	(3.2199)	(141.76)	(141.29)	(.8959)	(.8958)
Auto, rec. vehicle	436.32	432.22	-1.2083	-1.1958	767.27	765.45	-1.6612	-1.6772
	(103.28)	(103.37)	(.6988	(69.81)	(23.89)	(23.89)	(.1551)	(.1511)

Continued

TABLE 4--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Controls for Default Risk
(Standard errors in parentheses)

Independent Variable	Dependent Variables: Elderly				Nonelderly			
	Amount Financed		APR		Amount Financed		APR	
Security used--(Continued)								
Household goods	133.98 (130.73)	129.72 (131.09)	.0411 (.8845)	-.0524 (.8853)	486.82 (30.06)	485.69 (29.96)	-.8019 (.1899)	-.8051 (.1899)
Other goods	-146.00 (150.34)	-139.16 (150.44)	-1.4241 (1.0172)	-1.4564 (1.0160)	226.97 (34.29)	228.71 (34.18)	-2.6322 (.2167)	-2.6278 (.2167)
Cosigner not spouse	-443.88 (213.16)	-436.86 (213.32)	1.8187 (1.4423)	1.7274 (1.4407)	214.75 (36.80)	225.21 (36.68)	-.3109 (.2385)	-.3125 (.2325)
Unsecured	-329.42 (147.24)	-320.42 (147.33)	1.6138 (.9963)	1.5925 (.995)	4.64 (34.38)	-1.34 (34.84)	1.0373 (.2204)	1.0733 (.2209)
Predicted probability of delinquency in excess of 90 days		-1997.40		-19.5251 (13.2658)		-2571.63 (87.12)		-2.189 (1.7469)
Predicted probability of default cost	-427.48 (260.41)		1.7541 (1.7620)		277.97 (52.66)			
Constant	9612.74	9178.09	-33.349	-31.0167	110.64	547.63	28.91	29.10

Continued

TABLE 4--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Controls for Default Risk
(Standard errors in parentheses)

Independent Variable	Dependent Variables: Elderly				Dependent Variables: Nonelderly			
	Amount Financed		APR		Amount Financed		APR	
R^2	.4261	.4249	.1752	.1765	.4496	.4521	.2141	.2139
Standard error	784.65	758.50	5.3091	5.3050	782.36	780.55	4.9787	4.9499
Degrees of freedom	(29.765)	(29.765)	(29.765)	(29.765)	(29.1275)	(29.1275)	(29.1275)	(29.1275)

amount lent to nonelderly borrowers in perplexingly divergent ways. A higher probability of delinquency reduces the amount lent to nonelderly borrowers, yet a higher probability of default cost nominally increases the size of nonelderly loans. Neither control for default risk, however, seems to affect the interest rate that nonelderly borrowers face.

Even though the change in the explanatory power of the reduced-form equations by controlling for default risk is not great, it is still useful to investigate whatever any or all of the residual gap in interest rate or amounts financed between elderly and nonelderly borrowers is eliminated when default risk is controlled for. Columns two and three of Table 7 reveal the revised calculations of the residual gaps. When control is made for default risk, the astonishing result is that the difference increases between the amount lent to elderly borrowers and the amount elderly borrowers would have been lent had they faced the same market conditions that nonelderly borrowers face. While this gap is $114.45 without control for default risk, it rises to $202.13 and $275.94 when default cost and delinquency rates respectively are taken into account. Both of these latter gaps are statistically significant.

The interest rate gap using the delinquency rate control is statistically insignificant. In contrast, the interest rate gap obtained using the default cost rate control is positive and significant. This suggests that elderly borrowers can expect to

pay higher interest rates and to receive smaller loans because less credit is available to them than to nonelderly borrowers. In the context of the findings in column one, this means that there does appear to be some credit discrimination against elderly borrowers and this discrimination cannot be explained by differences in our measures of default risk.

A final exercise is worth pursuing. Perhaps there was some age discrimination before the enactment of the ECOA, but did discriminatory activities abate following the effective date of the law? We estimate elderly and nonelderly reduced-form equations for the amount lent and the APR for the period before March 23, 1977, and after that date (the effective date of Regulation B). A large fraction of the sample is eliminated because of the absence of a complete loan application date. If we assume, however, that the observations eliminated are done so randomly, little loss of precision results from concentrating on these regression results using the remaining observations.

Tables 5 and 6 present the estimates of the reduced-form equations for elderly and nonelderly borrowers, and for interest rates and amounts financed, for the periods before and after ECOA, controlling for default cost rates. The effects of default risk on elderly borrowers' amounts lent and APRs are negligible before and after ECOA. Still, the level of risk dropped dramatically after ECOA. Either lower risk elderly applicants were applying for loans or lenders were using better screening devices to obtain

TABLE 5

OLS Reduced Form Regressions for the Demand and Supply of Credit for Elderly before and after ECOA
(Standard errors in parenthesis)

Independent Variable	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Age	61.68	-1,454.33 (652.77)	-.5135 (4.8207)	61.98	348.80 (632.20)	2.1296 (5.1679)
Age squared	3,815.62	11.21 (5.15)	.0057 (.0380)	3,856.39	-2.93 (4.84)	-.0136 (.0402)
Late charges on preempted account	5.94	-1.32 (3.66)	.0037 (.0270)	.43	46.94 (108.39)	.9941 (.8988)
Disposable income	417.36	-.25 (.16)	-.0003 (.0013)	689.17	.04 (.05)	.0002 (.0004)
Former borrower	.1262	456.42 (301.99)	.3963 (2.2302)	.0988	-73.74 (430.72)	5.4502 (3.5717)
Present borrower	.6311	407.80 (233.28)	1.0366 (1.7227)	.5309	135.31 (304.29)	1.3971 (2.5233)
Unmarried	.2718	-44.88 (167.35)	2.7008 (1.2350)	.2963	95.57 (232.44)	2.9807 (1.9275)
Separated	.0194	-1,148.87 (550.17)	8.1792 (4.0629)	.0247	-412.68 (510.89)	-1.7929 (4.2366)
Other charge method for late charges	.0388	784.59 (463.84)	3.7099 (3.4253)	.0741	621.51 (358.97)	-1.7345 (2.9768)

Continued

TABLE 5--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit for Elderly before and after ECOA
(standard errors in parenthesis)

Independent Variable	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Contract provisions						
Advance waiver of exemptions	.3398	-56.97 (163.07)	.8392 (1.2043)	.4074	-191.81 (180.72)	.6554 (1.4986)
Confession of judgment	.0198	301.98 (616.17)	3.6028 (4.5503)	.0247	152.91 (1,042.78)	8.9612 (8.6473)
Attorney's fees	.4757	16.94 (175.75)	-.1047 (1.2979)	.5062	148.79 (207.33)	-2.4416 (1.7192)
Wage assignment	.1068	-185.64 (600.50)	-4.1279 (4.4365)	.0617	2,822.90 (3,121.36)	30.7415 (25.8814)
Deferring past-due installments	.4854	95.56 (178.34)	2.0904 (1.3170)	.5432	126.65 (231.73)	4.0936 (1.9216)
Late charges	.7379	-386.17 (214.08)	-.2211 (1.5809)	.8148	-596.42 (362.67)	-7.0609 (3.0075)
Credit used to purchase						
Named items	.3107	-434.77 (310.91)	1.7272 (2.2960)	.3210	337.48 (373.41)	3.9159 (3.0965)
Real property	-0-	--	--	.0123	130.60 (753.02)	-2.2579 (6.2445)

Continued

TABLE 5--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit for Elderly before and after ECOA
(standard errors in parenthesis)

Independent Variable	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Credit used to purchase--(Continued)						
Mobile home	-0-	--	--	-0-	--	--
Auto, rec. vehicle	.0777	485.84 (337.02)	-1.2439 (2.4888)	.0741	27.67 (495.79)	-7.6622 (4.1143)
Household goods	.1068	147.39 (337.76)	-3.2128 (2.4943)	.0741	-1,112.51 (464.01)	-3.5702 (3.8478)
Other goods	.1845	237.07 (318.18)	-2.4844 (2.3497)	.2593	-615.56 (411.09)	-2.0577 (3.4089)
Security used						
Real property	.0485	1,109.21 (365.95)	-3.5045 (2.6805)	.0247	2,292.94 (675.22)	-9.9565 (5.5992)
Mobile home	-0-	--	--	-0-	--	--
Auto, rec. vehicle	.1359	247.52 (277.85)	-1.0386 (2.0519)	.1358	617.56 (344.24)	-.4698 (2.8547)
Household goods	.4660	188.06 (358.74)	.0851 (2.6492)	.4691	745.34 (544.89)	2.3829 (4.5185)

Continued

TABLE 5--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit for Elderly before and after ECOA
(standard errors in parenthesis)

Independent Variable	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Security used--(Continued)						
Other goods	.2039	-277.72 (458.32)	.0366 (3.3846)	.1975	779.89 (646.24)	1.4093 (5.3590)
Cosigner, not spouse	.0097	1,706.69 (738.64)	-8.5662 (5.4548)	.0370	-316.56 (571.28)	3.0292 (4.7373)
Unsecured	.2521	-504.74 (404.24)	4.0361 (2.9857)	.2840	341.96 (581.04)	3.5080 (4.4818)
Predicted probability of default cost	.3356	54.61 (721.58)	5.4323 (5.3287)	.2151	-3,700.82 (3,952.09)	-41.5409 (32.7729)
Constant		48,288.70	28.45		-9,077.09	-51.8639
R^2		.5694	.3463		.5389	.4939
Standard error		670.07	4.94		610.45	5.06228
Degrees of freedom		(26,76)			(27,53)	
Mean of dependent variable		1,180.64	22.76		966.01	23.14

TABLE 6

OLS Reduced Form Regressions for the Demand and Supply of Credit: Nowaday, Before and After ECOA
(Standard errors in parenthesis)

Independent Variables	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Age	34.29	14.69 (13.79)	-.2525 (.0871)	33.53	15.66 (13.69)	-.1309 (.0980)
Age squared	1,285.61	-.03 (.19)	.0026 (.0012)	1,231.57	-.11 (.18)	.0009 (.0013)
Late charges on preempted accounts	5.43	.19 (.83)	.0053 (.0053)	.80	8.68 (3.00)	-.0007 (.0215)
Disposable income	390.45	-.03 (.01)	.0004 (.0001)	425.46	.06 (.03)	.0000 (.0002)
Former borrower	.0765	-78.62 (76.61)	1.4748 (.4834)	.0941	69.12 (79.36)	2.2433 (.5678)
Present borrower	.4397	316.12 (47.60)	-.2772 (.3004)	.4098	593.84 (54.07)	-.0647 (.3869)
Unmarried	.2748	-273.92 (44.17)	.5475 (.2787)	.3020	-82.76 (47.73)	1.0294 (.3415)
Separated	.0227	-216.74 (125.56)	.9186 (.7923)	.0314	-200.33 (113.87)	.8125 .8147)
Other charge method for late charges	.0591	121.75 (81.72)	.0492 (.5156)	.0582	128.05 (87.64)	.6866 (.6270)

Continued

TABLE 6--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Nowaday, Before and After ECOA
(Standard errors in parenthesis)

Independent Variables	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Contract provisions						
Advance waiver of exemptions	.2509	-104.77 (45.03)	-.1531 (.2841)	.2876	-153.30 (45.61)	.4019 (.3263)
Confession of judgment	.0323	73.21 (114.09)	1.9006 (.7199)	.0235	266.98 (133.15)	1.6763 (.9527)
Attorney's fees	.5305	-28.78 (41.77)	-.5353 (.2636)	.5523	-39.94 (44.58)	-.2766 (.3190)
Wage assignment	.1193	-343.67 (126.43)	.9774 (.7998)	.1065	1,049.29 (365.05)	.7658 (2.6119)
Deferring past-due installments	.5048	.79 (49.87)	1.8620 (.3147)	.5366	7.82 (51.92)	2.5917 (.3715)
Late charges	.7951	-101.85 (59.45)	-2.2019 (.3752)	.8268	-262.10 (71.96)	-2.4106 (.5148)
Credit used to purchase						
Named items	.4337	43.25 (72.95)	-.4774 (.4603)	.4288	31.16 (72.91)	-.2612 (.5216)
Real property	.0084	387.09 (205.04)	.5553 (1.2939)	.0118	53.89 (182.32)	.6241 (1.3045)

Continued

TABLE 6--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Nowaday, Before and After ECOA
(Standard errors in parenthesis)

Independent Variables	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Credit used to purchase--(Continued)						
Mobile home	.0006	1,639.14 (760.17)	-4.1800 (4.7969)	.0020	599.45 (444.45)	-1.4697 (3.1801)
Auto, rec. vehicle	.1338	180.67 (83.80)	.5395 (.5388)	.1137	240.30 (89.18)	-.6289 (.6381)
Household goods	.1673	-284.77 (79.55)	-1.3048 (.5019)	.1556	-373.45 (83.96)	-1.9438 (.6008)
Other goods	.2109	-238.95 (76.12)	-1.1091 (.4803)	.2399	-190.92 (77.10)	-1.9662 (.5517)
Security used						
Real property	.0155	2,463.34 (153.25)	-4.0285 (.9671)	.0144	2,521.34 (166.04)	-4.4872 (1.1879)
Mobile home	.0030	1,191.90 (340.30)	-2.6369 (2.1474)	.0039	1,210.07 (315.72)	-2.7902 (2.2589)
Auto, rec. vehicle	.1410	699.00 (64.23)	-1.9834 (.4053)	.1157	899.14 (72.50)	-1.5363 (.5187)
Household goods	.5096	316.82 (84.01)	-.9869 (.5301)	.4758	482.54 (88.21)	-.8378 (.6312)

Continued

TABLE 6--(Continued)

OLS Reduced Form Regressions for the Demand and Supply of Credit: Nowaday, Before and After ECOA
(Standard errors in parenthesis)

Independent Variables	Before ECOA			After ECOA		
	Mean	Amount Financed	APR	Mean	Amount Financed	APR
Security used--(Continued)						
Other goods	.2694	18.24 (94.05)	-2.8592 (.5935)	.2569	238.11 (99.57)	-2.0605 (.7124)
Cosigner not spouse	.0460	188.31 (95.66)	-.8579 (.6036)	.0346	124.12 (112.13)	.5006 (.8022)
Unsecured	.1637	-144.32 (96.88)	.5463 (.6113)	.2131	-38.93 (99.85)	.7824 (.7144)
Predicted probability of default cost	.3074	318.42 (153.58)	-1.1692 (.9692)	.2791	-1,415.69 (455.25)	-.7446 (3.2573)
Constant		509.85	30.8162		669.81	27.69
R^2		.4343	.2281		.4731	.2262
Standard error		754.36	4.7602		753.94	5.394
Degress of freedom		(29,1664)	(29,1664)		(29,1500)	
Mean of dependent variable		1,223.21	22.29		1,137.23	22.31

a lower-risk pool of elderly borrowers. (Alternatively, our measure of default risk is time dependent and is sensitive to the sampling date.)

For nonelderly borrowers a puzzling result emerges. Default risk expectedly lowered the amount lent after ECOA but unexpectedly raised it before the effective date of Regulation B. These effects, which are statistically significant, suggest the possibility of inefficient lending-decision criteria before the enactment of the ECOA. Such inefficiency, of course, would be consistent with non-cost-justified discrimination. So, does this mean that unjustified discrimination implied by our earlier results could be an artifact of inefficient decisions made by lender before the implementation of Regulation B?

Table 7 disputes the view that ECOA has eliminated the residual gap in the amounts lent and the APR paid by elderly borrowers. Indeed, the amount-lent gap is found to be larger ($498.23 as opposed to $480.51) and the interest rate differential greater (1.872 as opposed to .546) after ECOA than they were before ECOA. If our results have correctly controlled for default risk and the intermittant factors that affect loan amounts and interest rates through time, then the conclusion appears to be that the observed residual gaps in loan outcomes faced by elderly borrowers have not narrowed--and possibly have widened--as a result of ECOA.

TABLE 7

T-Test for Differences in Amounts Lent and APRs: Residual Gaps
(Standard errors in parentheses)

Elderly Borrower	Without Control for Defaults	With Control for Defaults Cost	With Control for Delinquency Probability	Before ECOA	After ECOA
Amount financed, elderly equation	1,242.31	1,242.81 (23.54)	1,207.12 (23.53)	1,142.99 (66.65)	936.85 (59.72)
Amount financed,	1,357.76	1,444.94 (26.95)	1,493.06 (26.95)	1,623.50 (74.40)	1,435.08 (80.96)
Difference	-114.45	-202.13 (11.06)	-257.94 (10.91)	-480.51 (46.84)	-498.23 (45.17)
T-statistic	-11.45**	-18.28**	-25.29**	-10.26**	-11.03**
APR, elderly equation	22.970	22.953 (.085)	22.558 (.085)	22.971 (.307)	23.246 (.453)
APR, nonelderly equation	22.771	22.731 (.086)	(.087)	(.254)	21.374 (.330)
Difference	.199	.222 (.037)	-.049 (.046)	.546 (.220)	1.872 (.237)
T-statistic	5.92**	6.06**	-1.03	2.48*	5.39**
Number of cases	795	795	795	103	81

* $P < .01$

** $P < .001$

V. FURTHER RESEARCH

An obvious extension of the foregoing analysis is to estimate the supply and demand curves for credit separately. This would permit a closer inspection of the effects of age on borrowing decisions as opposed to lending patterns. The problem of usury ceilings can be bypassed by restricting the sample to one or two states with high ceilings that are not binding. Otherwise an alternative specification would be demanded. In addition, the endogeneity of default risk must be considered. If default risk is not exogenous as we have assumed, the simple interpretations provided with our reduced form equation would be altered. Finally, the measure of default risk can be improved, perhaps by creating a variable that captures both the notion of default cost and the measures of delinquency rates. This would yield an "expected default" cost.

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