Credit Counseling and Mortgage Loan Default

by Rural and Urban Low-Income Households[1]

Valentina Hartarska[2]

and

Claudio Gonzalez-Vega[3]

---

[2] 2120 Fyffe Road, Department of Agricultural, Environmental and Development Economics, The Ohio State University, Columbus, OH 43210. Tel. (614) 292 9329. Email: hartarska.1@osu.edu.
[3] 2120 Fyffe Road, Department of Agricultural, Environmental and Development Economics, The Ohio State University, Columbus, OH 43210. Tel. (614) 292 6376. Email: gonzalez.4@osu.edu.

Credit Counseling and Mortgage Loan Default
by Rural and Urban Low-Income Households

The prolonged economic expansion of the past decade, government support efforts, and innovations in lending technologies, including credit counseling, have led to substantial growth in the provision of mortgage loans to low-income rural and urban households. Both lenders and borrowers can benefit from cost-efficient lending technologies that better address the difficulties of low-income housing finance. We present empirical evidence to support the hypothesis that, when properly designed, the innovation of *credit counseling* reduces the incidence of default on low-income mortgage loans.

Banks view loans to low-income households as riskier and/or costlier than home loans to wealthier households. Typically, banks and other financial institutions assess the risks of housing loans on the basis of loan features (term to maturity, interest rate, downpayment), borrower financial characteristics (income, total debt), and value of the property pledged as collateral. Banks, in turn, seek to attract low-income borrowers by reducing downpayment and cash contribution requirements, expanding closing cost assistance, and accepting lower qualifying incomes and non-traditional credit histories. These actions, usually in response to regulatory requirements, do not address the higher risks of low-income mortgages and do not reduce much a generalized reluctance to lend to this segment of the population. Dealing with these risks will require innovative screening and monitoring tools.

Several studies examine both mechanisms to attract low-income clients and tools to reduce the risks and costs of these loans. To study the costs of zero downpayment,

Deng *et al.* (1996) develop an empirical, option-based model of homeowner's default behavior, in a proportional hazard framework. These authors simulate probabilities of default and default costs on zero-downpayment loans and then compare the results with conventional underwriting standards. They estimate that, if low-income borrowers are enticed by zero-downpayment requirements and if no adjustment for the higher default rates is made, the cost of the implicit subsidy would amount from $74,000 to $87,000 per million dollars of lending.

Quercia *et al.* (1995) show that a lower loan-to-value (LTV) ratio at the time of origination (*i.e.,* higher downpayment) leads to lower default rates for rural, low-income borrowers. These authors focus on the 1981 Farmers Home Administration Section 502 program and show that, while contemporaneous equity value in rural low-income mortgage loans is not associated with default, crisis events are.

Van Order *et al.* (2000) find, however, that the default behavior of both low-income and average-income groups is responsive to negative contemporaneous equity, while default rates and default losses are higher for low-income borrowers. Moreover, the influence on credit risk of individual and neighborhood income is small for LTV less than 80 percent, but it ranges from 15 up to 50 basis points for very high LTV ratios. Enticing low-income mortgage borrowers with lower downpayment requirementes thus increases the risk of default.

Much less studied is the role of the debt-to-income ratio that lenders use to evaluate the maximum debt potential that a borrower can bear. Current underwriting standards require a ratio of housing expenses to pre-tax income no higher than 28 percent and a ratio of maximum total debt obligations to income no higher than 36 percent.

While, overall, these standards work well, they may not be adequate for low-income borrowers, who tend to experience greater income volatility and whose assets offer less cushion during cash flow crises. Poor households, moreover, often incur some well documented (*e.g.,* child alimony) and some less documented (*e.g.,* dry cleaning) expenses that strongly influence the amount of debt they can bear. To reduce instances of default and safeguard against loan losses, some lenders require counseling, to assist potential borrowers in correctly estimating the amount of debt they can service.

This study explores the effects on default of *cash flow-based counseling,* which explicitly accounts for all *actual* living expenses of the household and substitutes for standard debt-to-income ratios. The next four sections address methodological issues, describe the data, discuss model specifications, present results and draw conclusions.

Methodology

We estimate an *option-based* model of default by using a Cox proportional hazards technique. According to an option-based theory of mortgage termination, a borrower faces several choices when deciding how to act on the obligation. She has the option to (1) make the payment on the loan, (2) pay in full the remaining balance, by refinancing (prepayment), or (3) surrender the house to the lender in exchange for cancelation of the debt (Foster and van Order, 1984). The latter is called the *default option.* This is an European compound put option, because it must be exercised at the moment when payment becomes due, as opposed to an American option, which may be exercised any time (*e.g.,* the prepayment option).

When deciding whether to exercise the default (put) option, the borrower considers the market values of the mortgage and of the equity in the house, which is a

crude measure of the extent to which the put option is *in-the-money* (Quigley and van

Order, 1991). Default, from this perspective, is a purely a financial matter. Any default

behavior is *ruthless* if, once the option is in-the-money and transaction costs are

accounted for, the option is always exercised.

Observed default rates have been lower than predicted default rates, however,

which suggests that other factors may affect the decision to default (Quigley and van

Order, 1992). Proponents of the pure option-theory model argue, nevertheless, that

observed default rates are lower than predicted rates because empirical models do not

account for the possibility that, by always defaulting when the option is in the money,

borrowers would sacrifice the option to default in the future (Capozza *et al.,* 1998).

Foster and van Order (1984), Lekkas, Quigley and van Order (1993), Quigley and

van Order (1995), and Vandell (1998) provide evidence that traditional option-based

models ignore the role of transaction costs. Yang *et al.* (1998) find evidence about the

presence of consumer-choice determinants of mortgage termination, mainly through the

influence of household income. LaCour-Little (1999) shows that borrower characteristics

influence mortgage termination, especially when the option is at-the-money.

These studies claim that the option-based model of mortgage default has higher

explanatory power if transaction costs, trigger events, and borrower characteristics are

incorporated in the empirical specification. In a competing approach, *choice theoretic*

models underscore the importance of insolvency in default decisions and provide

additional reasons to study the role of income and debt-to-income ratios (Elmer and

Seelig, 1999).

Further, default probabilities and default severity are often specified in a broader framework, by considering both prepayment and default options as dependent competing risks (Deng, Quigley and van Order, 1996; Deng, 1997; Deng, Quigley and van Order, 2000). These models provide additional evidence that trigger events, transaction costs, and borrower heterogeneity influence default.

Critics of the option-based theory of mortgage default contend that borrowers may not understand how mortgage markets function. Counseling usually introduces the concepts of the present value of money, annualized interest rates, and the true value of a mortgage loan. When interest rates and property values change, borrowers who have undergone counseling will have a better understanding of how these changes affect their loan obligations. At the same time, counseling also helps in establishing the levels of debt that they are able to bear and, therefore, it is related to the *ability to pay* explanation of borrower behavior (rather than *willingness* to pay).

We argue that, adjusted for transaction costs and borrower heterogeneity, the option-based theory of mortgage default best captures the dual effects of counseling, namely, a better understanding of the financial characteristics of the mortgate contract (which may trigger default) and a better understanding of the borrower's own ability to service the loan payments (which may contain default). If the second effect dominates, public support of counseling programs may be more efficient than regulatory rules that force financial institutions to attract low-income borrowers with lower downpayment requirements and other offers that may not create compatible incentives leading to low default rates. This paper contributes some empirical evidence to this public policy debate.

The Data

The data used in the estimation come from a pilot project (Community Mortgage Loan Program) initiated in 1992 by Fannie Mae, Huntington Bank, and PT & Associates Community Development Consulting. This program requires potential borrowers to go through a counseling process. *Graduation* is granted only to those participants who, given an interest rate and loan amount, can generate zero or positive cash flows, based on a thorough calculation of their actual living expenses. Loan amounts adjusted by these criteria may not correspond to standard financial ratios for underwriting.

A major edge of this program is that the counsel provider is a third party, with superior knowledge of the circumstances of urban low-income households (information advantages). This expertise, combined with a conservative approach to maximum sustainable debt estimation, improves the chances of success. A potential drawback of this counseling program may result from the fact that it has not yet been adjusted to the circumstances of rural and suburban and of non-metro low-income households. Our hypothesis is that it may be less efficient in decreasing instances of default for these other demographic groups.

The data set consists of 392 observations, with 278 counseled and 114 non-counseled loans, drawn from the database of 1,338 mortgage loans originated between 1992 and 2000. The population includes mortgage loans from Florida, Indiana, Kentucky, Michigan, Ohio, and West Virginia. The majority of the loans were granted to urban and metro low-income borrowers, but the distribution of the demographic characteristics within the counseled and non-counseled groups is approximately the same (Table 1).

The data are observed at specific points in time, and many are time-censored observations. Repayment records in the sample expand up to nine years, with most loans still outstanding (Table 2). Non-parametric duration analysis shows that the incidence of default among non-counseled borrowers is substantially higher than the incidence of default among counseled borrowers (Table 3, Graph 1, and Graph 2). The difference in rates of default between the two groups is statistically significant.

For the overall sample, rural/suburban/urban characteristics, as identified in the appraisal report during the counseling and loan granting process, and borrower classification according to residence in metro/non-metro counties do not influence default rates. Stratified analysis shows, however, that, within the rural and suburban and the non-metro groups, counseling does <u>not</u> influence default, while, within the urban and metro groups, counseling does influence default in a significant manner.

Empirical Specification

Empirical studies of this topic either use computational methods or apply the Cox proportional hazards model to evaluate mortgage default risk (Cox and Oakes, 1984). The advantage of the proportional hazards model is that it allows for factors other than those dictated by pure option-based theory to be incorporated in the testing. Moreover, the approach is ideal for dealing with time censored (seasoned) data, as empirical information is often available for only several years since loan origination, for loans still outstanding.

Hazard in duration models is defined as a chance event. The hazard rate is the probability that this event will occur in a particular period, conditional on that event not occurring at the beginning of the period. The proportional hazards model of mortgage

default assumes that, at each point of time during the mortgage contract period, the mortgage has a certain probability of termination, conditional on the survival of the mortgage. In this model, the hazard function is defined as a baseline hazard and a set of time-varying covariates. The hazard rate for the *j-th* subject in the data is then:

$$h(t|x_j) = h_0 * \exp(x_j b) \tag{1}$$

where h_0 is the baseline hazard and $b = (b_1, b_2 \ldots, b_k)$ is to be estimated.

The baseline hazard *h_0* can decrease or increase over time (as it does in our case) or take any functional form. This approach does not require any assumptions regarding the change of the default rate over time. Actually, the default rate is not even estimated. In the Cox proportional hazards model, the focus is on the relative hazard of the time-varying covariates. Time plays no role in this framework; it merely serves to align time-varying contemporaneous values.

To establish the effect of counseling, we are interested in the relative hazard rate of counseling from a model that incorporates reasonable borrower behavior, as suggested by a modified option-based theoretical perspective. The variable that captures the value of the put option is EQR and is defined by:

$$EQR = \frac{CVP - PVRB}{CVP}$$

where *CVP* is the contemporaneous value of the house. This value is calculated as the market value of the property at the time of loan origination, indexed by the housing price index for each period and for the specific geographic region. *PVRB* is the present value of the remaining loan balance outstanding, discounted by the note rate.

The variable DOWNPAY represents the proportion of the downpayment. This variable is included here because most studies have found, as expected in theory, that the amount of downpayment significantly influences default. The program under study here, however, by design requires a downpayment of only 5 percent of the home value and, if the potential borrowers cannot provide this, they are offered downpayment assistance loans. There is, therefore, little variation in the actual downpayments observed; this may influence the results.

The variable INCOME is total monthly income. We are interested in how a $100 increase in income will affect the hazard rate. The expectation is that lower incomes increase default probabilities. The variable PRIME_HE is the ratio of housing expenses over pre-tax income. The purpose of including this ratio is to address the need of counseling, as the main purpose of this tool is to establish the maximum debt that a low-income household can bear. A significant coefficient would indicate that, within the limits of the current underlining standards, higher housing debt ratios influence default. This would be an additional argument for counseling.

Empirical Results

The main result of the Cox proportional hazards estimation is that counseled borrowers face only 46 percent of the default hazard that non-counseled borrowers face. This result supports the expectation that counseling significantly lowers default rates and that the resulting difference in establishing repayment capacity is important in promoting sustained compliance with mortgage contracts.

The results also show that the value of the put option, at least as approximated by the difference between the contemporaneous equity in the home and the current loan

value, does <u>not</u> significantly influence borrower decisions to default. This result does not necessarily contradict option-based theory. It merely shows that low-income borrowers weight more heavily their income expectations and personal circumstances. Thus, for example, for every $100 of additional monthly income, the hazard rate decreases by 6 percent.

Counseling is important because the amount of debt that low-income borrowers can bear is an important determinant of the rate of default. Our results show that, for each additional percentage point increase in the primary housing expense to income ratio, the hazard rate of default increases by 4 percentage points. Thus, if the increased risk is not acknowledged and if mortgage lenders rely on the current underwriting standards, the default rate and default losses will be higher than if the more accurate repayment capacity is estimated. One byproduct of the counseling program is a better measurement of this repayment capacity, through the assistance of an agency with information advantages in the accurate measurement of these magnitudes.

Conclusions

To attract low-income borrowers, financial institutions often adjust the conditions of the loan contracts, by decreasing the amount of downpayment required, accepting lower qualifying income, and providing downpayment and closing costs assistance. These adjustments, usually in response to regulatory requirements, have a high cost in terms of expected default losses. To compensate for the increased risk, lenders charge higher interest rates to low-income borrowers. Some financial institutions require potential borrowers to undergo counseling before extending the loan. The purpose of the study is to evaluate the efficacy of this innovation.

This paper shows that cash flow-based counseling significantly decreases the instances of default. Counseled loans show a hazard rate that is 46 percent of the hazard rate of non-counseled loans. Although counseled borrowers may behave more prudently, they may also learn to behave more strategically and may be more inclined to default when the put option is in-the-money. As a net result, this does not happen. The authors of this paper believe that the net positive impact of counseling emerges from the more accurate measurement of repayment capacity that results from the process and from the abandonment of rigid income-to-debt ratios not appropriate for a heterogenous low-income clientele. The results show that this innovation in screening borrowers is effective.

The positive effect of counseling, however, is not uniform across demographic groups. The specific counseling program studied here is effective in decreasing instances of default in metro counties and for properties located in urban, inner-city areas. For rural and suburban and for non-metro, low-income households, this counseling program does not significantly decrease default rates. That is, it does not make a difference in repayment behavior for these borrowers.

We then speculate that counseling does matter only when it addresses the specific circumstances of the target population and when the counsel provider possesses information advantages in a given market segment. If this is the case, counsel providers with expertise in the behavior of rural households may be needed.

There may also be differences in the behavior (*e.g.*, volatility) of rural incomes and in the incidence of crises that must be further studied. If indeed there is a greater volatility of income, screening criteria may demand a more conservative relationship

between loan size and housing expenses to income ratios. As in other contexts, innovations in lending technologies tend to be more difficult to achieve in rural than in urban areas (Navajas and Gonzalez-Vega, 2000).

We do not find evidence to support the notion that low-income borrowers repay or default on their mortgage by considering only the current value of their put option. In contrast, the evidence suggests that the ability to pay, as proxied by the level of income and by the housing expenses to income ratios, plays an important role. These results are consistent with Quercia *et al.* (1995), who also found that the value of the put option does not influence the default rates of low-income rural households.

In summary, counseling matters. The experience examined here shows that it indeed matters in urban, inner cities environments. This seems to be more a feature of the comparative advantages of the counsel provider. The jury is still out in terms of the efficacy of this financial innovation in rural areas.

References

Capozza, D.R., D. Kazarian and T.A. Thomas. (1998). "The Conditional Probability of Mortgage Default," *Real Estate Economics*, 26 (3), 359-389.

Cox, D. R. and D. Oakes.(1984). *Analysis of Survival Data,* Monographs on Statistics and Applied Probability. London. Chapman and Hall.

Deng Y.J., J.M. Quigley, R. van Order and Mac Freddie.(1996). "Mortgage Default and Low Downpayment Loans: The Cost of Public Subsidy," *Regional Science and Urban Economics*, 26, 263-285.

Deng, Y.J. (1997). "Mortgage Termination: An Empirical Hazard Model with Stochastic Term Structure," *Journal of Real Estate Finance and Economics*, 14 (3), 309-331.

Deng Y.J., J.M. Quigley and R. van Order. (2000). "Mortgage Terminations, Heterogeneity and the Exercise of Mortgage Options," *Econometrica*, 68 (2), 257-307.

Elmer P.J. and S.A. Seelig. (1999). "Insolvency, Trigger Events, and Consumer Risk Posture in the Theory of Single-Family Mortgage Default," *Journal of Housing Research*, 10 (1), 1-25.

Foster, C. and R. van Order. (1984). "An Option-Based Model of Mortgage Default," *Housing Finance Review*, 3, 351-372.

LaCout-Little, M. (1999). "Another Look ate the Role of Borrower Characteristics in Predicting Mortgage Prepayments," *Journal of Housing Research*, 10 (1), 45-61.

Lekkas, V. J M. Quigley and R. van Order. (1993). "Loan Loss Severity and Optimal Mortgage Default," *Journal of American Real Estate and Urban Economics Association* 21 (4), 353-371.

Navajas, Sergio and Claudio Gonzalez-Vega (2000), "Innovations in Rural Lending Technologies: The Experience of Financiera Calpia in El Salvador," BASIS Working Paper, Columbus, Ohio: The Ohio State University.

Quercia, R.G., G. W. McCarthy and M.A. Stegman. (1995). "Mortgage Default among Rural, Low-Income Borrowers," *Journal of Housing Research*, 6 (2), 349-369.

Quigley J.M. and R. van Order. (1991). "Defaults on Mortgage Obligations and Capital Requirements for U.S. Savings Institutions: A Policy Perspective," *Journal of Public Economics*, 44 (3), 353-370.

Quigley J.M. and R. van Order. (1992). "More on the Efficiency of the Market for Single-Family Homes: Default." Working Paper. Center for Real Estate and Urban Economics, University of California, Berkley.

Quigley J.M. and R. van Order. (1995). "Explicit Tests of Contingent Claims Models of Mortgage Default," *The Journal of Real Estate Finance and Economics,* 1, 99-117.

Van Order R. and P. Zorn. (2000) "Income, Location and Default: Some Implications for Community Lending," *Real Estate Economics*, 28 (3), 385-404.

Vandell, K.D.. (1995). "How Ruthless Is Mortgage Default? A Review and Synthesis of the Evidence," *Journal of Housing Research*, 6 (2), 245-264.

Yang, T.T., H. Buist and I.F. Megbolugbe. (1998). "An Analysis of *Ex Ante* Probabilities of Mortgage Prepayment and Default," *Real Estate Economics*, 26 (4), 651-676.

Attachment

Table 1. Demographic Characteristics

Variable	Number	Percentage
Classification according to property appraisal report		
Rural	11	2.8
Suburban	88	22.4
Urban	295	74.9
U.S. census classification		
Metro	362	91.9
Non-metro	32	8.1
Counseling		
1. Counseled	278	70.1
A/ Metro	266	96
Non-metro	12	4
B/ Rural	8	3
Suburban	73	26
Urban	197	71
2. Non-counseled	114	29.9
A/ Metro	94	82
Non-metro	20	18
B/ Rural	3	3
Suburban	14	12
Urban	97	85

Table 2. Loan Status

Loan Status	Number	Percentage
Current	342	86.6
Default	35	8.9
Counseled	18	
Non-counseled	17	
Prepaid	18	4.6

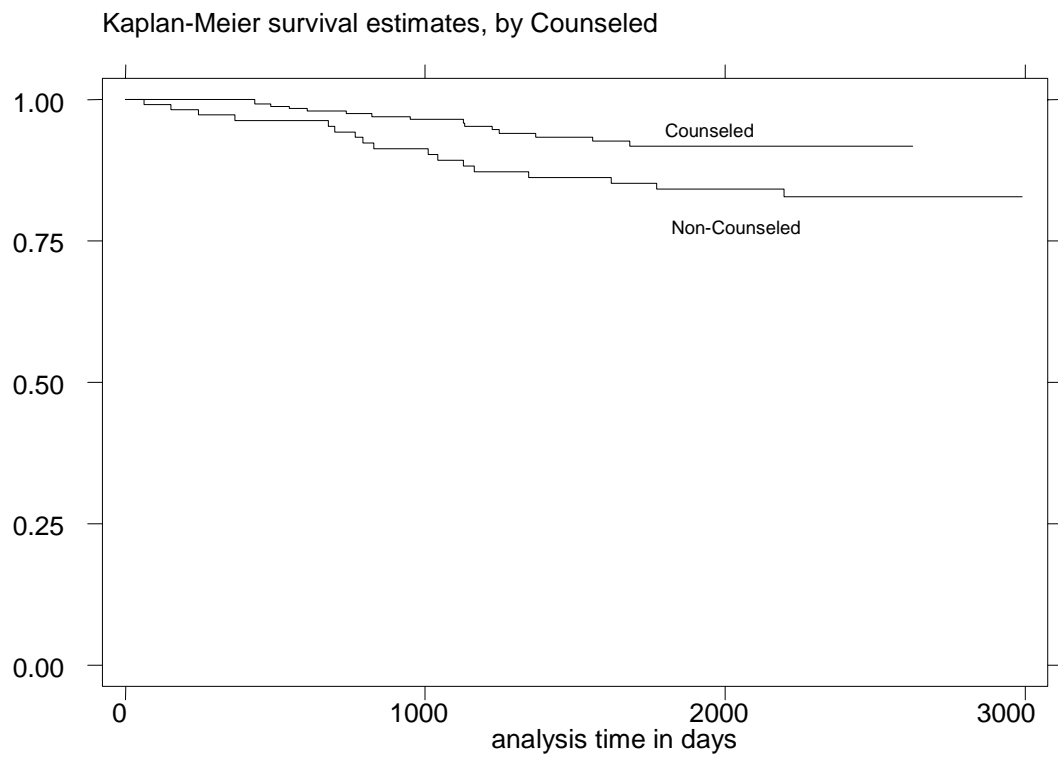|	Time at Risk (days)	Incidence Rate (days)
Overall Portfolio	578066	0.0000554
Non-Counseled	211941	0.0000802
Counseled	366125	0.000041

Table3. Nelson-Aalen Cumulative Hazard and Survivor Functions

Analysis time (days)	Nelson-Aalen Cumulative Hazard		Survivor Function	
	Non-counseled	Counseled	Non-counseled	Counseled
6	0	0	1	1
378	0.0375	0	0.963	1
750	0.0588	0.0255	0.9427	0.9748
1122	0.1131	0.0362	0.8925	0.9644
1494	0.1475	0.0685	0.8622	0.9336
1866	0.1715	0.0863	0.8417	0.917
2238	0.1884	0.0863	0.8274	0.917
2610	0.1884	0.0863	0.8274	0.917
2982	0.1884	.	0.8274	.

Table 4. Estimated Coefficients, Hazard Ratios and z-Score

	Unit of Change	Hazard Ratio	z	P>z
EQR		1.341517	0.56	0.578
DOWN_PAY		19.54141	0.55	0.590
COUNSEL		0.458946	-2.15	0.031
INCOME	$100	0.949253	-2.44	0.015
PRIME_HE	0.01point	1.040811	2.87	0.004
LR chi2(5)		18.76		
Prob.>ci2		0.0022		
Log likelihood		-168.56		

Graph 1.

Kaplan-Meier survival estimates, by Counseled

Graph 2.

Nelson-Aalen cumulative hazard estimates, by Counseled