Pre-Purchase Counseling Impacts on Mortgage Performance: Empirical Analysis of NeighborWorks® America's Experience

Prepared by

Neil S. Mayer

and

Kenneth Temkin

Prepared for

NeighborWorks® America

March 7, 2013

Neil Mayer and Associates
828 San Pablo Ave., Ste. 115B
Albany, CA 94706

Neil Mayer & ASSOCIATES

Table of Contents

Table of Exhibits

ACKNOWLEDEGMENTS

The authors would like to acknowledge the important contribution made by Experian in collecting the data used for this analysis and for completing the propensity scoring models that identified members of the comparison group used throughout the study. In particular, the following Experian staff deserves mention for their assistance: William Conrades, Sabrina Li and Eric Fox. Matt Piven provided expert research assistance. Kris Rengert of the Office of the Comptroller of the Currency and Kenneth Brevoort of the Federal Reserve Board provided very helpful suggestions. Barbara Richard and Tina Trent of NeighborWorks offered invaluable assistance throughout the project. Although many people contributed to this study, any errors or omissions in this report are the sole responsibility of the authors.

EXECUTIVE SUMMARY

Neighborhood Reinvestment Corporation (doing business as NeighborWorks® America, [(NeighborWorks]) has a nationwide network of affiliates offering pre-purchase homebuyer counseling throughout the country. Although the network members started to provide pre-purchase counseling in 1978, the impact of these services on mortgage performance has not yet been formally evaluated. Using information on about 75,000 loans originated between October 2007 and September 2009, Neil Mayer and Associates, together with Experian, analyzed the impact of pre-purchase counseling and education, provided by NeighborWorks' network, on the performance of counseled borrowers' mortgages. It compares mortgage performance for counseled buyers over two years after the mortgages are originated to mortgage performance of borrowers who receive no such services.[1]

The study's findings show that NeighborWorks pre-purchase counseling and education works: clients receiving pre-purchase counseling and education from NeighborWorks organizations are one-third less likely to become 90+ days delinquent over the two years after receiving their loan than are borrowers who do not receiving pre-purchase counseling from NeighborWorks organizations. The finding is consistent across years of loan origin, even as the mortgage market changed in a period of financial crisis. It applies equally to first-time homebuyers and to repeat buyers.

ES- 1: Estimated share of loans that are 90+ days delinquent within 24 months of origination with and without NeighborWorks pre-purchase counseling

	Year Loan Originated		
First-time Homebuyers	2007	2008	2009
With NeighborWorks counseling	4.7%	3.1%	2.0%
Without NeighborWorks counseling	6.9%	4.6%	2.9%
Difference	-2.2%	-1.5%	-1.0%
% Decline	***-32.2%***	***-32.7%***	***33.1%***
Repeat Borrowers	2007	2008	2009
With NeighborWorks counseling	6.1%	4.1%	2.6%
Without NeighborWorks counseling	9.0%	6.0%	3.9%
Difference	-2.8%	-1.9%	-1.3%
% Decline	***-31.7%***	***-32.4%***	***32.9%***

Source: Authors' analyses of logit model parameter estimates

[1] NeighborWorks also provides training for counselors who work for other organizations. We did not measure the impact of counseling performed by these non-NeighborWorks organizations.

The methodology employed deals directly with the primary challenge affecting previous work on the impacts of pre-purchase counseling: selection bias. The concern is that people who enter counseling may have unobserved characteristics in the way that they manage credit that both lead them to counseling and improve (or reduce) their mortgage performance. Without a way to control for the "unobservables," statistical analysis could yield an overstatement (or understatement) of the effect of counseling itself in statistical estimations. Drawing on Experian's unique set of credit data, this effort mitigates that risk and minimizes any potential bias in three ways.

First, Experian uses a procedure called propensity scoring to select a comparison group that has the same observable characteristics as counseled clients.[2] Second, the study estimates program effects with data that contain extensive, detailed information about borrowers' credit practices and behaviors both at origination and prior to receiving their mortgage. Inclusion of variables that measure credit behavior prior to seeking counseling assistance reduces the impact selection bias would have on loan performance, by controlling unobservable traits related to a client's financial capabilities and ability to remain current on financial obligations. The results demonstrate that pre-purchase counseling and education retains—indeed increases—its substantial independent impact when such measures are included in the analysis.

The work also breaks important ground in examining counseling taking place throughout the U.S., by a large number of separate non-profit organizations, rather than in a single place or organization. At the same time, the fact that the NeighborWorks' network has common counseling standards provides for some consistency in the counseling services provided. Further work on the role of the specific nature of the counseling in determining performance, on performance over a longer period following loan origination, and on the indirect impacts of counseling through their effect on mortgage product choice could well be fruitful future directions for research.

[2] The actual conduct of the propensity scoring process was undertaken by Experian.

INTRODUCTION

Neighborhood Reinvestment Corporation (doing business as NeighborWorks® America, [(NeighborWorks]) has a nationwide network of affiliates offering pre-purchase homebuyer counseling throughout the country. Although the network members started to provide pre-purchase counseling in 1978, the impact of these services on mortgage performance has not yet been formally evaluated.

Using information on about 75,000 loans originated between October 2007 and September 2009, this study analyzes the impact of NeighborWorks-network-provided pre-purchase counseling on the performance of counseled borrowers' mortgages within two years after they are originated, compared to mortgage performance of borrowers who receive no such services.[3]

We find that NeighborWorks pre-purchase counseling works: clients receiving pre-purchase counseling from NeighborWorks organizations are one-third less likely to become 90+ days delinquent within two years of receiving their loan than are borrowers who do not receiving pre-purchase counseling. The finding holds equally for both first-time homebuyers and repeat purchasers. And it holds after controlling for a large set of characteristics of borrowers and their credit histories, mortgages, and housing markets.

Our research deals directly with a primary challenge to previous work on the impacts of pre-purchase counseling: selection bias. The concern is that people who enter counseling may have unobserved characteristics in the way that they manage credit that both lead them to counseling and improve (or reduce) their mortgage performance. Without a way to control for the "unobservables," statistical analysis could yield an overstatement (or understatement) of the effect of counseling itself in statistical estimations. This analysis mitigates the impact of selection bias in two ways.

First, Experian, a credit reporting agency that partnered with Neil Mayer and Associates on this study, employed a procedure called propensity scoring to identify and create a comparison group that has the same observable characteristics as counseling clients. Second, we estimated program effects with data from Experian that contains extensive detailed information about borrowers' credit practices and behaviors both at origination and prior to receiving their mortgage. Many of these oft-unobservable characteristics are in fact observed in specific operationalized terms in our study. Given these methodological elements, our findings are based on data and methods that control for factors that may influence both an individual's choice to select counseling and their mortgage performance, minimizing any selection bias. We find that pre-purchase counseling retains its highly significant and substantial impact after biasing factors have been removed.

[3] NeighborWorks also provides training for counselors who work for other organizations. We did not measure the impact of counseling performed by these non-NeighborWorks organizations.

NeighborWorks Pre-Purchase Counseling Programs

NeighborWorks was created by Congress in 1978 to revitalize America's underserved communities. Local NeighborWorks organizations are independent, resident-led, nonprofit community development corporations that include business leaders and government officials on their Boards. Over 230 local organizations make up the NeighborWorks network, many of them active in promoting homeownership through counseling, lending, and other means.

Pre-purchase counseling provided by NeighborWorks organizations consists of a minimum of eight hours of group education and individual counseling sessions. Homebuyer education includes an initial orientation and overview of the home purchase process; an in-depth analysis of the potential homebuyer's personal and financial situation; details about house selection, the financing process, the closing, and other key issues of the home buying process and post-purchase concerns, such as home maintenance and community involvement. NeighborWorks recommends that the following topics be covered:

1. Assessing Readiness to Buy a Home
2. Budgeting and Credit
3. Financing a Home
4. Selecting a Home
5. Maintaining a Home and Finances

Most clients first attend a one- or two-hour orientation session that allows participants to self-select into the different tracks of homebuyer education according to their readiness. Individual counseling supplements other kinds of homebuyer education by focusing on problems and issues that are specific to a particular homebuyer. The sessions generally include information on budgeting, developing a savings plan, credit issues and repairing credit, and selecting a home (NeighborWorks America, 1999).

LITERATURE REVIEW

There are three recent comprehensive reviews of previous studies on the impact of pre-purchase counseling (Collins and O'Rourke 2011; Turnham and Jefferson 2011 and GAO 2011). All of the pre-purchase counseling programs included in these reviews are designed to give borrowers information and specific strategies to understand mortgage options and avoid predatory lending. Pre-purchase counseling programs are expected to result in better subsequent mortgage performance because they create well-informed consumers and promote responsible homeownership that reduces the risk of default to lenders (Turnham and Jefferson 2011).

All three reviews (Collins and O'Rourke's summary is presented in Exhibit 1, augmented with one study that post-dated their review conclude that the existing literature on pre-purchase counseling provides ambiguous findings regarding pre-purchase counseling's effectiveness as measured by mortgage

loan performance, credit scores and borrower self-reported financial capacity. The GAO (2011:3) concludes "[t]he limited body of literature on homeownership counseling does not provide conclusive findings on the impact of all types of homeownership counseling.

Previous studies on pre-purchase counseling's effectiveness, according to reviews of the literature, are hampered by the difficulty of tracking counseling recipients after the counseling ends and by the fact that no studies used an experimental design that randomly assigned clients into a treatment group that received counseling and a control group that did not receive these services. Existing quasi-experimental studies, according to the reviews, do not adequately correct for selection bias. None had use of detailed measures of homebuyer past performance with various forms of credit with which to control for the characteristics that might lead to selection into counseling.

Nonetheless, as detailed below, 5 of the 7 studies that analyze pre-purchase counseling's impact on mortgage performance found that mortgage performance improved with counseling. The order of magnitude of these findings was large in two studies: Hirad and Zorn (2002) found that 90+ days delinquency rates were 34 percent lower among clients receiving counseling; Agarwal, et al. (2009a) found that the pre-purchase counseling reduced delinquency rates by 30 percent, but attributed this difference to lenders changing their behavior, rather than the services received by counseling.

Exhibit 1: Summary of Previous Evaluations of Pre-purchase Counseling

Author(s)	Year	Method	Sample Size	Intervention	Outcome Measure(s)	Key Findings
Archer, Fitterman and Smith	2009	Quasi-experimental with Logistic regression	41 Florida Participating Jurisdictions	Florida nonprofit offering education after purchase contract is signed	Default rate	Homebuyer education has a statistically significant negative effect on aggregate, jurisdiction-wide loan performance. The authors caution that this finding is likely not causal.
Agerwal et al.	2009a	Quasi-experimental with Matched Pairs comparison	1,200 borrowers receiving counseling	Mandatory pre-purchase financial counseling for high-risk mortgage applicants	Default rate	Default decreased by 30%; authors attribute the decline to lenders' screening rather than counseling *per se*.
Agarwal et al.	2009b	Quasi-experimental with multiple estimations strategies	12,919 observations	Voluntary pre-purchase financial counseling for mortgage applicants with barriers to homeownership. Borrowers who became delinquent were also offered post-purchase counseling	Mortgage delinquency rates	Lower default rates that the authors attributed to the mortgage characteristics originated to participants, the skills participants gained during pre-purchase counseling and the program's post-purchase component.
Birkermeyer and Tyuse	2005	Descriptive pre-post	203	Homeownership education and counseling	Credit scores	No statistically significant change in credit scores
Carswell	2009	Descriptive Retrospective pre-test	405	Pre-purchase homeownership counseling	Self-reported financial behaviors	75.2% of respondents agreed that they had no difficulty paying their mortgage; 85.5% of respondents agreed that their mortgage took top priority over other bills

Author(s)	Year	Method	Sample Size	Intervention	Outcome Measure(s)	Key Findings
Hartarska and Gonzalez-Vega	2005	Quasi-experimental Selection model	919	Pre-purchase credit counseling	Mortgage loan default and pre-payment	For observations before 1996, when counseling was not mandatory, those counseled did not default less, and prepaid more often. For the sample as a whole, the counseled defaulted less often and prepaid more often.
Hartarska and Gonzalez-Vega	2006	Quasi-experimental Selection model	233	Pre-purchase credit counseling	Mortgage loan default	Counseled borrowers default rate was 39%
Hirad and Zorn	2002	Quasi-experimental Selection model	39,318	Pre-purchase homeownership counseling delivered through classroom, home study, individual or telephone	90-day delinquency rates	Borrowers who received counseling were 34% less likely to become 90 days delinquent. Correcting for selection showed statistically significant effects for classroom delivery of counseling services.
Quercia and Spader	2008	Quasi-experimental Selection model	2,688	Pre-purchase homeownership and education counseling	Mortgage loan pre-payment and default	Counseling had a statistically significant increase in probability of pre-payment; no statistically significant increase in mortgage performance.
Sheraton and Hill	1995	Descriptive comparisons of borrowers before and after counseling	35	Financial education for low- and moderate-income first-time homebuyers	Self-reported financial behaviors	50% increase in the proportion of participants who totaled the value of things they owned "All of the time" and the proportion of participants who compared their income and expenses "All of the time."
Turnham and Jefferson	2012	Descriptive comparisons of borrowers before and after counseling	573	Pre-purchase homeownership and education counseling	Mortgage performance	After 12 months, one of the 200 clients purchasing a home within 18 months of receiving counseling services.

Source: Collins and O'Rourke (2011)

DATA AND METHODS

The data used in this study consist of information on 18,258 clients who received pre-purchase counseling from NeighborWorks organizations at some point between October 2007 and September 2009 and who also purchased a home within this 24-month period. Experian (a credit repository), using propensity scoring, selected a comparison group of 56,298 borrowers with similar observable characteristics to those of NeighborWorks pre-purchase clients. We augmented information included in Experian's credit files with county-level data on unemployment rates and MSA-level measures of changes to house prices[4]. With these data we estimated a bi-nomial logit model in which the dependent variable =1 for loans that are observed to ***avoid*** becoming 90+ days delinquent within 24 months of origination.[5] In such a model the estimates (odds ratios) reflect the impact of a one unit change of an explanatory variable on the odds of observing a loan avoiding becoming 90+ days delinquent within 24 months of origination.

Propensity Scoring Comparison Group

Propensity scoring is a technique for developing a comparison group that closely matches the characteristics of those who received treatment. Those who obtain pre-purchase homebuyer counseling in general, and NeighborWorks network's counseling in particular, are not a representative sample of all potential homebuyers. For example, most are first-time buyers, relatively young, and of modest income (see Exhibit 2).[6] It is helpful on two counts to select a comparison sample that is similar to the set of counseled homebuyers on a variety of dimensions, rather than to all buyers.

First, while many variations between the counseled buyers and loans and a random sample of non-counseled loans would be controlled for in the subsequent logit modeling, large differences in the distributions of the control variables would reduce the efficiency of the model estimates. The issue of efficiency of the model estimates can be described as follows. Suppose that almost all the counseled-borrower loans were to first-time buyers and almost all the non-counseled-buyer loans were to repeat owners. It would be very difficult (if not impossible) to separate statistically the effect of pre-purchase counseling program on serious delinquencies from the effect of the past ownership history on delinquencies, since there would be very few buyers of the same history in the different treatment groups. The problem, therefore, is not that we would get the *wrong* answer regarding counseling impacts, but

[4]State level housing price data were used for locations outside of MSAs.

[5] Logit models are used when the dependent variable is categorical, and thus can take on a limited number of values. In this case the model estimates the explanatory power of variables that result in the dependent variable taking the value of "1".

[6] Note that the ratio of total credit outstanding to income (Dti) is higher for borrowers who did not receive NeighborWorks counseling when compared to borrowers who did receive such counseling. This mean value is different across the two groups because it was not included in the propensity scoring model. The difference is controlled for in the models that measure the impact of NeighborWorks counseling on loan performance by including the variable in the models' specification.

Exhibit 2: Descriptive statistics all variables included in the LOGIT model by comparison and NeighborWorks counseled groups

Variable Name	Variable Description	Comparison Group	NeighborWorks Counseled Borrowers	All Borrowers
Dti	ratio of total credit outstanding to income	.6396	.3690	.5733
Ind	indicator of borrower receiving counseling	0.00	1.00	.24
enhtype19	indicator of FHA loan	.40	.42	.41
income w/o over 200k	Income (excluding those over $200,000)	58309	55941	57730
Incomeclsq	square of income	4423878038	4077075828	4339133684
vantage cleaned	Vantage Score	740	723	736.1271
yr 2008 loan	yr 2008 loan	.3131	.3055	.3112
yr 2009 loan	yr 2009 loan	.5231	.5437	.5281
jan 2008 unemployment rate; if no MSA could be matched state is used; if county could not be matched, left blank	January 2008 unemployment rate; if no MSA could be matched state is used; if county could not be matched, left blank	5.153	5.009	5.117
% change between jan 08 and jan 10 UE rate; an increase from 5% to 10% would produce a value of 100	% change between January 08 and January 10 unemployment rate; an increase from 5% to 10% would produce a value of 100	96.998803	99.398760	97.590895
Q1 2008 HPI, if no MSA could be matched state is used; if county could not be matched, left blank	Q1 2008 HPI, if no MSA could be matched state is used; if county could not be matched, left blank	240.076944	228.402819	237.196825
% change between Q1 08 and Q1 2010 HPI	% change between Q1 08 and Q1 2010 HPI	-10.402717	-9.866913	-10.270529
DTI2cl	ratio of annual mortgage payment to income	.2897	.2740	.2857
mtf_int_rate	mortgage interest rate computed based on total mortgage payment	7.4182	7.5599	7.4529
ALL6250 recoded cleaned	dummy for credit >=90 days in 12 months since open	.1087	.1334	.1147
OVERALL BTL OPEN TRD RP6	balance to credit amount ratio on 6 months of trades	46.04	45.97	46.02
ALL7357D cleaned	% of trades >=60 days in last 12 months	4.5344	4.2399	4.4625
ALX0436 cleaned	total trades open in last 6 months	3.3597	2.8476	3.2343
TTL COL WBAL>250	total external collections with balance >250	.28	.21	.26

Variable Name	Variable Description	Comparison Group	NeighborWorks Counseled Borrowers	All Borrowers
TTL COL INQ IN 6M	total external collect inquiries in last 6 months	.06	.07	.06
TTL INQ IN 3M NO DEDUPE	number credit inquiries in past 3 months	1.55	1.87	1.63
REV3422 cleaned	total open revolving trades with bal/credit amount >=75 reported in last 6 months	.6296	.5671	.6144
chargeoff indicator (from ALL8164)	chargeoff indicator	.1474	.1543	.1491
indicator of past bankruptcy	indicator of past bankruptcy	.0737	.0997	.0801
mta0301	dummy for NOT first time buyer	.14	.13	.14
indintractmta0301	interaction between NOT first time buyer and counseling	0.0000	.1277	.0313
Ext_Age	Borrower age	39.88	37.78	39.61
N		56,284	18,258	74,542

rather that we would get *no answer at all*. By having counseled and non-counseled samples that are relatively similar on observable borrower and loan characteristics, our models will be more likely to separate program effects from other statistical "noise."

Second, choosing samples that are similar on observable characteristics likely reduces their dissimilarity along unobservable dimensions, as they are likely correlated with one another. That reduces the likelihood and likely size of selection bias, which if substantial might produce a higher or lower than accurate estimate of counseling's impact. Providing for a similar comparison sample is the first of the two methods we use to minimize such bias.

Instead of a random sample, we used Experian's comparison sample created by implementing a propensity scoring model to align the characteristics of the counseled loans and non-counseled loans as closely as possible on several important dimensions. For each loan in the counseled sample, the propensity scoring model found the three closest matches among the non-counseled loans in the Experian database.

Propensity scoring has been used in other evaluations of pre-purchase counseling, most recently in Agarwal et al.'s 2009 study of the Indianapolis Neighborhood Housing Partnership, Inc.'s counseling program in the Indianapolis area.[7] Their primary purpose was to reduce selection bias. NeighborWorks engaged Experian to construct the comparison group using its own databases. The propensity scoring model used by Experian included the following variables:

- Total open trades (a trade is any type of credit account, such as a credit card, auto loan, etc.)
- Total trades opened in last six months
- Total trades ever 60+ days delinquent in past 24 months
- Total balance of trades opened in last six months
- Ratio of balance to credit amount, trades opened in last 6 months
- Dummy for Florida
- Dummy for California
- income (excluding those over $200k)
- Vantage score[8]

[7] The authors report that they attempted to use a borrower's physical and commute-time distance from a counseling location as an instrument that predicts whether or not a borrower entered counseling. This instrument did not predict group membership accurately enough to use in the final analyses.

[8] A Vantage Score is a generic credit score model developed by the three credit repository companies. With a range between 501 and 900, the score predicts the likelihood of future serious delinquencies (90 days late or greater) on any type of account. A consumer's is based primarily on a 24-month review of a consumer's credit file. http://www.vantagescore.com/about/vantagescoremodel/.

- Mortgage amount
- Total monthly house payment
- Interest rate
- yr 2008 loan
- yr 2009 loan
- FHA loan
- Repeat homebuyer

Note that the borrower income and mortgage interest rate are not reported directly in Experian's database from income tax returns and mortgage documents. Experian estimated borrower income using a proprietary algorithm that uses all sources of income in Experian's files to determine which self-reported income value collected by Experian is most consistent and reliable. Where there are missing values, or no sources or reliable income sources provided for a consumer, an income value is imputed based on an algorithm that applies an income value based on the information contained on other records with characteristics similar to that of the missing consumer (e.g., realty, age, marital status, presence of children, occupation, etc.).

To impute the mortgage's interest rate, Experian used the total monthly payment associated with the loan (which may include escrow items such as property taxes and insurance), the loan amount and loan term (all three of these variables are in Experian's database) to calculate a mortgage's interest rate. Because Experian's database does not have information on just the monthly principal and interest payment, the imputed interest rate is not the same as the actual mortgage interest rate. Nonetheless, the imputed interest rate was used as a control in the propensity scoring model.

Using the propensity scoring method, Experian selected 56,298 borrowers who received their loans at the same time as the NeighborWorks clients (between October 2007 and September 2009). As shown in Exhibit 3 below, the propensity scoring method was successful, with average characteristics for the variables used in the propensity scoring model just about the same for NeighborWorks clients and the comparison group members.

Exhibit 3: Means for variables used in propensity scoring model

Variable	Comparison Group	NeighborWorks Counseled	Total
Total open trades	13.4181	13.6778	13.4813
Total trades opened in last six months*	1.90	2.78	2.12
Total trades ever 60+ days delinquent in past 24 months	.8848	.9060	.8900
Total balance of trades opened in last six months	31896	17325	28335

Ratio of balance to credit amount, trades opened in last 6 months	46.04	45.97	46.02
Florida**	.0461	.0421	.0451
California**	.1010	.0907	.0985
income (excluding those over $200k)	58309	55941	57730
Vantage score	740.5	722.9	736.1
Mortgage amount	133124	128880	132084
Total monthly house payment	900	881	895
Interest rate	7.4182	7.5599	7.4529
yr 2008 loan	.3131	.3055	.3112
yr 2009 loan	.5231	.5437	.5281
FHA loan	.40	.42	.41
Repeat homebuyer	.14	.13	.14
*** This variable differs slightly from the 6-month trades variable in Exhibit 2 because of different treatment of authorized user trades.**			
**** Experian actually used all states designations as part of the propensity scoring. We report here only the two states with largest numbers of delinquencies; additional results are available from the authors.**			

Logit Model of Performance

Pre-purchase counseling can have at least two types of effects on loan performance. The first is a direct impact, helping homebuyers with such matters as overall budgeting, with managing their other borrowing on credits cards and elsewhere, or with setting aside reserves for emergencies, in order to enable them to make their regular mortgage payments. A second impact is to help them select a mortgage product that is affordable and otherwise appropriate, including gaining a desirable interest rate on the loan given their credit rating and down payment[9] and choosing a home at a price that makes mortgage payments a manageable fraction of income. That second element, product choice, may then have impacts on mortgage performance, in part due to counseling. Our modeling estimates the first, direct effect.

We considered modeling the second effect as well, and conducted some initial trial runs. Because of three limitations in the Experian dataset we cannot perform satisfactory analyses of counseling's impact on product choice. The first were limitations of Experian's data, which does not include two central measures defining the mortgage product chosen: interest rate and DTI. Second, by using information on loan's payment and the imputed interest rate in the propensity scoring model, Experian eliminated much of the variation in key indirect effects of counseling between counseled and non-counseled homebuyers. Re-doing the control sample was beyond the purview of this study. Third, some people are referred to counseling, sometimes as a condition for financing, precisely because they are

[9] According to a recent survey of pre-purchase counseling clients, 44 percent of clients enter counseling to find the most appropriate mortgage: see Turnham and Jefferson, 2012.

seeking certain types of mortgage product or level of financial commitment. This further complicates, complicating the assessment of the direction of causation between product choice and counseling.

Therefore, we focus our analyses on one central potential impact of counseling: that providing clients with information about being a homeowner, general budgeting, and financial management skills will result in better loan performance over time, holding other factors constant. The dependent variable is binary, and takes the value of 1 if a loan *avoids* becoming 90+ days delinquent at any point within 24 months of origination regardless of when the loan was originated. (The data include loans originated in the fourth quarter of 2007, all of 2008 and the first three quarters of 2009.) Measurement is truncated at two years, and only loans made at least two years before the end of our observation period in third quarter of 2011 are considered, so that each loan's performance is viewed over the same length of time.

The model's explanatory variables are as follows, listed in Exhibit 4:

- The pre-purchase counseling intervention itself is measured by two explanatory variables, in order to identify potentially different impacts of counseling for first-time compared to repeat homebuyers, The first variable, *indicator of borrower receiving counseling*, is a dummy for whether NeighborWorks pre-purchase counseling was provided to the borrower prior to the acquisition of the owner's current home. Its coefficient by itself measures the effect of counseling for first-time buyers. The second intervention variable, *interaction between repeat buyer and counseling*, is the product of dummy variables for counseling and for repeat buyers; and its coefficient potentially amends the estimated impact of counseling found for first-time buyer performance to estimate counseling impacts for repeat buyers in particular.[10]
- The dummy variable for repeat buyer provides for measurement of whether repeat purchasers experience different mortgage outcomes than first-time buyers, aside from any difference in the impact of counseling.
- Income-related measurements of a buyer's ability to meet mortgage obligations, measured at the time of loan origination, include *annual income; square of income* (to allow for non-linearity in income's impact on performance); *ratio of annual mtge payment to income*, the conventional housing ("front-end") debt-to-income ratio (DTI) including principal, interest, and taxes and insurance when paid into escrow; and *ratio of total credit outstanding to income*, a modified form of "back-end" all-debts DTI employed by Experian, using the stock amount of credit rather than the flow of debt repayments as its numerator, which is the more standard method of calculating DTI.
- *Vantage credit score* (ranging 500-990) at time of loan origination

[10] Receiving counseling is a dummy variable with a value of "1" or "0". Being a repeat buyer is also a dummy variable. The product of the two values (1 x 0, 1 x 1, 0 x 1, and 0 x 0) yields "0" three fourths of the time and "1" in only one quarter of situations, where the client is both a repeat buyer and being counseled.

- Ten measures of the homebuyer's credit history and experience, with time of observation looking backward from the time of loan origination:
    - A dummy for whether the buyer has been delinquent 90 or more days on one or more credit trades in 12 months since the trades were opened (*dummy for credit >+90 days in 12 months since open)*
    - Overall balance to credit amount ratio on open trades reported in the last 6 months (*balance to credit amount ratio on 6 months of trades)*
    - Percentage of trades 60 days or more delinquent or derogatory in the last 6 months (*% of trades >=60 in last 6 months)*
    - Total number of trades open in the last 6 months (*total trades open in last 6 months)*
    - *total external collections with balance > $250.*
    - *total external collections inquiries in the last 6 months.*
    - *number of credit inquiries in past 3 months*
    - Total open revolving trades with a balance to credit ratio at or above 75% reported in the last 6 months (*total open revolving trades with bal/credit amount>= reported in last 6 months)*
    - Whether the homebuyer has ever had a credit been charged off as uncollectible (*whether a chargeoff)*
    - Whether the homebuyer has ever experienced a bankruptcy (*whether a bankruptcy)*
- Other loan and borrower characteristics: *indicator of FHA loan, mortgage interest rate computed based on total mortgage payment*[11], and *age of borrower*.
- Measures of housing market conditions include MSA (or state for non-metro mortgages) housing price indices (*housing price index Jan 08)* and changes in them over 2 years (*housing price index change Jan 08-Jan 10),* as provided by the Federal Housing Finance Agency.

[11] As indicated in the Methods and Data section, in discussion of product choice, Experian data do not actually include a lender-reported interest rate. Experian computed an "interest rate," based on total mortgage payment, often including property taxes and insurance if they are paid into escrow accounts with lender/servicers), loan term,; and loan amount at origin. Using the total mortgage payment together with mortgage amount, and term overestimates the interest rate. Because these extra costs (property taxes and insurance) are included in that payment, the variable inherently overstates the interest rate. We tested whether this variable nonetheless had value in comparing borrowers, including it in the LOGIT analysis even though it often overstates actual rates.

- Unemployment measures *county unemployment rate* and *change in unemployment rate Jan 08-Jan 10* provide rough proxy for the likelihood that borrowers have lost jobs and income since loan origination.
- Dummy variables for *loan originated in 2008* and *loan originated in 2009* respectively represent changing underwriting standards and economic conditions impacting loan performance, with origins in 2007 the excluded category.

Exhibit 4: Variables used in logit Model of Loan Performance

Variable Name	Description
ind	indicator of borrower receiving counseling
indintractmta0301	interaction between NOT first time buyer and counseling
Dti	ratio of total credit outstanding to income
enhtype19	indicator of FHA loan
incomecl200k	annual income (ignoring those over $200k)
incomeclsq	square of income
vantageocl	vantage credit score (500-990 is Experian's range for this variable)
yr2008	loan originated in 2008
yr2009	loan originated in 2009
UE08	county unemployment rate in Jan 08
UEch0810	change in unemployment rate Jan 08-Jan 10
HPI08	housing price index Jan 08
HPIch0810	housing price index change Jan 08-Jan 10
DTI2cl	ratio of annual mortgage payment to income
mtf_int_rate	mortgage interest rate computed based on total mortgage payment
ALL6250cl	dummy for credit >=90 days in 12 months since open
ALL7110	balance to credit amount ratio on 6 months of trades
ALL7357Dcl	% of trades >=60 days in last 12 months
ALX0436cl	total trades open in last 6 months
COL3210	total external collections with balance >250
IQC9416	total external collect inquiries in last 6 months
IQT9425	number credit inquiries in past 3 months
REV3422cl	total open revolving trades with bal/credit amount >=75 reported in last 6 months
Chargeoff	whether a chargeoff
ALL9220bkrptcyind	whether a bankruptcy
EXT_AGE	age of borrower
mta0301	dummy for NOT first time buyer

FINDINGS

The findings of our mortgage performance model analysis are summarized in Exhibit 5. The exhibit reports the parameter estimate, odds ratio and p-value for each variable. In interpreting the results, we focus on the odds ratio and p-value. The odds ratio reflects the impact of a one-unit change of the explanatory variable on the odds of a borrower not having a loan become 90+ days delinquent within 24 months of origination. Therefore, a variable that has an odds ratio of greater than 1.0 means that a one-unit change *increases* the odds of having a borrower not become delinquent on his/her loan. Conversely, an odds ratio of less than 1.0 means that a one unit change to the explanatory variable *decrease* the odds that a borrower will avoid becoming 90+ days delinquent on his/her mortgage within 24 months of origination.[12]

The second factor we use in interpreting the results is the p-value for each variable. In most statistical analyses, the null hypothesis is that a parameter estimate is equal to 0. In this context, the null hypothesis is that an explanatory variable has no impact on loan performance. The standard used in most studies is to reject this hypothesis and conclude that the explanatory variable has an impact on loan performance if the p-value is less than .05. Therefore, a parameter estimate with an odds ratio that is greater than 1.0 and a p-value of less than .05 can be interpreted as a factor that has a positive impact on loan performance.

The coefficient for the basic NeighborWorks counseling indicator impact on ***avoiding*** serious delinquency and default is positive and highly statistically significant, (the p-value is .000, well below the .05 threshold) with a substantial odds ratio of over 1.5. First-time buyers who obtain counseling achieve significantly better loan performance than do comparable buyers without counseling, over the important first two years of their loans.

The coefficient of the interaction between counseling and being a repeat buyer is not at all statistically significant.[13] First-time buyers and repeat buyers both receive the same substantial benefit from counseling, measured by the counseling indicator's coefficient and odds ratio.

Note that we attempted to estimate separate models for first-time and repeat buyers, thinking that their performances might be different in reaction to a variety of variables in addition to counseling. However the number of repeat buyers is, at 1/7 of the counseled total, small enough that when we then differentiate between people counseled and those not, and then look at the cases in which 90-day delinquencies occur, the number is too small to allow stable separate modeling. Including the interaction

[12] Note that odds are not the same as probability: odds are calculated by dividing the probability (p) by l minus the probability, or p/(1-p). Therefore, in the case where the probability of an event occurring is 25 percent, the odds are .25/(1-.25) = 0.33. Assume, for example that the odds of an event occurring are 0.33 without counseling, but 0.25 with counseling. The odds ratio between those events happening without and with counseling is 0.33/0.25 = 1.32.

[13] As Norton (2004) has pointed out, the interaction's impact in a non-linear regressions structure such as Logit is not simply the coefficient of the single interaction term. We computed the proper interaction and significance test using the procedure Norton lays out.

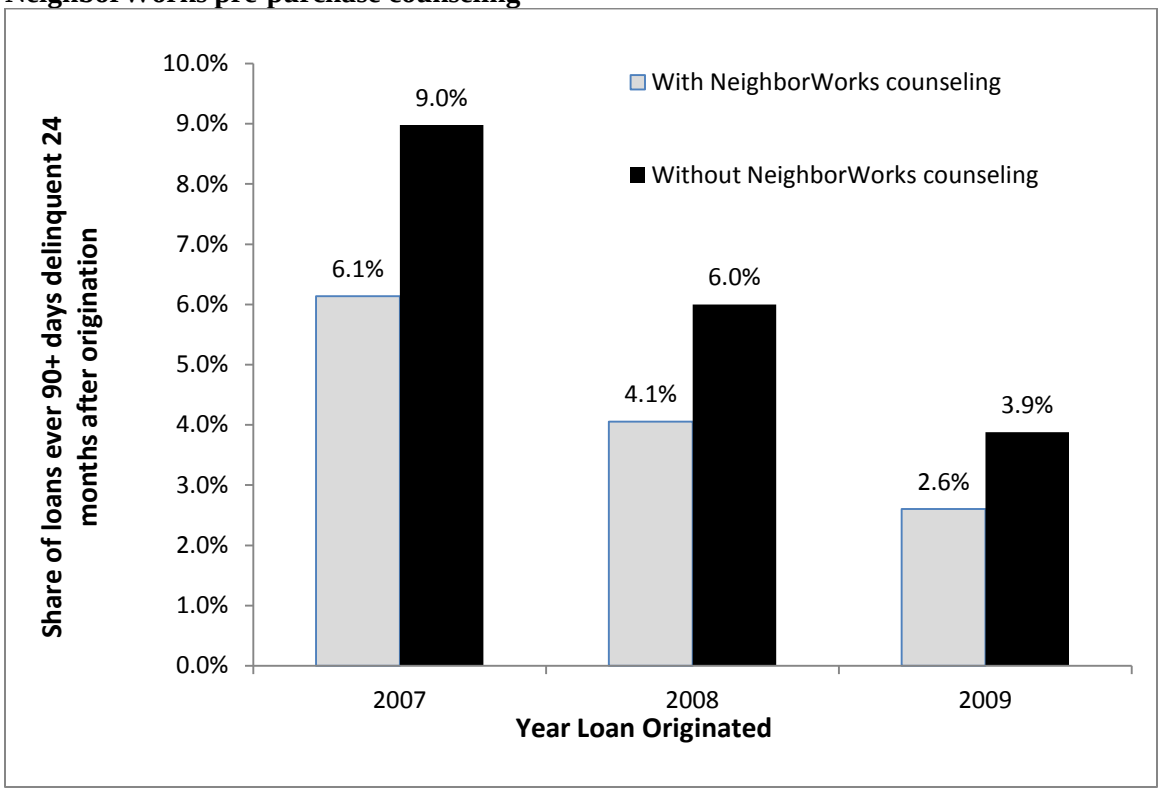
between counseling and repeat buyers in our single model allows us to isolate our key concern about counseling while retaining sufficient sample size to estimate the model effectively.

Exhibit 5: Parameter estimates of logit model of loan performance with prior use of credit variables

Variable	Parameter Estimate	P-value	Odds Ratio
indicator of borrower receiving NeighborWorks counseling	**0.411**	**0.000**	**1.51**
interaction between first time buyer and counseling	**-0.021**	**0.900**	**0.98**
ratio of total credit outstanding to income	-0.001	0.909	1.00
indicator of FHA loan	-0.520	0.000	0.59
annual income (ignoring those over $200k)	0.000	0.000	1.00
square of income	0.000	0.001	1.00
vantage credit score (500-990 is their range)	0.010	0.000	1.01
loan originated in 2008	0.436	0.000	1.55
loan originated in 2009	0.895	0.000	2.45
county unemployment rate in Jan 08	-0.006	0.749	0.99
change in unemployment rate Jan 08-Jan 10	-0.001	0.154	1.00
housing price index Jan o08	0.001	0.000	1.00
housing price index change Jan 08-Jan 10	0.027	0.000	1.03
ratio of annual mortgage payment to income	-0.877	0.000	0.42
mortgage interest rate computed based on total mortgage payment	0.074	0.000	1.08
dummy for credit >=90 days in 12 months since open	-0.111	0.038	0.90
balance to credit amount ratio on 6 months of trades	-0.004	0.000	1.00
% of trades >=60 days in last 12 months	-0.001	0.439	1.00
total trades open in last 6 months	-0.026	0.000	0.97
total external collections with balance >250	-0.032	0.045	0.97
total external collect inquiries in last 6 months	-0.058	0.187	0.94
number credit inquiries in past 3 months	-0.124	0.000	0.88
total open revolving trades with bal/credit amount >=75 reported in last 6 months	-0.010	0.481	0.99
whether a charge-off	-0.244	0.000	0.78
whether a bankruptcy	-0.321	0.000	0.73
age of borrower	-0.003	0.064	1.00
dummy for not first time buyer	-0.291	0.000	0.75
Constant	-3.698	0.000	0.02

Because it is difficult to interpret odds ratios, we used the model's parameter estimates and population means to translate that metric into the probability of loans becoming 90+ days delinquent within 24 months of origination with and without NeighborWorks pre-purchase counseling. We calculated separate probabilities for loans originated in 2007, 2008 and 2009 for clients who were not first time homebuyers. The results of these simulations are presented in Exhibit 6.

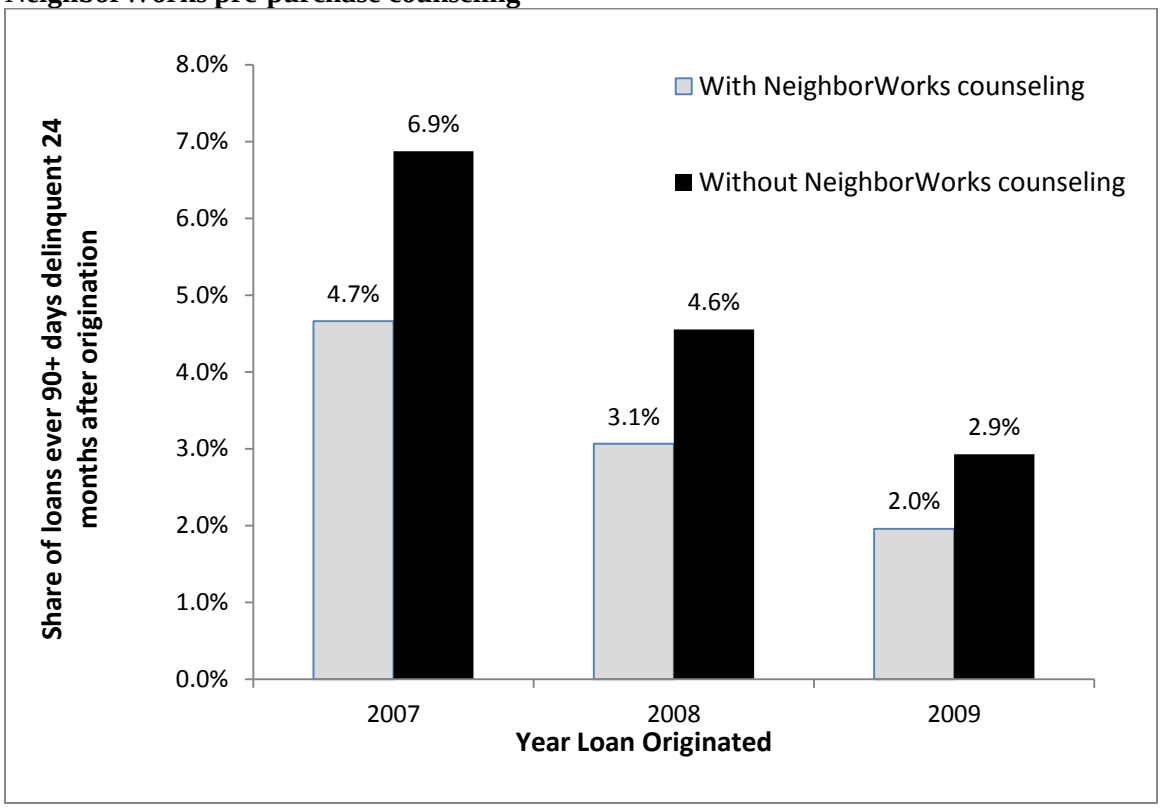
Exhibit 6: Estimated 90+ days delinquency rates for repeat homebuyers with and without NeighborWorks pre-purchase counseling



Source: Authors' analyses of logit model parameter estimates

We also estimated the share of loans that become 90+ days delinquent for first-time homebuyers only. Exhibit 7 graphically presents these findings, which are very similar to the estimates for all borrowers in the sample.

Exhibit 7: Estimated 90+ days delinquency rates for first-time homebuyers with and without NeighborWorks pre-purchase counseling



Source: Authors' analyses of logit model parameter estimates

The estimates of counseling's impacts show a one-third reduction in the share of loans for pre-purchase clients that are 90+ delinquent, when compared to borrowers who receive no such services. The results are highly consistent across years, despite the strong shocks to the mortgage market in this period. Given the results of the logit analysis, the findings are nearly identical for first-time and repeat buyers.

This reduction in the delinquency rate (using an approach that reduces potential selection bias issues) is consistent with studies conducted by Hirad and Zorn (2002) and Agarwal et al. (2009a) that reported declines in delinquency of 34 percent and 30 percent, respectively.

Model parameter estimates other than the counseling variables, as reported in Exhibit 4, make sense and have important implications of their own. A lower housing debt-to-income ratio produces significantly lower odds (0.42) of a serious delinquency. Should it be the case that NeighborWorks pre-purchase counseling leads homebuyers to take on lower housing payments relative to income, counseling could have an additional substantial effect by way of DTI. While, as we discuss in the Data and Methods section, various circumstances left us unable to model successfully the impact of counseling on mortgage product choice including DTI, additional research might be fruitful in pursuing that connection.

Exhibit 8: Estimated share of loans that are 90+ days delinquent within 24 months of origination with and without NeighborWorks pre-purchase counseling

	Year Loan Originated		
First-time Homebuyers	2007	2008	2009
With NeighborWorks counseling	4.7%	3.1%	2.0%
Without NeighborWorks counseling	6.9%	4.6%	2.9%
Difference	-2.2%	-1.5%	-1.0%
% Decline	***-32.2%***	***-32.7%***	***33.1%***
Repeat Borrowers	2007	2008	2009
With NeighborWorks counseling	6.1%	4.1%	2.6%
Without NeighborWorks counseling	9.0%	6.0%	3.9%
Difference	-2.8%	-1.9%	-1.3%
% Decline	***-31.7%***	***-32.4%***	***32.9%***

Source: Authors' analyses of logit model parameter estimates

Higher credit score has positive and significant link to performance. All ten of the coefficients of measures of past high level of use and misuse of credit have the expected negative signs for impact on avoiding serious delinquencies and defaults, and seven of them are statistically significant. These measures seem to well represent the characteristics of homebuyers/mortgage-borrowers in terms of their knowledge of, approach to, and ability to manage credit. Past difficulty with credit use is a good predictor of future mortgage performance.

Most importantly for our focus on the impacts of NeighborWorks pre-purchase counseling, inclusion of these ten measures of what are, in many studies, the "unobservables" about household ability to handle credit, by no means eliminates the separate impact of counseling. It is not the case the impact of counseling disappears once we control for people's measured past ability to handle credit. That might have been the case once we introduced the strong measures of credit history, if any perceived effect of counseling is actually the result of selection bias. That bias could occur in the case in which credit-savvy homebuyers are the people who—because of their savvy—both more frequently choose counseling (perhaps to gain access to homebuying financial assistance) and perform better with their mortgages, with counseling itself making no difference while personal approach to credit does. Because this selection bias issue has been so critical in questions about the validity of previous research on counseling impact, we shall return to it in the next section.

Income shows very little impact. The results suggest that lower income households can avoid serious mortgage trouble as well as others, if they are comparable in terms of past credit behaviors and other factors. People obtaining FHA loans are faring much worse than others, for reasons we have not explored in this study. Performance is substantially better for people with more recent loan origination dates, which may well reflect—by 2008 and 2009 —tightened underwriting and the sharp reduction in Option ARM and other types of loans that have proved hazardous to buyers. One surprise is that repeat

buyers generally were more likely to suffer serious delinquencies than were first-time buyers, even while that distinction had no effect on the impact of counseling.

Our available measures of housing market conditions show statistically significant but limited-scale impacts, with worse housing price declines pulling down mortgage performance at least modestly. The unemployment variables, available only at county level when we would ideally have household-level measures, show no significant impact. Finally, the large odds ratios for the dummy variables indicating whether a loan was originated in 2008 or 2009 indicate may reflect improved underwriting standards used by lenders after the financial crisis started in 2007.

Further exploration of selection bias

Analysts believe that issues related to selection bias have until now made it difficult to reach any conclusions about counseling's impact. To illustrate this problem, Collins and O'Rourke (2011) posit that there are two potential types of counseling clients: (1) those with a high financial capability with a high degree of future motivation and so have a strong credit profile and (2) people with low financial capability who are present-oriented and so have a weak credit profile. In previous studies, measures of financial capability have not generally been available, so that these unobserved financial-management skills may link entrance to counseling and good mortgage performance and bias estimates of counseling's own impacts. If people with high financial capability consistently choose to enter counseling compared to others, analysis may overstate counseling's effect; and if people with low financial capability recognize that and systematically seek out counseling, analysis may understate counseling's effect.

The inclusion in this study of several credit management indicators, however, should capture the degree of a client's financial capability, orientation toward future economic well-being, and related elements and minimize the bias. The methods used provide for this both through inclusion of credit measures' in the logit analysis and their earlier inclusion, for some identical and some similar variables, in the propensity scoring. **The logit analysis—with its inclusion of an array of measures that actualize concepts of financial knowledge, savvy, judgment, and discipline—shows strong evidence that NeighborWorks pre-purchase counseling has an independent effect on mortgage performance**. If entrance to counseling were acting only as a proxy for characteristics that both drew people to counseling and helped them avoid mortgage trouble, our inclusion of Experian credit data variables as extensive controls should have wholly or largely eliminated counseling's estimated impacts. In fact they remain very substantial.

We undertook a further test for selection bias. If counseled buyers are in fact self-selecting to be counseled because they are also more adept in handling credit, then eliminating all the credit history and performance variables from the basic model should *increase* the apparent estimated impact of the retained counseling indicator variables. We tested this possibility by re-running the performance model dropping all ten of the credit variables. The results are in Exhibit 9.

Exhibit 9: Parameter estimates of logit model of loan performance without prior use of credit variables

Variable	Parameter Estimate	P-value	Odds Ratio
Indicator of borrower receiving NeighborWorks counseling	0.376	0.000	1.46
interaction between first time buyer and counseling	-0.121	0.42	0.89
ratio of total credit outstanding to income	-0.014	0.151	0.99
indicator of FHA loan	-0.57	0.000	0.57
annual income (ignoring those over $200k)	0.000	0.000	1.00
square of income	0.000	0.001	1.00
vantage credit score (500-990 is their range)	0.012	0.000	1.01
loan originated in 2008	0.491	0.000	1.63
loan originated in 2009	0.921	0.000	2.51
county unemployment rate in Jan 08	-0.024	0.146	0.98
change in unemployment rate Jan 08-Jan 10	-0.002	0.020	1.00
housing price index Jan 08	0.001	0.000	1.00
housing price index change Jan 08-Jan 10	0.024	0.000	1.02
ratio of annual mortgage payment to income	-0.914	0.000	0.40
mortgage interest rate computed based on total mortgage payment	0.060	0.000	1.06
age of borrower	-0.005	0.000	1.00
dummy for repeat buyer	-0.362	0.000	0.70
Constant	-5.626	0.000	0.00

Our findings are just the opposite of those suggested by the notion of strong positive selection bias. The coefficient of our counseling indicator *declines* modestly in the revised model relative to that in our basic analysis. The odds ratio goes from 1.51 to 1.46 for the basic first-time buyer indicator. The coefficient for interaction for repeat buyers remains not significant. Both first-time buyers and repeat buyers are perceived to benefit less when the credit characteristics are not used in the model, not more. Letting people's self-selection biases go uncontrolled in the model doesn't create a false increase in perceived impact of counseling at all.[14]

[14] A common method to deal with selection bias in measuring interventions' impacts more broadly is to use instrumental variables that predict whether a person seeks treatment but do not influence the outcome of interest. In a recent analysis of foreclosure prevention counseling (Collins and Schmeiser 2010), the authors measure an organization's outreach advertising in Chicago as an instrumental variable that predicts entry into counseling but does not affect outcomes for clients who receive counseling, to good effect in their work. The results of this analysis suggest that the factors influencing selection into counseling affect outcomes negatively. Unfortunately, a similar instrumental variable approach does not work here. We are analyzing counseling across many different cities, and we do not know when particular NeighborWorks organizations made outreach efforts that would influence selection into counseling, nor that any such outreach for pre-purchase counseling would have a sufficiently substantial effect to serve as an effective instrument. Moreover, we do not we have an alternative instrumental variable available that would be correlated with the decision to enter counseling but not to the mortgage outcomes that concern us. We believe that our ability to directly operationalize and measure financial capability, by looking at past credit behavior and performance, provides a powerful and certain tool for handling selection bias in this kind of intervention.

It is further instructive regarding selection bias to look back at some of the specifics of the set of 10 credit-history-and-performance variables we have included in our analysis. Suppose we had only one measure: whether a buyer underwent bankruptcy in the past. Then—if we were hunting for selection bias—we might suspect that such a buyer could be chastened about credit use and also perceive a need for counseling, say to escape the stigma of bankruptcy that lenders would use to decline financing. This newly careful borrower might be more likely to go to counseling and to perform well on their mortgage—creating a version of selection bias where counseling seemed to correlate with good performance but was not necessarily the cause of improved performance.

Our analysis shows that the buyers with bad credit history perform worse on their new home mortgage, not better. Furthermore, this chastened borrower's changed behavior should be showing up in, and controlled for by, our host of other measures of recent credit management behavior besides bankruptcy. Alternatively, say our buyer with a past bankruptcy was singularly stubborn both about taking bad risk-management behaviors and refusing to go to counseling, leading to a false conclusion that lack of counseling produced poor mortgage performance. It might be argued that we do not have a measure of this "stubbornness" trait that might connect bad performance and non-receipt of counseling, at least within the bankruptcy indicator itself. But we do have controls for this persistent behavior/attitude among our ten variable (plus credit score) package. While the bankruptcy indicator measures whether one ever occurred for this buyer, we have numerous other credit-performance measures that control for behavior in the past 3, 6, 12, and 24 months. The bad-credit recidivist will be very much identified and his characteristics controlled.

CONCLUSION

Our analysis demonstrates clearly that NeighborWorks network pre-purchase counseling and education has a substantial impact on the performance of mortgages for home-purchase. Counseling produces a consistent one-third reduction in serious delinquency over the two years following origination. The impact is the same for both first-time buyers and previous homeowners.

The finding is consistent with evidence from other research on the same topic. It breaks crucial new ground in dealing directly with the possibility that bias was being introduced into those estimates by the role of unobservable financial capabilities of borrowers. We were able to employ strong operational measurements of previous "unobservables" to control for homebuyers' capacity to handle credit. We find that NeighborWorks pre-purchase counseling retains—indeed increases—its substantial independent impact when such measures are included in the analysis.

The work also breaks important ground in examining counseling taking place throughout the U.S., by a large number of separate non-profit organizations, rather than in a single place or organization. At the same time, that the NeighborWorks' network has common counseling standards provides for some

consistency in the counseling services provided. Further work on the role of the nature of the counseling could well be a fruitful future direction for research.

It is possible that NeighborWorks pre-purchase counseling's impact is still larger than we have estimated. Two directions deserve additional attention. First, our data constrained us to focus on counseling's impacts on serious delinquency over only the first two years of mortgage lives. NeighborWorks does not have satisfactorily precise homebuyer-level data for counseling activity before 2007, and we looked at originations for 2007-2009 to obtain adequate sample size. Experian data available at the time for the research ran only to later 2011, so that only two years of data could be consistently provided. To the extent that counseling reduces delinquencies over longer periods of observed loan performance, it may be worthwhile to measure counseling's impact for more than 24 months.

Another issue of timing and the size of NeighborWorks counseling's impact is the nature of the mortgage market in the particular years under study. In reaction to the mortgage crisis, lenders largely stopped making subprime loans, and specific types of exotic mortgages, during the period. Counseling may have been more important in protecting counseled households from default in periods in which mortgage products, underwriting, and other lending market conditions were less constrained by recent events.

In addition, the issue of counseling's impact on product choice, and then of product choice impact on mortgage performance, deserves further investigation. We have seen in our modeling that at least the ratio of housing payment to income has a major impact on mortgage performance. Interest rate properly measured may have such an effect as well. If, at least at certain times in the mortgage market, counseling substantially affects people's choice in size and cost of mortgage in relation to their incomes, as well as choice of riskiness of the product to the consumer (e.g. Option ARMS), then counseling may affect mortgage performance additionally through mortgage choice. Additional thinking about how to structure modeling and obtain data to examine the product choice issue could well be worthwhile in assessing pre-purchase counseling's total effects.

REFERENCES

Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, and Douglas D. Evanoff. 2009a. Do Financial Counseling Mandates Improve Mortgage Choice and Performance? Evidence from a Legislative Experiment. SSRN eLibrary.

Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, and Douglas D. Evanoff. 2009b. Learning to Cope: Voluntary Financial Education Programs and Loan Performance During a Housing Crisis. Charles A. Dice Center Working Paper No. 2009-23.

Archer, Wayne, Stan Fitterman, and Marc T. Smith. 2009. Real Estate Brokerage, Homebuyer Training, and Homeownership Sustainability for Housing Assistance Programs. *Family and Consumer Sciences Research Journal* 37 (4):442-455.

Carswell, Andrew. 2009. Does Housing Counseling Change Consumer Financial Behaviors? Evidence from Philadelphia. *Journal of Family and Economic Issues* 30 (4):339-356.

Collins, J. Michael and Collin M. O'Rourke. 2011. Homeownership Education and Counseling: Do We Know What Works? Washington, D.C.: Research Institute for Housing America. April. Report.

Collins, J. Michael and Maximilian D. Schmeiser. 2010. Estimating the Effects of Foreclosure Counseling for Troubled Borrowers. http://ssrn.com/abstract=1645339.

GAO. 2011. Homeownership Counseling: Although Research Suggests Some Benefits, Implementation and Evaluation Challenges Exist. Statement of Alicia Puente Cackley, Director Financial Markets and Community Investment before the Subcommittee on Insurance, Housing and Community Opportunity, Committee on Financial Services, House of Representatives. September 14.

Hartarska, Valentina, and Claudio Gonzalez-Vega. 2005. Credit Counseling and Mortgage Termination by Low-Income Households. *The Journal of Real Estate Finance and Economics* 30 (3):227-243.

Hartarska, Valentina, and Claudio Gonzalez-Vega. 2006. Evidence on the Effect of Credit Counseling on Mortgage Loan Default by Low-Income Households. *Journal of Housing Economics* 15 (1):63-79.

Hirad, Abdighani, and Peter Zorn. 2002. Prepurchase Homeownership Counseling: A Little Knoweldge Is a Good Thing. In *Low-Income Homeownership: Examining the Unexamined Goal* edited by N. P. Retsinas and E. S. Belsky. Washington, D.C.: The Brookings Institution.

Norton, Edward C., Hua Wang and Chunrong Ai. 2004. "Computing interaction effects and standard errors in Logit and Probit models." *The Stata Journal* 4(2): 154-167. http://www.unc.edu/~enorton/NortonWangAi.pdf.

Quercia, Roberto, and Jonathan Spader. 2008. Does Homeownership Counseling Affect the Prepayment and Default Behavior of Affordable Mortgage Borrowers? *Journal of Policy Analysis and Management* 27 (2):304-325.

Shelton, Gladys G., and Octavia L. Hill. 1995. First-Time Homebuyers Programs as an Impetus for Change in Budget Behavior. Financial Counseling and Planning 6:83-91.

Turnham, Jennifer and Anna Jefferson. 2012. Pre-Purchase Counseling Outcome Study: Research Brief. Washington, D.C.: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. May. Report.