

DIFFERENCES IN LOAN OFFICERS' PERCEPTIONS OF EARTH-SHELTERED HOUSING

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ABSTRACT

This paper investigates the ways in which loan officers who favor the financing of earth-sheltered housing differ in perceptions and in support of institutional policy changes from those who do not favor the financing of earth-sheltered homes. During the fall of 1982, a ten-page questionnaire was mailed to a loan officer in each Savings and Loan office within Nebraska. Analyses of the data, using the Student t-test, indicate significant ($p < .05$) differences between the perceptions of loan officers favoring the financing of earth-sheltered homes and those not favoring the financing of such homes, for each of ten measures of financial risk, six measures of complexity, and six measures of relative advantage. In each case, loan officers favoring financing perceive less risk and complexity and greater relative advantage. Loan officers favorable toward financing are significantly more supportive of nine of 12 policies related to quality control, changes in institutional practices and educational/informational thrusts. These findings have both short-run and long-run implications. In the short run, consumers desiring financing for earth-sheltered homes need to realize that loan officers differ in attitudes toward financing. In the long run, further research is needed to discover how attitudes develop among loan officers.

INTRODUCTION

In recent years, the energy crisis and instability of the oil market have fostered a great deal of interest and creative activity in designing alternative forms of housing. One such alternative is the earth-sheltered dwelling. Supporters of earth-sheltered housing identify energy savings, greater protection and durability and environmental enhancement as reasons for its adoption. These benefits, along with the simplicity and initial novelty of design, have attracted public interest and research efforts. There is a belief among many housing professionals that a growing demand exists for earth-sheltered dwellings. However, institutional barriers to such construction exist (Impson and Impson, 1984). A barrier reported frequently by those seeking to build this housing type is the inability to obtain financing or, if financing is obtained, the use of more stringent terms.

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It is the purpose of this paper 1) to discover the attitudes of loan officers toward the financing of earth-sheltered housing, 2) to investigate differences in perceptions of earth-sheltered housing between loan officers who favor financing and those who do not, and 3) to discover differences between loan officers in support of institutional changes to ease impediments to the financing of earth-sheltered dwellings.

There are several reasons for investigating the differences in attitudes toward financing earth-sheltered housing. First, if one can understand how the perceptions of loan officers who favor financing earth-sheltered houses differ from those who do not, one can investigate the validity of those differences, and where they are inaccurate, provide correct information. Second, such a study would help clarify the factors related to financing earth-sheltered housing that concern loan officers. An understanding of these factors would foster better communication between those desiring to build earth-sheltered homes and those who decide on the advisability of lending the money to make it possible. Third, it is important to have some understanding of loan officers' opinions regarding institutional changes that would affect the environment in which earth-sheltered housing must operate.

REVIEW OF LITERATURE

The diffusion-of-innovation theory (Rogers and Shoemaker, 1971), risk theory (Bauer, 1960), previous earth-sheltered studies (Underground Space Center, 1978, 1980) and preliminary analyses of the data in this paper (Hanzal-Kashi and Combs, 1984) provide guidance for the design of this study.

The decision of a loan officer to finance an earth-sheltered dwelling can be classified as adoption of an innovation because few earth-sheltered dwellings have been financed in the past. Rogers and Shoemaker (1971) identify five attributes related to the rate of adoption of an innovation: 1) relative advantage (the degree to which an innovation is superior to the idea it superseded), 2) compatibility (the degree to which an innovation is consistent with existing values and past experiences of the adopters), 3) complexity (the degree to which an innovation is relatively difficult to understand and use), 4) trialability (the degree to which an innovation may be tried on a limited basis), and 5) observability (the degree to which the results of an innovation are easily observed and communicated to others). Bauer (1960) conceptualizes risk as another factor in the rate of adoption of an innovation.

A report by the Underground Space Center (1980) identifies concerns of lending institutions regarding earth-sheltered housing. The Department of Housing and Urban Development contracted for that investigation. Concerns related to loan appraisal, evaluation and quality control are identified. Specific problems related to appraisal and loan evaluation include difficulty in assessing loan/value ratios, uncertainties related to loan parameters, lack of resale data on the primary and secondary mortgage market, unknown rate of return, greater tendencies of borrower default and the extra effort needed to analyze earth-sheltered loans. Concerns related to quality control include uncertainties regarding competent design, construction

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and building standards, cost of repairs, availability of insurance, neighborhood integration and reproductability of projects. Other concerns are uncertainties of energy savings realized in completed projects, accurate verification of energy use at the time of loan application and the projected economic life of earth-sheltered housing.

Hanzal-Kashi and Combs (1984) reduce the concerns of loan officers to three underlying dimensions that help to conceptualize these apprehensions. These underlying patterns of relationship are named Factor I, Financial Risk; Factor II, Complexity; and Factor III, Relative Advantage.

PROCEDURES

Data for this study were collected during the fall of 1982 by questionnaires mailed to one loan officer in each of the 237 home and branch offices of the 32 savings and loan associations located in Nebraska. The listing of home and branch offices was obtained from the 1982 membership directory of the Federal Home Loan Bank of Topeka. All Nebraska savings and loan offices were required to register in this directory. Of the 237 loan officers originally contacted, 140 were disqualified because either they no longer made mortgage finance decisions at the designated location, or there was no mortgage division at the particular office, or the office had recently merged with another financial institution, or the facilities were not fully constructed. The number of qualifying institutions was reduced to 97. Of this number, 95 questionnaires were completed.

Within the questionnaire, respondents were asked to what extent they agreed or disagreed with the statement, "In general, my feelings toward the financing of earth-sheltered housing are favorable."

Respondents were also asked to what extent they agreed or disagreed with 22 statements measuring their perceptions of possible concerns to loan officers when making earth-sheltered home loan decisions. Scores ranging from one (strongly agree) to five (strongly disagree) were assigned to responses. In addition, the respondents were asked to what extent they would support changes in institutional policies. Scores ranged from one (definitely yes) to five (definitely no).

The data were analyzed using the SAS program (SAS Institute, Inc. 1979) for the Student t-test and simple regression. The Student t-test was utilized to discover if differences exist between those who favor financing earth-sheltered homes and those who do not favor the financing of such housing. The test was also used to ascertain the officers' perceptions of financial risk, relative advantage and complexity. The test measured the officers' support of institutional changes affecting earth-sheltered housing. Simple regression was used to assess the strength of the relationship between the extent of favorability toward financing and the three factor scores representing perceptions of financial risk, complexity and relative advantage.

RESULTS

In response to the statement, "In general my feelings toward the financing of earth-sheltered housing are favorable," 39 percent of the loan officers say that they *do* favor financing earth-sheltered homes. Forty-five percent say they *do not* favor financing earth-sheltered homes, while 16 percent indicate they have no opinion.

Loan officers who favor financing earth-sheltered homes differ ($p < .05$) from those who do not favor financing such homes in their perceptions of each of the ten measures of financial risk (Table 1). Although both categories of loan officers agree (mean = < 3.0), there is a greater probability of 1) faulty design, 2) undependable dealers, and 3) poor construction associated with earth-sheltered dwellings than with conventional housing, those who are favorable toward financing perceive a lower probability of risk for each measure. Loan officers who favor financing earth-sheltered homes tend to disagree (mean = > 3.0) that earth-sheltered homes have a greater probability than conventional homes of 4) high maintenance costs, 5) early obsolescence/lack of durability, 6) borrower default, 7) substantial financial loss to the lender, and 8) high costs in relation to benefits. Loan officers not favoring financing tend to agree (mean = < 3.0) that earth-sheltered homes have a greater probability of such risks. Loan officers who favor financing earth-sheltered homes tend to agree that earth-sheltered homes are a cost-effective way to conserve energy, while those not favoring financing tend to disagree about energy effectiveness. Loan officers in favor of earth-sheltered homes tend to agree that it is difficult to determine if the cost of earth-sheltered dwellings is related to value, but the loan officers who are unfavorable do not.

Loan officers who favor financing earth-sheltered homes differ ($p < .05$) from those who do not favor financing in their perceptions of each of the six measures of complexity (Table 2). Loan officers favoring financing tend to disagree (mean = > 3.0) that it is difficult to 1) determine the appropriate terms for an earth-sheltered dwelling loan, 2) determine the appropriate parameters from experiences of other lending institutions, 3) explain parameters to co-workers, 4) communicate terms to consumers, and 5) obtain mortgage insurance for an earth-sheltered dwelling loan. Loan officers not favoring financing tend to agree (mean = < 3.0) that each is difficult. Both groups tend to agree that it is difficult to sell earth-sheltered dwelling loans on the secondary mortgage market, but those not favoring financing find it significantly more difficult.

Loan officers who favor financing earth-sheltered homes differ ($p < .05$) from those who do not favor financing in their perceptions of each of the six measures of relative advantage (Table 3). Both groups of loan officers tend to agree that (mean = < 3.0) compared with conventional homes, there is a much greater probability of: 1) resale problems, 2) poor neighborhood integration associated with earth-sheltered houses, 3) loans requiring more time and effort to arrive at appropriate terms, and 4) greater uncertainty of financial gain for the lender. However, those who are favorable toward financing do not indicate as strong an agreement as those who are unfavorable. Loan officers favorable toward financing tend to agree with the statements that financing an earth-sheltered home is likely

Table 1. Differences in perceptions of financial risks between loan officers who were favorable toward financing earth-sheltered dwellings and those who were not.

Perceptions of financial risks			t-	
Category of loan officer	Number	Mean ^a	statistic	Probability
Compared with conventional houses, earth-sheltered dwellings have a much greater probability of:				
1) Faulty Design				
Favorable toward financing	37	2.62		
Unfavorable toward financing	43	1.53	6.50	.000
2) Undependable Dealers				
Favorable toward financing	37	2.76		
Unfavorable toward financing	43	1.86	4.72	.000
3) Poor Construction By Builders				
Favorable toward financing	37	2.76		
Unfavorable toward financing	43	1.72	5.69	.000
4) High Maintenance Costs				
Favorable toward financing	37	3.54		
Unfavorable toward financing	43	2.07	6.65	.000
5) Early Obsolescence/Lack Of Durability				
Favorable toward financing	37	3.29		
Unfavorable toward financing	43	1.72	8.13	.000
6) Borrower Default				
Favorable toward financing	37	3.46		
Unfavorable toward financing	43	2.02	6.85	.000
7) Substantial Financial Loss To The Lender				
Favorable toward financing	37	3.14		
Unfavorable toward financing	43	1.58	8.59	.000
8) High Costs In Relation To Benefits				
Favorable toward financing	37	3.43		
Unfavorable toward financing	43	1.74	7.99	.000
9) It Is Important To Finance Earth-Sheltered Dwellings Because They Are A Cost-Effective Means For Conserving Energy				
Favorable toward financing	37	2.13		
Unfavorable toward financing	43	3.93	-7.81	.000
10) It Is Difficult To Determine If The Cost Of An Earth-Sheltered Dwelling Can Be Equated With Value				
Favorable toward financing	37	2.65		
Unfavorable toward financing	43	1.58	6.27	.000

^aScores were assigned to responses as follows: 1 = strongly agree
2 = agree, 3 = no opinion, 4 = disagree, 5 = strongly disagree

to provide them with "greater personal satisfaction" and "a more positive image in the community" than the financing of conventional homes. Those unfavorable to the financing of earth-sheltered homes tend to disagree (mean ≥ 3.0) with the statements.

Simple regression is utilized to examine the variation in attitude toward financing (from very unfavorable to very favorable) which could be explained by each of the three factors. Multiple regression is not performed to discover relative importance of the factors because of the high multicollinearity between the three factors. As shown in Table 4, 62 percent ($R^2=62$) of the variation in extent of favorability toward financing can be explained by Factor I---Financial Risk and 60 percent ($R^2=60$) of the variation can be explained by Factor II---Complexity. Fifty-seven percent ($R^2=57$) of the variation can be explained by Factor III---Relative Advantage.

The next objective is to investigate support of institutional changes by loan officers and see how this support differs between those who favor financing earth-sheltered dwellings and those who do not. Significant differences ($p < .05$) are found for nine of the 12 proposed changes (See Table 5). In general, loan officers who are favorable toward financing earth-sheltered dwellings tend to be more willing to support policies that affect quality control, initiating changes in institutional practices and providing educational/informational changes than those who are not favorable toward financing earth-sheltered dwellings.

With regard to quality control policies, no significant difference is found between loan officers favorable or not favorable toward financing for support of certification of designers and builders. Both groups indicate support. There is a significant difference between loan officers favorable toward financing and those unfavorable toward financing in the extent of support for the development of warranty programs. While both groups indicate support, those favorable toward financing indicate greater support.

With regard to policies proposing changes in institutional practices, no significant difference is found in support of reduced interest loans. Both groups oppose this change. Significant differences between the two groups are found for each of the other suggested changes. Both groups favor the stimulation of the secondary mortgage market to provide leadership. However, those favoring financing indicate greater support than those who do not favor financing. Loan officers favoring financing tend to support the use of energy costs as a loan appraisal feature while those not favoring financing tend to oppose this change. Both groups tend to oppose the creation of loan baskets for earth-sheltered loans and the reduction of reserve requirements when a certain percentage of earth-sheltered loans is granted. However, those unfavorable toward financing oppose these proposed changes to a greater extent than those favorable toward financing.

For educational/informational policies, no significant difference is found between groups as to the extent of the support of education for the general public. Both groups support the education and training of appraisers, research into marketability and the formation of a data bank. Again, those favorable toward financing tend to

Table 2. Differences in perceptions of complexity between loan officers who were favorable toward financing earth-sheltered dwellings and those who were not

Perceptions of complexity Category of loan officer	Number	Mean ^a	t- statistic	Probability
It is difficult to:				
1) Determine Appropriate Terms For An Earth-sheltered Dwelling Loan				
Favorable toward financing	37	3.16		
Unfavorable toward financing	43	1.93	5.98	.000
2) Determine Appropriate Parameters From Experiences Of Other Lending Institutions				
Favorable toward financing	37	3.14		
Unfavorable toward financing	43	1.95	5.98	.000
3) Explain Parameters To Co-Workers				
Favorable toward financing	37	3.10		
Unfavorable toward financing	43	2.63	2.17	.033
4) Communicate Terms to Consumers				
Favorable toward financing	37	3.24		
Unfavorable toward financing	43	2.16	4.80	.000
5) Obtain Mortgage Insurance For An Earth-Sheltered Dwelling Loan				
Favorable toward financing	37	3.16		
Unfavorable toward financing	43	1.90	6.45	.000
6) Sell Earth-Sheltered Dwelling Loans On The Secondary Mortgage Market				
Favorable toward financing	37	2.89		
Unfavorable toward financing	43	1.72	6.26	.000

^aScores were assigned to responses as follows: 1 = strongly agree
2 = agree, 3 = no opinion, 4 = disagree, 5 = strongly disagree

Table 3. Differences in perceptions of relative advantage between loan officers who were favorable toward financing earth-sheltered dwellings and those who were not

Perceptions of relative advantage		t-		
Category of loan officer	Number	Mean ^a	statistic	Probability
Compared with conventional houses, earth-sheltered dwellings have a much greater probability of:				
1) Resale Problems				
Favorable toward financing	37	2.16		
Unfavorable toward financing	43	1.49	4.44	.000
2) Poor Neighborhood Integration				
Favorable toward financing	37	2.43		
Unfavorable toward financing	43	1.58	5.08	.000
3) Likely To Require More Time And Effort To Arrive At Appropriate Terms				
Favorable toward financing	37	2.32		
Unfavorable toward financing	43	1.67	3.43	.001
4) Likely To Contain Greater Uncertainty Of Financial Gain For The Lender				
Favorable toward financing	37	2.76		
Unfavorable toward financing	43	1.47	7.90	.000
5) Likely To Provide Me With More Personal Satisfaction				
Favorable toward financing	37	2.86		
Unfavorable toward financing	43	3.90	-6.49	.000
6) Likely To Provide The Lender With A More Positive Image In The Community				
Favorable toward financing	37	2.54		
Unfavorable toward financing	43	3.93	-8.66	.000

^aScores were assigned to responses as follows: 1 = strongly agree, 2 = agree, 3 = no opinion, 4 = disagree, 5 = strongly disagree

Table 4. Standardized regression coefficients for the regression of attitudes toward financing on perception factor scores.

Attitude Toward Financing	Perception Factor Scores	R ²	Probability
In general, my feelings toward financing earth-sheltered dwellings are favorable.	Factor I (Financial Risk)	.62	.01
In general, my feelings toward financing earth-sheltered dwellings are favorable.	Factor II (Complexity)	.60	.01
In general, my feelings toward financing earth-sheltered dwellings are favorable.	Factor III (Relative Advantage)	.57	.01

support these policies to a greater extent than those unfavorable to financing. Loan officers favorable toward financing tend to support the use of specialists in energy-efficient housing in the lending and appraisal fields while those unfavorable toward financing do not.

CONCLUSIONS

Consensus does not exist among the loan officers in their attitude toward financing earth-sheltered dwellings. Approximately one-half are favorable and one-half are unfavorable. This finding has several implications. In the short run, consumers and builders interested in obtaining financing for earth-sheltered construction should be made aware that loan officers differ in their attitudes and that if they meet unfavorable reactions with one officer they should approach other loan officials with their request. In the long run, factors responsible for the development of the differing attitudes toward financing earth-sheltered housing need to be identified. Why are some loan officers developing one perspective and some quite another? One insight based on this study is that prior experience may not be as large a factor as one might assume (few loan officers indicate they made had earth-sheltered loans, yet most had opinions about financing). A second insight is that commitment to the energy issue may be a factor. Those favorable toward financing earth-shelters also favor the inclusion of energy costs as an appraisal feature and the use of specialists in energy efficient housing in the loan department while those unfavorable toward financing do not support either of these policies.

One finding is that perceptions of financial risk, complexity and relative advantage differ between those loan officers who favor financing and those who do not favor financing. Numerous studies find these perceptions related to rate of adoption. Therefore, if the proportion of loan officers favorable toward financing earth-sheltered dwellings is to increase, efforts to reduce the perceptions of financial

Table 5. Differences in perception of support of proposed changes in policy for energy efficient housing between loan officers who were favorable toward financing earth-sheltered dwellings and those who were not

Proposed changes in policy	Number	Mean ^a	t-	statistic	Probability
QUALITY CONTROL					
1) Certification Of Designers And Builders					
Favorable toward financing	37	1.81			
Unfavorable toward financing	42	2.10	0.01		.994
2) Development Of Warranty Programs					
Favorable toward financing	37	2.11			
Unfavorable toward financing	42	2.79	-3.05		.003
CHANGES IN INSTITUTIONAL PRACTICES					
1) Stimulation of Secondary Mortgage Market To Provide Leadership					
Favorable toward financing	37	2.32			
Unfavorable toward financing	42	2.81	-2.13		.036
2) The Use of Energy Costs As A Loan Appraisal Feature					
Favorable toward financing	37	2.38			
Unfavorable toward financing	42	3.64	-5.24		.000
3) Reduction Of Reserve Requirements When A Certain Percentage Of Earth-Sheltered Loans Were Granted					
Favorable toward financing	37	3.16			
Unfavorable toward financing	42	3.62	-2.11		.037
4) Reduced Interest Rate Loans					
Favorable toward financing	37	3.24			
Unfavorable toward financing	42	3.60	-1.70		.098
5) Creation Of Loan Baskets For Earth-Sheltered Loans					
Favorable toward financing	37	3.08			
Unfavorable toward financing	42	3.83	-3.44		.001
EDUCATIONAL/INFORMATIONAL					
1) Education And Training Of Appraisers And Lenders					
Favorable toward financing	37	1.76			
Unfavorable toward financing	42	2.38	-2.93		.004
2) Education Of The General Public					
Favorable toward financing	37	1.89			
Unfavorable toward financing	42	2.14	-1.53		.121
3) Research Into Marketability					
Favorable toward financing	37	1.89			
Unfavorable toward financing	42	2.74	-3.69		.000
4) Formation Of A Data Bank					
Favorable toward financing	37	2.16			
Unfavorable toward financing	42	2.69	-2.85		.006
5) Use Of Specialists In Energy-Efficient Housing In The Lending And Appraisal Fields					
Favorable toward financing	37	2.51			
Unfavorable toward financing	42	3.40	-3.48		.001

^aScores were assigned to responses as follows: 1 = definitely yes, 2 = probably yes, 3 = unsure, 4 = probably no, 5 = definitely no.

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risk and complexity and to increase perceptions of relative advantage are suggested. Several approaches are possible. Educational/informational efforts could help loan officers become more knowledgeable about earth-shelters, thereby reducing difficulties (complexity) of evaluating appropriate earth-sheltered loan parameters. Increased exposure to information about earth-sheltered construction would help them determine whether cost can be equated to value, the probability level of financial risk to the lender and possible resale problems.

Both groups of loan officers tend to oppose regulations that would affect institutional policy and autonomy such as lower reserve requirements, reduced interest rate loans and the creation of baskets to encourage earth-sheltered loans. Policies promoting these changes would be likely to encounter strong opposition from the financial community.

In conclusion, to promote the efficient use of resources, barriers that discourage the construction of energy-efficient housing alternatives need to be identified, analyzed and evaluated. In this way, it is possible to obtain information for use in making decisions that increase the welfare of individuals and families and contribute to a stable society.

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