MULTIFAMILY FINANCIAL FAILURES: A REVIEW OF EMPIRICAL STUDIES

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MULTIFAMILY FINANCIAL FAILURE: A REVIEW OF EMPIRICAL STUDIES

by

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INTRODUCTION

Several of the Federal Housing Administration's multifamily mortgage insurance programs have experienced high rates of default, assignment, and foreclosure, which have resulted in drains on HUD's insurance funds. This failure experience raises two broad policy issues. First, how can FHA's underwriting and production processes be modified to reduce the number of unviable projects constructed; and second, once a project begins to experience serious problems, what management tools are available to minimize loss to the federal government. Consideration of these policy issues requires a thorough understanding of the factors that cause multifamily projects to fail.

The purpose of this paper is to survey empirical studies that seek to explain financial failure among insured multifamily housing projects. During the past decade, HUD's central offices have initiated three major empirical efforts. The first of these--the Three Region study--was completed in 1973 with data collected from regions III, VI, and IX [19]. This study was followed by the BPA study, conducted in region IX by the Berkeley Planning Associates and using the Three Region data [4]. The second major effort--the OPAE study--was conducted in 1975 by HUD's central Office of Program Analysis and Evaluation, and included the collection of nationwide data [16]. Soon after this study was published, Robert Mendelsohn, who participated in the OPAE work, used the same data base to conduct an independent analysis [12]. Finally, in 1977 HUD-central initiated the third major empirical

effort, including substantial data collection--the Task Force study. This study consists of two reports: one devoted to unsubsidized projects [21], and one on subsidized projects [22].

In addition to these three major efforts and the two associated studies, there have been several relevant empirical efforts. In 1977, Robert Sadacca completed an analysis of multifamily failure using data collected for an assessment of management techniques in multifamily housing projects [13], and the Office of Management and Budget (OMB) formulated a model to predict demands on HUD's insurance funds [24].

Most of these studies focus primarily on FHA-insured, subsidized multifamily projects constructed and operated under Sections 236 and 221(d)(3) of the National Housing Act. Only the Task Force study [21] is concerned with unsubsidized programs, which make up 45 percent of the financially troubled projects in HUD's multifamily inventory ([21], p. VII-3). Although an understanding of failure in the conventional multifamily mortgage market would contribute significantly to an analysis of FHA's failure experience, we know of no studies of conventionally financed multifamily projects. In fact, a recent GAO report indicates that it may be impossible even to determine the proportion of conventionally financed multifamily projects that fail ([6], p. 79).

In order to gain some perspective on the existing multifamily literature, this paper draws on two related bodies of analysis. First, a limited number of studies have explored the causes of failure among business ventures. We rely in particular on work by Edward Altman [1 & 2], which has been criticized and extended by others [11].

Second, considerable research has focused on single-family home mortgage foreclosure. This literature was comprehensively reviewed by Martin Gellen in 1977 [9].

This paper consists of five sections and three appendices. First, we discuss the existing models of failure in terms of their dependent and explanatory variables. The second section describes the data collected and used in each of the relevant studies, and section three briefly reviews estimation methods. In the fourth section we present the results of all the relevant empirical studies, and finally, the fifth section contains conclusions and recommendations for further analysis. Appendices A, B, and C contain, respectively, regression equations as reported in the OPAE, Mendelsohn, and BPA studies.

I. MODELS

In this section the models used in the studies of multifamily financial failure are described in terms of the variables employed. First, the dependent variable, financial failure, is discussed. Then the variables that are utilized to explain failure are considered. Both macroeconomic and microeconomic models are reviewed.

Dependent Variable

All the papers surveyed attempt to explain financial failure. However, financial failure can be defined in a number of ways. Altman notes that three commonly used generic terms--failure, insolvency, and bankruptcy--have several meanings ([1] p. 2). At one extreme, any firm earning a rate of return on investment which is less than its opportunity cost is a failure. Such a firm may, of course, earn a positive rate of return, may remain in operation indefinitely, and may always be able to meet legally enforceable obligations. At the other extreme, failure may be defined in terms of loss to creditors made permanent by actions in a bankruptcy court, or the write-off of bad debts. Failure need not involve cessation of operations even in bankruptcy. For example, bankruptcy reorganization is a judicially supervised procedure for financial recovery.

In the case of insured multifamily housing, the ultimate concern of the federal government is in situations involving financial loss to the U.S. Treasury. However, failure may be defined to include

financial conditions which are likely to result in such losses even though the losses have in fact not yet been incurred. The failure process is time dependent. In the case of FHA-insured projects, it may be said to extend through four stages. The first is a situation which may be described as financial difficulty, characterized by negative cash flow, or by other indicators of financial risk such as a low ratio of cash flow to total debt, or by actions, such as waiver of contributions to replacement reserves, presumably taken to avert more serious problems. In a broad sense, even this stage may be defined as financial failure, although unless there is a waiver of mortgage insurance premium, there is no loss to the government. A project may, of course, experience various types of financial difficulty repeatedly, yet be viable in the long run. The second stage, default, occurs when a mortgagor is in arrears in any of his payments to the mortgagee. Default involves at least temporary loss to the mortgagee, but not to the government. Like the first stage, default can occur repeatedly, and projects which have defaulted also may be viable in the long run. In the third stage, assignment, HUD acquires the mortgage, replacing the original mortgagee. A mortgage is assigned only if it is in default, but it subsequently may be made current, and again long-term viability is possible. Government losses occur only if a project is unable to recover and amortize its accumulated delinquency. The final stage is foreclosure and acquisition of the property by HUD. Technically, foreclosure may not result in acquisition of a project, but in practice it nearly always does. When HUD acquires a project it may continue to operate it, receiving rental income and incurring operating

expenses. If operating revenues are sufficient to cover operating expenses, loss to the government at this stage exists only to the extent that a property acquired by HUD has a market value less than the balance of the mortgage. If revenues do not cover expenses, HUD must subsidize a project's operating costs. These losses are realized when HUD sells the project. A HUD study on multifamily property disposition reports on a model of comparative gains to HUD of alternative methods of property disposition [20]. A mortgagee may foreclose a defaulted project without assigning the mortgage to HUD. Most multifamily mortgagees, however, avoid the costs of foreclosure by exercising their option to assign defaulted projects.

Models may be constructed to explain failure in an inclusive sense, or to explain the more serious problems in the later stages of the progression. Variables relevant to explaining one stage may not be useful in explaining another. Much of the single family literature concentrates on foreclosure--the final stage [9]. However, attempts to use foreclosure alone as the dependent variable for multifamily housing are reported as unsuccessful ([12] p. 15). There are at least two reasons for this lack of success. First, relatively few foreclosures are present in the data sets used. Mendelsohn reports that only 29 projects insured under the 236 program were in acquired status as of March, 1974 ([12] p. 15). Many projects have been acquired since; the Task Force study reports 279 subsidized projects in acquired status ([22] p. 45). Thus, a statistical analysis using recent data might be more successful. Second, as OPAE notes, a decision to foreclose is frequently motivated by political factors ([16], p. C-3), and the data

sets used in the studies surveyed here may not provide very useful explanatory variables.

Most studies define failures as projects in either foreclosure or assignment status. BPA [4] and OMB [24] report regression results using foreclosures and assignments as the dependent variable. OPAE and Mendelsohn [12] also use foreclosure and assignment, but only in regressions in which the sample includes only projects which have defaulted. In Sadacca's work [13], a failed project is one which has at some point in its history been assigned. Since HUD-owned projects are generally first assigned, Sadacca's concept is equivalent to using foreclosures and assignments. Defining failure as either foreclosure or assignment has the advantage of confining the concept to situations which are not temporary. A project may be in and out of default repeatedly; a mortgage is assigned only once.

Many of the studies use a broader definition as well. OPAE [16] and Mendelsohn [12] use cross-sectional regressions in which failures are defined as projects which have defaulted after final endorsement, regardless of whether they were in default at the time of data collection. They also report regressions for projects which default before construction is complete and before final endorsement, which they reason is associated with different explanatory variables than is default after endorsement. A Region IX study [18] is devoted exclusively to determining causes of defaults before final endorsement. BPA [4] runs regressions in which failure is defined as default at any time during project life, or assignment, or foreclosure. Thus, the BPA variable and the OPAE variable are similar except that BPA does not

distinguish between default before and after final endorsement. The Three Regions study [19] also uses default, assignment, or foreclosure. The Task Force study [21, 22] defines troubled projects as those in default, assignment, or acquired status, although they present many tables distinguishing characteristics among those three categories.

Only the Sadacca study [13] tests definition of failure involving financial difficulty--the first stage of financial failure. In particular, Sadacca uses the existence of a mortgage modification as a dependent variable. Mortgage modifications are frequently used to avert or cure defaults, and to help assigned projects become current. Several of the studies discussed here treat mortgage modification as a possible explanatory variable. Finally, only the macro work by Henry Birnkrant and Anita Bishop of the Office of Management and Budget [13] seeks to explain dollar losses to the FHA insurance funds.

Macroeconomic Approach

There are two broad approaches to explaining failure--a macroeconomic approach and a microeconomic approach. The micro approach has dominated both the housing literature and the literature on business failure.

The macro approach relates economic aggregates to the rate of failure. In its ongoing analysis of business cycles, the National Bureau of Economic Research has used the number of business failures with liabilities over $100,000 and total failure liability among their economic indicators. Almost the only work attempting to directly explain failures with economic aggregates is by Altman [1]. He

examines the relationship between changes in quarterly business failure rates and changes in GNP, the money supply, and the Standard and Poors stock index, using a simple, one equation linear regression model and a variety of discrete lags. Gellen notes that there is little macro work relating to single-family foreclosures ([9] p. 21). Von Furstenberg reports an unsuccessful attempt to relate the effect of monetary conditions on the level of single-family default rates ([25] p. 11).

The only work examined which utilizes a macro approach to explain multifamily failures is the model developed by the Birnkrant and Bishop [24]. The purpose of the OMB model is to forecast FHA insurance fund outlays. To explain multifamily acquisitions and outlays, OMB uses in various equations, the Consumer Price Index, the prime interest rate, change in personal income, the volume of insurance written, a dummy for 1972-74--the period of FHA underwriting scandals and price controls, and a time trend.

Aggregate data cannot be used to forecast failure of an individual firm, of course, since some firms and projects survive any adverse macro changes. However, adverse macroeconomic conditions increase the financial risk faced by all firms, increasing the probability of failure. Many of those which are otherwise weak will fail. Since developmental work with the OMB model is still in progress, final results of macroeconomic results have not been published. Preliminary results, however, indicate that the Consumer Price Index and the unemployment rate are both useful in predicting demands on FHA insurance funds. In the remainder of the paper we will focus solely on the microeconomic approach.

Microeconomic Approach

The micro approach attempts to pinpoint the reasons for and factors associated with failure of individual firms. This is not to say that a micro analysis is necessarily oriented toward forecasting failure of an individual firm, although such a forecast is ideal. Micro models isolate factors which are associated with the probability of failure of an individual firm, or, viewed another way, micro models can estimate the proportion of firms in a particular class which will fail. For example, many studies find that projects which are rehab and which have non-profit sponsors are more often failures than are limited dividend new construction projects. Some non-profit rehabs are successful, of course, and a venture with these characteristics is by no means certain to fail. However, there is a relatively high probability of failure for such a project.

To explain what causes failure, many analysts in the business failure literature separate factors into two categories--immediate causes, which touch off the financial crisis; and underlying causes, which presumably make the firm susceptible to the immediate cause (for example, see [5], [8], and [14]). Of course it is the underlying causes which are of primary interest. Unfortunately, except in a few cases, it is difficult to classify variables as immediate or underlying causes. The ultimate immediate cause is lack of funds to pay current obligations. That this "cause" reveals little about why a firm fails is well recognized. On the other hand, the ultimate underlying cause may always be said to be poor managerial decisions by sponsors, underwriters, or managers. No matter what disaster befalls a business firm,

sufficient managerial foresight could have avoided it. Thus one can always blame management for business failure. However, the manager of the failed firm may have performed in exactly the same way as the manager of a successful firm did. Both had a probability of failure, while one failed and the other did not. Identifying the ultimate underlying cause alone, therefore, does not necessarily provide a useful understanding of why failure occurred.

Except for these two extremes, analysts disagree on which variables constitute immediate causes and which are underlying. The categories are nearly arbitrary. For example, suppose a multifamily project is placed in a poor location, characterized by inadequate access to amenities and social services and plagued by a high crime rate. This location gives rise to high vacancy rates which, in turn, results in a revenue shortfall, default, and finally foreclosure. The underlying cause might be said to be poor location, the immediate cause a high vacancy rate. Viewed differently, high vacancies are the underlying cause, and the revenue shortfall is the immediate cause. Again, however, the ultimate underlying cause is the poor decision by the sponsor and underwriters who allowed the project to be constructed at that location in the first place.

An alternative, and in our view more useful way of categorizing potential explanatory variables, is to consider them as being one of three types: (1) variables which are simultaneously determined with failure; (2) lagged dependent variables; and (3) exogenous variables. Not all variables are clearly assignable to one rather than another of these categories, but relative to the separation of underlying and

immediate causes, these categories considerably sharpen the distinctions between levels of causation.

The usefulness of variables which are simultaneously determined with failure is limited. They may be useful in identifying other dimensions and neglected costs of failure, and a simultaneous equation model may provide a more complete picture of failure than a single equation model. However, simultaneously determined explanatory variables in single equation models of the type used in the studies reviewed here neither provide important insight into why failure occurs nor do they contribute to assessing the probability that a firm will fail in the future. Simultaneously determined variables can be classified as immediate causes of failure. Some apparently simultaneously determined variables may still be useful in forecasting failure if they are not, in fact simultaneous, but instead make trouble visible before failure actually occurs. Some of the disagreement among business failure analysts regarding failure causes is disagreement about whether variables are in fact simultaneously determined with failure. For example, Altman uses financial ratios of liquidity, profitability, leverage, solvency, and activity to forecast failure [1]. Critics of Altman's approach contend that his financial variables are tautological descriptions of failure--in effect that they are simultaneously determined with failure [11]. Altman notes that his variables allow him to forecast failure several years prior to its occurrence, claiming in effect that his variables are of the lagged dependent category [2].

To illustrate some of the difficulty with the use of simultaneously determined variables, consider an example from the studies of

multifamily failures surveyed here. OPAE and BPA include use of mortgage modification agreements as an explanatory variable. OPAE reports that use of such agreements is strongly and positively associated with the likelihood of failure. BPA reports similar results [4]. The authors of the OPAE study interpret this result as showing that mortgage modification agreements are ineffective as default remedies. The expected sign is negative, in their view ([16] p. C-5). On the other hand, mortgage modification is a remedy granted only to projects which are in some degree of financial trouble. It is not surprising that a number of these projects fail. BPA states that the expected sign is positive ([4], Vol. 3, p. 68). The differences between the two studies regarding this variable illustrate the difficulty in interpreting simultaneous variables.

In contrast to simultaneously determined variables, lagged dependent variables can play an important role in a model of failure. Lagged dependent variables must be viewed as immediate and not underlying causes, but they are nonetheless useful for forecasting. This is, as noted earlier, the position of Altman regarding financial ratios for forecasting business failure. The character of the lagged dependency is often quite complex. An outstanding example of a complex lagged dependent variable in the multifamily failure studies is the use by OPAE of default prior to final endorsement to explain default after final endorsement. It is by far their strongest statistical result.

Exogenous variables such as type of sponsor, project location, design characteristics of the project, tenant characteristics, and experience of management include both immediate and underlying causes.

All underlying causes are exogenous, but in the eyes of some analysts, many immediate causes are exogenous as well. Exogenous variables are potentially useful for forecasting and for explaining why failure occurs, although regarding the latter, it is worth noting again that poor or inexperienced management can always be blamed for any failure.

Explanatory Variables

Bearing in mind the threeway distinction drawn above, one can gain perspective on the explanatory variables used in the multifamily failure studies by placing them into 12 categories, constituting three main groups--characteristics and behavior of the actors in the process, characteristics of the project; and characteristics of financing and the program (see Exhibit 1). Not all of the studies explicitly state their hypotheses about these explanatory variables; but when they do, we report them briefly.

Characteristics and Behavior of the Actors

This group includes a wide variety of both exogenous and simultaneously determined variables.

Project Sponsor. The most widely used variable in this category is sponsor type; studies generally expect profit motivated sponsors to be more successful than non-profits and cooperatives. Other important variables include sponsor's experience and the relationship between sponsor and manager. Generally, observers expect experience to reduce the likelihood of financial failure. The expected effect of the relationship between sponsor and manager is less certain; it could be argued that if a sponsor hires an outside management agent, HUD can

EXHIBIT 1

Categories of Explanatory Variables

A. Characteristics and Behavior of the Action

1. Project Sponsor
2. Project Management
3. Project Mortgagee
4. Tenants
5. Local Government Officials
6. HUD Underwriters and Processors

B. Characteristics of the Project

1. Property
2. Location
3. Age
4. Project Social Characteristics

C. Characteristics of Financing and the Program

1. Project Financial History
2. Characteristics of the Insurance Program and the Mortgage

exert more leverage over management practices and reduce the risk of failure. Although not included in any of the models, sponsors' reaction to income taxes and other incentive policies probably plays an important role. For example, the threat of detrimental tax consequences may encourage profit motivated sponsors to avoid foreclosure (see BPA [4], vol. 3, p. 10).

Project Management. This category includes variables such as management quality--as evaluated by local HUD officials, the presence of a resident project manager, management's experience and professionalism, and continuity of management. Sadacca [13] also considers several variables describing managerial attitudes and responsibilities. Many of the management variables are difficult to interpret. Several, such as high turnover, may be simultaneously determined with failure. Others, such as management quality, are suspect because of their subjectiveness; it is not surprising to know that the managers of failing projects are rated as unsatisfactory by local HUD officials [19]. Generally, failure is expected to be associated with non-resident management, inexperience, lack of professional management staff, poor quality, and high turnover.

Project Mortgagee. This category of variables is entirely neglected in quantitiative analyses, although it is recognized as relevant to mortgage assignment ([16], p. E-2). The type of mortgagee may be associated with the likelihood of assignment. Other possible characteristics of importance might include the size of the mortgagee, its volume of business, its total assets, its location, and whether or not it services its own mortgages.

Tenants. Tenant characteristics, which include race, age, income, rent to income ratio, and family size, are basically exogenous variables. In some instances, however, they may be simultaneously determined with failure. BPA ([4], vol. 3, p. 23) notes, for example, that as a project deteriorates, higher income tenants will seek other opportunities, leaving only lower income residents behind. Most of the studies acknowledge that tenant characteristics are highly interrelated, but expect failure to be associated with large families, low incomes, large numbers of children, single-headed households, large proportions of minorities, and high rent to income ratios.

Local Government Officials. None of the studies attempt to test the effects of local government actions regarding rent levels, evictions, housing standards, or tax rates. The potential importance of these factors is mentioned, however [15, 21, 22].

HUD Underwriters and Processors. Several observers have argued that inadequate underwriting and processing standards within HUD are responsible for the multifamily failure experience [6, 21, 22]. Therefore, variables such as processing delay, field office experience, field office workload, completeness of underwriting documentation, and accuracy of revenue and cost estimates are quantitatively assessed. The studies generally assume that the risk of failure is reduced by experienced staff, minimal delays, smaller workloads, complete documentation, and accurate estimates. Completeness of documentation is seen as an indication of field office diligence, and the accuracy of cost and revenue estimates represents a field office's competence. While most of these variables are exogenous, accuracy of estimates may be

simultaneously determined with failure or lagged dependent; since no project with estimated costs exceeding estimated revenues would be approved for production, the estimates are almost guaranteed to be proven inaccurate when a project fails.

Characteristics of the Project.

Project characteristics tend to be exogenous variables, except for those in the category of project social characteristics, some of which may be simultaneously determined with failure.

Property. This category encompasses most static construction and design variables such as project size, composition of residential units, appliances, and whether a project is newly constructed or rehabilitated. These variables are clearly exogenous, but some studies also measure the effect of a project's physical condition, which is more likely to be simultaneously determined. Generally, rehab projects are expected to be more prone to failure than new construction. The OPAE study expects projects with many bedrooms per unit to have higher failure rates, possibly because such projects would house large families with children. Several studies expect highrises to experience relatively high failure rates, since they are dense and can pose serious security and maintenance problems. Similarly, large projects are expected to fail more often than projects with fewer units. Alternatively, one could argue that larger projects benefit from economies of scale and are less likely to fail. The studies do not state clear expectations about the effects of appliances and services such as air conditioning. These variables can be interpreted as

indicators of housing quality and associated with success, or they can be viewed as substantial expenses to be associated with failure.

Location. The studies test a wide variety of locational variables. Several attempt to describe a project's neighborhood by analyzing census tract characteristics such as race, income, unemployment rate, proximity of other rental units, vacancy rate, and physical condition. Mendelsohn [12] also includes SMSA average income and rental vacancy rate. Generally these studies assume that failure is associated with vacancy rates, and poor physical condition. Mendelsohn hypothesizes that substantial numbers of nearby rental units decrease the likelihood of failure, since they imply that multifamily housing is appropriate in the area. The studies also measure the effect of location in a core city and in an urban renewal area, presumably expecting both types of location to increase the likelihood of failure. Finally, several of the studies test for differences among HUD regions, although they do not discuss their expectations. Location variables are all exogenous except to the extent that a failing project may change the characteristics of its surroundings.

Age. Many of the studies include a measure of project age. The expected impact of this variable is uncertain; the likelihood of failure may be highest during a project's early life, or specific years might be associated with failure due to unexpectedly high inflation and other macroeconomic phenomena. Age is clearly an exogenous variable.

Project Social Characteristics. This category describes interactions between tenants, management, and a project's physical characteristics, and includes such variables as vandalism rates, eviction

rates, vacancy rates, levels of rent delinquencies, tenants' sense of security, and adequacy of police protection. Studies assume that high rates of vandalism, evictions, vacancies, large rent delinquencies, tenant insecurity, and poor police services increase the probability of failure. Variables in this category are difficult to interpret, however, because many of them may be simultaneously determined with failure.

Characteristics of Financing and the Program.

This group includes exogenous, lagged dependent, and simultaneously determined variables.

Project Financial History. This category includes variables such as net cash flow, number of defaults, breakdown of expenses, size of first rent increase, number and type of mortgage modifications, and per unit cost of construction. Although some of these variables may appear to be simultaneously determined with failure, several may actually be lagged dependent. Studies generally assume that failure will be associated with low or negative cash flow, many defaults, and high expenses. The studies do not agree on the expected effects of mortgage modifications. Large initial rent increases might be associated with failure, on the assumption that the increase is approved to bail out an already troubled project; or with success, on the assumption that a sizeable rent increase starts a project out on firm footing. Similarly, high per unit construction costs might be viewed as indicative of good quality or impending delinquencies. Overall, variables in this category seem to us to be underemphasized.

Characteristics of the Insurance Program and the Mortgage. This category encompases variables identifying HUD insurance programs. Several of the studies test these characteristics on the assumption that one insuring program may produce more failures than others. None of the studies, however, test the loan to value ratio, which is of central importance in the single family literature [9]. Although there is very little variation in loan to value ratio among multifamily projects, sponsor type may serve as a proxy for this variable. Non-profits are eligible for insurance on mortgages up to 100 percent of replacement cost, while the maximum for profit motivated sponsors is 90 percent.

The studies reviewed concentrate on different categories of variables. The BPA [4] and the Three Regions [19] studies, which draw on the largest data set, include variables representative of each category except characteristics of the mortgagee. The OPAE study [16] has no information on management and relatively little financial information, though it deals extensively with tenant and neighborhood characteristics. The Mendelsohn study [12] focuses almost exclusively on project location characteristics. Sadacca's [13] variables are largely tenant and management characteristics, and characteristics of the project social environment.

II. DATA

Each of the three major empirical studies included a data collection effort. For the Three Region study [19], data was collected on 618 projects developed under Sections 236 and 221(d)(3) in Regions III, VI, and IX. The OPAE data set [16] includes some information on the total universe of Section 236, 221(d)(3), and 207 projects existing at the time, with more complete data on about 900 236 projects. For the subsidized program phase of the Task Force study [22], data were collected on 338 troubled projects insured under subsidized multifamily programs, as well as some information on the universe of multifamily projects. Interviews were also conducted with a number of individuals not connected with specific projects. For the unsubsidized phase of the Task Force study [21], data were collected on 228 troubled projects with additional information again gathered through interviews with industry professionals. The other studies reviewed have either used one of the three major data sets or developed much smaller data sets.

The studies obtained their data from three basic sources--HUD forms and reports, interviews and questionnaires administered to relevant actors, and census information. HUD forms and reports can provide extensive financial data and information about tenants, while interviews and questionnaires may be more useful for gathering information about the behavior of important actors, and the census is the most complete source of neighborhood and SMSA characteristics.

While internal HUD forms and reports offer a valuable data source, two of the major studies encountered problems in obtaining all the information they needed. THE OPAE study relied primarily on published, summary reports, and therefore lost much of the detail available from FHA's processing forms [16]. The Task Force study attempted to extract data from these processing forms, but reported that they were unable to locate information that should have been available ([21], p. III-19, [22], p. 19). One possible explanation is that the Task Force tried to extract some of its data from a form used internally for field office analysis, and might have experienced greater success by using forms submitted by projects for field office review [3].

Three Region Study

In the spring of 1973, data on 618 Section 236 and 221(d)(3) projects in Regions III, VI, and IX were collected for the Three Region study. All projects had reached permission to occupy status by May 1972. The sample was selected to include 50 percent of the nonfailures in the regions, 50 percent of the failures (defined as projects in default, assignment, or foreclosure), and 100 percent of those projects with negative cash flow. Three data instruments were used: (1) A 151 item form for recording basic project data, with items drawn from HUD forms 2013, 2264, 2485, 2500, 92458, 92470, and 92558; (2) a 68-item questionnaire administered to HUD field office staff familiar with each project, which included questions on management, the social environment of the project, its financial status, construction defects, and other items; and (3) a 66-item questionnaire administered to project managers

or management agents. This questionnaire, essentially the same as the one administered to the HUD staff, was completed for 219 of the sampled projects. BPA [4] used only data from the first two instruments and reduced the number of variables considered to 91.

OPAE Study

The data used in the OPAE study [16], collected in early 1974, is confined to Section 236 projects. Forty-five data items were gathered from five HUD sources and merged with 42 items of the 1970 Census Tract information on population, housing stock, and housing markets. The HUD sources were: HPMC Report 02, "Selected Multifamily Status Reports, Mortgage Insurance Programs;" HM records on defaults and foreclosures; HPMC records on defaults; HPMC records on Section 236 projects which have applied for rent supplement authority; and HPMC records of tenant income statements. The universe of 236 projects at the time of data collection was 4,154, and basic data was collected for all. The census data merge reduced the sample to 900. Tenant characteristics were available for 2,000 projects. The OPAE regressions were run using the census data sample. Mendelsohn [12], who assisted in the preparation of the OPAE study, used the OPAE data with the addition of some variables describing the SMSA in which the project is located.

Task Force Study

The data used in the subsidized phase of the Task Force study [22] were collected in the summer of 1977. Data on 338 insured subsidized multifamily projects in default, assignment, or acquired status were

collected from 13 Area Offices. Information was derived from a two-part questionnaire administered to appropriate Area Office personnel for each project, and to managers or owners of 65 selected projects. Some of the information on the questionnaires was in turn drawn from the 2264, 92558, and other forms. Other questions asked opinions of the respondents regarding the severity and importance of various problems the project experienced. In addition to the data on troubled projects, the Task Force collected limited information on the entire inventory of multifamily projects from Central Office sources. Finally, the Task Force interviewed 71 industry professionals, including mortgage bankers, developers, attorneys, and local housing officials, regarding general market conditions, the nature of project problems, and the HUD programs and their implementation. Those interviewed were not connected with particular projects in the sample.

Data for the unsubsidized phase of the Task Force study [21] were collected in the summer of 1978. The researchers structured the data gathering effort in a manner similar to that for the subsidized phase in order to facilitate later comparisons between problems of subsidized and unsubsidized projects in financial distress. Data on 228 HUD-insured unsubsidized projects in default, assignment or acquired status were collected from 12 area offices. Nine of the offices were among those used in the subsidized phase. The same two-part questionnaire was completed by appropriate area office personnel for each project. Site visits were made to 59 of the sampled projects. Interviews with 75 industry professionals were conducted regarding problems of troubled unsubsidized projects.

In the unsubsidized phase, investigators also selected for analysis a subset of both subsidized and unsubsidized projects "whose financial viability was potentially threatened due to poor construction." ([21], p. VIII-1.) Data were obtained from area office personnel in the nine offices common to both the subsidized and unsubsidized samples.

Sadacca Study

Sadacca's data set differs from the others. Approximately 100 data items were collected in 1970 on 66 projects. The original purpose was to examine characteristics of management, and the data collected are so oriented. Projects were followed over the succeeding five years, and Sadacca relates 1970 variables to subsequent failure status and to subsequent changes in the levels and variability of income and expenses. Sadacca reduces his variable set to 30 in reporting his results [13].

Each data set has strengths and weaknesses in terms of the complete set of explanatory variable types. The Three Region [19] data contain relatively large amounts of financial information and project physical characteristics, since forms from individual projects were used. Through interviews, some assessments of management quality were made, and information was elicited on the social environment of the project. On the other hand, little information is available on project tenants, which BPA notes is a significant drawback ([4], Vol. 1, p. 2). The data set also contains little information on neighborhood

characteristics. Finally, the Three Region study [19] includes a disproportionate number of failed projects and a disproportionate number of those with negative cash flow. This presents no problem if the observations are properly weighted in running the regressions, but BPA does no weighting, which could bias their results.

The OPAE data [16] were not drawn from HUD forms or from interviews and accordingly lack much financial information and management information on individual projects. On the other hand, OPAE collected detailed information on tenant characteristics, and, by merging census tract data, on a wide variety of neighborhood characteristics.

The major drawback for statistical analysis of the Task Force study data [21, 22] is the fact that both the subsidized and unsubsidized samples include only failed projects. Comparisons can be made between financially distressed subsidized and unsubsidized projects [21, appendix A], but without data on projects that have not failed, it is not possible to ascertain whether characteristics associated with failed projects are unique to these projects or common to all projects. This criticism does not apply to the interviews of industry professionals nor, of course, to the data on the entire project inventory. While detailed financial information was to be collected on the troubled projects sample, the attempt to do so was largely unsuccessful, as noted earlier.

The Sadacca data [13] has the advantage of being self-weighting, since the original data were collected before any of the projects had failed. However, the sample is small, and thus not necessarily representative, and the data were collected for a different purpose. The

variables available are strongly oriented to assessing actions of management.

III. ESTIMATION

Two of the major studies present only cross-tabular results. The Task Force study [21, 22] presents only bivariate tables--for example, failure category by type of sponsorship. The Three Region study [19] in some cases presents more complex multivariate tables--for example, given management quality and type of ownership, professional management is cross-tabulated against failure.

Among the micro studies using multivariate analysis, both BPA [4] and OPAE [16] report numerous single-equation linear regression models estimated using ordinary least squares (OLS). The dependent variable in these cases is binary (fail/no fail). Although such a dependent variable violates the statistical assumptions of OLS estimation, the regression technique may be sufficiently robust that the validity of the results is not significantly impaired. Still, the use of an alternative method, such as logit, would be appropriate. Noting the problem, Mendelsohn [12] uses a logit model. Along with multiple regression, Sadacca [13] uses a quite different technique, discriminant analysis, which is also appropriate to dealing with a binary dependent variable. No multiple equation models were developed although BPA reports experimenting with such models without success ([4], vol. 1, p. 61).

The OMB [24] macro model uses OLS, although a two-stage procedure (2SLS) was experimented with. Both discrete and distributed lags were used for the independent variables, and correction was made for autocorrelation.

IV. RESULTS

In this section, we summarize the results of the studies in terms of the explanatory variable categories set out in Section I, above. Regression results for OPAE, BPA, and Mendelsohn are presented in the appendices.

Characteristics and Behavior of the Actors

Sponsor

The quantitative literature examines possible relationships between between failure and sponsor type, experience, and relationship to management. Bivariate analysis consistently indicates that all these factors are associated with failure. Both the Three Regions study [19] and the Task Force study [22] report that subsidized non-profits fail twice as often as subsidized limited dividend projects, and the findings of the OPAE study [16] and the BPA study [4] are consistent. The BPA study, however, finds that profit motivated sponsors and non-profits face approximately the same risk of mild financial difficulty --such as negative cash flow. Non-profits are less likely to receive mortgage modifications and subsequently more likely to default. Among subsidized projects that have been either assigned or foreclosed, the Task Force study [22] indicates that non-profits are less likely to be foreclosed than profit motivated sponsors. Several studies also indicate that cooperative projects experience high default rates; the Task Force study [22] reports that three quarters of all subsidized cooperatives are in default, assignment, or foreclosure.

Bivariate analyses also suggest that the experience of the sponsor and the relationship between sponsor and manager are associated with failure. The BPA study [4] reports that failure is less common among experienced limited dividend sponsors, and the Task Force report [22] finds that most troubled subsidized project sponsors do not have experience in low-income housing management. According to the BPA [4] results, however, experience is associated with failure for non-profit projects. Finally, BPA finds that failure is associated with projects in which the sponsor does not own the managing agent.

Several of the quantitative studies incorporated these sponsor characteristics into their regression equations. Mendelsohn [12], BPA [4], and OPAE [16] all confirm that non-profit sponsors are more likely to enter default, assignment or foreclosure than limited dividends. The OPAE [16] regressions also indicate that cooperative ownership increases the likelihood of default, assignment, or foreclosure after final endorsement. Once projects have defaulted, however, a limited dividend is more likely to be assigned or foreclosed than a non-profit or cooperative project. OPAE offers no explanation for this finding.

Only the BPA study incorporates sponsor experience and relationship to management in its regression equations for failure. The results are consistent with bivariate observations; experience reduces the likelihood of failure only among limited dividends, and failure is less likely when the project sponsor owns the managing agent. Sadacca [13] finds that rental income grows at a relatively slow pace when sponsors participate in the selection and eviction of tenants.

Nonprofit sponsorship in itself does not cause failure, of course. There is considerable speculation as to the reason for its association with failure. The GAO suggests that nonprofit sponsors lack experience in multifamily housing, that they lask financial resources to weather adversity, and that relative to limited dividend projects, they tend to serve lower income tenants who have difficulty paying their rents ([6], pp. 92-94). Others speculate that nonprofits lack the incentive to avoid financial failure that exists for limited dividend sponsors. Limited dividends lose tax advantages at foreclosure, though not at earlier stages in the failure progression, and may have reason to protect their tax shelters by supporting projects with other funds ([4], Vol. 1, p. 18). It has also been suggested that some nonprofits view their participation as a social contribution and not a business proposition, that they are unwilling to contribute further operating funds, and that they are more reluctant to raise rents or to evict problem or delinquent tenants ([16], p. D-3). Finally, some of the problems of non-profits may stem from FHA program characteristics. For example, the loan to value ratio permitted for non-profits is 100 percent, which certainly increases risks.

Evidence to support some of these arguments is available in the literature. A HUD report on nonprofit sponsorship finds that non-profits do in fact tend to serve lower income tenants than do limited dividends [17]. Case studies accompanying the OPAE report provide some confirmation of limited capitalization and inexperience of nonprofit sponsors ([16] p. D-3). It is the BPA study [3] that provides the most intriguing results; while experience reduces risk for limited dividend

sponsors, it seems to increase the likelihood of failure among non-profits. The BPA study also calls attention to the fact that rates of financial difficulty are relatively close for non-profits and limited dividends, interpreting this finding as evidence that limited dividends support failing projects with cash from other sources. This argument does not, however, explain the OPAE finding that, given default, limited dividends are more likely to be assigned or foreclosed.

Taken together, the studies indicate that nonprofits and co-ops tend to fail at a higher rate than profit motivated sponsors. All sponsor types experience roughly the same degree of mild financial difficulties but limited dividends are more likely to obtain mortgage modifications, which can prevent or cure default. As expected, experience is beneficial to limited dividend sponsors, but surprisingly experience seems to weaken nonprofits. Sponsors of all types appear to enjoy greater probabilities of success when they own their managing agencies. It becomes somewhat more difficult to draw meaningful conclusions when we focus on the likelihood of assignment and foreclosure given defaults; but results indicate that profit motivated sponsors no longer enjoy significant advantages over nonprofits.

Management

Management variables receive considerable attention in the quantitative literature. According to the Task Force study [21, 22], maintenance, rental practices, fiscal and personnel management, and the overall performance of the manager were among the most frequently cited

problems for the samples of both subsidized and unsubsidized troubled projects. The results of the Three Region [19], BPA [4], and Sadacca [13] studies confirm the importance of some of these variables.

In the BPA and Three Region data, management quality is simply rated by local HUD officials in one of three categories: superior, satisfactory, or unsatisfactory. Both studies show this variable as related to the likelihood of failure. BPA confirms the importance of management quality with regression equations as well as with bivariate techniques. As previously noted, however, it is likely that management of a successful project will be rated as good, even if there is no objective difference in the way its management performs relative to the management of a failed project.

Results of the BPA study [4] also indicate that management turnover is closely associated with failure, but this variable may well be simultaneously determined. Bivariate analysis suggests that a resident manager and active tenant screening may reduce the risk of failure, but these variables do not play significant roles in regression equations. Three Regions [19] also reports that both resident and professional management appear to be insignificant.

Sadacca [13] finds managers with independent responsibility for budget, accounting, and payroll matters are less likely to fail. Whether this result stems from the advantage of on-site financial control or from the fact that owners who have good managers tend to give them more discretion is not clear. Sadacca also reports that extra managerial time spent on maintenance tends to keep expense levels down, but increases their variability. He also reports that projects

whose managers believe that stopping suspicious persons is mostly a tenant responsibility are more likely to fail.

Clearly, the skill of the manager has an enormous impact on the viability of a multifamily project, but the variables analyzed in the existing empirical literature fail to provide a complete picture. Subjective HUD ratings of management quality are not particularly useful, the turnover variable is likely to be simultaneously determined with failure, and the implications of Sadacca's variables are unclear.

Mortgagee

The studies surveyed place little emphasis on mortgagees; no variables appear in statistical tests, and there is little discussion of their potential importance. Mendelsohn notes that the FHA guarantee gives mortgagees little incentive to monitor or police insured mortgages ([12] p. 5). There is, in fact, a positive incentive to assign in some circumstances. For example, if interest rates are rising rapidly, some mortgagees may have an incentive to assign and regain the outstanding mortgage balance. Both GAO ([6], p. 92) and BPA ([4], Vol. 3, p. 10) remark on the absence of management incentives directed toward mortgagees. These two studies also note that FNMA has been relatively quick to assign FHA insured mortgages.

Tenants

Several empirical studies explore possible relationships between tenant characteristics and failure. Using bivariate techniques, Three Regions [19], BPA [4], and the Task Force [21, 22] find that some tenant demographic variables are associated with failure. All three of

these studies conclude that projects with large elderly populations are less likely to fail. This observation may stem from the fact that units with elderly occupants require relatively little maintenance and repair, and that elderly tenants with fixed incomes can be relied on to pay their rent. Results of the three studies also suggest that projects with large minority populations have high failure rates. This finding might be explained by the high degree of correlation between ethnicity and other tenant characteristics such as income, and unemployment. Finally, Task Force questionnaire results indicate that a high rent to income ratio is one of the most severe problems faced by subsidized troubled projects. It was a problem of somewhat lesser importance for unsubsidized projects.

In general, these observations are not supported by the results of regression analyses performed by OPAE [16] and BPA [4]. Ethnicity, sex of the household head, number of children, number of elderly tenants, average tenant income, and rent to income ratio are all found to be insignificant factors. The OPAE study does conclude, however, that low average tenant rents increase the likelihood of failure before final endorsement. This variable is interpreted as an indication of the type of market for which a project is designed; but during the initial rent-up that often occurs before final endorsement, the low rents actually paid by tenants may inhibit successful completion of construction. Finally, the OPAE study reports that given default, assignment and foreclosure are more likely among projects that house large families and families with young heads of households. Presumably, tenants of this kind are associated with instability and high maintenance and repair costs.

For the most part, tenant characteristics can not be usefully viewed as causes of project failure. Some of the variables may be simultaneously determined with failure; thus the empirical study results tend to be inconclusive. Family size and age may prove to be useful explanatory variables. Average rent or rent to income ratio may be lagged dependent, since higher income tenants may move out of failing projects.

Local Government Officials

The possibility that local government officials and regulations may enhance the likelihood of failure is not statistically tested in the existing empirical literature. In the Boston study [15], the Boston Rent Control Administration is mentioned as contributing to failure by delaying on requests for rent increases and approving rents less than those approved by HUD. In the Task Force study, respondents were asked whether state and local government officials and regulations were problems for their troubled projects. While a number of respondents answered positively, very few characterized these problems as severe.

HUD Underwriters and Processors

In the studies, considerable attention is paid to shortcomings of HUD staff in administering FHA programs. The GAO devotes an entire report to criticising HUD underwriting of multifamily projects [4]. Using a sample of 30 projects under the 207, 220, 221, and 236 programs, GAO examined area office procedures and policies for analyzing market need, location, earning capacity, and expense data. Twenty-one of the projects are described as being in serious financial difficulty

as of July, 1977. The survey revealed overestimate of revenues in 13 cases, underestimate of expenses in 27 cases, incomplete documentation supporting underwriting estimates, lack of complete and accurate information on operating projects, and misuse of prescribed procedures for estimating several key items. GAO also reports a view among HUD officials that the Department's objective is production and that proposed projects should be viewed in the most favorable light possible.

Underwriting and processing variables are also of central concern to the Task Force study [21, 22]. Respondents to the Task Force troubled projects questionnaire for subsidized projects indicate that during the underwriting and production period, the number and skills of the HUD staff, the timeliness of processing, and HUD policies and regulations are all among the most frequently mentioned problems. During the post-production period, those surveyed mentioned the lack of availability of HUD staff more frequently than any other problem. Problems with HUD processing and servicing were regarded as relatively less important by respondents to the same questionnaire in the unsubsidized study. Still, the lack of availability of HUD staff was fourth among the five most often mentioned problems to be faced in the near future by those associated with troubled unsubsidized projects. Interviews with housing management directors suggest that staff workloads in Loan Management and Property Disposition are too great and that training and handbooks are inadequate ([22] p. 35). Further, the Task Force study reports views critical of loan servicing in half of the interviews with private sector specialists interviewed for the subsidized study. One third of the private sector respondents were

also critical of underwriting and the availability of technical assistance to nonprofits. HUD underwriting/processing and management was mentioned as a problem by 76 percent of private sector experts surveyed for the unsubsidized phase. Program management action by HUD was viewed as contributing to financial distress by one third of those specialists [21]. Based on field visits during the subsidized study, the Task Force staff also argues that offices lack sufficient numbers of professional and support staff, that the available staff lack sufficient skill, that the management information system is inadequate, and that the "management environment in which the Loan Management and Property Disposition offices function is unprofessional and inefficient" ([22] p. 25). The same conclusions were reached following field office visits by the Task Force staff one year later, during the unsubsidized phase of the study ([21], p. VI-2). Other studies suggest deficiencies similar to those reported in the GAO and Task Force reports (for example, Boston [15], Region IX [18], GAO [7]).

The evidence reported in the regression analyses is less conclusive. The OPAE study reports that neither application processing time nor area office volume is significantly associated with failure. OPAE data did not permit analysis of specific processing bottlenecks. BPA tests the relationship between the accuracy of HUD's cost estimates and the likelihood of failure, and finds that overestimates of net project revenue are closely associated with failure. As discussed previously, however, this variable is not particularly useful for predicting defaults.

Like poor management, poor underwriting and poor servicing can too easily be blamed for project failure in any case. However, we can reasonably conclude from the literature that HUD accepts many projects which have a high probability of failure from the outset by allowing project budgets to be planned too closely, leaving little cushion for dealing with unanticipated costs. Quantitative results fail to provide a more detailed picture of the kinds of problems HUD faces and there is no evidence to indicate that poor loan servicing is a cause of project financial failure.

Characteristics of the Project

Property

All studies examine physical property variables. According to the Task Force [22] most troubled subsidized projects are substantially rehabilitated, lowrise, with 100 to 125 primarily two-bedroom units. Bivariate analyses in the OPAE [16] and BPA [4] studies all confirm the observation that rehab projects fail considerably more often than new construction. Although this finding is questioned by Three Regions [19], it is supported by the results of Mendelsohn's [12] and OPAE's [16] regression equations. Rehab projects may fail frequently because they are located in lower-income central city areas and because developers face more uncertainty than in new construction. Existing evidence for unsubsidized rehab projects is contrary to that for subsidized. Among unsubsidized projects, the Task Force reports rehabs slightly less likely to be financially distressed than new construction projects.

Studies also test the significance of design characteristics such as the number of units, number of bedrooms per unit, density, whether the project is highrise or lowrise, and availability of parking spaces and a recreation building. Results are generally inconclusive. Three Regions concludes that none of these characteristics except size is significant, while BPA finds in one of its equations that increased density is associated with failure and that the existence of a recreation building reduces risk slightly. Project size--expressed in terms of number of units--appears to play a role, but its effect is unclear. OPAE and the Task Force both find that smaller subsidized projects are more likely to fail. BPA, on the other hand, reports a positive correlation between size and failure which is not supported by the regression analysis. And in a cross-tabular presentation, the Three Regions study [19] notes that the rate of failure is higher in both small and large projects than in projects of moderate size. Among unsubsidized projects, the Task Force finds that financially distressed projects tend to be larger on the average than other projects.

Finally, Three Regions and BPA test the significance of project physical condition. Both studies conclude that physical condition, which is either lagged dependent or simultaneously determined with failure, is negatively associated with the likelihood of failure. In addition, BPA tests the percent of maintenance due to construction defects, and finds that this variable is highly related to failure. This finding implies that the difficulties of some projects stem from construction defects which can generate demands for correction and repair expenditures throughout a project's life. The report from the

unsubsidized phase of the Task Force study suggests, however, that serious construction defects appear to be present in relatively few projects--either subsidized or unsubsidized ([21], p. VIII-2).

Despite inconsistencies in the findings, rehab projects appear to be riskier than new construction. None of the design characteristics tested, however, is clearly associated with failure. On the basis of the BPA results we conclude that construction defects form a source of financial difficulty, and also that many financially troubled projects are in poor physical condition.

Location

Location variables can describe neighborhood residents, physical condition, and the availability of competing rental units. Neighborhood resident characteristics are tested extensively in the OPAE study. The likelihood of failure appears to be lower in neighborhoods with large elderly populations, low unemployment rates, and a high percentage of recent move-ins. However, risk is increased in neighborhoods with a high percentage of minority move-ins, and neighborhood overcrowding and race are unrelated to failure. Mendelsohn [11] finds that low neighborhood average income is associated with failure, particularly when the neighborhood average is low relative to average income in the SMSA.

Several studies also attempt to explore neighborhood physical characteristics. The OPAE study finds--in both crosstabulations and regressions--that the risk of failure is increased by location in an urban renewal area. Three Regions contradicts this finding in its

crosstabs. BPA reports that an overall indicator of neighborhood physical quality is negatively associated with failure; as quality improves the risk of failure decreases. Taken together, OPAE, BPA, and Three Regions agree that city size, location in central city or suburb, proximity of old buildings, and residential overcrowding in the neighborhood are all unrelated to failure.

Finally, market conditions appear to play a role of some importance. Multivariate analysis performed by OPAE, Mendelsohn, and BPA indicate that proximity to competing rental units, including competing subsidized units, reduces the likelihood of failure. Mendelsohn argues that nearby rental units indicate that multifamily housing is marketable in the area. The studies also find that high neighborhood vacancy rates increase the likelihood of failure.

On the basis of these findings we can conclude that multifamily projects are significantly influenced by neighborhood residents, and by physical, and market characteristics. A project faces lower risk if it is located in a non-urban renewal area with a large population of elderly residents, low unemployment, high average income, and high turnover. Failure is also discouraged by a good overall physical condition, by low vacancy rates, and by large numbers of nearby rental units.

Age

Age variables can be structured in two ways. If the variable is cumulative, the coefficient will usually indicate that older projects are more likely to be in the failure group. If, on the other hand, the variable is structured to reflect whether the project will fail in the

variable is structured to reflect whether the project will fail in the nth year, given that it has been a nonfailure to that point, the sign is less certain. All four regression studies include an age variable of the first sort. BPA introduces dummy variables for age. Projects in the youngest group (0-2 years from initial occupancy) are less likely to be in the failure group. As age increases, projects are increasingly likely to be in the failure group. OPAE introduces the time of final endorsement in two dummy variables, one representing endorsement prior to 1970 and one endorsement in 1974. Consistent with the BPA results, they find that projects most recently endorsed are in the default group less often; those endorsed four or more years previously are among the defaults more often. Mendelsohn, on the other hand, finds the date of final endorsement insignificant, which he interprets to mean that default is more a function of specific annual conditions than of the age of the project.

Sadacca introduces the reciprocal of years since project completion and finds it positively associated with failure; newer projects are more likely to fall into the failure group. He attributes this finding to lax underwriting in the later stages of the 221(d)(3) program ([13], p. 3). Although this result appears at first to contradict the results of other studies, it should be noted that all projects in the Sadacca sample were at least five years old at the time of testing.

Limited inferences can be drawn from the existing literature regarding project life cycles or potentially risky periods in a project's life. Most of the projects were not very old when examined. Nevertheless, it appears that the probability of failure increases with age, perhaps declining after five years.

Project Social Characteristics

The most widely cited variable in this category is vandalism. Task Force questionnaire respondents in the subsidized study mention vandalism as a current severe problem more frequently than anything else except rising utility costs ([22] p. 11). The Three Region study [19] finds that vandalism is closely associated with failure and with poor physical property condition, and BPA [4] finds that vandalism and the percentage of maintenance due to vandalism are significant in several regression equations. Thus, vandalism can at least be said to be an important dimension of the failure problem. However, while vandalism does push up costs and make a project a less attractive housing accomodation, one must be careful in interpreting it as an explanatory variable, since to some degree at least it occurs simultaneously with failure.

Inadequate police protection--which is clearly related to vandalism --also proves to be directly associated with failure in BPA's [4] regression equations and Three Region's crosstabs. BPA also reports that high vacancy rates are associated with failure. Although the Task Force study and BPA's correlations call attention to rent delinquencies, high turnover, and tenant involvement and militancy; these factors do not reappear in the BPA regression equations.

Sadacca [13] introduces a variety of project social characteristics into his equations. The most significant variable in Sadacca's failure regressions is the rate at which teens are employed by the project during the summer; the higher the rate, which Sadacca views as a proxy for the sponsor's service orientation, the greater the likelihood

of failure. Sadacca also finds that projects in which occupants are involved in handling behavior problems are more likely to be in financial trouble, but are likely to have smaller average changes in operating expense levels. High tenant turnover rates are also found to be associated with smaller increases in operating expenses and increasing levels of operating income less expenses. High occupancy rates yield higher average changes in rental income and thus in operating income less operating expense. Sadacca also finds that projects in which the residents' opinion in 1970 was that recreation facilities for women and children were adequate have lower total operating expenses in 1975.

As previously mentioned, many variables in this category are simultaneously determined with failure, and interpretation of their impact is difficult. We can only conclude that vandalism, poor police protection, and vacancies are all associated with failure.

Financing

Project Financial History

This category includes cost, revenue, and net revenue variables as well as variables representing actions taken in response to failure. The impact of various cost breakdowns, including per unit construction costs and operating costs, is assessed in both the BPA and OPAE studies, and is found to be insignificant. The Task Force study questionnaires, on the other hand, reveal that fuel and power utility expenditures are viewed as the most important single problem facing both subsidized and unsubsidized financially troubled projects [21, 22]. Insurance and other utility costs are also rated as important

problems. Sadacca finds that high 1970 per unit administrative, operating, and maintenance expenditures combined are strongly related to subsequent failure [13].

Negative cash flow is tested by BPA. This variable appears to be moderately correlated with failure, but it drops out of the regression equations. Net revenue, on the other hand, proves to be quite closely associated with failure; BPA reports that as net revenues increase the likelihood of failure decreases. Although this variable is clearly indicative of failure, it is not an exogenous cause, but is either lagged dependent or simultaneously determined with failure.

Studies also test projects' prior default experience. According to the Task Force study [19], most troubled projects experience long periods of default. BPA and OPAE conclude that repeated delinquency is associated with failure in most instances. OPAE also finds, however, that given prior default, projects that are repeatedly delinquent are least likely to be in the assignment or foreclosure categories. This result must be viewed with some caution, since the magnitude and duration of delinquency are not considered and since projects can no longer default once they have foreclosed. Finally, the OPAE study [16] finds that default before final endorsement is one of the most significant predictors of failure after final endorsement. This lagged dependent variable can be very useful for anticipating trouble early.

BPA [4], Three Regions [19], and OPAE [16], all test variables reflecting waiver of replacement reserve and modification of mortgage principal payments. In nearly every case variables are highly significant and positive, indicating either that the remedies are insufficient

or that the remedies are directed toward the projects in greatest need. The policy implications stemming from these alternative interpretations obviously differ, but there is no way to choose between them on the basis of evidence presented here.

It is clear from the empirical evidence that variables describing the financial condition of projects are closly associated with financial failure. Whether these variables are useful in forecasting failure depends on the degree to which they precede the occurence of failure.

Characteristics of the Insurance Program and the Mortgage

Much has been made of the failure rate of Section 236 projects relative to other programs (see GAO [7]). The 236 rate (16 percent) is lower than that of the 221(d)(3) programs and compares favorably with nonsubsidized programs [21, 22]. One explanation is that 236 is newer than other programs, so that the effect of age is being observed when a dummy variable for Section 236 is introduced. BPA confirms this, reporting equations in which 236 and age are both introduced. The Section 236 variable loses significance. The Three Region study asserts a lack of relationship between program type and failure, also noting that the difference in failure rate between 221BMIR and 236 can be attributed to program age.

Among programs making up most of the unsubsidized inventory, the proportion of financially distressed 221(d)(4) projects is 15 percent; that of 207 projects, 16 percent. On the other hand, 11 percent of Section 608 projects are failures, and only 1 percent of the existing 1056 Section 803 projects are in financial distress [21].

V. CONCLUSIONS

The objective of the empirical studies reviewed in this paper is to explain and predict financial failure in FHA-insured multifamily housing projects. Failure can be defined in a number of ways. Some of the studies define failure as negative cash flow or mortgage modification, but most classify as financial failures all projects in default, assignment, or foreclosure. Only one study--the OMB model--uses macroeconomic variables to explain failure. All the rest follow a pattern set in the general business failure literature, using microeconomic variables to explain financial failure. The relevant microeconomic variables breakdown into three broad, substantive categories--characteristics of actors involved in the development and management of multifamily projects, characteristics of the projects themselves, and financing and program characteristics. We find it useful to view all of these variables as belonging to one of three types, in terms of their usefulness in explaining financial failure. Variables can be simultaneously determined with failure, lagged dependent, or exogenous.

Three of the studies discussed here involved major data collection efforts. In 1973, three survey instruments were employed to collect data on Section 236 and 221(d)(3) projects in regions III, VI, and IX, for the Three Regions study [19]. In 1974, HUD's Office of Policy Analysis and Evaluation (OPAE) collected data on a nationwide sample of Section 236 projects, and merged it with census data on neighborhood characteristics [16]. Finally, in 1977, the Task Force developed

several questionnaires which were used to collect data on a small sample of troubled subsidized multifamily projects and on the entire multifamily inventory [22]. In 1978, the Task Force collected similar data for a sample of troubled unsubsidized projects [21].

A variety of statistical techniques are employed to analyze this data, including crosstabulation, correlation, and regression. Both the BPA study and the OPAE study report single-equation linear regression models using ordinary least squares (OLS). Mendelsohn and Sadacca implement alternative estimation methods; Mendelsohn uses a logit function, and Sadacca uses discriminant analysis.

Results of the microeconomic studies indicate that some of the variables in each of the three substantive groups increase the likelihood of failure in multifamily projects. Many variables that were expected to play a role, however, proved to be insignificant. The studies suggest that the characteristics and behavior of sponsors, management, and HUD underwriters and processors all affect the probability of project failure. Projects owned by nonprofits and cooperatives are more prone to failure than projects owned by profit motivated sponsors. The quality and continuity of management also appears to be closely associated with financial viability, although poor management and high turnover do not necessarily cause failure. Finally, the studies suggest that HUD underwriters accept many projects with inadequate margins for unanticipated costs, and that therefore face high probabilities of failure. Results do not support claims that tenant characteristics can cause failure, and they do not statistically explore the possibilities that mortgagees or local government officials may play important roles.

Some project characteristics prove to influence significantly the likelihood of financial failure. Although design characteristics are unimportant, rehabilitation projects appear to be more risky than new construction, and physical construction defects may constitute an important source of subsequent financial difficulties. Location may also play a role; some neighborhood demographic characteristics--such as proportion elderly, and average income--affect failure, as well as market factors--such as the rental vacancy rate. Project age may be related to failure; results indicate that the likelihood of failure increases with age for at least the first five years of a project's life, although once a project has weathered this initial period, it may be less likely to fail. Finally, vandalism and the quality of police protection are found to be closely related to failure, although there is no clear causal relationship.

The last group of explanatory variables explored in the micro-economic literature describe projects' financial and program characteristics. Financial variables clearly relate closely with failure, but they are little used in the studies surveyed. The most significant results relate negative cash flow and net revenue with failure. Results do not confirm the hypothesis that some of the subsidized FHA programs are more prone to failure than others. However, the high rate of failure among nonprofits may stem from the high loan-to-value ratio permitted by FHA programs for nonprofit sponsors. Potentially, financial variables could be extremely useful for explaining and predicting multifamily failure. They are used extensively in the business failure literature. The usefulness of these variables in forecasting financial

failure depends on the degree to which they precede or are exogenous to the failure.

The list of useful explanatory variables is rather limited, and collectively the findings do not reveal much to provide policy guidance. Some of the factors are so broad as to be virtually meaningless, and several others appear to be simultaneously determined with failure. To some extent, the studies reveal more about factors not associated with failure than about explanatory variables. Of particular interest is the fact that design and tenant characteristics do not appear to be significantly associated with failure. The lack of significant results is in part due to the nature of the problem. As BPA notes ([4], Vol. 2), multifamily failure is a problem akin to heart disease--systemic and environmental. There is no single outstanding cause which can be isolated and dealt with. However, the lack of useful guidance is also a result of the nature of the empirical work.

Good empirical work usually necessitates an underlying theoretical framework. Using such a framework, equations can be developed and variables specified which represent the crucial aspects of the problem being dealt with. A theory of the causes of failure is extremely elusive. In lieu of a complete theory, a framework at least as detailed as the list of variable categories presented in this paper is necessary to direct the choice of explanatory variables and to aid in the interpretation of results. Of the studies reviewed, only BPA and Mendelsohn provide an a priori framework. As a result, the literature seems extremely ad hoc. What seem to be important variables are neglected in favor of what would seem to be rather unimportant ones.

We would recommend a far more careful choice of variables. Particularly, more explicit attention should be paid to the lagged relationship between failure and some explanatory variables. An approach similar to that used by Altman to predict business failures may prove adaptable to multifamily housing. Altman forecasts failure of firms using a set of financial ratios. He examines the values of these ratios several years in advance of failure. His model appears to predict failure reasonably accurately up to two years in advance of its occurence, though predictive accuracy declines substantially as lead time is increased to three, four, and five years.

The absence of significant results in the existing literature may also stem from the fact that multifamily projects encounter two important types of risk--business risk and financial risk. Business risk is the possibility that a project will be unable to cover its expenses with its income. By focusing on variables such as project, tenant, and neighborhood characteristics, the existing studies primarily measure business risk, without considering the potential role of financial risk. Financial risk is the possibility that a project will be unable to absorb businesses losses, and is increased by factors such as high loan-to-value ratio.

We would argue that any new attempt to explain financial failure should distinguish between business and financial risk. A dynamic model of multifamily project operations would contribute to a better understanding of business risk, and could support a probabilistic model designed to explain financial failure.

We also recommend experimentation with a wide and more sopisticated range of estimation techniques. Given the bivariate nature of the dependent variable, further use of logit and discriminate analysis, as employed by Mendelsohn and Sadacca, as well as use of other techniques, would be appropriate. Given the inherent simultaneity of a number of the explanatory variables, we also believe that further attempts should be made to develop a simultaneous multiequation model.

The usefulness of models of multifamily failure lies in their potential contribution to resource allocation decisions. Unfortunately, existing models offer limited guidance to policymakers faced with these decisions. The focus of the empirical work is narrow; the crucial policy issues to be resolved are whether the costs incurred in the production of multifamily housing are worth the benefits obtained, and whether the same benefits might be obtained at a lower cost. The existing models begin to address issues of cost, but fail to assess costs in the context of the associated benefits. The studies show that providing housing for low- and moderate-income households which would otherwise be inadequately housed is costly and risky, and is likely to result in numerous financial failures. Providing such housing, however, also yields substantial social benefits. A more meaningful analysis of the multifamily failure experience should encompass the benefits of underwriting housing as well as the costs of financial failure.

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APPENDIX A

REGRESSION EQUATIONS FROM THE OPAE STUDY

Appendix A contains regression equations as reported in the OPAE study. In Table A-1, the dependent variable is default after final endorsement; in Table A-2, default before final endorsement; in Table A-3, assignment or foreclosure for a sample of defaulted projects. Explanatory variables were entered stepwise, and only significant variables are reported. The dependent variable is structured in each case such that a negative sign on the coefficient of an explanatory variable indicates a greater likelihood of failure associated with larger values of that coefficient.

TABLE A-1

Dependent Variable--Default After Final Endorsement

Explanatory variables[a]	1	2
Default prior to final endorsement	-.8598 (15.52)[b]	-.8499 (15.28)
Mortgage modified	-.8611 (12.30)	-.8470 (3.82)
Project in Region V	-.1353 (4.91)	-.1417 (5.10)
Non-profit sponsor	-.0956 (3.88)	-.0945 (3.82)
Final endorsement before 1970	-.4676 (3.88)	-.4740 (3.93)
Rehab project	-.1465 (3.84)	-.1297 (3.35)
Final endorsement in 1974	.0974 (3.40)	.0947 (3.31)
Project in urban renewal area	-.0948 (2.05)	-.0754 (2.19)
Cooperative sponsored project	-.0697 (2.03)	------
Percent families income under $3000 in census tract	------	-.0024 (2.03)
Constant	.9631	.9838
R^2	.433	.433
Sample size	713	713

[a] negative sign indicates greater likelihood of default
[b] t-statistics in parentheses

TABLE A-2

Dependent Variable--Default Before Final Endorsement

Explanatory variables[a]	1	2
Percent minority recent move-ins in census tract	-.0013 (3.03)[b]	------
Final endorsement in 1974	-.2035 (4.87)	-.2109 (5.00)
Percent rental units vacant in census tract	-.0033 (3.08)	-.0036 (3.39)
Project never finally endorsed	-.1776 (3.06)	-.1916 (3.31)
Percent inemployed in census tract	-.0135 (3.29)	------
Average monthly tenant rent in project	.0020 (2.73)	.0021 (2.80)
Cooperative sponsored project	-.1459 (3.29)	-.1438 (3.24)
Mortgage modified	.2347 (2.58)	.2061 (2.26)
Non-profit sponsor	-.0894 (3.06)	-.1044 (3.61)
Percent elderly population in census tract	.0035 (2.03)	.0042 (2.94)
Rehab project	-.0983 (1.96)	-.1131 (2.27)
Percent welfare recipients census tract	------	-.0064 (4.26)
Constant	.8180	.7551
R^2	.205	.190
Sample size	491	491

[a] negative sign indicates greater likelihood of default
[b] t-statistics in parentheses

TABLE A-3

Dependent Variable--Assignment or Foreclosure Given Default

Explanatory variables[a]	1	2	3
Number of times project reinstated	.4420 (8.22)[b]	------	------
Project never finally endorsed	.4198 (3.22)	.7061 (5.03)	.6275 (4.46)
Percent rental units vacantin census tract	-.0060 (2.51)	------	------
Number of units in project	.00087 (2.30)	.00096 (2.41)	.00088 (2.13)
Average household size in project	-.0640 (1.65)	-.1017 (2.51)	------
Percent unemployment in census tract	-.0209 (2.60)	------	------
Non-profit sponsor	.1738 (2.47)	------	------
Default prior to final endorsement	------	-.5732 (7.82)	-.5960 (8.23)
Average head of household in project	------	------	.0047 (1.93)
Percent tenants admitted not due to displacement priority	------	------	.0021 (1.80)
Constant	.5798	1.135	.5596
R^2	.614	.548	.547
Sample size	82	82	82

[a] negative sign indicates greater likelihood of assignment or foreclosure, given default

[b] t-statistics in parentheses

APPENDIX B

REGRESSION EQUATIONS FROM MENDELSOHN STUDY

Appendix B contains regressions using a logit model as reported in the Mendelsohn study.

TABLE B-1

Dependent variable / Sample	1 Defaulted in lifetime Finally endorsed	2 Defaulted in lifetime Not Finally endorsed	3 Assigned given default Defaulted
Explanatory variables[a]			
Median income of census tract	-.000058 (2.86)[b]	-.00016 (2.74)	-.000061 (.18)
Percent rental units vacant in census tract	.0086 (1.84)	.021 (1.66)	.015 (1.83)
Percent apartments in census tract	-.0042 (2.38)	-.01 (1.98)	-.013 (3.09)
Median renter income in SMSA	.021 (3.11)	.028 (1.58)	.027 (1.81)
Percent rental units vacant in SMSA	.075 (4.19)	.064 (1.33)	.020 (.54)
Percent rental units lacking plumbing in SMSA	-.031 (.94)	-.071 (.76)	-.11 (1.46)
Non-profit sponsor	.54 (5.32)	.67 (2.79)	.13 (.63)
Percent rent supplement units in project	.0093 (2.44)	-.0078 (.72)	.010 (1.17)
Rehab project	.45 (2.81)	.18 (.56)	-.0026 (.54)
Final endorsement date	.0012 (.33)	------	-.0026 (2.41)
Constant	-3.23	-1.28	.91
Log of likelihood	-336	-65	-83
Sample size	741	158	174

[a] positive sign indicates a greater likelihood of default/assignment

[b] t-statistics in parentheses

APPENDIX C

REGRESSION EQUATIONS FROM THE BPA STUDY

Appendix C contains regression equations as reported in the BPA study. Twenty-four regressions are reported on four tables. For each regression on a given table, the explanatory variables listed were entered stepwise. The first fifteen variables were selected for inclusion in the reported regressions. The dependent variable in each case is structured such that a positive sign on the coefficient of an explanatory variable indicates a greater likelihood of failure associated with larger values of that coefficient.

BPA began analysis with 91 variables. Of these, a reduced set of 27 variables was selected on the basis of "probable utility for predicting failure." Table C-1 shows regressions run on the reduced set. Separate equations are shown for two definitions of failure: (1) foreclosure or assignment, and (2) foreclosure, assignment, or default; for each of three samples: (1) all projects, (2) projects with limited dividend sponsors, and (3) projects with nonprofit sponsors. Table C-2 reports regressions using explanatory variables which could be gathered before a project is occupied or during the initial period of occupancy. Accordingly, the variables are known in the BPA report as the development set. Separate equations are again shown for two definitions of failure for each of three samples. Table C-3 reflects explanatory variables identified during the BPA study by HUD staff as being important to failure. Accordingly, the variables are known as the HUD set.

Finally, in Table C-4, regressions are reported for a small selected set of variables. The emphasis here is on selecting a minimum number of conceptually important variables.

TABLE C-1
Reduced Set Regressions

Dependent variable[a]	1 F1	2 F2	3 F1	4 F2	5 F1	6 F2
Sample	All Projects		Limited Dividend		Non-profit	
Explanatory variables[b]						
Waiver of replacement reserve	.056*	.172*	------	.095	.101*	.255*
Modification or waiver of princ. pymts.	.044	.231*	.077*	.241*	------	.229*
Negative cash flow	------	------	-.0075	------	------	.166*
Project in Region III	-.044*	------	-.042*	.108*	-.058	------
Project in Region IV	------	.053*	-.015	------	------	.160*
Project in suburb	.029	------	------	-.063	------	------
Project in city other than core	------	------	-.010	------	------	------
Good physical environment	-.067*	------	-.146*	-.157*	------	------
% vacancy in project	.0048*	.0077*	.0018	.0098*	.0054*	.0054*
% maintenance due to vandalism	.0013	.0041*	------	.0045*	.0034	.0045*
Low rise project	------	-.052	------	------	.044	------
Air conditioning	------	------	------	------	.026	------
% nonwhite tenants	.00029	------	.00021	-.0010*	------	------
Tenant council	------	.124*	.042	.104*	------	.143*
Rent strikes	.077	------	------	------	.259*	------
Non-profit sponsor	.061*	.106*	------	------	------	------
Coop. sponsored	------	------	------	------	------	------
Replacement reserve as % of estimated replacement cost	.00017*	------	------	------	-.00011	-.00023
(Revenue-cost)/unit	-.000059*	-.00014*	-.000029*	-.00015*	-.00014*	------
Management quality rated high	.026	-.071*	-.018	------	-.066	-.128*
Single management since occupancy	.099*	-.127*	-.066	-.127*	-.107*	-.146*
Prog. 221(d)(3)RS	------	------	------	.082*	-.047	------
Prog. 236	------	-.066*	-.018	-.082*	-.109*	.072*
Init. yr. cost-est. cost as % of est. cost	.00017*	.00020	------	------	.0012*	.0015*
Months of building & HUD processing time	------	.0045*	-.0022*	.0075*	------	.0061*
Info. on replacement reserve-balance missing	------	.032	.022	------	------	.0075
HUD personnel gave adequate technical assistance	------	------	------	.106*	-.068	-.071
CONSTANT	.141	.167	.285	.165	.308	-.00084
R^2	.23	.37	.13	.36	.33	.41

[a] F1 = foreclosure or assignment; F2 = foreclosure, assignment, or default
[b] positive sign indicates greater likelihood of failure
* significant at .90

TABLE C-2
Development Set Regressions

Dependent variable[a]	1 F1	2 F2	3 F1	4 F2	5 F1	6 F2
Sample	All Projects		Limited Dividend		Non-profit	
Explanatory variables[b]						
Project in Region III ...	-.070*	------	-.038	-.137*	-.189*	-.126*
Project in Region VI	------	------	-.041*	------	------	------
Project in suburb	.037*	------	------	------	------	.099
Urban Renewal Area	------	------	-.004*	------	------	------
Adequate social amenities	------	------	.034	.070	-.099	------
Good physical environment	-.081*	-.119*	-.138*	-.195*	------	------
Neighborhood feels safe .	-.088*	-.094*	-.080*	-.072	-.125*	-.222*
Insufficient market demand at occupancy	.044	.062	------	.091*	.114*	------
Other HUD subsidized units in area	------	------	.025*	------	------	.146*
Other private sector units in area	------	------	------	.043	------	------
Conventional units comparable	-.034*	-.040	------	-.037	-.059	------
Floor area per unit	------	------	.000034	------	------	------
Density (units/acre)	------	------	------	-.00085*	------	------
Parking spaces per unit .	------	------	-.0067*	------	------	------
Low rise project	------	------	.025	------	-.600	------
Recreation building	.062*	------	------	------	-.114*	-.084*
Number of units	------	------	------	------	------	.0011*
Air conditioning	------	------	------	.038	------	------
% maintenance due to construction defects ...	.0038*	.0055*	------	------	.0054*	.0048*
Non-profit sponsor	.055*	.123*	------	------	------	------
Coop. sponsor	------	-.101*	------	------	------	------
Estimated replacement cost per unit	------	------	------	------	------	.000018*
% increase of first rent increase	.00025*	.00029	------	------	.00080*	.00055*
Land as % of replacement cost (est.)	------	------	-.0017*	------	------	------
Consultant used in development stage	------	------	-.040	-.216*	------	------
Sponsor owns management entity	.050*	-.075*	-.037*	-.133*	-.083*	------
Sponsor had previous HUD projects	------	------	-.057*	-.103*	------	.108*
Months from permission to occupy to 75% occupancy.	------	.0061*	------	------	------	.020*

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TABLE C-2: Development Set Regressions, continued

Dependent variable[a]	1 F1	2 F2	3 F1	4 F2	5 F1	6 F2
Sample	All Projects		Limited Dividend		Non-profit	
Explanatory variables[b]						
Program 221(d)(3)RS	-.072	-.129*	------	------	-.188*	------
Program 236	-.057*	-.157*	------	-.142*	-.189*	------
Init. yr. revenue est. error (%)	.00018*	.00018*	------	------	.00010*	------
Init. yr. cost est. error (%)	------	------	------	------	.00050	.00065*
Init. yr. real estate tax est. error (%)	------	------	------	------	------	.0014*
Init. yr. net revenue est. error (%)	-.00019*	-.00031*	------	.00021	-.00030*	-.00044*
Months of building & HUD processing time	------	.0049*	------	.0069*	------	.0051*
% rent supplement units .	------	------	------	-.00090	------	------
CONSTANT	.236	.344	.261	.441	.587	-.051
R^2	.19	.19	.13	.23	.31	.24

[a] F1 = foreclosure or assignment; F2 = foreclosure, assignment, or default
[b] positive sign indicates greater likelihood of failure
*significant at .90

TABLE C-3
HUD Set Regressions

Dependent variable[a]	1 F1	2 F2	3 F1	4 F2	5 F1	6 F2
Sample	All Projects		Limited Dividend		Non-profit	
Explanatory variables[b]						
Waiver of replacement reserve	.103*	.230*	------	.115*	.176*	.342*
Modification or waiver of princ. pymts.	------	.242*	.090*	.253*	-.019	.166*
Negative cash flow	------	------	------	------	------	.160*
Project in suburb	.046*	------	------	------	.102*	------
Urban renewal area	------	------	-.056*	------	------	------
Good physical environment	-.114*	------	-.184*	-.238*	------	------
Neighborhood feels safe	------	------	------	------	------	.170*
Other HUD subsidized units in area	------	-.053*	------	-.058*	------	------
Vandalism severe	------	.197*	------	------	.062*	.182*
Vandalism slight	------	.056*	-.029*	------	------	------
Adequate police protection	-.078*	-.097*	------	------	-.115*	-.299*
Density (units/acre)	------	------	------	-.00056	------	------
Parket spaces/unit	------	------	------	------	------	.111*
2-bedroom units	------	-.070*	------	-.068*	------	------
3-bedroom units	------	------	.055*	------	------	------
Low rise project	.066*	------	.047*	-.066*	.082*	------
Recreation buildings	-.055*	------	-.035*	------	------	------
Air conditioning	------	.063*	------	.078*	------	------
Tenant council	------	.118*	.035	.159*	------	.130*
Rent strikes since first occupancy	.120*	------	------	------	.428*	.307*
Non-profit sponsor	.069*	.103*	------	------	------	------
Management quality rated high	------	-.106*	------	-.095*	-.106*	-.166*
Sponsor employs manager	-.071*	------	-.019	------	-.116*	------
Manager in residence	------	------	------	------	------	.125*
Program 221(d)(3)RS	-.056*	------	------	------	-.093*	------
Program 236	------	------	.027	-.050	------	.010*
Last annual physical inspection: good	-.182*	-.129*	-.233*	.172*	------	------
Last annual physical inspection: fair	-.120*	------	-.211*	------	.116*	.176*
Init. yr. revenue less est. revenue as % of est. revenue	.00011*	------	------	------	.00016*	------
Init. yr. cost less est. cost as % of est. cost	------	------	-.00017	------	.0011*	.0013*

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TABLE C-3: HUD Set Regressions, continued

Dependent variable[a]	1 F1	2 F2	3 F1	4 F2	5 F1	6 F2
Sample	All Projects		Limited Dividend		Non-profit	
Explanatory variables[b]						
Init. yr. net revenue less est. net revenue as % of est. net revenue ..	-.00020*	-.00030*	------	.00056*	-.00034*	-.00040*
Age from initial occupancy is 2 yr. or less .	-.046*	-.078*	-.043*	-.148*	-.124*	------
Age 3 yr. or less	------	-.103*	------	-.170*	------	------
Age 5 yr. or less	------	------	.082*	------	------	------
CONSTANT	.357	.300	.396	.645	.198	-.855
R^2	.24	.33	.28	.32	.33	.40

[a] F1 = foreclosure or assignment; F2 = foreclosure, assignment, or default
[b] positive sign indicates greater likelihood of failure
*significant at .90

TABLE C-4
Selected Set Regressions

Dependent variable[a]	1 F1	2 F2	3 F1	4 F2	5 F1	6 F2
Sample	All Projects		Limited Dividend		Non-profit	
Explanatory variables[b]						
Good physical environment	-.093*	-.083*	-.167*	-.204*	-.023	.032
% vacancy in project	.006*	.011*	.002*	.010*	.007*	.009*
% maintenance due to construction defects ...	.002*	.002*	-.0006	-.0005	.002*	.003
% nonwhite tenants	.0003	.001*	.0003	.0005	-.0002	.0009
(Revenue-cost)/unit	-.0001*	-.0002*	-.0001*	-.0001*	-.0002*	-.0003*
Sponsor owns management entity	-.035*	-.082*	-.015	-.087*	-.085*	-.014
Single management since occupancy	-.087*	-.134*	-.046*	-.095*	-.101*	-.189*
Initial year net revenue estimate error	-.0002*	-.0003*	.003*	-.002	-.0004*	-.0005*
Age from initial occupancy is 2 yr. or less .	-.158*	-.270*	.005	-.440*	-.420*	-.322*
Age is 3 yrs. or less ...	-.132*	-.254*	.008	-.428*	-.336*	-.241*
Age is 4 yrs. or less ...	-.081*	-.133*	.037	-.300*	-.210*	-.144
Age is 5 yrs. or less ...	.066	-.088*	.102*	-.260	-.277*	-.026
CONSTANT	.831	.575	.235	.823	.583	.658
R^2	.23	.29	.14	.26	.38	.31

[a] F1 = foreclosure or assignment; F2 = foreclosure, assignment, or default
[b] positive sign indicates greater likelihood of failure
* significant at .90