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A project-based analysis of the effects of federal tax credits on historic rehabilitation

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A PROJECT-BASED ANALYSIS OF THE EFFECTS OF FEDERAL TAX CREDITS ON HISTORIC REHABILITATION

BY

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B.S., University of Illinois, 1979
M.A.S., University of Illinois, 1980

THESIS

Submitted in partial fulfillment of the requirements
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CHAPTER 1

INTRODUCTION

Federal tax incentives have often been used to encourage taxpayers to undertake various types of projects. Research and development has been encouraged by the research and development tax credit, energy conservation by the energy tax credit, and investment in pollution control facilities by pollution tax incentives. This study is concerned with tax incentives enacted to encourage the preservation of historic property.

Historic preservation became a national priority with the passage of the National Historic Preservation Act of 1966. This legislation created the National Register of Historic Places and established a program of matching grants-in-aid to the states. To Congress, however, it soon became apparent that the grants provided by this legislation were not going to be enough to curb the high rate of demolitions of historic property. Consequently, additional legislation was enacted to encourage historic rehabilitation. This legislation began with the Tax Reform Act of 1976 which liberalized depreciation policies and discouraged demolition of the structures. The Revenue Act of 1978 provided a 10% historic rehabilitation tax credit (HRTC) for expenditures made on historic rehabilitation projects and the Economic Recovery Tax Act of 1981 increased the HRTC to 25%. Together, these tax incentives were intended to lead to additional spending on historic rehabilitation and to the larger goal of the preservation of historic property. However, there is little evidence in the literature to determine whether this has been accomplished.

STATEMENT OF THE PROBLEM

Congress has often used tax incentives to stimulate spending in areas deemed beneficial to society. Some of these incentives are intended to have an impact on business decisions [Nikolai and Elam, 1979, p. 119]. Although much has been written about tax incentives, there is little agreement on how effective tax credits are in stimulating additional spending in business situations. This is especially true of the HRTC because there are few studies in the area. Some evidence is needed as to the effect of this credit. It may have been an unnecessary cost to the government if it did not stimulate spending and additional rehabilitation projects. On the other

hand, it may have been very effective in stimulating spending and additional rehabilitation. This lack of evidence could result in ineffective tax policies or tax policies that are effective but not understood. Therefore, further analysis is necessary.

Most tax credit studies have had to rely on simulations and models based on highly aggregated data because data on actual projects were difficult to obtain. Bentsen [1983], for example, used a simulation to examine the effects of rehabilitation tax incentives on internal rates of return, but was forced to limit the scope of the study because of inherent data limitations. Feigenbaum and Jenkinson [1984] used an econometric approach to examine the effects of tax incentives on historic rehabilitation. They used macroeconomic data aggregated on a state by state basis and relied on various data surrogates. In addition, their study focused on only two time periods: 1975-76 and 1979-80. The infrequent use of empirical data in studies of tax incentives, including the HRTC, is unfortunate because it would be a useful contribution to the literature.

The effect of noneconomic factors on spending is an important yet often overlooked area. Composition factors such as the age of the building and its proposed use could be important determinants of rehabilitation spending. The omission of noneconomic effects in studies has often been due to the difficulty of measuring these effects. However, some tax incentive studies [e.g. Carpenter and Chester,1984] have included locational, housing, and environmental factors. Other studies [e.g. Feigenbaum and Jenkinson,1984; Fisher, Lentz, and Stern,1984] have mainly been concerned with economic factors. Economic factors are not unimportant in the historic rehabilitation spending decision. The first evaluation of syndicators and developers of potential rehabilitations is from a financial perspective [Opsata,1987,p.38]. However, the significance of noneconomic factors on rehabilitation as well as economic factors, including the historic rehabilitation tax credit, is an important issue and should not be ignored.

Besides formal studies in the literature, there occasionally is anecdotal evidence in news stories in the Wall Street Journal and other such sources. An example of increased spending as a result of the HRTC is stated by Guy S. McClellan, a principal partner involved in historic

rehabilitation activity in St. Louis, "We counted on the tax law to allow us to spend 40% more on our units than the typical new units in (St. Louis) county" [Guenther,1987]. Such stories convey impressions of effectiveness of the HRTC but are not conclusive.

In summary, the literature on tax incentives, specifically, the historic rehabilitation tax credit, has not fully evaluated the effectiveness of tax incentives. Part of the reason for this may have been the reliance on simulated and highly aggregated data rather than the use of actual project data. Also, the omission of noneconomic variables may have been significant.

OBJECTIVE OF THE STUDY

The objective of this study is to provide additional evidence on the effects of the HRTC on historic rehabilitation spending. This contributes toward filling the gap in the literature as to the effectiveness of this tax credit. To accomplish this, actual rehabilitation projects are analyzed from a large database of well-documented historic rehabilitation projects Significant determinants of historic rehabilitation including the HRTC, economic factors, and composition characteristics are examined for their effect on the spending, number, and character of the rehabilitation projects. Multiple regression analysis is used to determine the effect of the HRTC and other factors on spending on the historic rehabilitation projects. This provides some evidence into the responsiveness of the owners to the incentive. The results of this research contribute toward a better understanding of the HRTC effects which in turn contribute to a better understanding of tax credit and incentive effects in general.

CONTRIBUTION TO THE LITERATURE

The effect of tax incentives has not been fully evaluated empirically. Relatively little has been done to determine the effectiveness of the historic rehabilitation tax credit. This study is a contribution to the historic rehabilitation tax credit literature in particular and the tax incentive literature in general.

The first contribution is the project-based approach. It is rare in tax research to be able to gather empirical information on the effect of specific tax laws. Tax returns are not available to

be examined and corporate records are not open to the public. The ability to examine data for specific rehabilitation projects is a rare opportunity.

The second contribution is the exploration of a database that enables the project-based approach. This database of rehabilitated historic properties has not been used before in a tax credit study. No previous tax credit study has used such a large and well maintained database for research on project spending. Since the database is extensive and uniformly coded, it provides a unique opportunity to use the data-consumptive technique of regression with several factors. This database provides new and valuable insights for future tax policy research.

Another contribution is the use of noneconomic factors along with economic factors to determine the effects on rehabilitation spending. The noneconomic or composition factors could be important determinants in the area of historic preservation because of the noneconomic reasons that projects are rehabilitated.

An interesting policy aspect of historic rehabilitation as a research area is that it represents a national priority with high emotional content. Consequently, it is possible that tax incentives for these particular rehabilitation projects may have little effect beyond other incentives which may serve as the primary motivation for spending. Therefore, if it is shown that the HRTC provides incentive effects for these particular projects, then it could be postulated for future consideration that the effect of tax credits, in general, may be stronger than previously determined.

This research provides many other interesting policy implications. It provides a great deal of descriptive information on the historic rehabilitation projects from which policy implications can be made. It determines if the HRTC had a significant effect on the spending on projects given the size of the project and the other economic and composition effects. The study investigates the issue of the elasticity of the rehabilitation owners' demand for historic rehabilitation. The results of this study provide interesting information for policy making regarding the HRTC. They also provide useful information on the study of tax credits and tax incentives in general.

CHAPTER SUMMARY

This section is a very brief review of the content of Chapters 2 through 8 of this dissertation.

The following chapter, Chapter 2, Background of the Historic Rehabilitation Tax Credit, contains important information as to the procedures necessary in order for a historic rehabilitation project to qualify for the HRTC. It also summarizes the tax law applicable to historic rehabilitation since the 1970's. Lastly, the chapter provides statistics of the HRTC program, such as the number of projects which applied for the HRTC and the estimated spending of the approved projects.

The Literature Review, Chapter 3, summarizes the studies in the general area of tax incentives and in the specific area of historic rehabilitation. Some of the studies are interesting background information and provide information into the effectiveness of tax incentives in general. Other studies are of particular relevance to this dissertation in terms of the methodology and factors used

Chapter 4, Economic Theory, discusses externality theory and the importance of it with respect to the benefits of historic rehabilitation. Excise subsidy theory is then discussed as a remedy to the unfulfilled external benefits of historic rehabilitation. This theory is discussed with reference to the HRTC as an excise subsidy. Lastly, the elasticity of the historic rehabilitation owners' spending is discussed in terms of the effectiveness of the HRTC in increasing the owners' spending on historic rehabilitation. This theory leads into the model for this study which is discussed in Chapter 5.

The Methodology, Chapter 5, presents a description of the factors of interest in this study from which descriptive results are obtained. The regression models used in this study are also presented in this chapter and they are used to examine the effect of the HRTC and other factors on spending

The Descriptive Statistics, Chapter 6, presents the results of the descriptive information on the HRTC and economic and composition factors.

Chapter 7, Regression Results and Implications, presents the results of the regression analysis which tests the effect of the HRTC and other factors on spending. The implications of the results are discussed in terms of the owners' responsiveness to the HRTC

Chapter 8, Conclusions, presents a summary of the study, future research possibilities, and a review of the policy implications.

CHAPTER 2

BACKGROUND OF THE HISTORIC REHABILITATION TAX CREDIT

This background information on the HRTC is divided into three sections. The first is the description of the procedures that must be followed in order for the rehabilitation of a historic building to qualify for the HRTC. The second section contains a review of the tax law which affects historic rehabilitation property. The last section contains a summary of the available statistics on the historic rehabilitation tax credit program. This includes the number of projects which applied for the HRTC and the estimated spending on the approved projects.

TAX CREDIT ELIGIBILITY

A building must satisfy three sets of criteria to qualify for the historic rehabilitation tax credit. First, it must be certified as having historical significance. Second, its rehabilitation must be certified as consistent with the historic character of the building. Third, it must comply with several other provisions of the tax law. These criteria are discussed in detail below.

Certification of Historical Significance

The historical significance of a building is generally certified by listing the building in the National Register of Historic Places (National Register).[1] Created by Congress as part of the National Historic Preservation Act of 1966 (P.L. 89-665), this listing currently contains more than 250,000 properties [Walter, 1985]. It is the U. S. Government's official inventory of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture.

The National Park Service, a division of the Department of the Interior, maintains the National Register and attempts to protect the properties. While listing does not block demolition, it does provide certain protective benefits. For example, it requires that the federal Advisory Council on Historic Preservation comment on the effect of federally assisted projects on the

[1] A building can also have historical significance if it is in a historic district or a comparable local district and certified as contributing to the district.

National Register or unregistered but eligible properties[2] [Weinberg,1982]. Listing also requires that certain compliance standards be met with respect to the rehabilitation if federal action is involved. Therefore, more costly materials and additional workmanship may be required in some cases in order to protect the historical significance of the building. Listing enables owners who do certified rehabilitations to become eligible for the HRTC.

There are many ways for a property to be nominated to the National Register. The owner of the property can nominate it as well as private citizens, organizations, and other groups. Nomination can also occur following a federal, state, or local survey of historical resources which focuses attention on the property.

Once the property is nominated, an evaluation is made at the state level by technicians on the State Historic Preservation Office staff. A state review board recommends either approval or disapproval of the building based on certain criteria. These Criteria for Evaluation [36 CFR 60.4] have been set forth by the U.S. Department of the Interior as follows:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

Also, a historic property must generally be more than 50 years old to be listed in the National Register. *Upon approval by the state review board, the National Park Service staff*

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[2] A National Register-eligible property is a property that has met the requirements for listing in the National Register but its owner has decided not to list it.

reviews the nomination and, if acceptable, the property is listed in the National Register. An objection by the owner of the property can prevent actual listing but not eligibility for the National Register.

Certification of Rehabilitation

After a building is certified as having historical significance, its rehabilitation work must be certified as being consistent with the historic character of the building. The certification of the rehabilitation work is generally achieved by satisfying the Standards for Rehabilitation (Standards). These standards are a section of Standards for Historic Preservation Projects [1983] [36 CFR 67.7] that have been set forth by the U.S. Secretary of the Interior. These are used to determine if a historic rehabilitation project qualifies as a certified rehabilitation which would make it potentially eligible for the HRTC.

The rehabilitation is evaluated on two aspects: (1) identification of the building's materials and features which are important in defining its historical character and (2) assessment of the potential impact of the rehabilitation necessary for efficient contemporary use. The overriding concern is that the historical nature of the building and its setting be preserved in the rehabilitation process. The following are the Standards, all of which must be considered:

1. Every reasonable effort shall be made to provide a compatible use for a property which requires minimal alteration of the building, structure, or site and its environment, or to use a property for its originally intended purpose.

2. The distinguishing original qualities or character of a building, structure, or site and its environment shall not be destroyed. The removal or alteration of any historic material or distinctive architectural features should be avoided when possible.

3. All buildings, structures, and sites shall be recognized as products of their own time. Alterations that have no historical basis and which seek to create an earlier appearance shall be discouraged.

4. Changes which may have taken place in the course of time are evidence of the history and development of a building, structure, or site and its environment. These changes may have acquired significance in their own right, and this significance shall be recognized and respected.

5. Distinctive stylistic features or examples of skilled craftsmanship which characterize a building, structure, or site shall be treated with

sensitivity.

6. Deteriorated architectural features shall be repaired rather than replaced, wherever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical, or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other buildings or structures.

7. The surface cleaning of structures shall be undertaken with the gentlest means possible. Sandblasting and other cleaning methods that will damage the historic building materials shall not be undertaken.

8. Every reasonable effort shall be made to protect and preserve archeological resources affected by, or adjacent to any project.

9. Contemporary design for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant historical architectural or cultural material, and such design is compatible with the size, scale, color, material, and character of the property, neighborhood or environment.

10. Wherever possible, new additions or alterations to structures shall be done in such a manner that if such additions or alterations were to be removed in the future, the essential form and integrity of the structure would be unimpaired.

These Standards are subject to interpretation by the National Park Service regional offices. Other sources are also consulted throughout this certification process. The Guidelines for Rehabilitating Historic Buildings provide general design and technical recommendations. They are not codified and are intended only to assist in applying the Standards on a general basis. There is also a set of case decisions in this area.

Tax Law Compliance

Following the certification of the historical significance of the property and certification of the rehabilitation, certain other requirements of the tax law must be fulfilled. These are summarized here and discussed in detail in the next part of the chapter, Review of the Tax Law.

Two forms must be completed by the owner and approved in order for the rehabilitation to qualify as a certified rehabilitation. The first form certifies that the rehabilitation is in accordance with the historic character of the property. This is required under the 0% HRTC in

order for a historic rehabilitation project to qualify for the incentives brought about by the Tax Reform Act of 1976. When the rehabilitation project is complete, another form is filed to certify completion and the placement of the building into service and therefore eligibility for the tax incentives. The forms are filed at the state historic preservation office and upon approval transferred to the appropriate National Park Service regional office for their approval.

The qualifications for the 10% (assuming a useful life of the improvements of at least 7 years) HRTC (Revenue Act of 1978) do not differentiate between certified historic property and other rehabilitated property. However, rehabilitations of certified historic structures have to be certified as appropriate by the Secretary of the Interior in order to qualify for the HRTC. The basic requirement of a qualified rehabilitation for tax credit purposes is that the rehabilitated building (nonresidential only) be used for business or productive activities. It is also required that the age of the historic building be at least 50 years and the rehabilitation constitute a major portion of the building.

The 25% HRTC (Economic Recovery Tax Act of 1981) is available only to certified historic structures. Residential and nonresidential income producing historic properties qualify. In order to be a qualified rehabilitated building, which is required for the HRTC, the building has to be substantially rehabilitated, placed in service before the beginning of the rehabilitation, and at least 75% of the existing walls retained in place as external walls during the rehabilitation process. The substantially rehabilitated requirement states that the expenditures in the 24 month period (or 60 months for phased-in rehabilitations) selected by the taxpayer must exceed the greater of either $5,000 or the adjusted basis of the building. Gleye [1987,p.5] states that there is much criticism of this requirement because it encourages the destruction of many interiors. This requirement led to massive rehabilitations even when it was unnecessary. It also led to adaptive use buildings (used for other than their original purpose). He suggests that rehabilitation incentives should not only encourage the large scale rehabilitations but also the rehabilitations in which less work is needed.

The Tax Reform Act of 1984 allows an alternative to the existing wall requirement in order to promote more flexibility with regard to the external walls and less flexibility with regard to the internal structure. The alternative to the 75% of existing walls being retained in place as external walls is the following: (1) at least 50% of the existing walls retained in place as external walls, (2) at least 75% of the existing walls retained in place as internal or external walls, and (3) at least 75% of the existing internal structure retained in place.

The Tax Reform Act of 1986 went into effect in 1987 following the period of interest in this study. However, the changes it made with respect to historic rehabilitation are summarized for background information. This Act decreases the HRTC percentage available for historic rehabilitation expenditures incurred after 1986 to 20%. It also waives the existing wall requirement for the rehabilitations in order to give the Secretary of the Interior more flexibility with respect to the approval of certified historic rehabilitations.

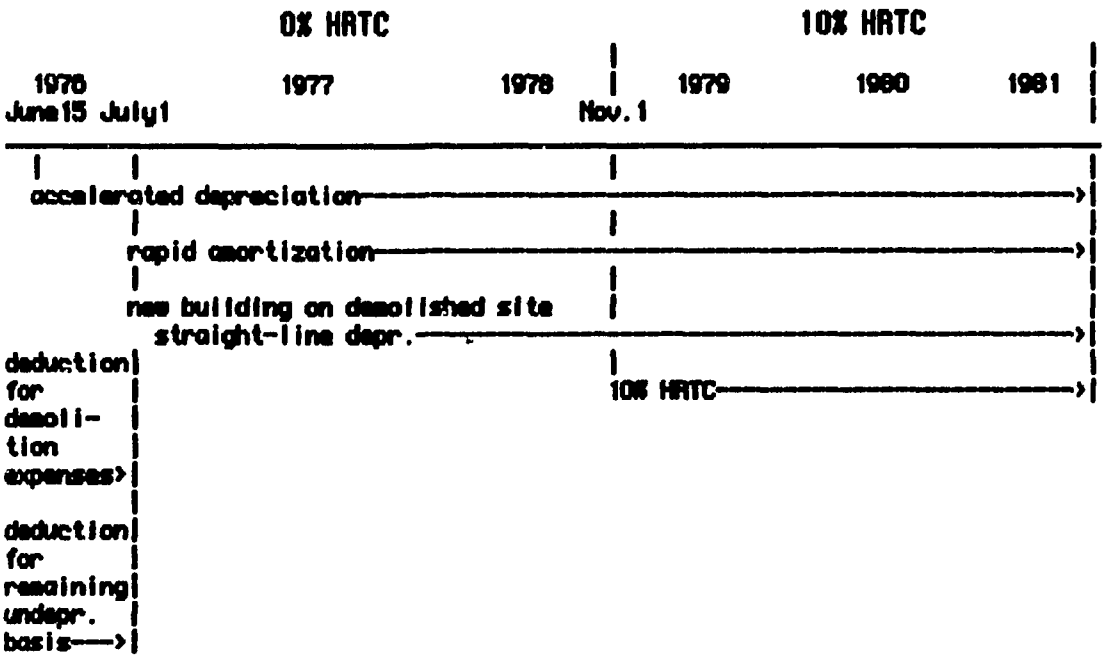
In summary, in order to qualify for the HRTC, the property has to be a certified historic structure which generally means listing in the Register. The rehabilitation has to be (1) certified, which generally means meeting the Standards for Rehabilitation and (2) qualified, which means adhering to other provisions in the tax law, many of which differ between the 10% and 25% HRTC periods.

REVIEW OF THE TAX LAW

This section summarizes the major effects of the tax laws since 1976 on historic rehabilitation. The effects of the tax laws are summarized in chronological order and the timing of these tax law changes is presented in Figure 2-1. Also included in this section is a brief statement on the overall intention of each tax law and its intended effect on areas of interest concerning historic rehabilitation such as business and real estate.

Prior to 1976

Prior to the Tax Reform Act of 1976 (TRA76), many historic buildings were demolished because it was not profitable to preserve them. Real estate tax incentives were generally aimed at the encouragement of capital investment in new buildings. Specifically, accelerated depreciation



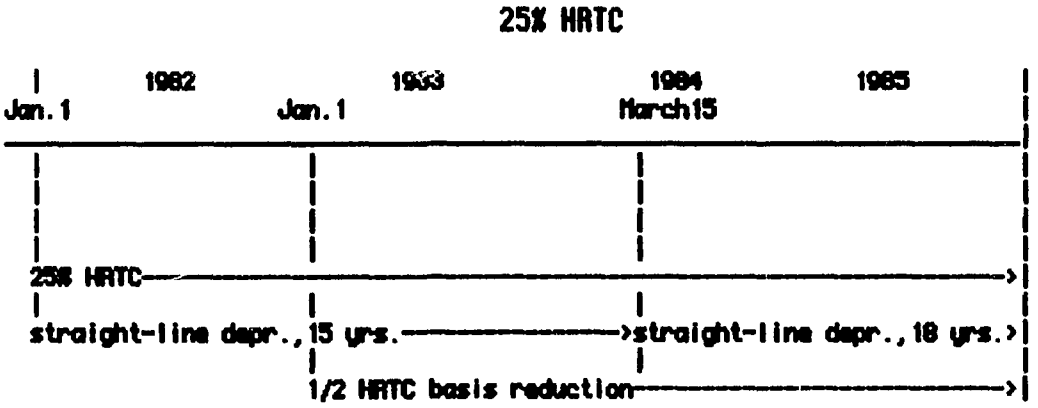


FIGURE 2-1

EFFECTIVE DATES OF TAX LAWS AFFECTING HISTORIC REHABILITATION

incentives for new buildings (not existing buildings) encouraged construction to the extent that many historic buildings were torn down to make room for the new buildings. There were not only no incentives for the rehabilitation of historic buildings but there were actually incentives for demolition of the buildings. Deductions were allowed for the expenses of demolishing historic buildings and for the losses on demolition. Preservationists attempted to eliminate this bias in the tax law against the rehabilitation of historic buildings by advocating a change in the tax law. One objective was to encourage redevelopment of urban downtown areas which had greatly decayed over the years. The result was the first tax incentives for historic preservation which were included in the TRA76.

Tax Reform Act of 1976

The TRA76 (P.L. 94-455) was enacted on October 4, 1976 and instituted many changes in almost every area of the tax law. Its purpose was to spur investment in new structures and locations. However, it was realized that this did not necessarily promote economic recovery if the new structures were at the expense of older structures, neighborhoods, and locations. The incentives for rehabilitation expenditures (including nonhistoric buildings) were intended to contribute toward the revitalization of the economic prospects of older locations and prevent the deterioration of distressed economic areas.

This Act encouraged historic rehabilitation and also discouraged the demolition of historic structures. Historic generally meant listing on the National Register of Historic Places or otherwise certified by the Secretary of the Interior. The rehabilitation had to be certified as consistent with the historic character of the property.

The TRA76 provided two major incentives for the rehabilitation of buildings of historical significance: accelerated depreciation and rapid amortization. The Act provided that accelerated depreciation alternatives (for expenditures after June 30, 1976) were available for the substantial rehabilitation of historic property as if it were new. Therefore, not only was the original cost of the building able to be depreciated but the rehabilitation expenditures were also depreciated. The substantially rehabilitated requirement stated that the rehabilitation

expenditures (after June 30, 1976) during a 24 month period had to exceed the greater of $5000 or the adjusted basis of the property determined at the beginning of the 24 month period. The other incentive instituted was the rapid amortization of the rehabilitation expenditures over 60 months. This was allowed for certified rehabilitations of depreciable historic buildings used in trade or business or held for the production of income. This applied to expenditures after June 14, 1976 and could only be used if the accelerated depreciation option was not chosen.

Besides providing these incentives for historic rehabilitation, the TRA76 discouraged the demolition of historic buildings by disallowing deductions for demolition expenses and for the remaining undepreciated basis of the property for demolitions after June 30, 1976. It provided a further discouragement by requiring that any new building built on the property of the destroyed building (or substantially altered building that is not certified) be depreciated by the straight-line method for its life. Therefore, the new building was no longer able to use accelerated depreciation as it otherwise would have been able to do.

Revenue Act of 1978

The Revenue Act of 1978 (RA78) (P.L. 95-600) was enacted on November 6, 1978 for the purpose of increasing economic growth by stimulating consumer and investment spending. A couple of examples of this were the reduction of business taxes and the increase of 10% in the percentage of long term capital gains which was deductible. Real estate was favored because the adverse "at risk" rules (loss deduction limited to amount the investor has at risk) were expanded to many areas but not to real estate.

The major contribution of the RA78 with regard to historic rehabilitation was the institution of an Investment Tax Credit or historic rehabilitation tax credit (HRTC) of 10% for qualified rehabilitation expenditures. The Act expanded the eligibility of the investment tax credit to rehabilitation expenditures on buildings over 20 years old. Historic buildings generally were required to be at least 50 years old. The reason for this HRTC was the following:

> In 1962 when the ITC was enacted, "Congress was primarily concerned about the substantially greater average age and lower efficiency of machinery and equipment in domestic manufacturing

> facilities in comparison with the facilities of major foreign producers of the same products....The Congress believed that it was appropriate now to extend the initial policy objective of the investment credit to enable business to rehabilitate and modernize existing structures." [Joint Committee on Taxation, 1979].

The HRTC was not available if the 60 month rapid amortization of rehabilitation expenditures was chosen. Accelerated depreciation was also allowed on properties qualifying for the HRTC. Qualified expenditures were expenditures on existing buildings used in all types of business or productive activities except residential. In order to be a qualified rehabilitated building, the building had to be placed in service prior to the rehabilitation and at least 75% of the existing external walls had to be retained as external walls. The rehabilitation costs were required to be the type of costs that would be capitalized under existing law. The improvements were required to have a useful life of at least 7 years to get the full 10% HRTC. The rehabilitation of a major portion of a building was treated as a separate building. The major portion was determined by the floor area and other factors. The acquisition cost of the building and any enlargements to it did not qualify for the HRTC All of these rules related to any property over 20 years old: historic or nonhistoric.

The rehabilitation expenditures on historic buildings were required to be certified as appropriate by the Secretary of the Interior in order to be eligible for the HRTC. The HRTC became available for all qualified rehabilitation expenditures on historic rehabilitation property incurred after October 31, 1978. This Act continued the trend begun with the TRA76 of treating the rehabilitation of a historic building on a similar basis to the construction of a new building.

Technical Corrections Act of 1979

This Act (P.L. 96-222) was enacted on April 1, 1980. Among the minor changes it made which affected historic rehabilitation was the rectifying of an unintended result of the RA78 by confirming the permanency of the 10% HRTC.

Economic Recovery Tax Act of 1981

The Economic Recovery Tax Act of 1981 (ERTA81) (P.L. 97-34) was enacted on August 13, 1981 to increase savings and spur investment. The law encouraged real estate limited

partnerships by the enactment of the accelerated depreciation rules and shorter property lives for depreciation purposes. Other provisions of the law encouraged business activity such as lower tax rates for small businesses.

The major contribution of the ERTA81 to historic rehabilitation was the 25% HRTC for the rehabilitation of historic buildings: residential and nonresidential. ERTA81 also contributed toward the rehabilitation of nonhistoric property with a 15% credit for the rehabilitation of buildings at least 30 years old and a 20% credit for the rehabilitation of buildings at least 40 years old. The reason for the increased tax credit was the following:

> "The tax incentives for capital formation provided in other sections of this bill might have the unintended and undesirable effect of reducing the relative attractiveness of the existing incentives to rehabilitate and modernize older business structures. Investments in new structures and new locations, however, do not necessarily promote economic recovery if they are at the expense of older structures, neighborhoods, or regions. A new structure with new equipment may add little to capital formation or productivity if it simply replaces an existing plant in which the new equipment could have been installed.
> "The increased credit for rehabilitation expenditures is intended to help revitalize the economic prospects of older locations and prevent the decay and deterioration characteristics of economically distressed areas." [House Ways and Means Committee,1981].

The HRTC was available for rehabilitations begun after December 31, 1981 and for expenditures of projects in progress at December 31, 1982 if they met the substantially rehabilitated test. For rehabilitation work begun before January 1, 1982, if the expenditures after December 31, 1981 were not sufficient to meet the substantially rehabilitated test, the project could continue to get the benefit of either the 10% HRTC or 5 year amortization.

In order to qualify for the HRTC, the Secretary of the Interior had to certify the rehabilitation as being consistent with the historic character of the property. This meant that the certified historic structure was required to be listed in the National Register of Historic Places or located in a registered historic district and certified as being of historic significance to the district.

Another requirement for the HRTC was that the historic building be a qualified rehabilitated building. This meant the historic building had to satisfy three criteria: (1) substantially rehabilitated, (2) placed in service before the beginning of the rehabilitation, and (3) at least 75% of the existing external walls retained in place as external walls in the rehabilitation process. The substantially rehabilitated requirement meant that the qualified rehabilitation expenditures during the 24 month period selected by the taxpayer and ending with or within the taxable year had to exceed the greater of $5000 or the adjusted basis of the building and its structural components, determined as of the beginning of the first day of the 24 month period. A 60 month period was allowed for rehabilitations which could be expected to be completed in phases. The portion of the basis attributable to qualified rehabilitation expenditures had to be depreciated by the Accelerated Cost Recovery System (ACRS) straight-line method over 15 years rather than by the accelerated ACRS rules. Qualified rehabilitation expenditures did not include the acquisition cost of the property or any enlargements or additions to the property.

The Act repealed the 60 month rapid amortization and special depreciation rules. The disincentive of having to take straight-line depreciation on property built on the site of a previous historic building was repealed for expenditures after December 31, 1981. Davis and Coady [1983] summarized the tax law provisions in ERTA81 which related to historic rehabilitation and also discussed a few tax planning opportunities.

With this Act, Congress continued with its policy of not encouraging new structures and new locations at the expense of the old. Other items of this act, such as ACRS, encouraged investment in new buildings. Congress compensated for this by the establishment of the 25% HRTC to increase spending on the rehabilitation of historic buildings which would lead to the revitalization of these buildings and their surrounding areas. Based only on the number of projects, the HRTC appears to have been effective since there were 614 historic rehabilitation projects approved in 1980 (prior to the 25% tax credit) and 3,214 projects approved in 1984 (after the 25% tax credit) [Andersen, 1985].

Tax Equity and Fiscal Responsibility Act of 1982

The Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA82) (P.L. 97-248) was enacted on September 3, 1982. It was designed to produce additional revenue partly by restrictions on business taxpayers including cutbacks in the use of accelerated depreciation and the ITC. This Act provided a disincentive for the rehabilitation of historic property. It required the basis of the historic property (for depreciation purposes) to be reduced by one-half of the HRTC taken for property placed in service after December 31, 1982. However, a transition rule exempts property placed in service before January 1, 1986 if the rehabilitation was begun pursuant to a contract entered into after December 31, 1980 which was binding on July 1, 1982 and at all times thereafter. Under the general rule, the basis of the historic property was initially reduced by 12.5% of the rehabilitation expenditures prior to the calculation of depreciation. This reduction in the basis was instituted because the previous tax laws were viewed by some as too generous. However, this basis reduction was not discriminatory against rehabilitation expenditures because the basis of new personal property also had to be reduced by half of the HRTC taken.

Technical Corrections Act of 1982

This Act (P.L 97-448) was enacted on January 12, 1983. It made some minor changes to generally amend unintentional results of ERTA81. This included confirming that the 25% HRTC was not eligible for rehabilitation projects begun prior to January 1, 1982. It also stated that for purposes of the substantially rehabilitated test, the adjusted basis of the building did not include land costs. These amendments applied to rehabilitation expenditures incurred after December 31,1981

Tax Reform Act of 1984

This Act was a division of the Deficit Reduction Act of 1984 (P.L. 98-369) and was enacted on July 18, 1984. Its purpose was to reduce budget deficits to safeguard economic recovery and also prevent further erosion of the tax base as a result of tax shelters. Incentives for continued economic growth included the reduction of the holding period for long term capital gains from one

year to 6 months. The Act instituted some minor changes in the tax laws affecting historic rehabilitation. The shortest period of time in which the rehabilitation expenditures were able to be recovered by depreciation was extended from 15 years to 18 years for property placed in service after March 15,1984. This was true of all new and used depreciable real property.

This Act also instituted an alternative test to the 75% external wall test of prior law. Congress changed the law to enable historic buildings of other than square or rectangular shape to qualify more readily for the HRTC [Joint Committee on Taxation,1985]. Less of the external walls had to be retained but there were stricter requirements with respect to the internal structure. The alternative test had three requirements: (1) at least 50% of the external walls retained in place as external walls, (2) at least 75% of the external walls retained in place as either external or internal walls, and (3) at least 75% of the building's internal structure retained in place. This rule was effective for rehabilitation expenditures incurred after December 31, 1983. The disallowance of deductions for demolition costs and losses sustained on account of the demolition was broadened from only historic property to all properties for tax years beginning after December 31, 1983. The changes in this Act did not appear likely to affect historic rehabilitation to any great extent.

Tax Reform Act of 1986

This Act (P.L. 99-514) was enacted on October 22, 1986. It does not affect the time period examined in this study but the changes it brings to the tax law of historic rehabilitation are summarized in order to provide a complete picture of the tax law with regard to historic rehabilitation. This Act reduces the tax credit available for the rehabilitation of certified historic structures to 20% for expenditures after December 31, 1986. It also eliminates the existing wall requirement in order to provide the Secretary of the Interior with total flexibility as to the approval of rehabilitation projects.

The Act also requires a full reduction in the depreciable basis for the HRTC received. This repeals the previous one-half basis reduction. The depreciation of the rehabilitation expenditures is also lengthened to 27 and one-half years from the previous 19 years. A broad change in the Act

limits losses and credits from passive activities such as investment in historic rehabilitation to $25,000 per year unless the losses are able to be offset by passive income. The $25,000 allowance for tax credits and losses is phased out for investors with income over $200,000 and is totally disallowed for investors with income over $250,000. Many of the rehabilitations are organized as partnerships and therefore may have difficulty in getting investors because of this change in the tax law. Because of these adverse changes in the tax law with respect to the rehabilitation of historic buildings, some say the credit is "practically unusable".[3] Ian D. Spatz, legislative counsel for the National Trust for Historic Preservation stated that applications to the National Park Service for the historic rehabilitation tax credit have decreased to about 150 per month as of mid-1987 from 270 per month in mid-1986.[4]

Summary

The following is a summary of the tax laws reviewed. They are presented in chronological order in Figure 2-1. The 5 year amortization was available for rehabilitation expenditures between June 15, 1976 and December 31, 1981 and for rehabilitations begun before December 31, 1981. Accelerated depreciation was available between July 1, 1976 and December 31, 1981 The 10% HRTC was available for expenditures between November 1, 1978 and December 31, 1981. Only one of the two incentives could be taken at any one time: 5 year amortization or 10% HRTC. The 25% HRTC was available for rehabilitations started after December 31, 1981 and for expenditures through December 31, 1985. Straight line depreciation over 15 years was required if the HRTC was taken. The depreciation period was lengthened to 18 years for property placed in service after March 15, 1984. Beginning January 1, 1983, half of the HRTC available had to be subtracted from the basis in order to compute depreciation. The disallowance of the deduction of demolition expenses and losses began on July 1, 1976 and continues to the present.

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[3] Guy S. McClellan, a principal in Mead-McClellan Partnership, in "Historic Rehabilitations Drop Despite Continued Tax Credit," by Robert Guenther in The Wall Street Journal, June3,1987, p.29.

[4] Guenther, Robert, "Historic Rehabilitations Drop Despite Continued Tax Credit," The Wall Street Journal, June 3, 1987, p.29.

The use of straight line depreciation on future buildings built on the site of a demolished historic building was required for demolitions between July 1, 1976 and December 31, 1981.

SUMMARY STATISTICS ON HRTC PROGRAM

There is some summary information available concerning historic rehabilitation projects throughout the HRTC periods. The information is limited however, because many presentations of the statistics represent only one or two years rather than information from all HRTC periods which is what is of interest in this study. Only the comprehensive statistics which include all years of the 0%, 10% and 25% HRTC periods are included in this summary. This aggregate summary information is of interest because it provides general information on the HRTC program. It also provides some statistics that are not available in the database used in this study. Few projects were completed prior to the 10% HRTC and data are not readily available. Therefore the number of projects in the 0% HRTC period included in the summary information is small.

Tables 2-1 through 2-4 present some results of the 0%, 10%, and 25% HRTC programs. For purposes of these tables, the 0% HRTC period includes the years 1977 and 1978, the 10% HRTC period includes the years 1979 through 1981, and the 25% HRTC period includes the years 1982 through 1985 These were the years each HRTC percentage was in effect. The years included in the HRTC periods vary slightly from the dates for the HRTC used in this study because the date of enactment of the HRTC percentages is used in this study to distinguish the HRTC periods. The reason for this is explained in the Methodology (Chapter 5)

Table 2-1 presents aggregate summary information on the historic rehabilitation program organized by the HRTC period. The number of applications received by the National Park Service for certification of the historical significance and eligibility for the HRTC increased greatly with the 10% HRTC and increased again with the 25% HRTC. In total, more than 19,000 applications were received in the HRTC periods from 1977 through 1985. While the lowest percentage of these applications was approved in the 25% HRTC period, there was still over three times the number of projects approved in that period than in the 10% HRTC period. Just short of 14,000 projects were approved in total. The rehabilitations actually completed and eligible for

TABLE 2-1

SUMMARY INFORMATION ON HISTORIC REHABILITATION PROGRAM BY TAX CREDIT PERIOD

	0% HRTC 6/76-10/78	10% HRTC 11/78-7/81	25% HRTC 8/81-12/85	TOTAL
Applications received	549	3,392	15,090	19,031
Rehabilitations approved	512	2,624	10,705	13,841
Estimated expenditures for approved projects (in millions)	$ 140.0	$ 1,384.5	$ 7,832.2	$ 9,356.7
Average estimated expenditures per approved project	$ 273,438	$ 527,630	$ 731,639	$ 676,013
Completed certified rehabilitations	0	1,327	4,914	6,241

Source: U.S. General Accounting Office, "Tax Policy and Administration, Historic Preservation Tax Incentives," August 1, 1986, p.26.

the 10% HRTC and 25% HRTC totalled 6,241 which was a significant amount less than the number of approved projects. This was due to the fact that many projects were not completed by the end of 1985 and some did not receive final approval upon completion of the project.

The estimated expenditures for all approved projects in the HRTC periods totalled over $9.3 billion. This averaged $676,013 per approved project. The average estimated spending per approved project was greatest in the 25% period. It should be noted however, that not all of these approved projects were completed and eligible for the HRTC.

Table 2-2 breaks down the totals of Table 2-1 into yearly numbers. The applications received increased each year and the number of approved projects increased in all years but 1980 and 1985. The estimated expenditures for approved projects leveled off in the last two years of the 25% HRTC and the average expenditures per approved project decreased in these last two years compared with 1983. These numbers indicate an overall leveling off of the stimulatory effect of the 25% HRTC.

Certain characteristics of the projects are summarized in Table 2-3. This presents the percentage of projects in the HRTC periods with the stated characteristics. The database used to obtain this information is the same database from which projects are examined in this study. It is not clear from the source, however, the characteristics and approval status of the projects that were examined to determine these statistics. The majority of projects examined were in a historic district and the original structures were built before 1900. Small projects were encouraged by the HRTC policy since the majority of projects cost less than $200,000 to rehabilitate. Less than 2% of the rehabilitations cost over $1 million to rehabilitate. One-third of the larger rehabilitations were adaptive use projects (buildings rehabilitated to be used in other than their original use). Almost all of the residential use projects were in buildings which were originally built as residences and one-half of the commercial use projects were in originally commercial buildings Therefore, more commercial use buildings were adaptive use projects than residential buildings because many offices and shops were built into previous residences, factories, and public buildings such as schools.

TABLE 2-2

SUMMARY INFORMATION ON HISTORIC REHABILITATION PROGRAM BY YEAR ENDED

	0% HRTC	10% HRTC		
	1977-1978	1979	1980	1981
Applications received	549	807	931	1,654
Rehabilitations approved	512	635	614	1,375
Estimated expenditures for approved projects (in millions)	$ 140	$ 300	$ 346.2	$ 738.3
Average estimated expenditures per approved project	$ 273,438	$ 472,441	$ 563,384	$ 536,945
Completed certified rehabilitations	0	*	752*	575

	25% HRTC			
	1982	1983	1984	1985
Applications received	2,215	3,639	4,461	4,775
Rehabilitations approved	1,802	2,572	3,214	3,117
Estimated expenditures for approved project (in millions)	$ 1,128.4	$ 2,164.9	$ 2,123.1	$ 2,415.8
Average estimated expenditures per approved project	$ 626,193	$ 841,719	$ 660,579	$ 775,040
Completed certified rehabilitations	563	1,102	1,424	1,735

* 752 is the total number of certified rehabilitations completed in 1979 and 1980.

Source: U.S. General Accounting Office, "Tax Policy and Administration, Historic Preservation Tax Incentives," August 1, 1986, p.26.

TABLE 2-3

SUMMARY INFORMATION ON REHABILITATION PROJECTS (CUMULATIVE)

Characteristic	Percentage
In Historic District	74
Built before 1950	13
Built before 1900	64
Estimated rehabilitation costs under $100,000	37
Estimated rehabilitation costs under $200,000	56
Estimated rehabilitation costs over $1 million	1.3
Large projects which are adaptive use	33
Residential projects in originally residential buildings	85
Commercial projects in originally commercial buildings	52

Source: Walter,J. Jackson, "Historic Rehabilitation Tax Incentives: Stimulating Economic Development While Preserving America's Heritage," Government Finance Review, February 1986, pp. 7-8.

Table 2-4 presents information on the use of the projects in the 25% HRTC period. The majority of projects were residential. These projects tended to be smaller than commercial and other use projects [Walter,1986,p.8]. Buildings were rehabilitated for other uses significantly less often.

In summary, these statistics provide background information on the characteristics of the historic rehabilitation projects that are investigated in this study. Applications, approvals, and completions all increased over the HRTC periods as well as total expenditures and per project expenditures. The yearly figures, however, indicate a leveling off of the 25% HRTC incentive in the last two years of the credit. Most projects were completed for residential use, at a cost of less than $200,000, located in a historic district, and on buildings built before 1900. While this information is interesting, it does not provide insight into other areas such as the economic factors in existence when the projects began, the time needed to complete the rehabilitations, the size of the buildings, and other information It also does not indicate if the HRTC was a statistically significant determinant of the increases in spending or if the owners were responsive to the HRTC. These issues are not possible to examine by only a brief summary of data. Therefore this study examines these issues in depth with the use of statistical methods. Descriptive results and results of the statistical tests, using the database of this study, are discussed in Chapters 6 and 7.

SUMMARY

This chapter provides background information into three areas of the HRTC: the procedures necessary in order for a project to be eligible for the HRTC, the tax law affecting historic rehabilitation, and the statistics available on the HRTC program. Now that the procedural and statistical details of the HRTC are known, the background of the HRTC in terms of literature is reviewed. The next chapter, Literature Review (Chapter 3), reviews studies performed in the HRTC area and in other tax incentive areas.

TABLE 2-4

SUMMARY INFORMATION ON USE OF HISTORIC REHABILITATION PROJECTS (25% PERIOD)

Type of Use	Percentage in 25% HRTC
Residential Use	54
Mixed Use (residential, office, commercial)	19
Office Use	14
Commercial Use	8
Other Use	5

Source: U.S. General Accounting Office, "Tax Policy and Administration, Historic Preservation Tax Incentives," August 1, 1986, p.28. Taken from National Park Service, Preservation Technical Services Division.

CHAPTER 3

LITERATURE REVIEW

The extent of research into the effectiveness of tax incentives in encouraging various types of investment in the private sector varies according to the incentive. Much research has been done into some tax incentives such as the investment tax credit (ITC), but few studies have been interested in the effectiveness of more specialized incentives such as the HRTC. This literature review summarizes many studies in the tax incentive area and demonstrates that the effectiveness issue has not been settled. The literature is examined to determine the extent to which project-based approaches have been used as in this study. The methodologies and results of each study will be discussed with specific interest in regression analysis. The use of any relevant noneconomic factors is also discussed. This lays the groundwork for interpreting the design and results of this project-based dissertation which uses regression analysis to study the economic and noneconomic factors' effects on the HRTC.

This review begins with literature in the area of tax incentives for historic preservation. Then the literature in the area of real estate is reviewed because of its direct relationship to historic rehabilitation. Following that, a review of the ITC literature is presented along with other tax incentive areas: pollution, energy, and research and development. There are two reasons this review is broad and includes studies in many areas of tax incentives. First, the HRTC is one of many tax incentives. These incentives are all interrelated: it is difficult to study one incentive in isolation without examining the others. Second, the literature in the area of the tax incentives for historic rehabilitation is limited; therefore the broader area of tax incentives contributes toward providing a base for this study of the HRTC.

HISTORIC PRESERVATION TAX INCENTIVES

The U.S. Department of the Interior, Heritage Conservation and Recreation Service [1979] surveyed owners of rehabilitated property and others involved with historic rehabilitation to determine the perceived effectiveness of the TRA76 and the RA78. Some

questions involved the noneconomic nature of the projects including the certification process and the effect of the tax incentives on the community. Some comparison of projects was done using tabulations of the data and descriptive statistics. The results indicated that (1) 93% of those polled believed the laws brought about an increased awareness and interest in the preservation of historic buildings, (2) many believed the laws made the difference between an uncertain future and financial success, and (3) 80% believed the tax laws were achieving Congress' goal of increasing interest in and maintaining and rehabilitating historic buildings.

The National Bureau of Standards [1979], analyzed the effect of the TRA76 on the after tax costs of two alternatives facing the owner: to rehabilitate or demolish. A simulation was performed using a life-cycle cost minimization model with six different tax situations. The TRA76 was found to make the rehabilitation option significantly more attractive than prior when it was more advantageous to demolish historic buildings.

Dunning and Longsworth [1983] studied two rehabilitation projects in the eastern United States which used different methods of financing. The study of the first project, which used private financing, examined certification forms, detailed breakdowns of expenditures, and cash flow statements. It reached the conclusion that the 25% HRTC offset the costs associated with certification and increased the return on investment. It also concluded that the effect of the basis reduction requirement of TEFRA82 was a decrease in the net present value of the project by 5% and internal rate of return by 2.9%. The second project was originally owned by a not-for-profit organization and was financed with a limited partnership. The study of it included descriptive information only; no conclusions were made.

Bentsen [1983] attempted to determine the strengths and weaknesses of the tax and nontax incentives for historic preservation available before ERTA81 and whether the tax incentives available after ERTA81 were an improvement An after-tax internal rate of return simulation was used to analyze the tax alternatives available to historic property owners. There is a discussion of the financing and grants available for rehabilitations. The study concluded that changes made by ERTA81 were favorable for most investors and the changes made by the TEFRA82

reduced the tax benefits to investors. It was found that under pre-ERTA81 law, the 60 month amortization and accelerated depreciation/HRTC alternatives were both viable incentives. It also appeared that the government could provide similar incentives to the 25% HRTC with less cost by using a nontaxable grant. The combination of the 25% HRTC and straight-line cost recovery provided the consistently highest rate of return.

Shlaes and Co. [1984] reported on historic rehabilitation in Illinois during the post-ERTA of 1981 period when the 25% HRTC was in effect. Included in this study were the results of a survey of developers involved with historic rehabilitation, two case studies of rehabilitation projects, and descriptive information and statistics on rehabilitation activities in Illinois. The survey contained questions about the certification process, the financing of the project, the perceived importance of the HRTC, and the costs of the rehabilitation along with other costs associated with it. It concluded that (1) approximately 67% of the projects would not have been undertaken without the 25% HRTC, (2) 80% of the projects did not rely on public financing, (3) the majority rated the 25% HRTC very important in securing investors, and (4) it was believed that there was virtually no long term tax loss to the government

Chittenden [1984] provided a statistical summary of a sample of properties listed in the National Register of Historic Places. Data obtained from the National Register nomination forms included noneconomic characteristics of the properties. The results were that (1) 33% were private residences, 67% were a mixture of commercial, governmental, educational, and others, and (2) 40% were in the South, 25% in the Northcentral region, 22% in the Northeast region, 15% in the West. A detailed discussion of the certification process of the National Register was also included.

Sowick [1984] provided a descriptive summary of the historic rehabilitation projects in the Preservation Research and Rehabilitation Impact Estimation (PRIME) database that were certified for tax benefits from 1977-1983. The study examined only a few characteristics of the projects, such as the tax law under which the projects were begun and the size of the projects in terms of total dollars. The results of a National Park Service data sheet (1980-1983) were

tabulated. Some project owners completed this data sheet upon final certification for the tax benefits. The following are some of the results: 43% more projects qualified for the HRTC in 1983 than in 1982, 87% more than in 1981, and 320% more than in 1980. In addition, dollars invested increased over this time period to an even greater extent; average cost per project increased significantly; and since ERTA81, there has been a trend toward more housing rehabilitations than office building rehabilitations. After ERTA81, 63% of the owners stated that they would not have rehabilitated without the tax incentives.

Feigenbaum and Jenkinson [1984] performed a cross-sectional regression analysis on the sensitivity of historic preservation expenditures to various factors, most of which were economic in nature. These factors included the change in real per capita income, a composite of the grants and HRTC received, and the existence (or lack of it) of property tax relief in the state, and the change in the stock of historic landmarks. All of these factors were found to have a significant positive effect on preservation expenditures Data aggregated by state were collected on preservation projects for two separate two year periods. This data set was limited to the examination of per capita expenditures on projects applying for federal subsidies. The results predicted that the change in the HRTC from 10% to 25% would stimulate an additional 24% in annual rehabilitation expenditures.

Holden [1985] modeled the relationship between certain tax laws and the before-tax rate of return needed to achieve a given after-tax rate of return. Using sensitivity analysis, the simulation predicted that a decrease of the HRTC from 25% to 10% or lower would have a very negative impact on the profitability of projects. However, a decrease of the HRTC from 25% to 20% (proposed currently) would have only a slight impact on the before-tax rate of return required.

This summary of the historic preservation literature indicates that the tax incentives for the rehabilitation of historic buildings have generally been found to be effective in increasing public awareness of rehabilitation activity [U.S. Department of the Interior, 1979] and in increasing rehabilitation expenditures [National Bureau of Standards, 1979; Shlaes and Co., 1984;

Sowick,1984; Feigenbaum and Jenkinson,1984]. However, there were some mixed results [Dunning and Longsworth,1983; Bentsen,1983] mostly due to TEFRA82. The studies were based on limited sources of data and restrictive methodologies. The methodologies consisted of cross-sectional regression [Feigenbaum and Jenkinson,1984], simulation [National Bureau of Standards,1979; Bentsen,1983; Holden,1985], and description [U.S. Department of the Interior,1979; Dunning and Longsworth,1983; Shlees and Co.,1984; Chittenden,1984; Sowick,1984]. The only studies that were project-based were the Shlees and Co. [1984] survey and case studies, the case studies by Dunning and Longsworth [1983], and the descriptive summary of Sowick [1984]. The U.S. Department of the Interior [1979] was project-based in part, due to the property owners who completed the questionnaire. None of these project-based studies used regression analysis.

While all of these studies are of general interest in this dissertation because they are in the same subject area, the study which is of the most interest is Feigenbaum and Jenkinson [1984]. This study has similar methodology and variables and therefore is of specific interest to this dissertation and is discussed in further detail in the Methodology (Chapter 5) and Regression Results and Implications (Chapter 7).

REAL ESTATE

Three types of real estate literature are discussed in this section: real estate valuation, housing, and real estate tax incentives. This is important information for this study because historic rehabilitation involves the rehabilitation of real estate. Real estate valuation and housing studies provide general insights into the factors and methodologies that are used in real estate studies. These studies used many factors of interest in this dissertation. Many of the studies also used regression analysis which is also of interest in this dissertation. Results of these studies are discussed in the Regression Results and Implications (Chapter 7). These studies are drawn upon in the formulation of the model in the Methodology (Chapter 5). The real estate tax incentive studies are then reviewed because tax laws which affect real estate affect the rehabilitation of historic buildings.

Real Estate Valuation

Maser, Riker, and Rosett [1977] examined the economic and noneconomic determinants of the sales price per acre of land plus the sales price of the structure. They randomly sampled real estate transactions in Rochester, New York over a three year period. The factor they were particularly interested in was the zoning of the property. The regression results indicated that no price effect was attributable to the dummy variables indicating the zoning categories. Along with zoning, they examined several other variables including the effect of the mortgage rate on the price of the land, residential versus commercial use of the land, and uses of adjacent property. Therefore, in order to examine the effects of zoning on the price of land per acre, they also examined many other potential influences on the land price.

Mark [1980] sampled sales of single family residences in the St. Louis, Missouri area over a two year period. He examined by regression analysis the effect of noneconomic variables on the sales price per unit and on the log of sales price per unit. The noneconomic factors included the age of the unit, the year it was sold, the square feet, and various neighborhood characteristics such as distance from school districts and business districts, the existence of flood plains, and noise problems. These environmental characteristics were found to significantly affect spending. Mark also tested for multicollinearity.

Jud [1980] examined the effects of noneconomic factors on the market price per square foot of single family residential property sampled from a North Carolina county. The dependent variable of market price per square foot gave the most consistent results in the regression analysis. The most significant determinant of the price was the structure size, lot size, and quality of the building which included the age of the building and type of construction. Neighborhood characteristics were also examined along with zoning.

Mark and Goldberg [1981] focused on the price of housing in the Vancouver, British Columbia area for one and one-half years. A linear regression was performed with the sales price as the dependent variable. The independent variables were noneconomic factors concerned with zoning, structure, and location of the house. The structural characteristics included the square

feet, construction type, condition, and year built, all of which were significant. They also tested for multicollinearity.

Shonkwiler and Reynolds [1986] investigated the effects of physical and location characteristics on the sale price of rural land per acre near the urban area around Sarasota, Florida. Some of the noneconomic or qualitative factors examined were commercial versus residential use, the months sold, and the size of the tract in acres. Regressions were run and the use and size were found to be significant in determining the sales price of the land.

Housing

Grether and Mieszkowski [1974] examined housing values in New Haven, Connecticut over a seven year period. They examined the effects of the structural characteristics, including the size, construction type, and condition of the building, as well as the year built, and neighborhood characteristics on the housing prices and price per square foot. These variables were found to be significant in the regression.

Mendelsohn [1977] analyzed census data of rehabilitation expenditures of over 5,500 homeowners over a six month period. The location and age of the house, as well as the age and income of the homeowner were some of the factors which were used to estimate the probability of home improvement expenditures. The probability of nonzero expenditures increased with the age of the building and age and income of the owner.

Mayer [1981] examined the effects of neighborhood, structural, zoning, and ownership characteristics on the likelihood of home rehabilitations. The Berkley, California housing market was sampled for this study. The size of the houses was not a significant factor on the likelihood of home rehabilitations. However, neighborhood characteristics, structural characteristics including the square feet, and condition of the building along with the year built, zoning, and owner characteristics were significant.

Dowall and Landis [1982] examined the effect on new housing prices of development controls, housing market conditions, community characteristics, and size of the building. A dummy variable for year the housing prices were recorded was also included. Log and linear

regressions were run. The community characteristics were of the most interest and the development controls such as land availability and development fees were not significant.

Sheer [1983] analyzed national rehabilitation data for homeowners for a three year period. The dependent variable was whether or not the house was rehabilitated. Many noneconomic factors concerning the households were examined such as the age of the owners and the number of people in the households. Many noneconomic factors concerning the buildings were examined such as the age of the houses, and their condition and neighborhood. The decision of whether the household moved was also a factor because it was found that rehabilitation and move decisions were interrelated. The age and condition of the house were important determinants of whether the house was rehabilitated. Some neighborhood characteristics were not significant.

Palmquist [1984] examined the demand for single family houses in seven Metropolitan areas. Linear and log regressions were run with many independent variables including square feet, construction type, condition, year built, and neighborhood characteristics. The coefficients had the expected signs and magnitudes and most were highly significant.

Dodl and Adibi [1985] examined the per capita single and multiple residential units in Orange County, Florida over a several year period. The mortgage rate and construction costs were examined as well as other economic factors. These variables were all found to be significant determinants of real estate valuation. They used that information to project real estate values into the 1990's.

Boehm and Ihlanfeldt [1986] found that internal and external factors were important in explaining home improvement expenditures. Over a three year period, single family residences in 20 neighborhoods were examined. Material and construction costs were examined, the last of which were significant. Household characteristics, structural characteristics (including age and condition which were significant) and neighborhood factors were all examined for their effect on home improvement expenditures.

In summary, the real estate valuation section and this housing section are reviewed because of the importance of real estate to historic rehabilitation and also because the factors and

methodology in these studies are useful information for this dissertation. There are a great many studies in these areas and the studies reviewed here are only a few of them. However, each of the studies reviewed is referenced in the Methodology (Chapter 5) for its use of the factors mentioned in this review and for any other relevent methodology issues. Then each study is referenced in the Regression Results and Implications (Chapter 7) for purposes of the comparison of the results with the results of this study. These studies all used information from actual real estate projects and examined it by some type of regression analysis. Most of the factors are noneconomic and represent the structure and condition of a building and its use and neighborhood. These composition factors are very important in the determination of the real estate prices. The significance of the factors is discussed in detail in the Regression Results and Implications (Chapter 7).

Real Estate Tax Incentives

Since the TRA76 there have been many studies on real estate tax incentives which are relevant to this review because they affect historic rehabilitation. Dorr [1979] examined the impact of the TRA76 and the RA78 on the investment in real estate tax shelters by constructing a simulation model to test the effects of the laws on new housing and new commercial property. Besides the tax factors, the study also examined different marginal tax rates, earned incomes, lengths of investment period, and assumed selling prices of property in determining the rate of return. The result was that the TRA76 had a negative effect on the profitability of real estate investments. The main tax provisions which contributed to this result were those limiting front end deductions for construction period interest and taxes and prepaid interest.

Stern [1979] analyzed the effect of the TRA76, the RA78, and proposed tax law changes on *the internal rate of return and optimum holding period of income producing properties.* A simulation model was used which addressed assumptions about characteristics and size of the investors' income as well as encompassing various tax alternatives. A few of the general results obtained were (1) the combined effects of the two laws were minor for many investors in commercial and residential property, (2) the Congressional intent was not supported by the tax

laws as a whole, (3) the changes in net operating income and property values as small as 2% could cause large changes in the after-tax internal rate of return and the optimal holding period of income producing real estate, and (4) the use of the maximum allowable declining balance depreciation method rather than straight line yielded no appreciable advantage for investors.

Dickens [1983] examined the impact of ERTA81 and TEFRA82 on investment in apartments by corporations and partnerships. A simulation was performed to generate after-tax internal rates of return. Among the results were that ERTA81 caused an increase in mean after-tax returns and that TEFRA82 caused them to decrease. Overall, these returns increased as the holding period increased. Also, the returns available from partnerships were consistently higher than those from corporations.

Born [1984] developed a model to include cyclical inflation's impact on real estate investment analysis This had not been explicitly included previously in the traditional real estate investment analysis framework. The model incorporated several analysis techniques including capital budgeting and was then tested on a case study. It was found that (1) cyclical inflation was significant in real estate investment analysis, (2) an increasing inflation rate was more significant than a decreasing inflation rate, and (3) the type of asset acquisition financing was sensitive to cyclical inflation.

Fisher, Lentz, and Stern [1984] examined the effects of tax law changes since 1976 on the relative tax benefits available to investors in new and selected categories of existing nonresidential property including rehabilitations. The present value simulation model focused on the long run market response and used several financial and tax variables, including total cost, credits received, and the year construction ended. The results indicated that prior to 1976 there was a bias in the tax law in favor of investment in new structures but since then the bias has shifted in favor of the rehabilitation of older and historic structures. Inflation was found to have an immaterial effect on the findings.

In summarizing the literature in the real estate taxation area, the tax laws must be considered separately because of the very different impacts each can have on investment. There

were mixed results of the TRA76 and the RA78. Dorr [1979] concluded that the TRA76 had a negative effect on the profitability of real estate investment and that the RA78 restored some of the equity, whereas Stern [1979] concluded that the laws had a minor effect on investors. Fisher, Lentz, and Stern [1984] concluded that since the TRA76 the bias of the tax law has shifted away from new construction and in favor of older and historic buildings. It is the general conclusion that ERTA81 increased the return of investment in real estate and TEFRA82 decreased it [Dickens,1983]. All of the studies reviewed here were simulations; no actual real estate projects were studied.

These studies provide background information as to the type of issues examined and the results determined in the real estate tax incentive area. The factors and methodologies are not of direct interest to this study because of the different approaches compared to this dissertation.

OTHER TAX INCENTIVES

Investment Tax Credit

An ITC of 7% was adopted in 1962 to promote capital formation in certain business properties. It was suspended from October 1966 to March 1967, a shorter period than planned. It was repealed in December 1969 and reinstated in December 1971. In January 1975, the rate was increased to 10%. The ITC was repealed again for expenditures after December 31, 1985.

Much of the early literature on the ITC (late 1960s and early 1970s) concluded that it provided a positive impact on investment. The central work of this time was by Hall and Jorgenson [1967;1969;1971] who used a partial equilibrium investment model to examine the impact of the ITC. They concluded that the ITC had a positive impact on investment spending. Many subsequent studies found similar results [Fralick,1970; Johnson and Carey,1970; Bischoff,1971; Pitts and Whitaker,1971] however, there were a few that disagreed with those findings [Eisner,1969; Coen,1971; Klein and Taubman,1971]. In the 1970s, many of the studies found that the ITC did not significantly stimulate investment. Among the findings were (1) the ITC may have only altered the mix of investment spending [Eisner,1973], (2) the effective ITC rate was much smaller than the nominal rate [Sunley,1973], and (3) in many cases, the ITC

rewarded investment that would have been undertaken without the ITC [U.S. General Accounting Office, 1978].

Many of the recent studies analyzed the weaknesses of the previous studies. Bird [1980] reviewed many tax incentive studies and concluded that researchers knew little about the effectiveness of tax incentives and that research techniques were incapable of improving their knowledge. In addition, the tax incentives did not effectively or efficiently achieve most of their objectives. Hendershott and Hu [1981] pointed to the problem of previous studies of examining the ITC in a closed system. Summers [1981] suggested that the design of the incentives was important as well as their size and that interactions between tax policy and inflation must be considered.

Wunder [1978] used the Hall and Jorgenson model with industry tax return data to test the relationship between the ITC and investment in certain industries during the period 1965-1974. The results were (1) a significant relationship between investment and the change in the optimum level of capital (which included the ITC), (2) a t-test found that labor-intensive industries used the ITC to a greater degree than capital-intensive industries, and (3) industries responded to the ITC in a firm-specific manner.

Posey [1978] performed a descriptive historical analysis of the ITC for the purposes of understanding the past and being able to project future tax policies. Some of the findings of the study were (1) Congress was responsive to inputs, (2) tax legislation was intertwined with political considerations, and (3) the legal interpretation of qualifying ITC property has been liberalized over time in favor of taxpayers.

Bait-Elmal [1978] investigated the effectiveness of the ITC in increasing the availability of investment funds to corporations. He examined the COMPUSTAT data of 20 firms for five years prior to the ITC and five years when the ITC was in effect. The results of the regression and correlation analysis on the time series data were that the ITC significantly increased capital expenditures and that it appeared to improve the relationship between capital expenditures and net income.

The primary objective of Foster [1981] was to determine if the ITC had a significant impact on capital formation. Linear multiple regression econometric models using 20 years of time series data were analyzed for each of the FORTUNE 500 firms. The model with no ITC was the best predictor of corporate investment and the model with ITC was the worst predictor. Therefore, the result was an insignificant impact of the ITC on capital formation.

Rose [1983] surveyed corporate executives in Virginia as to their perceived importance of the ITC in their decision making for new equipment. The results of the statistical analysis were that those decision makers who operated relatively close to full output capacity perceived the investment tax incentives as more important than did the others. However, the impact of the ITC on decision making was only modest. The lowest perceived importance of the ITC was during an economic recession.

Maloney [1984] used intervention analysis to examine the association between the ITC and investment activity around the periods when the ITC was enacted and when it was increased from 7% to 10%. A two step analysis was performed: (1) regression isolated the level of investment that could have been attributed to influences other than the economic factors specified in the financial model and (2) residuals from the regression were analyzed using intervention analysis (a time-series technique). It was concluded that investment was positively impacted by the enactment of and change in the rate of the ITC; meaning that there was a significant intervention effect of the ITC. There was no intervention effect of the control group (property which did not qualify for the ITC) which supports the assertion that there was not a shift of investment away from those investments that did not qualify for the ITC and to those investments that did qualify.

Overall, this review of the recent ITC studies indicates that no conclusion can be reached as to the effectiveness of the ITC in encouraging investment. Some studies concluded that it was effective [Bait-Elmal, 1978; Maloney, 1984], others that the results were mixed [Wunder, 1978; Rose, 1983] and another found that the ITC was ineffective [Foster, 1981]. Regression analysis was the most commonly used methodology. Aggregated data by firm or industry was used in the

studies rather than project data. The only study reviewed that did not use regression was the historical analysis by Posey [1978].

This review of the ITC studies is for background purposes, only. Because of the different issues and factors involved in these studies, the studies do not provide a direct input into the approach of this dissertation. However, it is notable that all but one study used regression analysis which is the methodology used in this dissertation.

Pollution Control

Nikolai and Elam [1979] used a present-value federal income tax impact model to determine the effectiveness of a provision in the tax law (Sec. 169 (Internal Revenue Code of 1954, as amended); rapid amortization of pollution control facilities and eligibility for the 10% pollution tax credit) which was enacted to stimulate investment in pollution control facilities. The result was that it was rarely (when the pollution facility had a long life) that the incentive worked as planned.

Tai [1981] developed present value decision models for not-for-profit institutions making pollution control investment decisions by adapting capital investment decision models used by profit-oriented institutions. The study evaluated whether pollution control tax incentives designed for profit-oriented institutions could also stimulate not-for-profit institutions to invest in pollution control facilities. Most of the data set was taken from interviews of two not-for-profit institutions. A simulation was performed to incorporate risk into the models. Results showed that certain of the pollution control tax incentives, including the pollution tax credit and tax-exempt industrial development bonds, can act as a stimulus for not-for-profit institutions to invest in a certified pollution control facility. Therefore, tax incentives designed for profit-oriented institutions can provide an indirect incentive for not-for-profit institutions.

Kauder [1982] surveyed firms in six industries which were regarded as major polluters. Empirical data were obtained on Sec. 169 in order to investigate the process managers use when they choose between multiple tax incentive alternatives. The questionnaire consisted of the following areas: legal; socio-psychological; economic; accounting; and demographic. Statistical

analyses were performed including ANOVA, discriminant analysis, and correlation analysis. There were many results including; age of the equipment and size of the firm were associated with the decision to select Sec. 169, and the level of knowledge of the incentive was not found to be related to the firms' decision to select or reject Sec. 169.

Murphy [1983] performed a simulation analysis to determine the ability of Sec. 169 to encourage compliance with pollution standards and make the required investment in pollution control assets. His decision model incorporated financial, tax, and regulatory variables and took into account the intent of Congress in the enactment of the law. The results indicated that Sec. 169 was not effective in encouraging compliance with pollution control standards.

In summary, the literature in the pollution control tax incentive area supports the conclusion that the incentives were not effective [Nikolai and Elam,1979; Murphy,1983] with the exception that the incentives could have possibly been used effectively by not-for-profit organizations [Tai,1981]. Simulation was the most common methodology [Nikolai and Elam,1979; Tai,1981; Murphy,1983]. However, Kauder [1982] used several other methodologies: ANOVA, discriminant analysis, and correlation analysis. Kauder [1982] was the only study that resembled a project-based study since it was based on actual firms' decisions in the pollution control tax incentive area. These studies are of general interest because they examined the effectiveness of tax incentives. However, none of the factors used in these studies is appropriate for purposes of this dissertation.

Energy

There are two types of energy tax credits for homeowners. The first is for energy conservation expenditures, such as insulation (15% of the first $2,000 of expenditures). The second is for renewable energy source property, such as solar energy panels (40% of the first $10,000 of expenditures). Carpenter and Chester [1984] were the first to use household level data to evaluate the effectiveness of the federal energy tax credits. They sampled homeowners in the Western U.S. to determine awareness and use of the energy tax credit, the role of climate, and the type, age, and location of the dwelling. The use of the tax credit was found to be related to each

of these factors along with the following socioeconomic factors: marital status, employment, education, and income. Their analysis included logit models and log-linear contingency tables. The study concluded that 99% of homeowners who made an energy improvement would have done so anyway without the credit. This percentage was much lower for those making major energy improvements.

Petersen [1985] replicated Carpenter and Chester [1984] using more recent data and more specific questions in the questionnaire. The incentive effect of the energy tax credit increased with the level of expenditures which was a similar result of Carpenter and Chester. The reply by Carpenter and Durham [1985] to the replication cleared up some of the confusion in the original study.

Procter and Tyner [1984] developed an analytical model for comparing the life-cycle cost of alternative home heating systems under varying energy prices, government energy and tax policies, and electricity pricing schemes. The tax credit had varying impact depending on the electricity pricing.

In summary, the effectiveness of the energy tax incentives varied with the amount expended [Carpenter and Chester, 1984; Petersen, 1985] and with electricity pricing [Procter and Tyner, 1984]. The methodologies used were logit models, contingency tables [Carpenter and Chester, 1984; Petersen, 1985] and simulation [Procter and Tyner, 1984]. Project-based studies were performed using data on households [Carpenter and Chester, 1984; Petersen, 1985].

While the methodologies of these studies are not useful for purposes of this dissertation, the factors used in the project-based studies are of interest, especially in the study of Carpenter and Chester [1984]. This is because of the similarity of the data they used compared to the data examined in this dissertation.

Research and Development

Eisner, Albert, and Sullivan [1984] studied the effectiveness of the research and development tax credit (25% of the excess research and development expenditures over a base amount) by using COMPUSTAT and survey data. The tax credit was estimated using a constant

eligibility ratio from firms' research and development information. Comparisons of the estimated tax credit were then made. It was found that the credit had a limited potential for stimulating expenditures and sometimes actually discouraged them. This study is useful for this dissertation from the broad tax credit perspective. It is interesting to examine the effectiveness or lack of effectiveness of other tax credits.

SUMMARY

As is evident from this review of the tax incentive literature, the issue of the effectiveness of tax incentives has not been settled. More research must be done into the effectiveness of tax incentives before any conclusions can be made as to the policy implications of the incentives. No conclusion has been reached as to the effectiveness of the HRTC.

A project-based approach is used infrequently in the literature. Of the studies reviewed, the few project-based approaches are used in the historic preservation, energy tax incentive, and real estate valuation, and housing areas. The limited use of project data is very likely because of the unavailability of the information. This dissertation samples a database of historic rehabilitation projects that has not been used in previous research. This is a unique opportunity to perform a project-based study of a specific tax incentive: historic rehabilitation.

The methodologies of the studies reviewed are generally basic and subject to the availability of data. Simulations are often used as well as descriptive statistics and case studies. Except for the real estate valuation and housing studies, regression analysis is used rarely and when it is used the data are highly aggregated by state [Feigenbaum and Jenkinson, 1984]. The real estate valuation and housing studies comprise the majority of studies reviewed that examined noneconomic factors such as the structure of the house, and the neighborhood characteristics. None of the tax incentive studies combined regression analysis, project data, and noneconomic factors

In summary, this dissertation fills a gap in the literature on tax incentives. It studies the HRTC: the effectiveness of which has not been determined. This is a comprehensive project-based study of the HRTC which includes both economic and noneconomic factors.

In the next chapter, economic theories are examined which provide the basis for the model which is used to test the effectiveness of the HRTC.

CHAPTER 4

ECONOMIC THEORY

Economic theories attempt to explain the behavior of market participants at various levels within the economy. With respect to the HRTC, the theory of externalities, for example, explains why the private sector on its own might not rehabilitate historic buildings to an acceptable level. The theory of excise subsidies suggests that a tax subsidy might remedy some externalities by stimulating the private sector to undertake more projects than it might otherwise undertake on its own.

Most tax credit research to date has focused on economic behavior at the market level. However, the effect of the HRTC can not be evaluated directly by the aggregate theories of externalities and excise subsidies. Project level analysis provides evidence on individual behavior. The owners' reactions to the HRTC are examined by elasticity theory. These aggregate and project level theories are examined separately.

THEORIES CONCERNED WITH AGGREGATE BEHAVIOR

Externality Theory

An externality is a side effect of an activity that is borne by people not directly involved in the activity. An externality occurs when (1) the utility derived from a set of goods and services depends on the consumption or production of other people, or (2) the cost of production of a set of goods or services depends upon the consumption or production of other people [Pogue and Sgontz, 1978, p.49]. Historic rehabilitation can generate externalities because people other than owners and occupants can be affected. Locally, the residents of a neighborhood may benefit from improved aesthetics and additional commerce. Nationally, historic rehabilitation projects can provide benefits to outsiders and future generations who benefit from having a part of history preserved. The nature and extent of these externalities depends, of course, on the location and significance of the historic rehabilitation project.

Conditions. Externalities are produced by (1) the interdependence of production and utility functions among economic units (owners affect neighbors) and (2) non-compensation for

these interdependencies (owners do not receive full compensation from users for benefits received). These two conditions cause private costs (owner) to diverge from social costs (includes external benefits) [Hyman,1973,pp.46-48].

Characteristics. Head [1974, p.187-189] provides a seven-category taxonomy which can be used to discuss some of the characteristics of externalities. These characteristics are (1) positive versus negative (historic rehabilitation is mainly a positive service to others), (2) production versus consumption (owners are producers, beneficiaries are consumers), (3) joint supply versus separate supply (historic rehabilitation involves joint supply because it does not cause a reduction in benefits to some only because others increase their consumption), (4) small numbers versus large numbers (rehabilitation could affect small or large numbers of outsiders), (5) marginal versus inframarginal (historic rehabilitation must be marginal in order for a tax credit to be called for), (6) reciprocal versus nonreciprocal (rehabilitation can have reciprocal effects when the benefits of the nicer neighborhood reflect back to the rehabilitated property), and (7) private versus government (historic rehabilitation is typically private investment for private use)

Effects. Because externalities are outside the price system, they can lead to inefficient resource allocations [Browning and Browning,1983,pp.34-36]. Consequently, their impact cannot be determined by market forces. Depending on the situation, there can be either external costs or external benefits. Since the market reflects only those costs and benefits of its participants, those outside the market who receive benefits or incur costs of the activity do not affect the market.

With respect to historic rehabilitation, only the interests of those directly affected are reflected in the market. Consequently, the market fails to consider all the interests of the people who are effected by historic preservation. Walter [1986,p.6] states this in another way by suggesting that in the absence of tax incentives, the market contributes toward the abandonment and destruction of historic properties rather than their rehabilitation and protection.

Figure 4-1 depicts these effects. Assuming the historic rehabilitation industry is constant cost competitive, S_0 is the aggregate supply curve and D_P is the aggregate private demand curve of the rehabilitation owners. D_P is the demand of the owners for historic buildings to rehabilitate and for supplies and labor with which to rehabilitate. This demand does not take into account externalities. The downward sloping demand curve indicates that as the price of historic rehabilitation drops, the owners' demand for historic rehabilitation increases because they can get more rehabilitation for their investment. The owners may demand a larger building or more labor or materials for a more expensive or higher quality rehabilitation due to the decrease in the cost of these factors. S_0 represents the market of historic buildings and the suppliers of rehabilitation materials and labor. At any given time the market of available historic buildings and supplies (materials, labor, etc.) available for historic rehabilitation is fixed. Upon completion of the historic rehabilitation projects, the owners become the suppliers of the rental property. That is beyond the scope of this study. The equilibrium is at Point X where D_P intersects S_0. P_0 is the price and Q_0 is the quantity. This level of spending, however, does not take into account the effects of externalities on the projects undertaken.

The demand of those who gain external benefits is taken into account in the marginal external benefit curve (MEB). The demand curves (D_P and MEB) can be vertically summed because the benefits derived by one person do not diminish the benefits derived by others. The total demand for historic rehabilitation, D_T, includes both internal (private) and external (public) benefits. Point Z represents the equilibrium point which equates aggregate total demand for historic rehabilitation, D_T, and aggregate total supply of historic buildings and supplies, S_0.

Due to the market forces, the government may have to step in to encourage owners to take into account the external benefits of the activity through their spending decisions. If owners do not take these external benefits into account they are more apt to destroy a building than save it which was the case prior to the tax incentives when the owners had no incentive to act in other than their own interest. The government can induce owners to consider external benefits by instituting an incentive that adjusts the equilibrium (increase output) of historic rehabilitation to account for

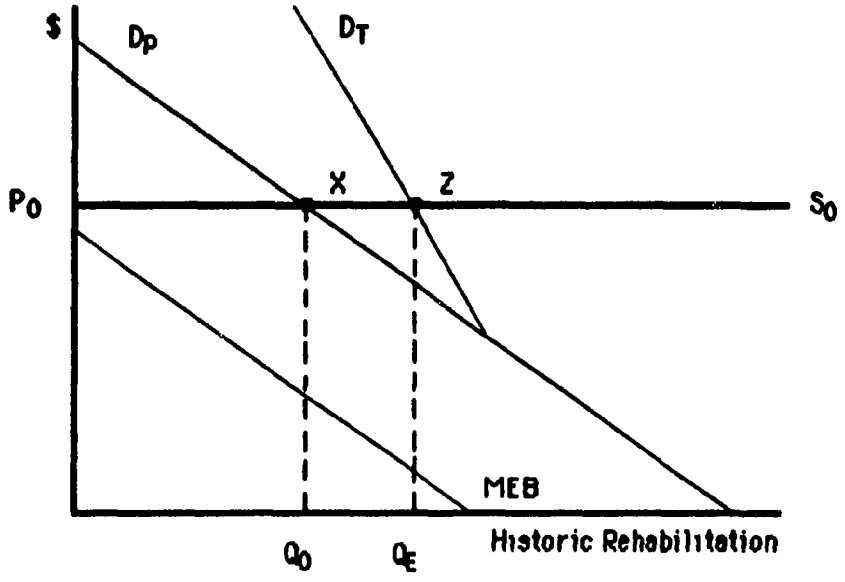

FIGURE 4-1

HISTORIC REHABILITATION EQUILIBRIUM WITH AND WITHOUT EXTERNALITIES

S_0 = supply
D_P = private demand of rehabilitation owner
D_T = total demand of rehabilitation owner (includes MEB)
MEB = marginal external benefits
Q_0 = quantity at $D_P=S_0$
Q_E = quantity at $D_T=S_0$
P_0 = price at $D_P=S_0$

the external benefits. There are many possible incentives, including deductions and tax loopholes. However, an excise subsidy is a popular means of corrective action in dealing with externalities [Browning and Browning, 1983, p.42].

Merit Wants. The theory of merit wants also attempts to explain why government intervention is sometimes necessary [Musgrave, 1959, pp.13-14]. The theory holds that public policy may dictate that there should be an allocation of resources which deviates from that which is reflected by market forces. This may be because individual values do not lead the market to produce at a level that is satisfactory to the government's desires. An elite group is assumed to exist which can make these decisions better than the market. Therefore, consumer preferences are interfered with. This theory allows for the government to intervene even when no externalities are involved [Pogue and Sgontz, 1978, p.78].

Subsidy Theory

Definition. The HRTC reduces the cost of a rehabilitation project by the HRTC percentage. The quantity, however, is still determined by the market. In effect, then, the HRTC is an ad valorem excise subsidy [Browning and Browning, 1983, p.105].

There is general agreement that tax credits can be viewed as subsidies [Wiseman, 1983, p.36]. When there are externalities, the market equilibrium is inefficient (as discussed in previous section) and an excise subsidy generally would be expected to improve resource allocation [Browning and Browning, 1983, p.110]. In some cases though, the cost of correcting small market inefficiencies that are due to externalities could exceed the benefits [Browning and Browning, 1983, p.320]. Nevertheless, tax credits have remained a popular device for making such corrections because (1) the rate can be easily adjusted, (2) there are few administrative problems, and (3) the market is able to adjust to these changes [Browning and Browning, 1983, p.42-43].

In many respects, the HRTC has the same basic effect as a direct subsidy because in both cases the government subsidizes a percentage of the cost of the rehabilitation project. However, since the HRTC is received on completion of a project and a direct subsidy would generally be

received before or during construction, there is a timing difference. There is a cost to the government of both forms of subsidy since the funding must come from sources such as tax revenues or borrowing.

The HRTC is available to all qualified rehabilitations of historic buildings regardless of the external benefits each rehabilitation creates. Although some buildings involve more external benefits than others (as discussed in the previous section), it would be very difficult and involve much subjective judgment to determine which buildings warrant a tax credit and which do not warrant a credit on the basis of their external benefits. Therefore, the HRTC is available to all historic buildings and it is assumed that overall, the tax credit leads to an increase in rehabilitation which takes into consideration the external benefits.

Effects. The effect of an excise subsidy or tax credit (HRTC) is to reduce the price of the good by the amount of the subsidy. This stimulates more output. If the price cut is passed along to the consumer (the renter of the historic building), consumption of the good will also increase. Therefore, as long as the law of demand is valid (as it always is) the subsidy will stimulate output and consumption [Browning and Browning, 1983, p. 106]. The subsidy does not reduce the true cost of production but rather a portion of the cost is provided by the government. It reduces the percentage of costs incurred by private owners of rehabilitated buildings. The government assumes part of the risk and becomes, in theory, a co-owner of the project because it is partially subsidized by the government [Meysher, 1977].

The HRTC reduces the marginal cost of rehabilitation. This shifts the aggregate supply curve of the historic rehabilitation market, S_0, downward. Therefore, investors will be interested in historic rehabilitations, their quantity will increase, and more money will be spent on them.

This discussion is presented graphically in Figure 4-2 which is derived from Figure 4-1. Prior to the HRTC, S_0 is the supply curve. Therefore, P_0 is the price of historic rehabilitation and Q_0 is the quantity of historic rehabilitation. The demand curve is D_P: the private demand of the rehabilitation owner for historic rehabilitation without taking external benefits into account. The

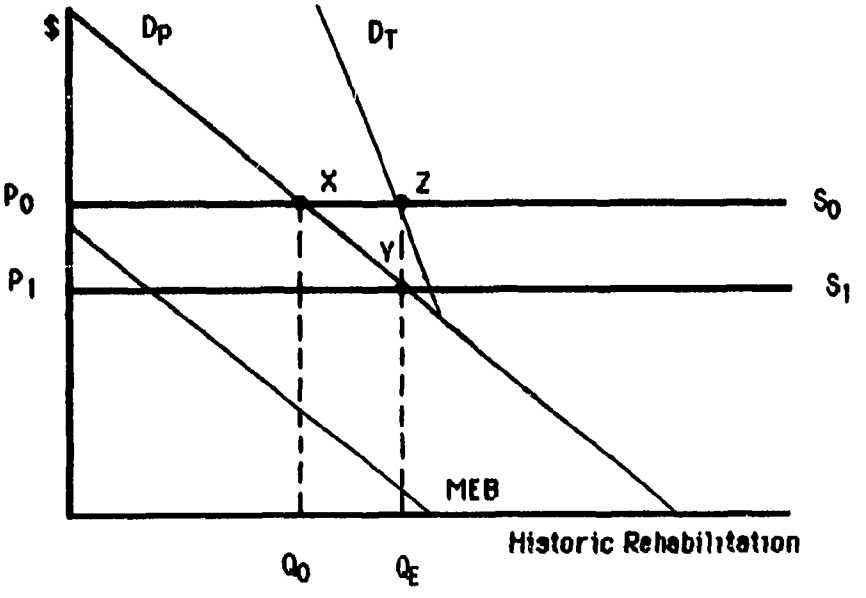

FIGURE 4-2

HISTORIC REHABILITATION WITH A SUBSIDY (OR TAX CREDIT)

S_0 = supply before HRTC
S_1 = supply after HRTC
D_P = private demand of rehabilitation owner
D_T = total demand of rehabilitation owner
MEB = marginal external benefits
Q_0 = quantity at $D_P=S_0$
P_0 = price at $D_P=S_0$
Q_E = quantity at $D_P=S_1$
P_1 = price at $D_P=S_1$

spending on the rehabilitation of $P_0 * Q_0$ is the amount spent by the owners of their own money (Point X). The total spending = private spending. The market output of Q_0 does not consider the external benefits.

It is assumed the HRTC is then implemented in order to induce the owners to consider the external benefits. Figure 4-2 shows that the HRTC decreases the price of historic rehabilitation to P_1 and therefore the supply curve decreases to S_1. Because of the subsidy (HRTC), the owners can do the same amount of rehabilitation at a lower cost or more rehabilitation at the same cost as without the HRTC. The credit induces the owners to take external benefits of others into account because although the owners operate on their private demand curve, where $D_p = S_1$ (Point Y), that quantity translates to Point Z on the owners' total demand (D_T) curve. The total spending = private spending + HRTC. The quantity increases to Q_E. Assuming demand is not perfectly inelastic, total spending increases as a result of the HRTC due to the decrease in the price of historic rehabilitation. This increase in spending is possible because it is assumed in this theory (and in this study) that the owners have not made their decision of how much to spend and therefore can alter their spending decisions as a result of the HRTC. The total spending is the amount spent by the rehabilitation owners including their own spending and the HRTC they receive It is based on the total demand (D_T) which takes into account external benefits of others because the MEB is built into it. The private spending is the total amount spent by the owners less the HRTC. It is the amount of their own money spent ($P_1 * Q_E$) which is determined by the intersection of D_p and S_1. Assuming an elastic demand, this private spending in the HRTC period is greater than private spending prior to the HRTC ($P_0 * Q_0$).

In order to set an optimum HRTC (P_0-P_1), the aggregate demand curve, D_T, the private demand curve, D_p, the aggregate supply curve before the tax credit, S_0, and the aggregate supply curve after the tax credit, S_1, must be known for each owner. These effects are not observable and therefore not possible to calculate. However, any tax credit which decreases the price by an amount up to (P_0-P_1) encourages more rehabilitation than in the no tax credit situation.

Figure 4-2 is not likely to be a perfect representation of reality. If the owners increase total spending by at least as much as the HRTC then the HRTC policy is cost effective because the increase in spending offsets the cost to the government of the HRTC. Cost effectiveness, in this study, involves the comparison of the 'tax expenditure'[5] to the government and the change in spending on historic rehabilitation due to the HRTC.

If the owners spend less than without the HRTC (inelastic demand), the HRTC is not cost effective because the spending does not increase by the cost to the government of the HRTC. The owners may spend more of their own money however in order to receive a higher HRTC since the HRTC is a percentage of spending. This indicates the "coupon effect". For example, coupons are given to retail customers to encourage them to use the coupons and in the process they may spend more on the coupon item than they would have without the coupons. Spending may be redirected from other items to the coupon item. The end result is more spending on the coupon item. With respect to historic rehabilitation, the owners are 'fooled' into spending more money because the government pays for a percentage of the cost of the project. There is evidence of this "coupon effect". One instance is described by an owner of a historic castle in England: "Today the Department of the Environment provides 40 percent matching grants-in-aid for repairs of historic buildings. 'It encourages you to put your own money in,' says the commander, who has received several grants. 'You spend more than you might otherwise.'" [Leccese and McCormick,1986].

Descriptive statistics (Chapter 6) provide the total and private spending levels in the 0, 10%, and 25% HRTC periods. The significance of the HRTC on total spending and private spending are determined in the regression analysis. This information provides evidence into the cost effectiveness of the HRTC policy. If total spending stays the same or increases (and therefore private spending does not decrease by more than the HRTC percent) then the HRTC is cost effective.

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[5] Pechman[1977,p.356] presents the definition of tax expenditures as defined in the Congressional Budget and Impoundment Control Act of 1974 as "revenue losses attributable to provisions of the Federal tax laws which allow a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability."

Figure 4-3 provides another view of how the HRTC generates additional rehabilitation activity. This demonstrates that care must be taken not to institute too high a tax credit percentage because this could cause costs to exceed benefits. The total cost curve, TC, and total benefit curve, TPB, are derived from the D_P and S_O curves in Figure 4-1 [Browning and Browning, 1983, pp. 42-44]. Expanding rehabilitation would never be profitable without a subsidy, in this case, because costs would always exceed benefits. The total benefits, which include the external benefits, are represented in the total social benefits curve (TSB). When taking the external benefits into account, expanding output would be desirable up until Point O at Q_3 because the total benefits exceed the total costs. Beyond Point O rehabilitation would not be profitable because the costs exceed the benefits.

The quantity at the origin of the graph is Q_1, the competitive output which assumes no HRTC. The optimum or most efficient level of rehabilitation in which the maximum difference between the total benefits and total costs is achieved occurs at Point N with a quantity of Q_E and price of P_E. At this point the slopes of TC and TSB are equal as well as the marginal cost and marginal social benefit. A tax credit can be used to induce the expansion of rehabilitation to Point N. However, care must be taken not to increase quantity beyond Q_3 because the costs would exceed the benefits It is difficult to determine when this point is reached. However any HRTC which increases rehabilitation beyond Q_1 and prior to Q_3 would be better than no HRTC. It is not the purpose of this study to determine the "best" HRTC rate which would achieve the most efficient rehabilitation level, but rather the purpose is to examine the effect of the two actual HRTC percentages of 10% and 25%.

Inframarginal Externalities. The above discussion relates to "marginal externalities" which involve shifts in equilibrium due to effects at the margin. However, "inframarginal externalities" (inside the margin) also exist. These do not result in an inefficient allocation of resources as do marginal externalities because the value of the external benefit is zero at the margin in private equilibrium. The equilibrium output is therefore no different with inframarginal externalities than it is without such externalities. The effect of these externalities

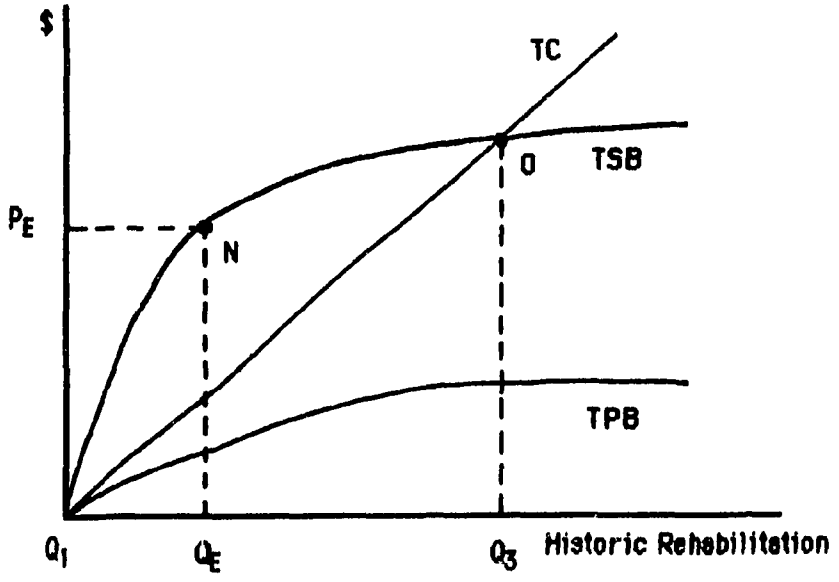

FIGURE 4-3

HISTORIC REHABILITATION EQUILIBRIUM WITH VARYING COSTS AND BENEFITS

TC = total cost
TPB = total private benefit to owner of additional rehabilitation
TSB = total social benefit to owner of additional rehabilitation (including external benefits)
Q_1 = competitive quantity (no tax credit)
Q_E = quantity at which TSB-TC is greatest
Q_3 = maximum quantity at TSB=TC .

would be small relative to private demand [Browning and Browning,1983,pp.46-47]. Inframarginal externalities would be one reason to have no use for government subsidies for historic rehabilitation projects.

Figure 4-4 demonstrates this concept. As in Figure 4-1, the total demand which includes the owners' demand (D_p) and externalities (MEB) is curve D_T. Rehabilitation levels beginning with Q_1 at Point G, where $D_p = D_T$, have no marginal externalities (MEB = 0). Therefore only the owners receive the benefits if the rehabilitation exceeds Q_1. Q_E, the equilibrium for the owners where D_p intersects MC (marginal cost) at Point H, is greater than Q_1, therefore there is no marginal value of external benefits. Therefore a tax credit would not be called for to induce the owners to take into account external benefits because there are no marginal external benefits. The HRTC should not be offered for this reason although it may increase the quantity of historic rehabilitations. Rehabilitation should not be increased beyond Q_E because the costs would exceed the benefits to the owners.

THEORY CONCERNED WITH INDIVIDUAL BEHAVIOR: SPENDING ELASTICITY

The theory of externalities and the theory of excise subsidies are designed to explain how the market responds in various ways to tax and other incentives. Most research on tax incentives has focused on this aggregate market behavior. This study examines the aggregate issue by using project level information. As well as providing evidence on the aggregate theories of externalities and excise subsidies, this study contributes information on the individual theory level.

In particular, this study focuses on the effects of the HRTC on individual owner's spending. These effects are explained in terms of elasticities of spending at the project level. The significance of the HRTC in determining the spending on projects contributes toward explaining the owners' elasticity of spending (how responsive his spending is to the HRTC). Accordingly, an empirical analysis of the HRTC effects is designed to focus on the effects of the HRTC on project spending. The theory background for that analysis follows.

One way to provide evidence on the effects of the HRTC is to examine the project level in order to determine the owners' reactions to the HRTC policy. This can be done by determining the

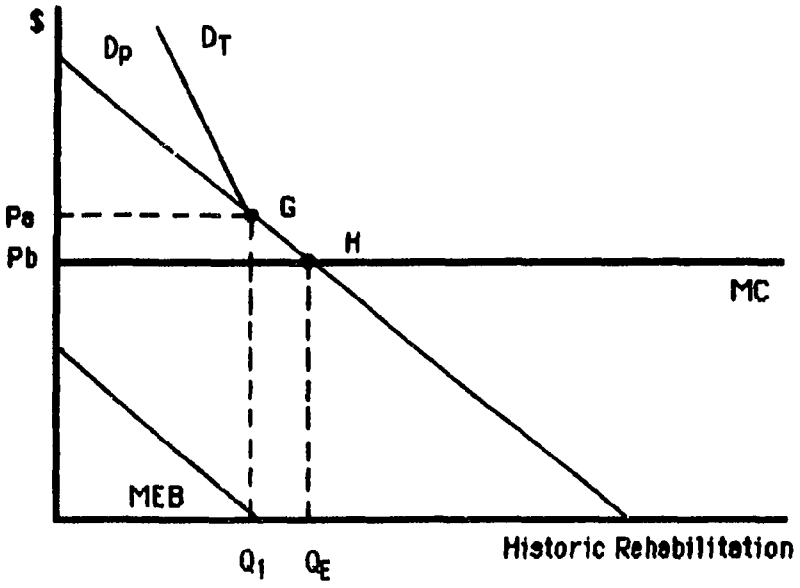

FIGURE 4-4

HISTORIC REHABILITATION WITH INFRAMARGINAL EXTERNALITIES

MC = marginal cost
D_p = private demand of owner
MEB = marginal external benefits
D_T = total demand of owner (includes MEB)
Q_1 = quantity at D_p=D_T
Q_E = quantity at D_p=MC

approximate demand elasticity of the rehabilitation owner. If the HRTC is a significant factor in the spending decision of the owner, his demand is not perfectly inelastic because the spending is responsive to the change in price of historic rehabilitation due to the HRTC.

Definition

Elasticity of demand for historic rehabilitation is the percentage change in one factor (historic rehabilitation) due to the percentage change in another factor (HRTC). The results (Chapter 6) do not measure this elasticity directly but rather provide insight into the general idea of whether or not demand is elastic. If the HRTC has a positive effect on historic preservation, the owner must have an elastic demand: the increase in HRTC significantly affects the owner's spending. In equation form elasticity is: change in historic rehabilitation/change in HRTC*HRTC/historic rehabilitation.

The general case for each individual owner is demonstrated in Figure 4-5. The downward sloping demand indicates the elasticity is negative because as the price of historic rehabilitation decreases due to the HRTC, spending increases because the same goods cost less. The negative slope does not imply an elastic or inelastic demand curve because that depends on the slope of each individual owner's demand curve and where he operates on that demand curve. In the portion of the curve from e=0 to e=-1, or $|e|<1$, the demand is inelastic: downward movements on the price axis result in a less than proportional movement to the right on the quantity axis. In this study, this means that a decrease in price as a result of the HRTC causes a less than proportional increase in spending. In this case, spending decreases in response to a decrease in price.

At the point e=-1, or $|e|=1$, the downward movement along the price axis results in a proportionate movement to the right along the spending axis. This means that a decrease in price due to the HRTC causes spending to remain unchanged.

Demand is elastic when the $e<-1$, or $|e|>1$. A downward movement along the price axis results in a more than proportionate move to the right along the quantity axis. In this case, the drop in price due to the HRTC causes spending to increase because spending is very responsive to the drop in price. This is the desirable case from a policy standpoint.

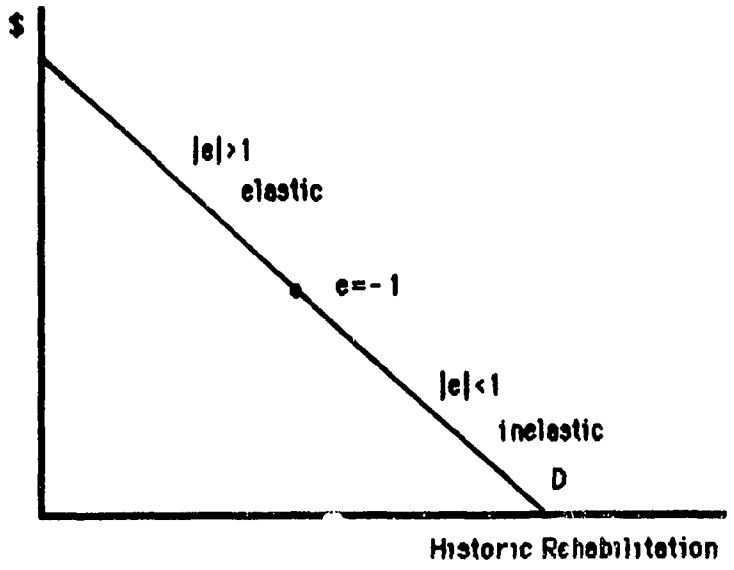

FIGURE 4-5

ELASTICITY

e = elasticity
D = demand of rehabilitation owner

Effects

The effect of the HRTC varies depending on the elasticity of demand of the owner. The owner's total and private demand is examined through the owner's total and private spending amounts. The effect of the HRTC on spending is tested through the regression which is discussed in the Methodology (Chapter 5). If the HRTC does not have a positive effect on spending then the owner is operating in the inelastic portion of his demand curve ($|e|<1$). Total spending does not increase due to the HRTC if the owner's demand is perfectly inelastic because of the owner's unresponsiveness to the drop in price of historic rehabilitation. Private spending decreases in an inelastic demand situation. Resource allocation in the direction of maintaining the stock of historic properties may be affected in this case because of the increased number of buildings rehabilitated. However, resource allocation is not affected as a result of the owner's unresponsiveness to the tax policy.

An owner operating at the point where $|e|=1$ is operating between the elastic and inelastic portions of his demand curve. In this case the decrease in the price of historic rehabilitation due to the HRTC leaves private spending unchanged. Total spending would therefore increase.

An owner with elastic spending ($|e|>1$) increases his total and private spending due to the HRTC. If the HRTC is a significant determinant of spending, the demand is not perfectly inelastic and the owner is responsive to the HRTC. Resource allocation is positively affected.

In summary, examining spending changes in response to the HRTC provides evidence of the elasticity of demand for historic rehabilitation. An increase in private spending implies an elastic demand of the rehabilitation owners. No change in private spending implies that $|e|=1$. A decrease in private spending implies an inelastic demand and owners that are not responsive to the HRTC. The effect of the HRTC on spending, which is tested through the regression analysis, provides additional evidence into the elasticity.

SUMMARY

Excise subsidy theory predicts that the HRTC would encourage rehabilitation owners to take external benefits into account through their spending decision and to increase the quantity of

rehabilitation projects. There is some evidence (Chapter 2) that the HRTC policy increased spending and the number of projects. Evidence on the cost effectiveness of the HRTC is obtained from the database used in this study and is examined in Chapter 6. The reaction of rehabilitation owners to the HRTC is examined by project level information. This will provide evidence into the demand elasticity of the owners: the degree of responsiveness of spending to the HRTC. Because of the project level information available for this study this testing will also provide a closer look into HRTC policy than had previously been possible.

CHAPTER 5

METHODOLOGY

This study is designed to assess empirically the effects of the HRTC and other factors on the nature and spending on historic rehabilitation projects. The descriptive information included in the project-based database is discussed first. This includes a discussion of the database and the factors of interest in this study. Then the development of regression models to test two hypotheses concerning the owners' responsiveness to the HRTC is discussed.

DATA GATHERING

This first section of the methodology discusses the data that are used to determine the descriptive statistics (Chapter 6) and regression results (Chapter 7) regarding the HRTC and historic rehabilitation. The development and content of the database are then discussed followed by a discussion of the factors used in this study. Lastly, the process used to select the projects from the database for this study is discussed.

Database

The database used in this study was discovered by the author of this study after a long search for data on historic rehabilitation projects. Throughout the search, there was always the sense that there was information available on the projects because of the requirements for eligibility for the tax credit. After much background reading in the area, it was discovered that the National Park Service of the U.S. Department of the Interior is the governing body over the historic buildings in the country. The National Register of Historic Places was of interest because a building must be a historic building to be eligible for the historic rehabilitation tax credit. These buildings are listed in the Federal Register [6] when they enter the National Register but more specific information on the buildings was needed such as the year each was built, the type of construction, the location, and the size. These features of the buildings were expected to be helpful in determining the reasons for different spending levels on rehabilitations. After talking with

[6] The Federal Register is published daily and contains the government agency rules and regulations issued each day.

people at the Washington D.C. office of the National Register branch, Interagency Resources Division of the National Park Service, it was discovered that their records were available. They stated it might be easier however to visit one of their five regional offices to gather the information. The next step involved talking with people at the Technical Preservation Services Branch of the National Park Service who supervise the tax credit program. They stated the forms the project owners must fill out for the tax credit are kept at the National Park Service Regional offices. Employees at a couple of the regional offices said it was possible to visit their offices and examine the forms to get the information on the projects.

However, throughout all of this searching it was disappointing that it was not possible to examine projects throughout the entire country without visiting all five of the regional offices including Alaska and San Francisco. Over this several month period the author learned a great deal about historic preservation. One way was by subscribing to several periodicals and joining organizations in the historic preservation area. One organization joined was the National Trust for Historic Preservation, an organization chartered by Congress to promote historic preservation. Material was received concerning an annual conference they were having in Seattle and as part of the information there was the mention of a database they collected on historic rehabilitation projects throughout the country. This was surprising and the author immediately called the National Trust. The Director of Public Policy Research, Dr. Margaret Drury, was very helpful in discussing the database, sending information, and extending an invitation to visit and use the database for this dissertation. Because of the coding and other unique characteristics of the database, the database could not be accessed outside of the National Trust. The conference in Seattle was very helpful in learning more about the database and several months (mid-1986) later the author visited the National Trust headquarters in Washington D.C. to gather the data and run statistical tests. They had a great deal of information on the buildings and projects in their computerized database which saved a trip to each of the regional offices and a great deal of hand coding from forms. Dr. Drury and her staff were very helpful in interpreting the coding of the database, checking for possible errors, and running statistical tests on a portion of the database.

The National Trust's process of collecting the database and the content of it are discussed in the following sections.

Development. The National Trust for Historic Preservation, Public Policy Research Division, started collecting information in 1984 from the certification forms which project owners submit at the start of the projects as part of their application process for the HRTC. Their data collection went back to the start of tax incentives for historic preservation with the Tax Reform Act of 1976, which provided five year amortization of qualified rehabilitation expenditures and which predated the HRTC. The purpose of the collection was "to help establish informed estimates of the magnitude of the program nationally." [Chittenden, DeLaittre, and Drury,1985,p.1]. They found the information invaluable and began coding it for computer use.

The collection of the database information involves photocopying and coding the information from the certification and completion forms. This is done at each of the five National Park Service regional offices and is constantly updated. It is an expensive undertaking. The National Trust has spent over $125,000 which was matched by contributions from developers. Therefore over $250,000 has been spent in total on the development of the database [Holden,1985,p.iii].

The result is the PRIME (Preservation Research and Rehabilitation Impact Estimation) database. It is the only database on the rehabilitation of historic buildings. The content of the database is discussed in the next section.

Content The National Trust for Historic Preservation's PRIME database contains information on over 10,000 historic rehabilitation projects. These projects are in different stages of completion. They also have different statuses with regard to the HRTC. Some were completed prior to the 10% HRTC, others received the 10% HRTC, and others received the 25% HRTC Some projects were denied a tax credit, others have incomplete information, and others may receive the HRTC in the future.

The database contains information from the two forms the owners of each historic rehabilitation project must complete in order to qualify for the tax incentives (prior to the HRTC)

and the HRTC: the certification form and the completion form. These forms are discussed in the Tax Credit Eligibility section of Chapter 2. The information in the PRIME database is presented in Table 5-1. It consists of the following information from the certification form: estimated cost, use of government funding, date project started, square feet of the building, construction material of the building, year the building was built, use of the building before and after the rehabilitation, whether or not located in a historic district, state located, and housing units before and after the rehabilitation. The information from the completion form includes: actual costs which qualify for the HRTC, associated costs which do not qualify for the HRTC, completion date, and status of the HRTC approval (or disapproval).

Limitations. The limitations of the forms from which the database is obtained can be categorized into four areas: availability of project information, building characteristics, owner characteristics, and environmental characteristics. These limitations are not crucial to this study but rather would have been interesting to analyze. The first limitation is the lack of available information on rehabilitation projects which were completed prior to the 10% HRTC. Forms were required to be filed certifying the rehabilitations for purposes of obtaining the amortization tax incentives of the 0% HRTC period. However, there are not many of these projects included in the database. No information is available on projects prior to the Tax Reform Act of 1976 because project owners did not complete forms such as these due to the fact that there were no incentives for historic rehabilitation.

A related limitation is the lack of any projects which did not apply for the HRTC. Many historic rehabilitation projects were completed without an application for the HRTC. Projects completed by governments, other entities, and individuals who could not qualify or did not want to apply for the HRTC did not complete the forms and therefore were not available to be included in the database. An example of this is owners who rehabilitated a historic house and lived in it themselves rather than rented it out to others. They were not eligible for the HRTC and therefore did not complete the application forms. Analysis of these projects would be interesting but would go beyond the purpose of this study. Limitations as to the representativeness of the projects in the

TABLE 5-1

INFORMATION AVAILABLE FROM DATABASE

Certification Form	Completion Form
Estimated Cost	Actual Cost
Government Funding	Associated Cost
Date Project Started	Date Project Ended
Square Feet	Status of HRTC Approval
Construction Type	
Year Building Built	
Use Before Rehabilitation	
Use After Rehabilitation	
Historic District	
State	
Housing Units Before Rehabilitation	
Housing Units After Rehabilitation	

database as compared to the total number of completed projects is discussed in the section of the chapter entitled: Process of Selecting Projects from the Database.

Another limitation concerning the availability of project information is the lack of information on associated costs for all projects. Some versions of the completion forms did not include this item and therefore it is not available for all projects. These costs are not eligible for the HRTC, however, it would have been interesting to determine if this spending changed over the HRTC periods as the spending eligible for the HRTC changed.

Building characteristic limitations include the fact that the forms do not include the condition of the buildings prior to the rehabilitation. Other factors proxy for this in this study. The appraised value of the buildings before and after rehabilitations would also have been interesting because they would have given an indication of the extent of the rehabilitations. Another omission is the amount of government funding for the projects which received funding. The existence of funding is included on the forms but the amount of funding is not included. Therefore, the spending of government funding is included in the private spending of the owners in this study. However, since only a small percentage of the projects received funding, this is not a critical issue.

Information on the owners of the buildings would have been interesting, such as whether each owner was an individual, partnership, or corporation. The National Trust attempted to obtain information on this area by contacting owners directly. This attempt was not successful due to a low response rate. This would have provided insight into the different ownership formats which would have provided insight into other issues such as additional tax law effects. Insight into the reasoning of the owners as to why they chose to invest in historic property rather than other investments would also have provided interesting policy implications.

Several environmental factors would have provided for an interesting analysis Two examples are the mortgage rate and the construction cost index faced by each project owner. These are estimated in this study since the actual figures are not available. The location of each rehabilitated building in terms of city or rural area would have provided a useful addition to the

neighborhood factors. The historic district factor contributed somewhat to this issue of whether or not the buildings were among similar buildings or isolated. The city or rural information would also have provided a useful insight into a factor that is omitted from the database: land cost. Owners of land bought at a low cost could be viewed as receiving a type of subsidy whereas owners of land bought at a high cost may need the HRTC to undertake the rehabilitation project and offset the high cost of land. The benefits to the city from the project (both during and after the rehabilitation) in terms of tourism, jobs, and the local economy may have been important considerations of some owners but the information is not available. The opportunities upon completion of the project would have been interesting to know because if the prospects were good and the building was rented prior to completion, more may have been spent on the rehabilitation because the owner knew the costs would be recouped quickly.

Source of Factors

The factors used to examine historic rehabilitation spending in this study consist of most of the factors in the database collected by the National Trust along with two additional factors. The sources of the factors used is discussed in this section. Table 5-2 lists the factors by source. This combined data set is used in this study The factors are described in the next sections.

Factors from Database. Much of the information in the National Trust database is used in this study. The form from which each of the factors was obtained is listed in Table 5-2. All of the factors are from the certification form with the exception of actual cost (does not include associated cost) and completion date which are from the completion form. These forms are discussed in the Tax Credit Eligibility section of Chapter 2.

From a comparison of Tables 5-1 and 5-2 it is obvious that a few of the database factors are not included in this study. The housing units before and after the rehabilitation are not included because this information was omitted on some versions of the forms the owners completed. The forms changed somewhat over the years and this was a factor that was not consistently used. However, residential use was captured by the use after rehabilitation factor, therefore the housing issue is addressed if not the number of units. The use before the

TABLE 5-2

SOURCE OF FACTORS

Database		Additional
Certification Form	Completion Form	
HRTC Period	Actual Cost	Mortgage Rate
Government Funding	Completion Time	Construction Cost Index
Square Feet		
Construction Type		
Age of Building		
Use After Rehabilitation		
Historic District		
Region		

rehabilitation is not included in this study because the use after the rehabilitation was the major interest. Also, the majority of buildings have the same after rehabilitation use as before rehabilitation use. The estimated cost is not included because this was often guesswork by the owner. The actual cost upon completion was studied instead because it determined the HRTC. The associated costs were not included because these costs were not eligible for the HRTC. Some versions of the completion forms did not include this item. Therefore, it is not available for all projects and is not able to be examined in this study.

Additional Factors. As mentioned in the limitations of the database, some information, specifically the economic conditions facing the projects, would have been interesting to have included on the forms and in the database. Since this information is not available, it is approximated for each project. The two factors of interest are the market conditions of the mortgage rate and construction cost index each project faced. These market conditions are approximated for each project and are then included in the descriptive results of the projects. These market conditions, deflated for inflation, are also included in the regression analysis to determine the effects of these factors on spending. The justification and the description of the use of these factors is discussed in the next section. The process used to approximate these factors using national economic statistics for each project is discussed in this section.

Because the actual mortgage rates used by the project owners in financing the projects are not known, a mortgage rate is approximated for each project in order to consider the effect of financing costs on spending on the projects. The mortgage rate each project owner incurred in order to receive a loan for the project is approximated by the 90 day prime rate [Survey of Current Business, 1972-1986] the month the rehabilitation was begun. The 90 day prime rate is used as a surrogate for the actual mortgage rate because it is a short-term loan rate which is generally the term of a construction loan. Doti and Adibi [1985] also used this prime rate as a proxy for the cost of credit of residential building investment. The construction loan rates are not available for the period of this study. The month the rehabilitation is begun is the date used to approximate the mortgage rate because construction loans are normally taken out at the start of

construction for the entire construction period. Therefore, the rate in effect at the start of the project is normally the financing rate the owner pays for the project and the rate that affects his spending decision.

The deflator used to deflate this mortgage rate to real terms for purposes of the regression analysis is the Fixed Weighted Price Index for GNP-Fixed Investment [Survey of Current Business,1972-1986] (1972=100). The Fixed Weighted Price Index measures the price change of GNP only, holding the composition of GNP constant. This particular index is appropriate because it approximates the inflation rate of residential and nonresidential investment (price changes only) of the month the project was begun. The implicit price deflator which is often used to adjust costs to real terms is not recommended because it not only reflects price changes but also composition changes of GNP [Survey of Current Business, 1986]. When the mortgage rate is divided by the Fixed Weighted Price Index for GNP-Fixed Investment, the remaining rate is the real rate of interest. This computation is illustrated in Table 5-3. The average nominal mortgage rate, the average deflator, and the average real mortgage rate are presented for each HRTC period. These averages represent the average for all projects in each HRTC period.

The construction cost index of each rehabilitation project approximates the cost of construction materials and wage rates the rehabilitation owners faced. It is approximated by the index which is obtained from the E. H. Boeckh Building Cost Index [Survey of Current Business,1986] (1972=100). This index is used because it is the most representative index of historic rehabilitation costs across the country. This is because several types of buildings in several cities with several different types of costs are included in the index. This index is the average of three indexes on different use buildings: small residences; apartments, hotels, and offices; and commercial and factory buildings. This index is based on a survey of building costs in 20 cities. Costs include building materials such as brick, lumber, cement, glass, and paint along with wage rates, social security payroll taxes, and sales taxes. The index includes an inflation component. It is averaged for the whole construction period of each project because it is assumed that construction occurred evenly throughout the period.

TABLE 5-3

CALCULATION TO DETERMINE AVERAGE MORTGAGE RATE AND CONSTRUCTION COST INDEX IN DEFLATED TERMS BY HRTC PERIOD

	0% HRTC 6/76-10/78	10% HRTC 11/78-7/81	25% HRTC 8/81-12/85	TOTAL
Mortgage Rate[a]	6.95	13.05	11.19	11.53
(divided) deflator[b]	1.61	1.99	2.37	2.26
Mortgage Rate (real)	4.31	6.56	4.72	5.14
Construction Cost Index[c]	173.42	198.34	236.25	223.51
(divided) deflator[d]	1.81	2.11	2.35	2.26
Construction Cost Index (deflated)	95.81	94.00	100.53	98.90

[a] 90 day prime rate the month each project began, Survey of Current Business, 1972-1986.

[b] Fixed Weighted Price Index for GNP-Fixed Investment the month each project began, Survey of Current Business, 1972-1986, 1972=100.

[c] E.H. Boeckh Building Cost Index averaged over each construction period, Survey of Current Business, 1972-1986, 1972=100.

[d] Fixed Weighted Price Index for GNP-Fixed Investment averaged over each construction period, Survey of Current Business, 1972-1986, 1972=100.

The deflator used to deflate the construction cost index for purposes of the regression analysis is the Fixed Weighted Price Index for GNP- Fixed Investment [Survey of Current Business,1972-1986] (1972=100). It includes the costs of nonresidential and residential structures, and additions and alterations to structures. This is a broader category of costs than the construction cost index but is the most appropriate deflator for rehabilitation expenditures. The average deflator over the project construction period is calculated for each project because it is assumed that spending occurred evenly throughout the construction period. The construction cost index (with inflation) is divided by the deflator to obtain the deflated (without inflation) construction cost index. Table 5-3 presents the average construction cost index, average deflator, and the average deflated construction cost index.

This same deflator is used to deflate the spending on each project for purposes of the regression analysis. The deflation to real terms is needed in order to compare projects over a nine year period on an equal basis. Spending is divided by the Fixed Weighted Price Index for GNP-Fixed Investment (averaged over the construction period) to obtain the spending adjusted for inflation which is examined in the regression analysis. Because the spending is construction related, the deflator used to deflate the construction cost index is appropriate to determine the spending in real terms for each project.

Description and Justification of Factors

The factors chosen consist of the HRTC (the issue of primary interest) and several other factors which control for influences on historic rehabilitation other than the HRTC. These factors are all expected to impact on the historic rehabilitation spending decision. The factors used in this study which are listed in Table 5-2 are grouped into categories in Table 5-4. The categories consist of the subsidies used with each historic rehabilitation project: HRTC and government funding; the market conditions in effect when each project began: mortgage rate and construction cost index; the size and exterior characteristics of the building: square feet and construction type; the condition of the building: age of the building, completion time, and use on completion; and the neighborhood and area characteristics of the building: historic district and region. The

TABLE 5-4

CATEGORIZATION OF FACTORS, EXPECTED EFFECTS, AND UNITS OF MEASURE

Factor	Expected Effect	Units of Measure
Economic Factors		
Subsidies:		
10% HRTC (TC1)	+	1 if in 10% HRTC period
25% HRTC (TC2)	+	1 if in 25% HRTC period
Government Funding (GF)	+	1 if used government funding
Market Conditions:		
Mortgage Rate (MR)	-	approximate mortgage rate
Construction Cost Index (CCI)	+	approximate construction cost index
Composition Factors		
Size and Exterior Characteristics:		
Square Feet (SQFT)	-	number of square feet
Wood Construction (CONS)	-	1 if wood construction
Condition of the Building:		
Age (AGE)	+	age of building when rehabilitated
Completion Time (TIME)	+	months to complete rehabilitation
Residential Use After Completion (USE)	-	1 if residential use after rehabilitation
Neighborhood and Area Characteristics:		
Located in Historic District (HD)	-	1 if in historic district
Located in Northeast (NE)	+ or -	1 if in Northeast
Located in Midwest (MW)	+ or -	1 if in Midwest
Located in Southeast (SE)	+ or -	1 if in Southeast

justification for the use of each of these factors in the rehabilitation decision of an owner is examined in this section. Included in this discussion is the expected effect of each factor on spending. This is included for purposes of the regression analysis which is discussed later in this chapter A factor in which a positive effect is expected on spending is expected also to have a positive coefficient in the regression analysis concerning the effects on spending. Therefore as the factor level increases, spending is expected to increase. A negative effect on spending means that as the factor level increases, spending decreases. The expected effects on spending are included in Table 5-4. Also included in this section are references to studies that used the variables or category of variables. The studies cited are discussed in the Literature Review (Chapter 3). These studies are included to demonstrate the importance of these variables in other real estate spending studies. The descriptive results of these factors including dollar amounts, totals, and percentages are categorized by HRTC period and by year in the Descriptive Statistics (Chapter 6).

Spending Factors The spending factors examined include: the total amount spent on each historic rehabilitation project, total spending (TSP) (that is eligible for the HRTC); the amount of the owners own money spent (total spending less the HRTC amount), private spending (PSP); and these spending amounts divided by the square feet per project, total spending per square foot (TSFT) and private spending per square foot (PSFT). The spending per square foot is obtained for each project and then averaged over all projects to determine an overall average of spending per square foot The justification for examining these spending amounts is presented in the Economic Theory (Chapter 4). Private spending is computed by subtracting the HRTC received by the owner from the total spending. The HRTC received is computed by multiplying total spending by the HRTC percentage in effect for the months of the project. Projects that span two HRTC periods, therefore, receive a portion of two HRTC percentages based on the number of months the project is in each HRTC period. The actual HRTC received by the owner is not available information, therefore this is the next best alternative.

The following research studies were helpful in dealing with these spending factors: spending on historic rehabilitation projects, Feigenbaum and Jenkinson [1984]; spending on

general real estate, Mark [1980], Mark and Goldberg [1981], Dowall and Landis [1982]; price per square foot of building, Jud [1980]; and price of land per acre, Moser, Riker, and Rosett [1977] and Shonkwiler and Reynolds [1986].

Economic Factors. Subsidies Used. The subsidies examined in this dissertation are the HRTC and government funding. Feigenbaum and Jenkinson [1984] combined these factors into one factor. However, this study is interested in the separate effect of each variable. Subsidies should impact the spending decision of the owner. This subsidy effect is discussed in the Economic Theory (Chapter 4).

The HRTC represents three time periods: the 0% tax credit period from 6-76 to 10-78 (TC0); the 10% tax credit period from 11-78 to 7-81 (TC1); and the 25% tax credit period from 8-81 to 12-85 (TC2). The effective date for the 0% and 10% HRTC periods in this study are the dates the expenditures became eligible for the incentives. The 25% HRTC was signed into law in August 1981 which is the date used in this study. While expenditures were not eligible for the HRTC until January 1982, projects undertaken from August to December of 1981 did so assuming they would receive the 25% HRTC and perhaps delayed the projects until all expenditures qualified for the 25% HRTC. Project starting dates are used to classify each project into a tax credit period. This is because the HRTC percentage in effect at the start of the project is the percentage that each project owner used in his spending decision on the historic rehabilitation project. He was not able to know of any later increase in the HRTC even if his project extended over a long enough time period to get the benefit of a larger HRTC percentage for a portion of the expenditures on the project. Because each project's starting date is used to categorize the project into an HRTC period, some of the projects classified in the 0% HRTC period actually received the 10% HRTC (and possibly the 25% HRTC) for a portion of their spending if the project extended beyond the 0% HRTC period. This is due to the fact that the HRTC is calculated on the spending within each HRTC period and not as of the project starting date. Also, some projects classified in the 10% HRTC period received the 25% HRTC for a portion of their spending. All projects begun in the 25% HRTC period (for purposes of this study) were completed within the 25% HRTC

period. Since the government picked up a portion of the cost of the rehabilitation project through the HRTC, it should have had a positive effect on spending. The effect is expected to be greatest with the higher subsidy which occurred with the 25% HRTC.

The government funding (GF) represents the use of federal, state, and local funding in the historic rehabilitation project. There are many types of funding. Federal funding includes Community Development Block Grants and Department of the Interior grants. States and localities also offer many different types of funding. Most projects did not use any government funding but it was a viable alternative for some projects. It is important to consider the effect of government funding on spending because the funding is another type of government subsidy (other than the HRTC) that takes the place of private funds of the rehabilitation owner. Government funding is expected to affect spending positively. The stimulatory effect of government funding with regard to tax incentives was examined by Tai [1981] and Feigenbaum and Jenkinson [1984].

Market Conditions. The economic variables of this category are expected to affect the owners' spending because market conditions which are conducive to rehabilitation may encourage the owners to spend more than otherwise. The category of market conditions was also used in the housing studies of Dowall and Landis [1982] and Boehm and Ihlanfeldt [1986].

The mortgage rate (MR) of the month and year the project was begun approximates the actual construction loan rate the owner of the rehabilitation project paid. It approximates the demand for money. This factor is important to examine because the mortgage rate the project owners face may directly impact their spending. This assumes the project owners borrowed money for their projects. It is not known which owners borrowed for their projects. There are many facets of this mortgage rate issue that would be interesting to know, such as, which owners borrowed money and how much, the cost of other investment opportunities, the after tax cost of borrowing money, and the expected return from the project. However, these items are not available which limits the conclusions that can be drawn with respect to this factor. Therefore, only a general idea can be obtained in this study as to the mortgage rate each project owner faced and whether or not the mortgage rate affected spending over the HRTC periods. On average, a

negative effect on spending is expected because when the mortgage rate is high (relative to other HRTC periods) spending is expected to be low because the high cost of borrowing money may discourage spending. A low mortgage rate may encourage additional spending on nonessential rehabilitation items.

The nominal mortgage rate (including inflation) is examined when considering the mortgage rate the project owners used to make their spending decision. This is because the mortgage rate which includes inflation is the rate the owners actually pay for financing. The real mortgage rate (deflated for inflation) is important for the regression analysis because the comparison of mortgage rates over a nine year period would have a significant inflation component without the adjustment. The mortgage rates must be comparable across all nine years. It is important to include the cost of borrowing money for the historic rehabilitation projects in the regression model in order to consider the possible factors which may affect spending. The effect of mortgage rates on the price of real estate was examined by Maser, Riker, and Rosett [1977] and Dodi and Adibi [1985].

The cost of construction materials is a factor in each rehabilitation owner's spending decision. The construction cost index (CCI) represents the level of construction costs the project owner faced. It encompasses the demand and supply of the construction cost industry. While the actual construction cost index of each project would be more representative than this approximated index, the actual index is not available. The assumption of this study is that the decision has already been made to undertake a historic rehabilitation project and therefore the spending is the remaining decision given the economic conditions in effect at the time. Other investments compete for the owners' investment dollars. However, once the decision to rehabilitate a historic building is made, a certain level of rehabilitation is required in order to obtain certification of the completed rehabilitation and the HRTC. Therefore, if the cost of construction materials increases, spending may increase because these materials can not be eliminated solely because they cost more than previously. However, an increase in the construction cost index can negatively affect the discretionary rehabilitation spending: spending

that is not essential to the historical character of the rehabilitation. The major portion of the rehabilitation spending is expected to be nondiscretionary spending due to all of the requirements necessary to qualify as a certified historic rehabilitation. Therefore, the overall effect is expected to be positive.

The construction cost index (not deflated) is important when investigating the factors that affect the project owners' spending decisions. The construction cost index in effect throughout each rehabilitation project affects the project owners' spending decisions. This is useful for comparison purposes with other projects. Because the construction cost index may be an important determinant of the amount of spending of a rehabilitation owner, it must be included in the regression analysis. In the regression model it is important to include the deflated construction cost index because the construction costs over the nine year period of this study must be examined on an equivalent basis without an inflation component. Construction cost indices were used in the studies of Boehm and Ihlanfeldt [1986] with regard to home improvement expenditures, Doti and Adibi [1985] concerning residential building investment, and Holden [1985] in a simulation model of historic rehabilitation.

Composition Factors. Size and Exterior Characteristics of the Building. The size of a building and its exterior can have a large impact on the cost of rehabilitating it. Since most of the external walls must be retained and the historic character maintained, the type of exterior will affect the spending needed to rehabilitate the building to its original looks. Similar categories were used by Boehm and Ihlanfeldt [1986] and Grether and Mieszkowski [1974].

The number of square feet (SQFT) in the rehabilitated building is expected to have a negative effect on spending on historic rehabilitation projects. This is due to economies of scale, larger buildings will have less spent on them per square foot than smaller buildings. The number of square feet in buildings is a factor in many housing studies including Grether and Mieszkowski [1974], Mayer [1981], Dowell and Landis [1982], and Palmquist [1984]. Square feet was also used in many real estate valuation studies including those of Mark [1980], Jud [1980], Mark and Goldberg [1981], and Shonkwiler and Reynolds [1986].

The construction type (CONS) of the building signifies whether the building is of wood construction or brick, stone, or other construction. It is expected to affect the spending on the rehabilitation. For example, a wood frame building is expected to be less expensive to rehabilitate than a brick or masonry building (everything else equal) and therefore should have a negative effect on project spending. Since the frame and exterior of the building is often crucial to its historic character, the owner has to use the original construction material in the rehabilitation and the spending therefore varies depending on its construction type. The construction type was studied by Mark and Goldberg [1981] and Carpenter and Chester [1984]. The category of brick versus other types of construction was used by Grether and Mieszkowski [1974], Jud [1980], and Palmquist [1984].

Condition of the Building. The condition of a building can greatly affect spending needed to get the building back to its original state. The worse off the condition, the higher the spending needed. Condition, per se, is not available from the database (because it is not included on the forms the owners complete) and therefore three factors proxy for it: the age of the building, completion time, and the use of the building upon completion. Condition of the building was a factor in many studies: Boehm and Ihlanfeldt [1986]; Grether and Mieszkowski [1974]; Sheer [1980]; Mayer [1981]; Mark and Goldberg [1981]; and Palmquist [1984].

The age of the building (AGE) when rehabilitated is expected to have a positive effect on spending. This is because in many cases the older a building is the more money that is needed to rehabilitate it to its original condition and therefore more is expected to be spent on the building than if the building was newer. The age of a building was used in many studies including the tax credit study of Carpenter and Chester [1984], the housing studies of Grether and Mieszkowski [1974], Mendelsohn [1977], Mayer [1981], Sheer [1983], Palmquist [1984], and Boehm and Ihlanfeldt [1986], and the real estate valuation studies of Mark [1980], Jud [1980], and Mark and Goldberg [1981].

The completion time (TIME) of the project is the actual number of months used to complete the rehabilitation. This is expected to have a positive effect on spending because the more

months of rehabilitation construction; the poorer the condition of the building, the more expense that would likely be involved.

The use of the completed building (USE) is divided into residential and commercial uses. Residential use includes apartment buildings and houses. Commercial use includes office buildings and warehouses and other uses include religious and educational uses such as churches and schools. Residential use is expected to have a negative effect on spending because residential buildings are generally smaller than commercial buildings [Walter, 1986, p.8] and therefore less is spent on their rehabilitation. Residential versus commercial property was examined by Moser, Riker, and Rosett [1977], Dorr [1979], and Stern [1979].

Neighborhood and Area Characteristics. This category is important to this study because the area surrounding the rehabilitated building can greatly influence the spending on the rehabilitation. Also, more may be spent on buildings in particular regions of the country. This category was used as a determinant in many studies including the energy tax credit study of Carpenter and Chester [1984], the housing studies of Grether and Mieszkowski [1974], Mendelsohn [1977], Dowell and Landis [1982], Sheer [1983], Palmquist [1984], and Boehm and Ihlanfeldt [1986], and the real estate valuation studies of Moser, Riker, and Rosett [1977] and Mark [1980].

The historic district represents whether the rehabilitated building is part of a historic district. The standards for evaluation of a historic building may be different if the historic building is part of a historic district than if it is individually listed in the National Register. The building could qualify for the HRTC if it is of historical significance to the district. The requirements for this are generally less strict than the standards for individual certification. Therefore, less is expected to be spent in general on buildings in historic districts because the HRTC is available to historic district rehabilitations with fewer restrictions as to amount spent. Stricter standards on other buildings may force the owners to spend more.

The region signifies in which of the five regions of the country the property is located: Northeast (NE), Midwest (MW), Southeast (SE), West (W), or Alaska. Appendix A lists the

states in each region. These are regions designated by the National Trust for Historic Preservation. There are no completed projects in the database located in Alaska and therefore four regions are examined in this study. The regions could have a varying impact on spending due to varying economies of the regions, and other factors. Therefore there is no expectation as to direction of the effect of the regions on spending. Regions of the country were studied by Mendelsohn [1977] and Carpenter and Chester [1984].

Process of Selecting Projects from the Database

At the time the author visited the National Trust in mid-1986 and selected projects for use in this study, there were 11,313 projects in the PRIME database. This included some projects that were denied the HRTC, projects that were incomplete, and other projects that received the HRTC. 8,613 of these projects were coded as approved certified rehabilitations as a result of the Certification Form the owners complete at the start of each project. There is no separate status code for projects that filed the Completion Form and received the HRTC however it is those projects which are of interest in this study. Therefore only those projects in the database with actual spending amounts from the Completion Form indicating they received the pre-HRTC tax incentives or the HRTC were examined. 2,504 projects were approved upon the completion of the project. The remainder were pending approval and a few were denied approval. 2,103 of these projects had relevant information on the dates of the projects and the number of square feet, both of which are necessary in order to determine the proper HRTC period and spending per square foot. Of those projects, 1,984 projects had no missing information on the other factors of interest including the financing, construction type, year built, use, historic district, and region. These projects were examined in this study. The projects with missing data that were not selected were distributed over the HRTC periods in a way similar to the distribution of the projects with complete information over the HRTC periods: a few projects in the 0% HRTC period, more in the 10% HRTC period, and the greatest number in the 25% HRTC period. Therefore, the results of this study would not be expected to be significantly different if all of the projects with complete

data were examined. The results would also not be expected to be different if more completed projects were included in the database because there is no evidence of bias in the included projects.

Table 5-5 presents a comparison between the number of completed projects examined in the database categorized by year ended and the total number of completed projects by year compiled by the General Accounting Office (GAO). The latter information is also presented in Table 2-2 of Chapter 2. This GAO information does not include projects eligible for tax incentives in the 0% HRTC period. The GAO information is categorized by year ended and therefore the projects in the database are compared to the GAO information according to year ended. However, this study categorizes projects by year started. Therefore, the project totals per HRTC period are different when categorized by year ended in Table 5-5 as compared to year started. The third column of Table 5-5 indicates the percentage of projects examined in the database of the total number of completed projects determined from the GAO report. Approximately one-third of the total projects are examined in the 10% and 25% HRTC periods. The lowest percentages occur in the first two years of the HRTC (1979 and 1980: 20%) and last two years of the HRTC (1984: 21% and 1985: 2%). The low percentages in the 10% HRTC period are somewhat a function of the different recordkeeping by the National Park Service prior to 1982. The national office of the National Park Service in Washington D.C. collected the applications and certification forms prior to 1982 for the entire country. When the regional office system was set up in 1982, the regional offices began the collection of the forms and the Washington D.C. office distributed some of the forms to the regional offices. The confusion over these forms may be part of the reason for the low number of projects recorded in the database from the10% HRTC period. Also, the National Trust seems to be most interested in the 25% HRTC period. An indication of this is that their data collection did not begin until 1984. The explanation for the low percentage of completed projects included in the database in 1984 and especially 1985 is due to the great time, money, and effort necessary to update the database. The National Trust makes every effort to update the database, however it takes time to gather the information at each regional office and then code it into the computer. This lag due to recordkeeping also explains why there are a great many projects

TABLE 5-5

PROJECTS COMPLETED AND ELIGIBLE FOR THE HRTC BY YEAR ENDED

Year	Database	GAO Total[a]	Percentage of Database to Total
0% HRTC:			
1976	1	[b]	[b]
1977	2	[b]	[b]
1978	8	[b]	[b]
10% HRTC:			
1979	28	[c]	[c]
1980	126	752[c]	20[c]
1981	250	575	43
25% HRTC:			
1982	525	563	93
1983	712	1,192	60
1984	294	1,424	21
1985	38	1,735	2
TOTALS	1,984	6,241	

[a] Source of the Totals: U.S. General Accounting Office, "Tax Policy and Administration, Historic Preservation Tax Incentives," August 1, 1986, p.26.

[b] Year and totals for 1976-1978 are not available from the GAO Total source.

[c] The 752 is the total number of projects completed in 1979 and 1980 and the 20% is the percentage of database projects to the total projects completed in 1979 and 1980.

NOTE: The database project numbers do not match the number of projects categorized by HRTC periods for this study because this table is categorized by year and not year started as the projects are categorized for purposes of this study.

(5,998) included in the database which were approved at the start of the project but the database does not have the completed project information and therefore the projects are not included in this study. While there are some limitations to using the National Trust database, it must be kept in mind that to get information on a higher percentage of completed projects, one would have to visit each of the five regional offices and hand code a database from the certification and completion forms.

In summary, this is the process that was used to select the HRTC projects examined in this study. While more information on the projects not chosen would be interesting, such as information on the projects denied the HRTC and projects still pending the HRTC, that is not the focus of this study and is therefore for future research. All of the completed projects in the database which received the HRTC and have complete information are analyzed in this study.

STATISTICAL TESTING

This second section of the methodology discusses the method which is used to test the effect of the HRTC on historic rehabilitation spending. The factors (discussed in previous section), along with the HRTC, which affect the owners' spending on the projects are examined by regression analysis. The results of this analysis provide insight into elasticity theory which is discussed in the Regression Results and Implications (Chapter 7).

Hypotheses

Based on economic theory (excise subsidy theory and elasticity of demand theory of Chapter 4), hypotheses are formulated to evaluate the effectiveness of the HRTC in affecting the owners' spending. These theories can not be proven but rather provide guidance as to the effect of the HRTC. These hypotheses are designed to provide evidence concerning the issue of whether the HRTC is a significant determinant of spending on historic rehabilitation projects.

The following hypotheses are formulated:

1. Ho: The HRTC did not affect total spending per square foot for rehabilitation.
   Ha: The HRTC did affect total spending per square foot for rehabilitation.

2. Ho: The HRTC did not affect private spending per square foot for rehabilitation.
   Ha: The HRTC did affect private spending per square foot for rehabilitation.

Concerning the first hypothesis, the inability to reject the null would imply that the HRTC was not a significant factor with respect to total spending per square foot of the rehabilitation. In this case, the owners' total demand (D_T in Figure 4-1 and 4-2) is inelastic and not responsive to the HRTC. Other factors were more important to the owner than the price of rehabilitation. These other factors could be intangible, noneconomic factors such as a preference for new construction.

Rejecting the null hypothesis concerning total spending would indicate that the HRTC was a significant determinant of spending per square foot of rehabilitation projects. In this case, total demand (D_T) is elastic and responsive to the HRTC. Consequently, the HRTC had a significant effect on total spending. Noneconomic factors may also have been important to the owner, however they did not counteract the effect of the HRTC.

Concerning the second hypothesis on private spending, not rejecting the null would imply that the HRTC was not a significant factor with respect to private spending per square foot. The owners' private demand (D_P) was inelastic and not responsive to the HRTC. This indicates the HRTC was not influential in encouraging the owner to spend more of his own money (total spending less the HRTC received) on historic rehabilitation than prior to the HRTC. The HRTC may be a significant factor in his total spending decision (in which case the first null hypothesis is rejected) and not a significant factor in the owner's private spending decision. This may be because the noneconomic factors are more important to the owner with respect to his own money than when he spends the government's money.

Rejecting the null hypothesis would imply that the HRTC was a significant factor with respect to private spending by the rehabilitation owner. The private demand (D_P) was elastic and responsive to the HRTC. The decrease in price of historic rehabilitation influenced the owner to shift some of his spending away from other goods and into historic rehabilitation. The owner's preferences were very much affected by the price decrease in historic rehabilitation due to the HRTC. In this case, the amount of the owner's own money spent was significantly influenced by the

HRTC. Therefore, the noneconomic factors did not override the importance of the HRTC in the private spending decision of the rehabilitation owner.

General Model

The following general model is developed:

Spending=f(Economic Factors, Composition Factors)

The HRTC is an economic factor in this model in addition to government funding and market conditions. Composition factors include size and exterior characteristics of the building, condition of the building, and neighborhood and area characteristics. These are the factors discussed in a previous section of this chapter, most of which are in the National Trust database.

A concern of using this model is that there are a great many historic rehabilitation projects with many different attributes. These projects must be comparable in order to examine them as a group. The differences between the projects are captured in the factors of the model. Varying opportunities are examined by the subsidy and market condition factors, varying building sizes and types are examined by the structural characteristics of the building, and conditions of the buildings are examined by the complexity of project factors. In order to compare spending on an equal basis over an eight year period, the spending amounts are deflated to real terms. In order to compare many sizes of buildings, the spending is divided by the number of square feet in the building. This technique is used in similar studies of land prices which examine the spending per acre. Land, like buildings, can vary greatly in size, so it is necessary to use a common denominator (square feet) when examining spending.

Regression Models

Two regression models are used to test the effect of the HRTC on total and private spending adjusted for size. These models can be represented as follows:

$$y_1=b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7+b_8x_8+b_9x_9+b_{10}x_{10}+b_{11}x_{11}+e$$

$$y_2=b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7+b_8x_8+b_9x_9+b_{10}x_{10}+b_{11}x_{11}+e$$

y_1 = total spending/square foot (TSFT)

y_2 = private spending/square foot (PSFT)

x_1 = HRTC (TC0) (TC1) (TC2)

x_2 = government funding (GF)

x_3 = mortgage rate (MR)

x_4 = construction cost index (CCI)

x_5 = square feet (SQFT)

x_6 = construction type (CONS)

x_7 = age of the building (AGE)

x_8 = completion time (TIME)

x_9 = use of completed building (USE)

x_{10} = historic district (HD)

x_{11} = region (NE) (MW) (SE) (W)

Multiple regression analysis is performed on these models. It is appropriate in this study because the effects of each HRTC period on spending are the main concern and the effects of other variables on spending are also of interest. Multiple regression analysis determines the positive or negative effect of each variable on spending and the extent that spending changes due to a change in each of the factors. Spending per square foot (y_1 and y_2) is the dependent variable because it is dependent on the other variables. The other variables (x's) are independent variables. The effects on spending per square foot are determined by combining complete project information on each project with information on all of the other projects. Therefore, there is a value for each variable for each of the 1,984 projects. The regression analysis determines the coefficients (b's) for each of the variables. The factors either have a significant effect on spending or not. This is determined by a two-tailed test because it is more conservative than a one-tailed test. Although some variables have expected signs, the effects could be in either direction. If they have a significant effect then their coefficient is examined. It has either a positive or negative sign and a number. These indicate if the variable has a positive or negative effect on the dependent variable (spending)

and the extent an increase in one unit of the independent variable increases or decreases spending. The b_0 term is the intercept which is the spending level with no factors considered.

Two linear regressions are run: one for each dependent variable (TSFT and PSFT). There is evidence in the real estate and tax incentive literature for the use of logarithmic regression as well as linear regression when the dependent variable is total spending to determine which is the best fit for the data. Total spending as the dependent variable is often associated with heteroscedasticity, therefore logarithmic regressions are needed to control for it. However, when the dependent variable is scaled by square feet, as in this study, there is no heteroscedasticity problem and therefore the linear format is appropriate. Linear regression allows the elasticity to vary with the different levels of the variables [Mallela,1980]. For example, if completion time increases from six months to one year, there may be a big difference in spending. However, an increase in completion time from three and one-half years to four years (also a six month increase) may not increase spending significantly. The interpretation of the coefficients of the linear regression is in terms of dollars per square foot.

The results of this regression analysis are presented in the Regression Results and Implications (Chapter 7). The results include the overall explanatory power of all of the independent variables in explaining spending and the coefficients of each independent variable and therefore their individual effect on spending. The computer programs used to run the regression analysis are SYSTAT (System Statistics) and SAS. Interesting policy implications, including some related to the economic theories, are discussed in Chapter 7.

Variable Codification

The codification of the variables for regression is discussed in this section. All historic rehabilitation projects included in the database which were completed by the end of 1985 with no missing information on the factors of interest are used in this study. The total number of projects studied is 1,984. A thorough description of the selection process in determining the projects in this study is presented in the Process of Selecting Projects from the Database section of this chapter. The variables of interest are obtained from the database for each of these projects. Next,

the economic variables of mortgage rate and construction cost index are approximated for each project. This combined data set, which is described in the Description and Justification of Factors section of this chapter, is then used for the analysis. The expected effects of each variable on spending (the sign of the b coefficient) are mentioned in this section but they are discussed in more detail in the Description and Justification of Factors section of this chapter.

The dependent variables are TSFT (y_1) and PSFT (y_2). These variables are scaled by square feet in order to control for differences in project size and deflated to real terms in order to compare several years of spending. They are studied to determine if the HRTC had a significant effect on the project spending when all projects are equalized by size. Projects are equalized by size because of the large differences in project spending and size. If projects are not equalized by size, these large differences would violate a statistical property of regression analysis, homoscedasticity. This is discussed in the following section of this chapter, Statistical Properties of the Model.

The HRTC (x_1) consists of two dummy variables which indicate the tax credit period in effect when each project was begun: (TC1) 1 if 10%, 0 if 0% or 25%; and (TC2) 1 if 25%, 0 if 0% or 10%. The 0% HRTC period (TC0) is represented by a 0 value of both TC1 and TC2. It is used as the base period for comparison purposes. Dummy variables are used because the area of interest is whether the 10% or 25% HRTC periods affected spending. Projects are classified into one of the three periods by starting date. The HRTC period is expected to affect spending positively.

GF (x_2) is a dummy variable: 1 if the project received any federal, state, or local government funding, 0 if the project received no government funding. A positive effect is expected. MR (x_3) is the mortgage rate, deflated. A negative effect is expected because a high mortgage rate is expected to be associated with low spending as compared to a low mortgage rate. CCI (x_4) is the construction cost index, deflated. A positive effect is expected because a high construction cost index is expected to be associated with high spending as compared with a low construction cost index.

SQFT (x_5) is the actual number of square feet (in 1000's) in the rehabilitated building. In this study, square feet of the rehabilitated building is included as an independent variable and a negative effect is expected. Some studies that used price per square foot as the dependent variable (as this study does) also used square feet as an independent variable and found it to be a significant factor [Shonkwiler and Reynolds, 1986 and Jud, 1980]. A further justification for the inclusion of square feet on both sides of the equation is provided by Palmquist [1984,p.397]: "Appraisers have long known that price per square foot varies with the size of the house."

CONS (x_6) is a dummy variable: 1 if wood construction, 0 if not wood construction (brick, stone, etc.). A negative effect on spending is expected because wood construction is expected to be associated with low spending. AGE (x_7) is the actual age of the building at the start of the rehabilitation. A positive effect on spending is expected because the greater the age, the more that is expected to be spent. TIME (x_8) is the number of months used to complete the historic rehabilitation project. A positive effect is expected. USE (x_9) consists of one dummy variable: 1 if residential, 0 if commercial or other uses. A negative effect on spending is expected with respect to residential projects because they are expected to be smaller and less expensive than commercial projects. HD (x_{10}) is a dummy variable: 1 if part of a historic district, 0 if not. A negative effect is expected.

The region (x_{11}) divided the country into four regions. The three dummy variables are: (NE) 1 if Northeast and MidAtlantic state, 0 if not; (MW) 1 if Rocky Mountain and Central Plains state, 0 if not; and (SE) 1 if Southeast state, 0 if not. The remainder are Western states (W) which are used as the basis for comparison. When the three dummy variables have values of 0, this indicates a project in the Western region. No particular positive or negative effect of the region variables is expected.

Statistical Properties of the Model

Four important statistical properties of regression analysis are: (1) unbiased estimation of the parameters; (2) normal distribution; (3) lack of multicollinearity; and (4) homoscedesticity. Regression analysis is robust, meaning that the results are not necessarily

worthless if the statistical properties are not present. "... the strength of ordinary regression is its great resilience....If the researcher sets up the problem correctly, regression will tend to the right answer under any reasonable practical circumstances, even if a great many of the classical postulates are violated [Achen, 1982,p.36-37]. However, evidence on these statistical properties is gathered to determine if any of the properties are not present, and if so if it is a limitation of the study.

Unbiased Parameter Estimates. Ideally, in order to have unbiased estimation of the parameters, there must be an absence of specification error. This means that the theoretically specified variables are included in the regression [Rao, 1971]. Any violation of this statistical property in this study is examined by determining if all of the theoretically specified variables are included in the regression The theory in this tax incentive area does not specify particular variables. Therefore, the variables were chosen for this study after an extensive literature review. Because this property can not be formally tested, the presentation of the tests of the properties in the Regression Results and Implications (Chapter 7) does not include this property

Normality. The statistical property of a normal distribution can not be tested directly because the distribution of the population of historic rehabilitation projects is unknown. However, the central limit theorem states that as the number of observations increases, the distribution of the sample approaches the distribution of the population which is assumed to be a normal distribution [Glass and Stanley, 1970]. While the distribution of the population of historic rehabilitation projects is not known to be necessarily a normal distribution, the large number of projects examined (1,984) provides evidence that the historic rehabilitation project values in this study are distributed in a similar way as all historic rehabilitation projects. This then indicates that the projects examined are representative of all completed historic rehabilitation projects (including those projects with missing data and therefore not included in

this study). This statistical property also can not be formally tested and therefore is not discussed in Chapter 7.

Multicollinearity. Multicollinearity is a threat to the proper specification and effective estimation of the relationship between the variables. Multicollinearity exists when two independent variables, such as size of the project and the age of the building, vary together and so are correlated with each other. Therefore each variable's coefficient does not indicate solely its effect on spending because other variables' effects are enmeshed with it and the effects of the variables can not be separated. Therefore, the parameter estimates (coefficients of the regression model) are unreliable [Lewis-Beck,1983,p.59] and the standard errors are large [Kerlinger,1973,p.443]. Perfect multicollinearity would mean perfect linear dependency within the independent variables which leads to a completely indeterminate set of parameter estimates. The variances of the affected variables' regression coefficients become infinite [Farrar and Glauber,1967,p.93].

In order to determine if multicollinearity exists in a study, Mark [1980] suggests examining the simple correlation coefficients and if any are large (1.0 is perfect multicollinearity) then there may be multicollinearity. He also suggests regressing each of the independent variables on the other n- 1 independent variables to look for high R^2 values (1.0 is perfect explanatory power) This takes into account the relationships among all of the independent variables. Both of these tests are performed in this study to determine if there is any evidence of multicollinearity. Common solutions to multicollinearity are to omit a variable or gather more data. The latter option is not available in this study because all of the available historic rehabilitation projects are studied. The results of the tests of this statistical property of lack of multicollinearity are presented in the Regression Results and Implications (Chapter 7).

Homoscedasticity The statistical property of homoscedasticity is violated if the variance of the error term is not constant for all values of the independent variables. While the least squares estimates remain unbiased, the significance tests and confidence intervals could be wrong [Lewis-Beck,1980,p.28]. For example, normally as the building size (square feet) increases,

there is more variability in the spending and the assumption of homoscedasticity is violated. This is heteroscedasticity. For this reason, many real estate studies on spending (including this study) divide the spending by the square feet of the project as a control for heteroscedasticity. This control is utilized in this study. In order to test for heteroscedasticity, each independent variable is plotted against each of the two dependant variables (total spending per square foot and private spending per square foot) to determine if either dependent variable increases as any of the independent variables increase. If this occurs, then there may be evidence of heteroscedasticity. The results of the tests of the assumptions of homoscedasticity are presented in Chapter 7.

The statistical property of homoscedasticity is not commonly tested which is evidenced by the fact that of all of the studies used as authority in this chapter, only two studies tested for the violation of this property. Only one of the studies is of interest to this dissertation in terms of the way it corrected for heteroscedasticity. Grether and Mieszkowski [1974, p.136] divided the price of housing by the square feet of each house because the price of housing alone varied greatly depending on the size of the project. Therefore, as the size and price of the house increased, the error associated with it also increased. Therefore their dependent variable was price per square foot. They stated that the transformation had virtually no effect on the estimated coefficients and made very little difference in the t- statistic values (significance of the variables)

SUMMARY

The two main components of the methodology were discussed in this chapter: the descriptive effects and the statistical effects of the HRTC. The database provides a great deal of descriptive information about historic rehabilitation projects and provides part of the input into the statistical tests on the effects of the HRTC on spending The results of the descriptive information are presented in Chapter 6. These results provide a summary of the descriptive results of each factor by HRTC period and by year. This includes dollar figures, counts, and percentages pertaining to each factor.

The results of the statistical tests are discussed in the Regression Results and Implications (Chapter 7). The actual regression models are presented and the effect of each variable on

spending compared to the expected effects. The statistical properties of the regression are also discussed.

CHAPTER 6

DESCRIPTIVE STATISTICS

The descriptive information from the database provides interesting statistics on the projects rehabilitated in the HRTC periods. Descriptive statistics regarding the spending, economic, and composition factors in each HRTC period and in total are examined. A summary concludes this chapter.

The summary information of the descriptive statistics of each factor is presented in Table 6-1 (spending factors), Table 6-2 (economic factors), and Table 6-3 (composition factors). These tables are used for purposes of the discussion in this chapter. More detailed information on the factors is presented in Tables B-1 to B-16 in the Appendix. These tables contain tabulations of means, counts, and percenteges of the database factors. The information for these tables is obtained from the database analyzed in this study, of which most of the information is obtained from the National Trust for Historic Preservation database. Two additional factors are added. These factors are discussed in the Methodology (Chapter 5).

SPENDING FACTORS

The descriptive statistics on the spending on the historic rehabilitation projects are presented in Table 6-1. Average total spending per project (TSP), average private spending per project (PSP), average total spending per square foot per project (TSFT), and average private spending per square foot per project (PSFT) are presented. The nominal and deflated amounts are included in the table.

The TSP increased greatly, according to Table 6-1, from $349,794 in the 0% HRTC period to $596,328 in the 10% HRTC period. This is a 70% increase. In deflated terms, TSP increased 46% from $192,897 to $281,757. The HRTC periods, for purposes of this study, represent information from the projects started in these time periods. Many projects continue into the next HRTC period. Moreover, it is notable that larger buildings were rehabilitated in the 10% HRTC period than in the 0% HRTC period. Square feet per project increased by 23% to

TABLE 6-1

SUMMARY OF SPENDING INFORMATION

	0% HRTC	10% HRTC	25% HRTC	TOTAL
NUMBER OF PROJECTS	45	463	1,476	1,984
TSP nominal	$ 349,794	$ 596,328	$ 478,066	$ 502,785
deflated	$ 192,897	$ 281,757	$ 203,660	$ 221,641
nominal by region:				
NE	$ 411,829	$ 664,178	$ 502,356	$ 541,029
MW	$ 210,436	$ 239,408	$ 459,967	$ 423,987
SE	$ 343,463	$ 542,764	$ 374,297	$ 406,108
W	$ 333,841	$ 762,826	$ 847,177	$ 829,079
GRO average[a]	$ 273,438	$ 527,630	$ 731,639	$ 676,013
square feet	13,511	16,592	11,829	12,979
PSP nominal	$ 322,675	$ 517,880	$ 358,427	$ 394,827
deflated	$ 178,386	$ 245,981	$ 152,767	$ 175,101
TSFT nominal	$ 25.89	$ 35.94	$ 40.41	$ 38.74
deflated	$ 14.28	$ 16.99	$ 17.22	$ 17.08
nominal by region:				
NE	$ 30.73	$ 35.69	$ 40.57	$ 38.20
MW	$ 19.72	$ 26.11	$ 37.09	$ 35.62
SE	$ 25.74	$ 39.91	$ 42.83	$ 41.69
W	$ 20.33	$ 40.60	$ 43.08	$ 41.69
PSFT nominal	$ 23.88	$ 31.21	$ 30.30	$ 30.42
deflated	$ 13.20	$ 14.63	$ 12.91	$ 13.49

[a] Estimated spending per approved project

TSP = Total Spending per Square Foot
PSP = Private Spending per Square Foot
TSFT = Total Spending per Square Foot
PSFT = Private Spending per Square Foot

16,592 in the 10% HRTC period from 13,511 in the 0% HRTC period. This increased size of projects accounts for part of the increase in spending.

The TSP decreased by 20% from $596,328 in the 10% HRTC period to $478,066 in the 25% HRTC period. In deflated terms, the decrease is 28% from $281,757 to $203,660. The spending level of the 25% HRTC period remained above the 0% HRTC spending level. The building size decreased 28% from 16,592 in the 10% HRTC period to 11,829 in the 25% HRTC period. The smallest TSP (nominal) in the 0% and 10% HRTC periods was in the Midwest and the smallest TSP in the 25% HRTC period was in the Southeast. The highest TSP was in the Northeast in the 0% HRTC period and in the West in the 10% and 25% HRTC periods. The TSP for all regions increased with the 10% HRTC. The TSP decreased with the 25% HRTC in the Northeast and Southeast and increased in the Midwest and West. More TSP was associated with both the 10% HRTC and 25% HRTC as compared to the 0% base period, however, TSP tailed down in the 25% HRTC period compared to the 10% HRTC period.

These results are not wholly consistent with the GAO information presented in Table 2-1 and summarized in Table 6-1. This comparison is presented as a matter of potential interest, but there is no reason to expect that the results would totally agree. The GAO information (nominal) demonstrates an increase in estimated spending per approved project over all of the HRTC periods. The actual TSP decreased in the 25% HRTC period using the database of this study. These differences are due to different procedures used in calculating the numbers in the GAO information as compared to the spending of this database. The GAO expenditures are estimated and not actual and are based on approved projects at the beginning of the rehabilitation which are not necessarily completed projects eligible for the HRTC. This study examines only actual spending of completed projects which received the HRTC. Therefore, the projects examined in this study are a subset of those included in the GAO information.

Some explanation is needed about the consequences of the computation of PSP prior to the statement of the results of this factor. Because the projects are categorized in this study, for

purposes of the HRTC, by year started, and many projects extend beyond this initial HRTC period, this indicates that many projects received a combination of two HRTC percentages on their total spending. It is assumed (for lack of any other information) that spending occurred evenly throughout the rehabilitation period. Therefore, the owners received the stated HRTC percentage for the portion of their spending in that HRTC period. For example, project owners that began projects in the 10% HRTC period (therefore are categorized in the 10% HRTC period for purposes of this study) received the 10% HRTC on the portion of their spending in the 10% HRTC period. However, projects that extended into the 25% HRTC period also received the 25% HRTC on the portion of their spending in the 25% HRTC period. Therefore, the overall HRTC received is between 10% and 25% of the total spending although the project is categorized in the 10% HRTC period. This indicates an unexpected windfall for project owners that began the project in one HRTC period and extended it into the next (higher percentage) HRTC period because they actually received a higher overall HRTC percentage than they expected based on the HRTC percentage in effect when the project began. Only projects begun and completed in one HRTC period received the exact HRTC percentage in effect at the start of the projects. This is true in this study of all projects begun in the 25% HRTC period because no projects are examined that were completed after December 1985. Therefore, the possibility of a windfall or higher HRTC percentage than stated when the project began is only possible, for purposes of this study, with the 0% and 10% HRTC periods.

As discussed, TSP increased by 70% with the 10% HRTC period. Therefore, PSP is expected to increase but to a lesser degree because the HRTC is subtracted from total spending in the determination of private spending. This increase did occur because according to Table 6-1, PSP increased by 60% from $322,675 in the 0% HRTC period to $517,880 in the 10% HRTC period. In deflated terms, the increase is 38% from $178,386 in the 0% HRTC period to $245,981 in the 10% HRTC period. Therefore, with the 10% HRTC, the owners spent 60% more of their own money (less subsidy from the government) than they did without the HRTC.

In the 25% HRTC period, TSP is expected to increase by 25% as compared to the 0% HRTC spending level or an incremental 15% over the 10% HRTC spending level because of the subsidy. However, since TSP decreased with the 25% HRTC period compared to the 10% HRTC period, PSP is expected to decrease by an even greater degree because the TSP decrease encompasses an incremental increase of 15% due to the increased HRTC. According to Table 6-1, the PSP decreased by 31% from $517,680 in the 10% HRTC period to $358,427 in the 25% HRTC period. In deflated terms, PSP decreased by 38% from $245,981 in the 10% HRTC period to $152,767 in the 25% HRTC period. In deflated terms, PSP decreased over the HRTC periods. Less was spent in the 25% HRTC period than prior to the HRTC.

TSFT increased from $25.69 in the 0% HRTC period to $35.94 in the 10% HRTC period which is a 39% increase. In deflated terms, TSFT increased 19% from $14.28 to $16.98. This increase was due to the large increase in TSP which more than compensated for the larger projects rehabilitated. With the 25% HRTC, the TSFT again increased to $40.41 which is a 12% increase. The increase is 1% in deflated terms, from $16.98 to $17.22 The projects in the Midwest had the lowest TSFT (nominal) in all HRTC periods The Northeast had the highest TSFT in the 0% HRTC period and the West had the highest TSFT in the 10% and 25% HRTC periods.

PSFT increased according to Table 6-1 from $23.88 in the 0% HRTC period to $31.21 in the 10% HRTC period which is a 31% increase. In deflated terms, the increase is 12% from $13.20 to $14.83. The PSFT then decreased by 3% to $30.30 in the 25% HRTC period. In deflated terms there was a 13% decrease to $12.91. The end result is lower PSFT (deflated terms) with the 25% HRTC than during the 0% HRTC period. This indicates that owners spent less of their own money (less the HRTC) on a square foot basis during the 25% HRTC period than prior to the HRTC. The owners had the greatest PSFT on the projects rehabilitated in the 10% HRTC period.

In summary, the 10% HRTC is associated with relatively large increases in spending and spending per square foot compared with the 0% HRTC period. The 25% HRTC is associated with

decreases in TSP, PSP, and PSFT compared to the 10% HRTC. The only increase in spending in the 25% HRTC period is with respect to TSFT.

ECONOMIC FACTORS

Subsidies Used

The two subsidy factors are the HRTC (of which a few preliminary results with respect to spending were just discussed) and government funding (GF). Two popular types of GF, Community Development Block Grants and Urban Development Action Grants, were available throughout the HRTC periods and were able to be used along with the HRTC.

Only a small percentage of the projects used GF of any type, according to Table 6-2. The number of projects in each HRTC period which used GF totaled 575 over all three HRTC periods. The percentage of projects which used GF increased with each HRTC period, beginning with 13% in the 0% HRTC period, then 27% in the 10% HRTC period, and 30% in the 25% HRTC period. However, even the highest percentage, 30% in the 25% HRTC period, is relatively low. Overall, the HRTC was the only government incentive in 71% of the projects. The presence of GF as well as the HRTC in some projects makes it difficult to isolate the effects of the HRTC. GF, as well as the HRTC, may contribute to increased spending. However, since GF is not used in the majority of projects, this is not an important issue. Table 6-2 presents the TSP (nominal) in each HRTC period. The TSP on projects in the 10% and 25% HRTC periods was higher for projects that used GF. The highest percentage of projects over all HRTC periods which used GF was in the Northeast (38%) and the lowest percentage was in the Southeast (16%). Therefore, most projects relied only upon private funds (in addition to the HRTC).

Market Conditions

The average nominal MR per project in each HRTC period is presented in Table 6-2 along with the average deflator used to deflate the nominal MR to real terms and the real MR. The nominal MR at the start of the project is of interest in terms of the decision making of the project owner because that is the MR he faced when he needed to borrow money for the project. The calculation of the real MR is discussed in the Methodology (Chapter 5). The MR is calculated for

TABLE 6-2

SUMMARY OF ECONOMIC FACTOR INFORMATION

	0% HRTC	10% HRTC	25% HRTC	TOTAL
GF number of projects that used GF	6	126	443	575
number of projects did not use GF	39	337	1,033	1,409
percentage of projects used GF	13	27	30	29
percentage of projects did not use GF	87	73	70	71
within regions (percentage):				
NE	19	33	43	38
MW	25	11	29	26
SE	0	19	16	16
W	0	34	21	24
TSP for projects that used GF	$ 266,265	$ 979,222	$ 566,503	$ 653,809
TSP for projects did not use GF	$ 362,645	$ 453,169	$ 440,140	$ 441,111
MR nominal	6.95	13.05	11.19	11.53
(divided) deflator	1.61	1.99	2.37	2.26
real	4.31	6.56	4.72	5.14
CCI	173.42	198.34	236.25	223.51
(divided) deflator	1.81	2.11	2.35	2.26
deflated	95.81	94.00	100.53	98.90

GF = Government Funding
MR = Mortgage Rate
CCI = Construction Cost Index

each project in the month the project was started. The MR for each project is then averaged for all projects. The average nominal MR (90 day prime rate) [Survey of Current Business, 1972-1986] increased with the 10% HRTC from 6.95 in the 0% HRTC period to 13.05 in the 10% HRTC period. It then decreased to 11.19 with the 25% HRTC. It is expected that less would be spent as the rate increased and more as the rate decreased. This is the opposite of the actual spending amounts.

The average CCI per project in each HRTC period is presented in Table 6-2 along with the average deflator and deflated CCI. The CCI (not deflated) is the index that is relevant to the spending decision of the rehabilitation owner. The index is the average of the indexes for all projects over the months of construction. This is then averaged over all projects to determine the Table 6-2 numbers. The computation of the index in deflated terms is discussed in the Methodology (Chapter 5). The average CCI (E.H. Boeckh Building Cost Index, 1972=100) [Survey of Current Business, 1972-1986] increased to 198.34 with the 10% HRTC from 173.42 in the 0% HRTC period and increased to 236.25 with the 25% HRTC.

COMPOSITION FACTORS

Size and Exterior Characteristics of the Building

The average SQFT per project increased, according to Table 6-3, from 13,511 in the 0% HRTC period to 16,592 in the 10% HRTC period which is a 23% increase. The average building size decreased by 29% to 11,829 with the 25% HRTC. The West rehabilitated the largest buildings in all HRTC periods The Northeast and Southeast rehabilitated their largest buildings in the 10% HRTC period and the smallest buildings in the 25% HRTC period. The Midwest rehabilitated its smallest buildings in the 10% HRTC period and its largest buildings in the 25% HRTC period. Therefore, there is no consistency in the size of projects rehabilitated in the HRTC periods across the regions.

The average CONS, according to Table 6-3, indicates that buildings of wood construction were in the minority. Approximately one-quarter of the buildings were constructed of wood and three-quarters of the buildings were of brick, masonry, or other construction. The highest

TABLE 6-3

SUMMARY OF COMPOSITION FACTOR INFORMATION

	0% HRTC	10% HRTC	25% HRTC	TOTAL
SQFT	13,511	16,592	11,829	12,979
within regions:				
NE	13,400	18,508	12,383	14,162
MW	10,671	9,168	12,403	11,904
SE	13,345	13,600	8,740	9,740
W	16,419	18,789	19,666	19,898
CONS number with wood construction	12	103	388	503
number with brick, etc. construction	33	360	1,088	1,481
percentage with wood construction	27	22	26	25
percentage with brick, etc. construction	73	78	74	75
within regions (percentage wood construction):				
NE	24	15	21	19
MW	13	15	17	16
SE	29	43	44	44
W	44	32	23	27
AGE (years)	107	100	97	98
within regions:				
NE	131	107	105	106
MW	81	89	88	88
SE	97	97	96	96
W	85	71	79	78
TIME (months)	27	11	8	9
within regions:				
NE	22	11	8	9
MW	39	12	9	10
SE	13	11	8	8
W	41	12	8	11

TABLE 6-3 (CONTINUED)

SUMMARY OF COMPOSITION FACTOR INFORMATION

	0% HRTC	10% HRTC	25% HRTC	TOTAL
USE percentage residential	51	62	66	65
percentage commercial	49	38	34	35
within regions (percentage residential):				
NE	52	72	80	77
MW	63	55	61	60
SE	57	52	58	56
W	33	24	26	26
HD percentage in district	56	70	81	78
percentage not in district	44	30	19	22
within regions (percentage in district):				
NE	62	77	84	82
MW	75	67	75	74
SE	57	64	87	82
W	22	42	45	36
REGION number in NE	21	273	658	952
number in MW	9	55	339	402
number in SE	7	97	395	499
number in W	9	38	84	131
percentage in NE	45	59	44	48
percentage in MW	18	12	23	20
percentage in SE	16	21	27	25
percentage in W	20	8	6	7

SQFT = Square Feet
CONS = Type of Construction
AGE = Age of the Building
TIME = Completion Time
USE = Use on Completion
HD = Historic District

percentage of wood buildings (44%) was in the Southeast and the lowest percentage was in the Midwest (16%). The Southeast and West had the highest percentage of wood constructed buildings in all HRTC periods and the Northeast and the Midwest had the lowest percentages. These percentages remained relatively constant over the HRTC periods.

Condition of the Building

According to Table 6-3, the average AGE of the buildings became younger over the HRTC periods. The average AGE of the rehabilitated buildings was 107, 100, and 97, for projects in the three respective HRTC periods. The oldest projects were located in the Northeast in all three HRTC periods and the youngest buildings were located in the Midwest in the 0% HRTC period and in the West in the 10% and 25% HRTC periods. There was not a large decrease in the age of the buildings rehabilitated over the HRTC periods.

These results are in accordance with the GAO information in Table 2-3 which states that the majority of projects (64%) rehabilitated over all HRTC periods were built before 1900.

The average TIME to complete the historic rehabilitation projects greatly decreased over the HRTC periods according to Table 6-3. The 0% credit period averaged over two years to complete a project (27 months) whereas the 10% and 25% HRTC periods averaged less than one year (11 months, and 8 months, respectively) to complete a project. There were big differences between regions in terms of completion TIME in the 0% HRTC period, however the TIME was relatively stable across the regions in the 10% and 25% HRTC periods. The TIME decreased over the HRTC periods in all regions.

The USE of the completed building indicates the buildings which were for residential or commercial use upon completion. This may affect spending because less is normally spent on residential use projects [Walter,1986,p.8]. Table 6-3 indicates that residential USE gradually increased over the HRTC periods from 51% in the 0% HRTC period to 62% in the 10% HRTC period to 66% in the 25% HRTC period. Commercial and other uses gradually decreased over the periods. The West had the lowest percentage of residential projects and the highest percentage of commercial projects compared to the other regions. The majority of projects in the other regions

were for residential use. In general, residential use was favored over the years with preferential tax treatment

Table 2-4 indicates the GAO information reported a slightly smaller percentage of rehabilitations for residential use (54%) than that found in this study.

Neighborhood and Area Characteristics

More buildings were part of a HD as the HRTC percentage increased. According to Table 6-3, the percentage of projects in a HD increased from 56% in the 0% HRTC period to 70% in the 10% HRTC period to 81% in the 25% HRTC period. A greater number of historic districts were set up over the years and therefore more rehabilitated buildings were part of historic districts. The majority of projects in each HRTC period were in a HD except in the West region.

The GAO information (Table 2-3) reports approximately the same overall percentage (74%) of projects in a historic district.

The region information in Table 6-3 indicates that the NE had the greatest number of historic rehabilitations in each HRTC period with a total of 952 projects The percentage of projects in the NE ranged from 44% to 59% over the HRTC periods. This is expected because the NE has the largest number of older buildings compared to the other regions. The percentage of projects in the MW and SE stayed relatively constant over the HRTC periods in the teen and twenty percentages. The W had 20% of the projects in the 0% HRTC period but had only a small percentage of the projects (8% and 6%) in the 10% and 25% HRTC periods.

RELATIONSHIPS BETWEEN THE FACTORS

This discussion pulls together the results of all of the factors over the HRTC periods. It is not meant to be an exhaustive discussion or to include implications regarding the factors. Implications are discussed following the presentation of the regression results. (All amounts mentioned in this section are from Tables 6-1, 6-2, and 6-3 unless otherwise noted.)

The comparison of TSP and PSP in the HRTC periods provides information on the issue of the windfall some project owners received when the HRTC percentage was increased part way through their project. Projects begun and categorized in the 0% HRTC period received an average

of a 7.8% HRTC (percentage of total spending). This indicates that, on average, the projects were mainly under construction in the 10% HRTC period. This is in accordance with the completion time information in Table 6-1 which indicates that the 0% HRTC period projects averaged 27 months to complete. Projects begun and categorized in the 10% HRTC period received an average of a 13.2% HRTC which indicates that they were mainly finished within the 10% HRTC period. These projects were completed in a shorter completion time of 11 months. The 25% HRTC projects, by definition, were all completed within the 25% HRTC period. Therefore, the owners received the 25% HRTC and did not receive any unexpected windfall.

In the 10% and 25% HRTC periods, a great deal more was spent on projects that used government funding as compared with projects that did not use government funding. Therefore, the increase in spending that has been attributed to the HRTC may be partially due to the use of government funding. However, an examination of total spending per square foot (deflated for inflation) in Table B-2, indicates that the projects which received government funding spent less per square foot in the 25% HRTC period than those projects which did not receive government funding.

The increase in the mortgage rate in the 10% HRTC period does not correspond with the increase in total spending or total spending per square foot. The increased spending would have been encouraged by a lower mortgage rate rather than a higher mortgage rate. The mortgage rate declined in the 25% HRTC period which does not correspond with the decrease in total spending per project but does correspond with the increase in total spending per square foot.

The construction cost index in the 10% HRTC period corresponds with the increase in spending and spending per square foot in the HRTC periods. Because the cost of materials is more expensive and a great deal of construction is nondiscretionary, more would be expected to be spent on the same rehabilitation. The increase in the CCI in the 25% HRTC period does not correspond with the decrease in total spending. However, TSFT increases with the 25% HRTC period and therefore the higher CCI does correspond with the higher spending per square foot. Therefore, as the CCI increased, the owners spent more on their projects. They did not scale back because of the

higher CCI. The higher the CCI, the higher the spending and the higher the HRTC received. Therefore, the increase in the CCI over the HRTC periods provided the benefit of a higher HRTC on the projects which were associated with increased spending.

The square feet or size of the buildings rehabilitated increased greatly with the 10% HRTC as did total spending. The size of the buildings and total spending decreased with the 25% HRTC. This indicates that, on average, the larger buildings were rehabilitated first. The varying size of the buildings over the HRTC periods indicates the difficulty of forming conclusions based on average spending rather than spending per square foot. The use of government funding increased in the 10% HRTC period, as the size of the projects increased. The larger buildings were rehabilitated despite the high financing and construction costs. The decrease in size in the 25% HRTC period occurs despite the increase in government funding and the lower mortgage rate.

The percentage of wood versus brick and masonry buildings stayed relatively consistent over the HRTC periods. These results indicate that the increased use of government funding and the changing market conditions did little to affect the choice of the building exterior rehabilitated. It also indicates that the construction type is not related to the building size since the size varied greatly over the HRTC periods yet the construction type remained constant.

The age of the building decreased over the HRTC periods. That indicates that, on average, the oldest buildings were rehabilitated first. Therefore in the succeeding HRTC periods, relatively younger buildings were left to be rehabilitated. There does not appear to be a relationship with other factors such as market conditions or size of the building.

The completion time decreased greatly over the HRTC periods. This decrease occurred in the 10% HRTC period despite an increase in total spending per project and total spending per square foot. Also, despite a further decline in completion time in the 25% HRTC period, the total spending per square foot increased. It does not appear that completion time is related to construction type because construction type stayed relatively constant while the completion time decreased. The completion time also does not appear related to the market conditions because the market conditions did not improve over the HRTC periods which would have made increased

spending more feasible. There appears to be no relationship between the completion time and the size of the rehabilitated projects, at least in the 10% HRTC period, because the number of months needed to complete the projects declined at the same time the building size increased.

Residential use projects are smaller on average than commercial projects [Walter, 1986, p.8] and therefore they would be expected to be less expensive and quicker to complete. The increase in buildings rehabilitated for residential use in the 25% HRTC period corresponds with the decrease in spending, building size, and completion time.

An increasing percentage of buildings was located in historic districts. The increasing percentage of buildings in historic districts may be related to the increase in residential use projects and the decrease in completion time. This may be the case in the 25% HRTC period when the buildings rehabilitated were smaller, although more was spent per square foot.

The regional statistics are varied. Overall, the greatest number of projects is in the Northeast with the West having the smallest number. Total spending increased with the 10% HRTC in all regions and continued to increase with the 25% HRTC in the Midwest and West. Spending decreased with the 25% HRTC period in the Northeast and Southeast. Total spending per square foot increased in all regions over the HRTC periods. Table 6-2 indicates for each HRTC period, the percentage of projects in each region which used government funding. For example, in the 0% HRTC period, for the Northeast region, 19% of the projects used government funding. The Midwest had the highest percentage of projects which used government funding in the 0% HRTC period, the West had the highest percentage in the 10% HRTC period, and the Northeast had the highest percentage in the 25% HRTC period. However, the use of government funding seems to be fairly evenly spread over the regions. Building size, according to Table 6-3, increased greatly in the 10% HRTC period in the Northeast and West, increased slightly in the Southeast, and decreased in the Midwest. The building size in the 25% HRTC period continued to increase in the West, increased greatly in the Midwest and decreased greatly in the Northeast and Southeast. Construction type stayed relatively constant within the regions over the HRTC periods with the Southeast having the greatest percentage of wood buildings in the 10% and 25% HRTC periods. The

age was also relatively constant across regions with the Northeast having the oldest buildings rehabilitated on average and the West, the newest buildings. The completion time decreased across the periods in each region with the most notable regions in the 0% HRTC period being the Southeast with the shortest completion time and the West with the longest completion time. There is some variation in the percentage of residential use after completion but the greatest difference is that all regions but the West have the majority of buildings of residential use after rehabilitation. The percentage of projects in historic districts increased in each HRTC period with the exception of a decrease in the Midwest with the 10% HRTC. All conclusions regarding the West must be guarded because of the relatively small number of projects on which these amounts are based.

SUMMARY OF DESCRIPTIVE RESULTS

Overall, with the 10% HRTC, more was spent in total and privately per project on more buildings than in the 0% HRTC period. More projects used government funding in the 10% HRTC period than previously. The buildings were larger and built a few years later than in the 0% HRTC period. The time to complete the projects decreased greatly as compared with the 0% HRTC.

The 25% HRTC is associated with a decrease in average total and private spending per project as compared with the 10% HRTC. However, the number of projects greatly increased. A slightly higher percentage of projects used government funding than in the 10% HRTC period. The buildings were smaller and built a few years later than in the 10% HRTC period. The completion time decreased even further than in the 10% HRTC period.

In all HRTC periods, the exterior construction was mainly brick or masonry. Most of the buildings were rehabilitated for residential use and located in a historic district. The Northeast had the greatest number of projects in all HRTC periods.

The statistical effect of the HRTC and other factors on spending is tested in the regression analysis. Those results and implications of the regression analysis are discussed in the next chapter.

CHAPTER 7

REGRESSION RESULTS AND IMPLICATIONS

The results of the regression analysis concerning the effect of the HRTC and other factors on the spending per square foot on historic rehabilitation are discussed in this chapter. Before the results can be presented, however, some preliminary information on the regression models must be discussed. Then, the effect of economic and composition factors on spending as determined by the regression results is discussed, followed by the results of the tests of the statistical properties of the regression models. Then, the implications of these results are discussed. A summary concludes this chapter.

PRELIMINARY INFORMATION

There are a few issues that are necessary to discuss as background prior to the discussion of the regression results. The first is simply to identify the relevant tables. The second is the presentation of the model. Lastly, the explanatory power of the regression models is discussed.

The summary of the results of the linear regressions are presented in Table 7-1. The results of the regression are presented for each of the two dependent variables, TSFT and PSFT. The detailed results of the regression analysis are presented in the Appendix in Table C-1.

The models which result from the regression analysis, including the coefficients which are presented in Table 7-1, are the following:

TSFT=17.73+3.33TC1+3.91TC2-.16GF-.23MR-.01CCI-.02SQFT-2.32CONS+.04AGE
+.07TIME-2.01USE-2.15HD-2.65NE-3.30MW-2.72SE

PSFT=19.06+1.35TC1-.44TC2-.07GF-.22MR-.02CCI-.02SQFT-1.89CONS+.03AGE
+.04TIME-1.41USE-1.67HD-2.28NE-2.96MW-2.43SE

The first number in each model is the intercept (17.73 in the TSFT model and 19.06 in the PSFT model) which is the spending per square foot when the other variables are equal to zero. Many of the factors are not significant determinants of spending per square foot. The significance

TABLE 7-1

SUMMARY OF REGRESSION RESULTS

Variable	Expected Sign	TSFT Coefficient	TSFT Significance Level	PSFT Coefficient	PSFT Significance Level
TC1	+	3.33	.1935	1.35	.5051
TC2	+	3.91	.1376	- .44	.8327
GF	+	- .16	.8308	- .07	.9051
MR	-	- .23	.5106	- .22	.4220
CCI	+	- .01	.9570	- .02	.8456
SQFT	-	- .02	.0966*	- .02	.0822*
CONS	-	-2.32	.0040***	-1.89	.0029***
AGE	+	.04	.0001***	.03	.0001***
TIME	+	.07	.1874	.04	.3303
USE	-	-2.01	.0075***	-1.41	.0170**
MD	-	-2.15	.0109**	-1.67	.0123**
NE		-2.65	.0706*	-2.28	.0492**
MW		-3.30	.0290**	-2.96	.0128**
SE		-2.72	.0676*	-2.43	.0391**
Intercept		17.73	.2842	19.06	.1443
R-Square		.0254		.0319	
Adjusted R-Square		.0185		.0250	
F-Statistic		3.668	.0001***	4.632	.0001***

TSFT = Total Spending per Square Foot
PSFT = Private Spending per Square Foot

* Significant at .10 level (two-tail test)
** Significant at .05 level (two-tail test)
*** Significant at .01 level (two-tail test)

Note: For test statistics and other details see Appendix C.

of the factors is discussed in the following sections. The dependent variables can be stated as functions of the significant factors:

TSFT= f(SQFT, CONS, AGE, USE, HD, NE, MW, SE)

PSFT= f(SQFT, CONS, AGE, USE, HD, NE, MW, SE)

Before discussing the regression results, it is important to know how effective the regression models are in explaining the variation in the dependent variables (historic rehabilitation spending on a square foot basis). The explanatory power of the regression models, R-Square (R^2) is low: 2.5% with the dependent variable of TSFT and 3% with the dependent variable of PSFT (presented at the base of Table 7-1, R-Square=.0254 and R-Square=.0319). The adjusted R^2 is also presented which adjusts for the degrees of freedom (R^2=.0185 and R^2=.0250). The low R^2s mean that the regression models using the economic and composition factors, based on the theory and literature, explain only 2% to 3% of the total variation in spending per square foot on historic rehabilitation projects. While higher explanatory power of the regression models would have been desirable, there is precedence in similar studies on rehabilitation and home improvement for low explanatory power. No R^2 was stated in three of the studies examined [Mendelsohn,1977, Mayer,1981, Shear,1983], presumably because it was small. The one study [Boehm and Ihlanfeldt,1986] that reported an R^2 was a low value of 20%. It stated that one cause of the low explanatory power may have been that the expenditures had a large intrinsically stochastic component: what homeowners decided to do with their property reflected diverse preferences. The low explanatory power is an indication from the outset of this discussion of the results that the factors included in the regression analysis do not explain all of historic rehabilitation spending.

Now that the models are stated and the explanatory power of the regression models is discussed, the detailed results of the regression analysis can be presented. The significance of the economic and composition factors on spending is discussed next.

SIGNIFICANCE OF FACTORS ON SPENDING

This part of the chapter discusses the effects of the factors of interest in this study on historic rehabilitation spending. This differs from the results presented in Chapter 6. However, this does not alter the descriptive information presented in Chapter 6 but rather complements it. The descriptive effects are known and in this section evidence is provided as to the effects of the factors on spending. The results of the significance of the economic and composition factors on spending per square foot are discussed. The implications are reserved until the end of the chapter.

The regression results of Table 7-1 are used in this discussion. These results are the output of a regression computer program which processed the data on the 1,984 historic rehabilitation projects. SYSTAT (System Statistics) was used for the preliminary analysis in Washington D.C. and SAS programs were used for the full analysis. Appendix Table C-1 provides the detailed information on these results.

Some further explanation of the parameter estimates, the coefficients of the regression models, is needed. For the independent variables that are used to explain the dependent variables of spending per square foot, the coefficient indicates the increase or decrease in spending per square foot that is associated with a one unit increase in the independent variable. For the continuous independent variables, the one unit refers to the mode of measuring the variables: mortgage rate, 1%; construction cost index, 1 index unit; square feet, 1,000 square feet; age, 1 year; and completion time, 1 month. For the dummy or attribute variables, the one unit is in comparison to the base period that is excluded or to the absence of the attribute: HRTC, projects in the 0% period; government funding, projects without funding; wood construction, projects without wood construction; residential use, projects not completed for residential use; historic district, projects not located in historic districts; and regions, projects in the Western region.

The asterisks next to the significance levels of each factor indicate the factors with acceptable significance levels. No conclusions or inferences can be drawn concerning the actual directional effects or the coefficients of the insignificant variables.

Economic Factors

Subsidies Used. A positive effect is expected of the 10% HRTC (TC1) and the 25% HRTC (TC2) on historic rehabilitation spending as discussed in the Methodology (Chapter 5) and noted in Table 6-4. The effect of both HRTC percentages on TSFT is an insignificant effect as noted in Table 7-1 This conclusion is based on the lack of significance of the coefficients at the .10 level. This means that it can not be stated with at least 90% confidence that the coefficients are significantly different from zero. The coefficient of the 10% HRTC (TC1) of 3.33 is insignificant at the .1935 level. The coefficient of the 25% HRTC (TC2) of 3.91 is insignificant at the .1376 level. Therefore, due to the insignificant effects, the null hypothesis of no effect of the 10% HRTC and 25% HRTC on TSFT is not rejected. The 10% HRTC and 25% HRTC were not significant determinants of total spending per square foot on historic rehabilitation projects. Although it is known that total spending per square foot increased, this indicates that the HRTC is not a significant factor in that increase.

There is also no significant effect of the HRTC on private spending per square foot The coefficients of 1 35 with the 10% HRTC period and -.44 with the 25% HRTC period are not significant at the 10% level (the significance levels are .5051 for the 10% HRTC period and .8327 for the 25% HRTC period) according to Table 7-1. This is particularly interesting since in the majority of projects the HRTC was the only incentive received due to the low amount of government funding. The null hypothesis of no effect of the HRTC on private spending per square foot is therefore not rejected. The HRTC is not a significant determinant of the owners' private spending decision. The implications of these spending results in terms of elasticity theory are discussed in a following section.

The use of government funding (GF) is insignificant in the regressions. A positive effect is expected because an owner may have spent more if he received government funding. However, the insignificance of the coefficient (change in spending associated with the use of government funding as compared to projects which did not use government funding) of -.16 in the TSFT model at the 8308 significance level and the parameter estimate of -.07 in the PSFT model at the

significance level of .9051 indicates that government funding received by an owner does not significantly affect spending on the project. Because the significance levels are high numbers , no conclusions or interpretations can be made with respect to the coefficients because there is no confidence in the results.

In summary, the subsidies used do not have a statistically significant effect on spending per square foot. The 10% HRTC and 25% HRTC are not significant determinants of TSFT and PSFT Therefore, the null hypotheses of no effect of the HRTC are not rejected. This has important implications with respect to the theory which are discussed in a following section. Government funding has an insignificant effect on total spending per square foot. The only study which used regression analysis in this historic rehabilitation tax incentive area [Feigenbaum and Jenkinson,1984] found the HRTC to be significant with respect to total spending. However, there were many differences as compared with this study because the HRTC was combined with funding, defined differently, and sampled over a limited time period.

Market Conditions The mortgage rate (MR) should have a negative effect on spending, however, its effect is insignificant The coefficient indicates the change in spending associated with a 1% increase in the mortgage rate. In the TSFT model, the coefficient is -.23 which is insignificant at the .5106 level and in the PSFT model, the coefficient is -.22 which is insignificant at the 4220 level.

The construction cost index (CCI) should have a positive effect on spending, however, its effect is also insignificant. The coefficient indicates the change in spending associated with an increase of 1 point in the index. The coefficient of -.01 is insignificant at the significance level of .9570 in the TSFT model and the coefficient of -.02 is insignificant at the significance level of 8456 in the PSFT model.

In summary, the market conditions of mortgage rate and construction cost index are insignificant. As is discussed in the next section, there is evidence of multicollinearity between these market condition variables. However, after testing, it is determined that these variables would not have been significant even without the multicollinearity. Similar variables were found

to be significant in Doti and Adibi [1985]. However, Moser, Riker, and Rosett [1977], Dowall and Landis [1982], and Boehm and Ihlenfeldt [1986] found mixed results.

The economic factors examined in this study were not found to be significant determinants of historic rehabilitation spending on a square foot basis. This overall lack of significance of economic factors is not expected because of the emphasis on economic factors in the tax incentive literature. While many other factors are important in the rehabilitation decision, the decision is a business decision with a profit motive. There has been a large emphasis on economic factors when examining tax incentives (Chapter 3). These results indicate that the economic factors may not be as important as previously thought.

Composition Factors

The noneconomic or composition factors provide interesting information on the historic rehabilitation projects. They are all significant in the regression with one exception. This demonstrates the importance of these factors in historic rehabilitation spending decisions. They are often omitted from tax incentive studies. These results provide strong support for the inclusion of these factors in future tax incentive studies.

Size and Exterior Characteristics of the Building. The square feet (SQFT) of a building is a significant determinant of the money spent per square foot. The coefficient is - 02 in both models with the significance level of .0966 in the TSFT model and the significance level of 0822 in the PSFT model. The coefficient is expected to be negative because of economies of scale, which it is in both regressions. The coefficient indicates the change in spending per square foot due to a one-thousand foot change in the total square feet of a rehabilitation project. Because the number of square feet is large in the rehabilitation projects, a one-thousand foot change results in a small change in spending per square foot. Square feet had mixed significance in other studies. It was significant in Jud [1980], Mark [1980], Mark and Goldberg [1981], and Palmquist [1984] and insignificant in Grether and Mieszkowski [1977], Mayer [1981], Dowall and Landis [1982], and Shonkwiler and Reynolds [1986].

Wood construction (CONS) significantly decreases construction costs compared to brick, masonry, or other types of construction. The coefficient of -2.32 is significant at the .0040 level in the TSFT model. The coefficient of - 1.89 is significant at the .0029 level in the PSFT model. This indicates that buildings of wood construction (as compared with brick) are associated with lower TSFT of $2.32 and lower PSFT of $1.89. The negative effect is expected. This gives an indication of the type of building exterior (e.g. brick, masonry) which requires more spending to rehabilitate adequately. The type of construction was significant in all of the studies examined: Grether and Mieszkowski [1977], Jud [1980], Mark and Goldberg [1981], Carpenter and Chester [1984], and Palmquist [1984].

In summary, both of the size and exterior characteristic factors of square feet and wood construction are significant determinants of spending. The characteristics of the rehabilitated buildings may directly affect the historic rehabilitation spending which provides an indication of the type of buildings which are costly to rehabilitate.

Condition of the Building. The age of the building (AGE) has the expected significant positive coefficient. This means that the older a building is, the more costly it is to rehabilitate. The coefficients of .04 in the TSFT model and 03 in the PSFT model are significant at the 0001 level in both regression models. This indicates the strong importance of the building's age in each owner's spending decision. Because the coefficients are near zero, the change in one year only is not associated with more or less spending. However, a several year change in the age would be associated with a noticeable change in spending. This positive effect is expected with regard to total spending per square foot because higher spending would be expected on older buildings. This was found to be significant in all of the studies that used it: Mendelsohn [1977], Grether and Mieszkowski [1977], Jud [1980], Mark [1980], Mark and Goldberg [1981], Mayer [1981], Shear [1983], Carpenter and Chester [1984], Palmquist [1984], and Boehm and Ihlanfeldt [1986].

The time to complete (TIME) a historic rehabilitation project is not a significant determinant of spending per square foot. A positive effect is expected. A significant coefficient

would indicate the change in spending per square foot associated with a one month increase in completion time. The TSFT model's coefficient of .07 has a significance level of .1874 and the PSFT model's coefficient of .04 has a significance level of .3303. Therefore, the length of construction time does not have a significant impact on the amount of spending.

The use of the building (USE) has a significant negative coefficient in both models which means that residential use has a negative effect on spending and commercial use increases spending. This negative effect of residential use is expected. The coefficient of -2.01 in the TSFT model is significant at the .0075 level and the coefficient of the PSFT model is -1.41 which is significant at the .0170 level. Therefore, the residential use on completion (compared to commercial and other uses) is associated with lower TSFT of $2.01 and lower PSFT of $1.41. Studies that used this category such as Maser, Riker and Rosett [1977] found the effects varied greatly depending on the uses examined.

In summary, two of the three variables in this category have a significant effect on spending: building age and use of the building on completion of the project. This indicates the condition of the building is often an important determinant of spending. All of the studies examined that used the condition variable found it to be significant: Grether and Mieszkowski [1977], Meyer [1981], Mark and Goldberg [1981], Shear [1983], Palmquist [1984], and Boehm and Ihlanfeldt [1986].

Neighborhood and Area Characteristics The historic district (HD) variable has the expected significant negative sign meaning that less is spent on buildings which are part of a historic district. The coefficient of -2.15 in the TSFT model is significant at the .0108 level and the coefficient of -1.67 in the PSFT model is significant at the .0123 level. This indicates that TSFT is lower by $2.15 for buildings located in historic districts as compared with buildings not located in historic districts and that PSFT is lower by $1.67 for buildings located in historic districts. Owners of buildings of historic significance based strictly on their own merit and not in a district spent more on rehabilitations than owners of buildings in historic districts. This provides insight into the location of buildings that are associated with higher spending.

The region variables: Northeast (NE), Midwest (MW), and Southeast (SE) all have a significant negative effect on spending. This is because the Western region (W) is the basis for comparison of the other regions in the regression analysis. The projects are all contained in one of the four regions and therefore if spending increases overall and three of the regions (NE, MW, SE) have lower spending then there must be higher spending in the fourth region (W). The significance levels are listed in Table 7-1 and range from .0128 to .0708. An example of the interpretation of the meaning of one of the coefficients is the following: the coefficient for NE indicates that projects in the Northeast spend $2.65 less in total spending per square foot on average than projects in the West.

In summary, these neighborhood and area characteristics are all significant determinants of spending. These characteristics were generally found to have mixed results in previous studies including Grether and Mieszkowski [1977], Maser, Riker and Rosett [1977], Mendelsohn [1977], Mark [1980], Dowall and Landis [1982], Shear [1983], Palmquist [1984], Carpenter and Chester [1984], and Boehm and Ihlanfeldt [1986].

The noneconomic or composition factors provide interesting information on the historic rehabilitation projects. They are all significant in the regression with one exception. This demonstrates the importance of these factors in historic rehabilitation. They are often omitted from similar studies. These results provide strong support for the inclusion of these factors in future tax incentive studies.

RESULTS OF TESTS OF STATISTICAL PROPERTIES OF THE MODEL

In the Methodology (Chapter 5), it is pointed out that it is necessary to test two common statistical properties of regression analysis: lack of multicollinearity and homoscedasticity. The results of the testing are included in this section. Two other statistical properties of regression analysis are discussed in the Methodology (Chapter 5). Because they can not be formally tested, they are not included in this section.

Multicollinearity threatens the specification and estimation of the relationship between the variables. It is tested by examining the simple (Pearson) correlation coefficients between

each pair of independent variables. These correlation coefficients between all of the variables are presented in Table 7-2 along with their level of significance. These coefficients indicate the degree of relationship between the two variables. If any of the correlation coefficients are close to 1.0 or -1.0, this indicates that the two independent variables are close to perfectly correlated and their effects are combined and can not be separated. It also would indicate that the variables explain some of the same effects of spending.

The simple correlation coefficient between TC1 and TC2 (according to Table 7-2) is -.94 which is due to the method of categorization of the historic rehabilitation projects into one of the HRTC variables. The majority of historic rehabilitation projects are classified in either the 10% or 25% HRTC period. Very few projects are classified in the 0% HRTC period. The solution to this multicollinearity would be to eliminate one of these variables. However this is not possible because the three HRTC periods are the focus of this study.

The other potential multicollinearity problem, which is evident from Table 7-2, is between the market condition variables. This is also expected because many economic conditions are captured in each variable, some of which are repeated in the other market condition variables. The simple correlation coefficient between the mortgage rate and construction cost index is -.695 which indicates that there is negative correlation between these variables. This is because they encompass some of the same market conditions.

The possibility of dropping one of these variables from the regression model is considered because the variables measure some of the same effects. Therefore, the second test of multicollinearity is performed which is to regress each of the multicollinear variables on the other n-1 independent variables to determine if there is a high R^2 value In each of the tests, the R^2 is relatively high although not close to 1.0 (dependent variable of MR:.5310 and dependent variable of CCI:.7015). This indicates a potential, although not severe, multicollinearity problem. These market condition variables are justified by previous literature in this area and

TABLE 7-2

PEARSON CORRELATION COEFFICIENTS

	TSFT	PSFT	TC1	TC2	OF	NR	CCI	SQFT	CONS
TSFT	1.0								
PSFT	.982 (.0001)	1.0							
TC1	-.003 (.8868)	.075 (.0008)	1.0						
TC2	.006 (.8067)	-.083 (.0002)	-.940 (.0001)	1.0					
OF	-.020 (.3637)	-.021 (.3549)	-.022 (.3385)	.039 (.0643)	1.0				
NR	-.011 (.6230)	.029 (.2013)	.569 (.0001)	-.519 (.0001)	.027 (.2375)	1.0			
CCI	.007 (.7400)	-.059 (.0087)	-.733 (.0001)	.754 (.0001)	-.003 (.9079)	-.695 (.0001)	1.0		
SQFT	-.023 (.3005)	-.019 (.3948)	.081 (.0003)	-.080 (.0004)	.104 (.0001)	.090 (.0001)	-.106 (.0001)	1.0	
CONS	-.056 (.0132)	-.060 (.0075)	-.039 (.0793)	.037 (.1030)	-.081 (.0003)	.018 (.4357)	-.001 (.9471)	-.191 (.0001)	1.0
AGE	.080 (.0004)	.086 (.0001)	.037 (.1019)	-.051 (.0219)	-.044 (.0517)	.016 (.4693)	-.040 (.0774)	-.212 (.0001)	.112 (.0001)
TIME	.013 (.5505)	.035 (.1191)	.156 (.0001)	-.282 (.0001)	.057 (.0110)	.154 (.0001)	-.171 (.0001)	.169 (.0001)	.000 (.9905)
USE	-.077 (.0006)	-.075 (.0009)	-.038 (.0881)	.052 (.0203)	.203 (.0001)	-.074 (.0010)	.084 (.0002)	-.093 (.0001)	.099 (.0001)
HD	-.068 (.0023)	-.078 (.0005)	-.101 (.0001)	.126 (.0001)	.042 (.0646)	-.076 (.0007)	.112 (.0001)	-.203 (.0001)	.024 (.2883)
NE	.005 (.8295)	.021 (.3438)	.121 (.0001)	-.116 (.0001)	.180 (.0001)	-.004 (.8553)	-.068 (.0025)	.046 (.0391)	-.135 (.0001)
MW	-.020 (.3735)	-.036 (.1063)	-.115 (.0001)	.115 (.0001)	-.031 (.1567)	-.022 (.3240)	.091 (.0001)	-.022 (.3261)	-.104 (.0001)
SE	-.017 (.4442)	-.026 (.2455)	-.053 (.0173)	.063 (.0048)	-.160 (.0001)	-.014 (.5376)	.036 (.1050)	-.076 (.0007)	.244 (.0001)

TABLE 7-2 (CONTINUED)

PEARSON CORRELATION COEFFICIENTS

	AGE	TIME	USE	HD	NE	NW	SE
AGE	1.0						
TIME	.003 (.8869)	1.0					
USE	.098 (.0001)	.004 (.8474)	1.0				
HD	.050 (.0269)	-.071 (.0017)	.209 (.0001)	1.0			
NE	.234 (.0001)	.017 (.4626)	.240 (.0001)	.093 (.0001)	1.0		
NW	-.150 (.0001)	.021 (.3490)	-.052 (.0207)	-.045 (.0460)	-.484 (.0001)	1.0	
SE	-.031 (.1696)	-.083 (.0002)	-.104 (.0001)	.031 (.0070)	-.557 (.0001)	-.289 (.0001)	1.0

( ) = Significance Levels

proxy for different market conditions. They are important to this model and can not be dropped from it. Accordingly, the market condition variables remain in the model.

There is also relatively high correlation between the market condition variables and the HRTC variables. The correlation ranges from -.733 to .754 and is presented in detail in Table 7-2. This correlation between the market condition variables and the HRTC variables is because these variables all represent a time component and economic conditions. The MR, CCI, and HRTC are also all dependent on the date the projects started. As previously mentioned, the HRTC and market condition variables can not be eliminated from the model as a solution to the relatively high correlation with the market condition variables.

The correlation of the other factors, including government funding and the composition factors, with the economic factors and other composition factors is small The largest correlation coefficients of these variables are between R1 and R2 and also between R1 and R3. This, like the correlation between TC1 and TC2, is due to the method of categorizing projects into regions. Because almost all of the projects are categorized into one of these three regions, the correlation coefficients are relatively high. The correlation is not high enough, however, to cause a multicollinearity problem Therefore, the government funding and composition factors are not associated with a multicollinearity problem The correlation of the independent variables with the dependent variables is presented in Table 7-2 for informational purposes.

The statistical property of homoscedasticity is violated if the variance of the error term is not constant for all values of the independent variables. The violation of this property is heteroscedasticity This is controlled for by the division of spending by square feet (dependent variable). Following the implementation of this control, the violation of homoscedasticity is tested by plotting, through a computer program, each independent variable against the dependent variables to determine if the dependent variables increase as any of the independent variables increase. This would indicate that the variance of the error term is not constant but rather increases as the independent variable increases. The result of this testing is 22 graphs. They have not been reproduced as a part of this study, but would be available to any interested reader.

The result of these plots is that none of the independent variables increase as the dependent variable increases. This indicates that the control was effective in avoiding any violation of homoscedasticity. Therefore, this property is upheld.

In summary, the statistical property of lack of multicollinearity is upheld, in general. However, there is relatively high correlation between a few pairs of independent variables. These variables, however, can not be dropped from the model. The statistical property of homoscedasticity is upheld.

IMPLICATIONS OF FACTORS

The implications of the HRTC are important for tax policy because its effects must be determined so that an assessment can be made by policy makers as to the effectiveness of the different percentages of the credit. The 10% HRTC and 25% HRTC were found to be insignificant determinants of spending per square foot. There is no statistically significant evidence that the HRTC induced the owners to spend more. This implies an inelastic demand curve for historic rehabilitation of the owners. The implications of the HRTC regarding the theory are discussed in the next section.

On average, the 10% HRTC is associated with the rehabilitation of larger, older buildings which may have been most in need of rehabilitation. Marginal projects (smaller, younger, less costly) may have been encouraged by the 25% HRTC because less was spent on more recent buildings in less time. However, the most was spent in total on a square foot basis in the 25% HRTC period which may indicate higher quality rehabilitations. The HRTC is not a significant determinant of spending per square foot and therefore no conclusions can be made as to the HRTC on the quality of the historic rehabilitations.

The HRTC policy was meant to take the place of much government funding [Feigenbaum and Jenkinson, 1984, p. 114], however, this does not seem to have occurred since the percentage of projects which used government funding increased throughout the HRTC periods. However, the insignificance of the government funding variable on spending indicates that government money

paid to owners does not encourage any more spending and therefore the policy to continue government funding may need to be reevaluated.

The insignificance of the market condition variables, mortgage rate and construction cost index, implies that these factors are not of great importance to the owners' spending decision. Historic rehabilitation spending seems fairly oblivious to adverse market conditions on the supply side. This may be because the owners did not borrow heavily, possibly because of the use of government funding, or it may be because these variables are not appropriate proxies for the actual market conditions.

As a whole, the economic factors did not significantly affect the owners' spending. This indicates that these factors which are used extensively in tax incentive studies do not provide much of an explanation of owners' spending That makes the examination of the noneconomic factors, the composition factors, all the more important

The size and exterior characteristics of the building, square feet and construction type, significantly affected spending. Because building size increased greatly with the 10% HRTC, these buildings may not have been profitable without the subsidy. The smaller buildings rehabilitated in the 25% HRTC period may be because these smaller buildings were what was left after the 10% HRTC period. The buildings may have been more costly, as evidenced by the higher CCI during this period On average, these rehabilitated buildings were newer than the buildings rehabilitated in the earlier HRTC periods but for other reasons they may have needed the higher credit to be profitable

The variables age and use on completion, which represent the condition of the building, are significant determinants of spending. The decrease in age over the HRTC periods, may be because the oldest buildings were of the most interest or most profitable and therefore were rehabilitated first. The newer buildings were left for later HRTC periods. The time to complete the projects is not a significant factor although the completion time decreased a great deal over the HRTC periods. The decrease in completion time may be due in part to the rehabilitation of newer buildings which were in better condition and did not require as much labor to rehabilitate. Or perhaps the

laborers became faster workers through experience. A reason that this decrease did not affect spending may be because the long time to complete projects in the 0% HRTC period did not result in increased spending but rather the projects were stalled in order to eventually receive the 10% HRTC on a portion of the expenditures. The shorter completion time in the 25% HRTC period may be due to owners' speeding up the projects because of concern that the HRTC would be revoked.

The increased residential use may be because of the need for housing in urban areas where many historic buildings are located. The increase in spending on commercial projects may have been due partly to adaptive use projects in which offices and shops were built into former apartment houses and schools. This seems to confirm assertions such as the following: "The incentives are bringing new investment to low-income and minority neighborhoods. They are creating new uses for surplus schools, government buildings, industrial facilities and aging waterfronts. They are, in short, successfully bringing market forces to bear on our stock of old buildings." [Walter, 1986, p.5]

The significance of these condition variables implies the importance of considering the building condition in spending decisions. Older buildings and buildings which are rehabilitated for commercial use have a relatively high cost associated with them.

The neighborhood and area characteristics of location in a historic district and in specific regions of the country significantly affected spending. The HRTC brought increased awareness of historic buildings and their surrounding areas which led to the formation of more historic districts. These buildings often had more profit potential because they are grouped with other historic buildings for purposes such as tourism and shopping. This increase in historic districts occurred at the same time many urban areas increased their number of residences in downtown areas. Location in a historic district and in all regions but the West are associated with lower spending. This indicates that the building locations which are the most costly to rehabilitate are those not located in historic districts and those located in the West.

On the whole, the composition factors significantly affected spending. This indicates the importance of these factors in the owners' spending decision. A thorough knowledge of the building

itself is important in determining the amount of money that should be spent on a rehabilitation. It also indicates the serious omission in studies which do not consider the noneconomic factors. The low explanatory power of the regression models, however, implies that there are more factors which affect the owner's spending decision than those examined in this study. Nonquantifiable factors such as a desire to preserve a part of history and perhaps the challenge of rehabilitating a 200 year old building to its original appearance are most likely important to some owners. The inclusion of the composition factors is an important addition as compared with other studies. Unfortunately, other such factors are not available to be included in the regression models because they undoubtedly would improve the explanatory power.

OVERALL IMPLICATIONS

The implications of the descriptive statistics and regression results provide insight into externality theory, "coupon effects" and cost effectiveness of the HRTC They also provide insight into the owners' responsiveness to the HRTC.

Descriptive Statistics

Prior to the enactment of the HRTC, rehabilitation owners did not have any economic incentive to take the external benefits of others into account in their spending decisions. The historic rehabilitation market did not finance the external benefits of others. Excise subsidies, in theory, should cause the fulfillment of external benefits and increase output. Therefore, in order to induce owners to take external benefits into account through their historic rehabilitation spending, the 10% HRTC was enacted and the percentage was later increased to 25%. The fulfillment of any external benefits means the benefits must have been brought into the price system through HRTC policy. This can not be tested directly. However, since the number of projects increased greatly over the HRTC periods, many external benefits were likely fulfilled during the HRTC periods. The rehabilitated buildings may have been destroyed without the HRTC policy but now they can be enjoyed by future generations. The HRTC policy appears to have made people, in general, and especially investors aware of historic preservation and therefore the number of rehabilitated buildings increased. During the HRTC periods, other positive indications

of the fulfillment of external benefits are the increase in aggregate total spending on historic rehabilitation projects and the increase in total spending per square foot. However, caution must be exercised with respect to the interpretation of these results because the regression analysis did not find statistical significance for the effect of the HRTC on spending per square foot.

The "coupon effect" refers to increased spending on an item after subtracting the cost reduction of the coupon from the spending. The coupon may stimulate not only the use of the coupon but more spending on the item (less the coupon amount) than prior to the coupon. The HRTC is an analogy to this. The average private spending of the owners per project (total spending less the HRTC) (nominal) increased with the 10% HRTC (0%:$322,675, 10%:$517,880) by 60% and the private spending per square foot increased (0%:$23.88, 10%:$31.21) by 31%. This indicates that the "coupon effect" was present with the 10% HRTC because the owners spent more of their own money per project than prior to the 10% HRTC. While these amounts are nominal, Table 6-1 indicates that the deflated (for inflation) amounts also indicate increases, however, not as large The owners may have spent more in the 10% HRTC period than in the 0% HRTC period because they knew they would receive a credit of 10% on their total spending. They also may have redirected spending away from other investments and into historic rehabilitation. This "coupon effect" seems to have been a bonus of the 10% HRTC. However, again the regression analysis does not support a cause and effect conclusion.

The nominal private spending (25%:$358,427) and private spending per square foot (25%:$30.30) did not increase with the 25% HRTC as compared to the 10% HRTC. Private spending and private spending per square foot did increase in the 25% HRTC period as compared to the 0% HRTC period. However, according to Table 6-1, when these amounts are deflated for inflation, there is actually a decrease in the private spending and private spending per square foot amounts as compared with the 0% HRTC period. Therefore, there appears to have been no "coupon effect" of the 25% HRTC as compared with the 0% and 10% HRTC periods.

A couple of cautionary notes should be made, however, with regard to these implications of the "coupon effect". The HRTC amount subtracted from the total spending in the determination of

private spending is not necessarily the actual HRTC received by the project owners. The assumption is made, which may not be accurate, that spending was evenly distributed throughout the rehabilitation projects. This is discussed in the paragraph immediately following. Also, since the HRTC was found not to be a statistically significant determinant of private spending per square foot, no cause and effect relationship can be claimed.

Cost effectiveness involves the comparison between the cost to the government from the revenue loss and the increase in total spending (nominal) on historic rehabilitation. With respect to the 10% HRTC, the cost to the government per project is the difference between the total spending and private spending which is $78,448 (13% of total spending). This difference is not 10% because some projects extended into the 25% HRTC period and therefore received an overall HRTC of over 10% of total spending. This occurs because spending is assumed to be distributed equally over the rehabilitation period of the projects. The total spending per project increased by $246,534 (70%) from the 0% HRTC period. It should be noted that this increase might have been even greater because the 0% HRTC spending level might have been lower without some of the projects qualifying for the 10% HRTC and possibly increasing their spending as a result of that windfall. Therefore, the 10% HRTC seems to have been cost effective in terms of spending because it cost the government less than the increase in spending. These results, based on total spending, are confounded by the varying sizes of the projects. Therefore, a more useful insight into the cost effectiveness of the HRTC may be provided by examining total spending per square foot. In terms of spending per square foot, the cost to the government of the 10% HRTC is the difference between total spending per square foot and private spending per square foot of $4.73 per square foot. This is an increase of 13% of total spending per square foot. Total spending per square foot increased by $10.05 (39%) from the 0% HRTC period. Therefore, the 10% HRTC appears to have been cost effective in terms of spending per square foot.

The 25% HRTC also seems to have been cost effective as compared with the 0% HRTC spending level because it cost the government the difference (25%) between total and private spending of $119,639 per project while total spending increased by $128,272 (37%) from the

0% HRTC. In terms of spending per square foot, the cost to the government of the 25% HRTC is the difference between total and private spending per square foot of $10.11 which is 25% of total spending per square foot. The total spending per square foot increased by $14.52, a 56% increase from the 0% HRTC period. Therefore, the 25% HRTC seems to have been cost effective in terms of spending per square foot. In terms of both spending and spending per square foot, the 10% HRTC and 25% HRTC appear cost effective in comparison with the 0% HRTC period. However, the 25% HRTC did not encourage an increase proportionately as large as the 10% HRTC.

Regression Results

The regression analysis provides a statistical significance test of the owners' responsiveness to the HRTC: their elasticity of demand for historic rehabilitation. Since the HRTC is not a significant determinant of spending per square foot (hypotheses of no effect are not rejected), the tests did not confirm that the owners were responsive. This indicates that the owners' demand for historic rehabilitation is inelastic. This is an indication that those to whom the tax credit policy was targeted were not receptive to the policy. Noneconomic factors may have overridden the importance of the price decrease in historic rehabilitation due to the HRTC.

SUMMARY

In summary, the descriptive statistics in Chapter 6 indicate that the large increase in the quantity of buildings rehabilitated and aggregate total spending and total spending per square foot over the HRTC periods suggest that external benefits may have been fulfilled with the HRTC policy. It also appears that the HRTC increased awareness of historic preservation. The 10% HRTC seems to have had a "coupon effect" and seemed cost effective. The 25% HRTC appeared cost effective but did not have a "coupon effect". However, these results are not confirmed when controlling for the other economic and composition factors in the regression models. The HRTC is not a significant factor in affecting spending per square foot. On the other hand, noneconomic factors were found to be significant. This leads to the implication that the owners were not responsive to the HRTC in terms of spending per square foot because of their inelastic demand. Therefore, the results of the HRTC were mixed.

CHAPTER 8

CONCLUSIONS

This chapter summarizes the dissertation along with its contribution to the literature. It also discusses potential future research possibilities in the historic rehabilitation tax incentive area. In addition, it discusses the policy implications for tax incentives in general which result from this study.

SUMMARY OF THE DISSERTATION

The HRTC was designed to encourage the rehabilitation of historic property. This study provides evidence as to whether this has been accomplished. The first step was an examination of the background of the eligibility for the HRTC and the relevant tax laws (Chapter 2). Summary statistics on the HRTC program were also presented. The literature in the tax incentive area was reviewed including the areas of historic preservation, real estate, and other tax incentive areas (Chapter 3). Externality theory, excise subsidy theory and elasticity theory were discussed with reference to the HRTC (Chapter 4) The factors of interest in this study were summarized and regression analysis was performed concerning the effect of the HRTC and other factors on spending per square foot (Chapter 5).

There were many interesting results (Chapter 6) from the descriptive information including an increase in the quantity of projects and in the average total spending per square foot over the HRTC periods. The average spending per project and average spending per square foot increased with the 10% HRTC. Over the HRTC periods, most projects did not use government funding, were of brick or masonry construction, were rehabilitated for residential use, and were *located in a historic district.*

The results of the regression analysis (Chapter 7) indicate that the 10% HRTC and 25% HRTC were not significant determinants of spending per square foot on historic rehabilitation projects. Significant determinants of spending were the size of the building, construction type, age of the building, use after rehabilitation, location in a historic district, and region.

In terms of descriptive statistics (Chapter 6), the increase in the number of projects rehabilitated and total spending during the HRTC periods indicates that external benefits may have been fulfilled due to the HRTC. The 10% and 25% HRTC appeared to be cost effective (less cost to the government than spending on historic rehabilitation) in comparison with the 0% HRTC period. The 10% HRTC appeared to be associated with a "coupon effect" due to the increase in private spending during the HRTC periods. However, the regression analysis (Chapter 7) does not support a cause and effect conclusion. The insignificance of the HRTC in explaining spending limits the conclusions that can be reached. Moreover, the apparent unresponsiveness of the owners to the HRTC indicates inelasticity of demand.

The noneconomic or composition factors provided important insights into historic rehabilitation. They were generally found to be statistically significant determinants of spending. There is a strong indication, however, that intangible, unmeasurable factors also affected historic rehabilitation. An example is owners who rehabilitate historic buildings in order to preserve a part of history. This reason can not be quantified and therefore was not able to be included in this study. This and other such noneconomic factors may have been important determinants of the owners' spending decisions.

This study contributes both data and analysis toward the understanding of the historic rehabilitation tax incentive as well as to the tax incentive area, in general. The use of a project-based database that has not previously been used enabled the project-based approach and provided new information on actual historic rehabilitations. The database also enabled the use of noneconomic or composition factors which were important determinants of historic rehabilitation spending. The study discussed many policy implications of the HRTC which can be viewed as an effective tax policy These are summerized in a following section.

FUTURE RESEARCH

There are many research possibilities in this historic rehabilitation tax incentive area. Because few research studies have been done in this area and because there is a need for further information as to the effectiveness of this tax incentive, there is great potential for research.

There are many details of historic rehabilitation projects that were not available for use in this study. Research on any of these areas would provide a contribution to the historic rehabilitation tax incentive literature.

Information as to the owners' reasons for deciding whether or not to rehabilitate a historic building would provide insight into the rehabilitation decision that was not available for this study. The reasons may be largely nonquantifiable. The ownership format, such as whether the owner is an individual, partnership, or corporation would provide an interesting insight into the effects of ownership on historic rehabilitation spending. More information on the cost of borrowing and cost of construction throughout the projects may provide insight into these market conditions, beyond the insight provided by the proxies used in this study. Information as to the type of financing used in the projects and the impact of changes in the various financing options available to owners would provide insight into the types of financing that particularly encourage historic rehabilitation. The effect on spending of projections for the rental or other use of the completed rehabilitated buildings would also be interesting to determine. Issues such as the influence of vacancy rates and the local economic conditions in the area of the historic building on the historic rehabilitation decision would be interesting to investigate. Any benefits the historic rehabilitation building provides to the city, such as tourism, or benefits the building receives from the city, such as relief from local taxes, would provide insight into the effect of local incentives on spending.

The condition of the buildings prior to the rehabilitation and the appraisal value before and after the rehabilitation would provide information as to the extent of the rehabilitation and the increase in value as a result of it. Studies on adaptive use projects would provide insight into the different concerns of these particular historic rehabilitation projects. Research into the varying importance of factors in small versus large projects would provide insight into the effects of different size projects.

The impact of additional spending on the historic rehabilitation projects would be valuable information This additional spending is due to costs of the projects which do not qualify for the

HRTC such as spending on a parking lot or an addition to a historic building. Further examples of these additional costs which do not effect the HRTC amount are the initial costs of the land and building. Information on these additional costs would be helpful in determining how the level of these costs affects spending that is eligible for the HRTC.

More extensive information on projects in the 0% HRTC period and information on projects in the current 20% HRTC period would provide additional information on the effectiveness of various HRTC percentages. For comparison purposes, information on rehabilitations which did not apply for the HRTC would be interesting. Research into the tax incentives for the rehabilitation of nonhistoric property would also provide a useful comparison to the effects of the tax credit for historic property.

Research into a specific category of historic rehabilitation, facades, would provide a valuable insight into a controversial area of historic preservation. The tax incentives for the preservation of building facades are intended to preserve the front exterior of a building while the remainder is often destroyed and rebuilt. The rebuilt portion of the building is often a different style than the facade and the original building.

The realization of many of these research ideas on a national basis would require the continuation and possible expansion of the National Trust database or the development of a similar database. An alternative to research on a national basis is field studies on historic rehabilitation projects within a region, state, or city. This would provide insight into many aspects of the historic rehabilitation projects that would not be available from a database.

In summary, research into any of these historic rehabilitation areas would provide additional insight into the HRTC and historic preservation in general. This research could also provide a broader look at the general area of tax incentives and further the knowledge in that area.

POLICY IMPLICATIONS FOR TAX INCENTIVES

The original 10% HRTC and the increased HRTC of 25% appear to have been effective in stimulating historic rehabilitation spending and the number of historic rehabilitation projects. Although the increase in the HRTC percentage to 25% seems to have been cost effective, it did not

have a proportional cost effectiveness or a "coupon effect" comparable to the original 10% HRTC. Therefore, this implies that when the government wanted to continue to stimulate historic rehabilitation, it is questionable whether an increased HRTC percentage was necessary. Perhaps an extension of the original 10% HRTC (or a 15% HRTC or a 20% HRTC) rather than the 25% HRTC would have increased historic rehabilitation to a similar extent and at a lower cost to the government. However, since the 10% HRTC was not extended, this is not possible to know.

Moreover, this degree of responsiveness seems to indicate that there should be careful consideration as to the length of time a tax credit or incentive should be available. It may be effective to grant an initial tax incentive for a limited period of time. At the end of the time period, it should be determined whether the continuation of the policy would be justified or whether a greater incentive would be more effective Depending on the objective, a greater incentive may or may not be justified. The government should not necessarily expect the high degree of effectiveness of an initial tax incentive with the continuation of an existing incentive.

Because (based on the descriptive statistics in Chapter 6) the HRTC policy appears to have been successful to some degree in encouraging the rehabilitation owners to take external benefits into account in their spending decisions, this indicates that tax credits may possibly be used successfully in many other applications to bring externalities into the market system. The HRTC policy appears to have been cost effective because it cost the government less than the increase in spending. Therefore, it should not be assumed necessarily that a tax credit program would be more costly to the government than a direct subsidy.

On the other hand, the regression analysis (Chapter 7) indicates that the rehabilitation owners, the people to whom the tax incentive policy was aimed, were not responsive to the HRTC policy in terms of spending per square foot. They had an inelastic demand curve in terms of economic factors. They did, nonetheless, respond to noneconomic factors It is important to any tax incentive policy that the targeted group is responsive to the incentive. Therefore, research into their potential responsiveness is critical prior to the issuance of an incentive. The regression analysis results indicate that the HRTC did not affect spending per square foot. The

descriptive statistics demonstrate some positive results. Therefore, the results of this study as to the HRTC policy are mixed.

This study is not meant to provide all of the answers in the tax incentive area. These results can not be generalized to other subsidies. Additional research is needed prior to any action with respect to tax incentives. There has not been much evidence about the effects of tax credits or incentives. This study provides some positive, some negative, and some inconclusive evidence concerning one tax credit. On the one hand, many buildings can be enjoyed by future generations that most likely would have been destroyed without the cost effective HRTC. On the other hand, the recipients of the credit, rehabilitation owners, did not not seem to respond as expected to economic stimuli, including the HRTC. Rather, noneconomic factors seemed to be very important.

In conclusion, this dissertation provided some new insights into the effects of the HRTC. The insights led to important policy implications in the HRTC area. These insights and implications with respect to historic rehabilitation may or may not apply in other tax incentive areas. Research must be initiated in the tax incentive areas of interest. This future research might seek to incorporate some of the insights gained from viewing spending on a project level. The positive results of the HRTC are an indication that the research into other tax incentives may have similar positive results.

APPENDIX A

STATES WITHIN EACH REGION

Northeast Region	Connecticut, Delaware, District of Columbia, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia
Midwest Region	Colorado, Illinois, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wisconsin, Wyoming
Southeast Region	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee
West Region	Arizona, California, Hawaii, Idaho, Nevada, Oregon, Washington

APPENDIX B

TABLES ACCOMPANYING DESCRIPTIVE STATISTICS (CHAPTER 6)

TABLE B-1

PROJECT MEANS BY TAX CREDIT PERIOD

	0% HRTC	10% HRTC	25% HRTC	TOTAL
SPENDING				
TSP nominal	$ 349,794	$ 395,328	$ 478,066	$ 502,785
PSP nominal	$ 322,675	$ 517,880	$ 358,427	$ 394,827
TSP deflated	$ 192,897	$ 281,757	$ 203,660	$ 221,641
PSP deflated	$ 178,386	$ 245,981	$ 152,767	$ 175,101
TSFT nominal	$ 25.89	$ 35.94	$ 40.41	$ 38.74
PSFT nominal	$ 23.89	$ 31.21	$ 30.30	$ 30.42
TSFT deflated	$ 14.28	$ 16.98	$ 17.22	$ 17.08
PSFT deflated	$ 13.20	$ 14.83	$ 12.91	$ 13.49
OTHERS				
SQFT	13,511	16,592	11,829	12,979
AGE	107	100	97	98
TIME	27	11	8	9
MR	6.95	13.05	11.19	11.53
CCI	173.42	198.34	236.25	223.51
NUMBER OF PROJECTS	45	463	1,476	1,994

TABLE B-2

PROJECT MEANS BY TAX CREDIT PERIOD (WITHOUT GOVERNMENT FUNDING)

	0% HRTC	10% HRTC	25% HRTC	TOTAL
SPENDING				
TSP nominal	$ 362,645	$ 453,169	$ 440,140	$ 441,111
PSP nominal	$ 334,805	$ 390,839	$ 329,777	$ 344,520
TSP deflated	$ 200,427	$ 213,891	$ 187,085	$ 193,864
PSP deflated	$ 185,545	$ 185,917	$ 140,431	$ 152,559
TSFT nominal	$ 25.88	$ 34.21	$ 41.42	$ 38.88
PSFT nominal	$ 23.89	$ 29.51	$ 31.03	$ 30.36
TSFT deflated	$ 14.30	$ 16.15	$ 17.61	$ 17.09
PSFT deflated	$ 13.24	$ 14.04	$ 13.22	$ 13.45
OTHERS				
SQFT	14,013	13,245	10,626	11,346
AGE	103	100	98	99
TIME	27	11	8	9
MR	6.89	13.15	11.04	11.57
CCI	173.58	198.51	236.39	223.54
NUMBER OF PROJECTS	39	337	1,033	1,409

TABLE B-2 (CONTINUED)

PROJECT MEANS BY TAX CREDIT PERIOD (WITH GOVERNMENT FUNDING)

	0% HRTC	10% HRTC	25% HRTC	TOTAL
SPENDING				
TSP nominal	$ 266,265	$ 979,222	$ 566,503	$ 653,809
PSP nominal	$ 243,833	$ 857,664	$ 425,235	$ 518,101
TSP deflated	$ 143,950	$ 463,301	$ 242,310	$ 289,709
PSP deflated	$ 131,851	$ 406,627	$ 181,531	$ 230,338
TSFT nominal	$ 25.99	$ 38.34	$ 38.71	$ 38.50
PSFT nominal	$ 23.80	$ 33.58	$ 29.06	$ 30.51
TSFT deflated	$ 14.05	$ 18.14	$ 16.56	$ 17.06
PSFT deflated	$ 12.87	$ 15.92	$ 12.40	$ 13.57
OTHERS				
SQFT	10,246	25,543	14,635	16,980
AGE	134	98	95	97
TIME	29	12	9	10
HR	7.29	12.78	11.52	11.75
CCI	176.19	197.90	234.89	223.47
NUMBER OF PROJECTS	6	126	443	575

TABLE B-3

PROJECT MEANS BY REGION

	NORTHEAST	MIDWEST	SOUTHEAST	WEST
SPENDING				
TSP nominal	$ 541,029	$ 423,987	$ 406,108	$ 829,079
PSP nominal	$ 430,933	$ 321,782	$ 315,907	$ 652,931
TSP deflated	$ 240,286	$ 182,391	$ 178,660	$ 368,087
PSP deflated	$ 192,654	$ 138,632	$ 139,767	$ 292,112
TSFT nominal	$ 38.20	$ 35.62	$ 41.69	$ 41.69
PSFT nominal	$ 30.43	$ 27.03	$ 32.43	$ 32.83
TSFT deflated	$ 16.97	$ 15.32	$ 18.34	$ 18.51
PSFT deflated	$ 13.60	$ 11.65	$ 14.35	$ 14.69
OTHERS				
SQFT	14,162	11,904	9,740	19,899
AGE	105	88	96	78
TIME	9	10	8	11
MR	11.62	11.48	11.35	12.38
CCI	220.95	230.98	224.03	219.27
NUMBER OF PROJECTS	952	402	499	131

TABLE B-4

PROJECT MEANS BY TAX CREDIT PERIOD BY REGION

	OR HRTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
SPENDING				
TSP nominal	$ 411,829	$ 210,438	$ 343,463	$ 333,841
PSP nominal	$ 383,894	$ 193,169	$ 320,387	$ 295,729
TSP deflated	$ 228,738	$ 112,710	$ 193,506	$ 177,000
PSP deflated	$ 198,518	$ 105,498	$ 182,549	$ 157,894
TSFT nominal	$ 30.73	$ 19.72	$ 25.74	$ 20.33
PSFT nominal	$ 28.65	$ 18.10	$ 24.01	$ 18.07
TSFT deflated	$ 17.07	$ 10.56	$ 14.50	$ 10.78
PSFT deflated	$ 14.81	$ 9.69	$ 13.68	$ 9.62
OTHERS				
SQFT	13,400	10,671	13,345	16,419
AGE	131	81	97	85
TIME	22	39	13	41
MR	7.05	6.54	7.71	6.44
CCI	173.58	176.80	169.56	179.35
NUMBER OF PROJECTS	21	8	7	9

TABLE B-4 (CONTINUED)

PROJECT MEANS BY TAX CREDIT PERIOD BY REGION

	10% HTTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
SPENDING				
TSP nominal	$ 664,178	$ 239,408	$ 542,764	$ 762,825
PSP nominal	$ 564,448	$ 202,555	$ 463,642	$ 648,285
TSP deflated	$ 303,758	$ 111,828	$ 257,443	$ 359,641
PSP deflated	$ 268,245	$ 94,919	$ 219,806	$ 306,140
TSFT nominal	$ 35.89	$ 26.11	$ 39.91	$ 40.60
PSFT nominal	$ 30.50	$ 22.09	$ 34.09	$ 34.50
TSFT deflated	$ 16.41	$ 12.20	$ 18.93	$ 19.14
PSFT deflated	$ 14.50	$ 10.35	$ 16.16	$ 16.29
OTHERS				
SQFT	18,508	9,168	13,600	18,799
AGE	107	89	97	71
TIME	11	12	11	12
MR	12.86	13.97	12.92	12.76
CCI	198.02	202.96	198.00	195.08
NUMBER OF PROJECTS	273	55	97	38

TABLE B-4 (CONTINUED)

PROJECT MEANS BY TAX CREDIT PERIOD BY REGION

	25% HRTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
SPENDING				
TSP nominal	$ 502,356	$ 459,967	$ 374,297	$ 847,177
PSP nominal	$ 377,041	$ 344,906	$ 280,024	$ 634,659
TSP deflated	$ 214,321	$ 195,798	$ 159,294	$ 359,873
PSP deflated	$ 160,625	$ 146,824	$ 119,357	$ 270,837
TSFT nominal	$ 40.57	$ 37.09	$ 42.83	$ 43.08
PSFT nominal	$ 30.45	$ 27.81	$ 32.04	$ 32.27
TSFT deflated	$ 17.31	$ 15.79	$ 18.23	$ 18.30
PSFT deflated	$ 12.97	$ 11.84	$ 13.68	$ 13.77
OTHERS				
SQFT	12,383	12,403	8,740	19,666
AGE	105	88	96	79
TIME	8	9	8	8
MR	10.93	11.35	11.33	12.02
CCI	235.66	235.99	236.13	234.46
NUMBER OF PROJECTS	658	338	394	85

TABLE B-5

PROJECT MEANS BY YEAR STARTED

	1976	1977	1978	1979	1980
SPENDING					
TSP nominal	$ 191,250	$ 242,294	$ 519,608	$ 918,485	$ 646,620
PSP nominal	$ 188,631	$ 222,166	$ 458,435	$ 821,428	$ 567,786
TSP deflated	$ 119,659	$ 134,815	$ 283,485	$ 456,344	$ 302,415
PSP deflated	$ 118,045	$ 124,142	$ 250,313	$ 408,135	$ 266,135
TSFT nominal	$ 21.87	$ 23.14	$ 31.28	$ 31.58	$ 37.50
PSFT nominal	$ 21.57	$ 21.22	$ 27.60	$ 28.24	$ 32.93
TSFT deflated	$ 13.68	$ 12.88	$ 17.07	$ 15.69	$ 17.54
PSFT deflated	$ 13.50	$ 11.86	$ 15.07	$ 14.03	$ 15.43
OTHERS					
SQFT	8,745	10,470	16,611	29,066	17,244
AGE	78	109	109	92	98
TIME	31	36	21	15	11
MR	5.31	5.59	8.12	11.04	12.78
CCI	156.45	172.14	174.27	189.32	200.00
NUMBER OF PROJECTS	4	16	28	83	217

TABLE B-5 (CONTINUED)

PROJECT MEANS BY YEAR STARTED

	1981	1982	1983	1984	1985
SPENDING					
TSP nominal	$ 474,980	$ 561,750	$ 379,541	$ 260,107	$ 761,718
PSP nominal	$ 370,778	$ 421,353	$ 284,672	$ 195,068	$ 571,288
TSP deflated	$ 209,469	$ 240,988	$ 160,110	$ 106,021	$ 309,782
PSP deflated	$ 165,168	$ 180,766	$ 120,091	$ 80,151	$ 232,336
TSFT nominal	$ 37.97	$ 39.69	$ 43.47	$ 40.10	$ 37.64
PSFT nominal	$ 29.64	$ 29.77	$ 32.60	$ 30.07	$ 28.23
TSFT deflated	$ 16.75	$ 17.02	$ 18.34	$ 15.34	$ 15.31
PSFT deflated	$ 13.20	$ 12.77	$ 13.75	$ 12.36	$ 11.48
OTHERS					
SQFT	12,508	14,155	8,731	6,487	20,239
AGE	103	95	99	95	90
TIME	10	9	7	6	6
MR	15.32	11.89	8.90	10.15	8.08
CCI	215.15	230.85	242.40	252.69	254.93
NUMBER OF PROJECTS	239	733	479	172	13

TABLE B-6

PROJECT MEANS BY YEAR ENDED

	1976	1977	1978	1979	1980
SPENDING					
TSP nominal	$ 80,000	$ 42,500	$ 179,166	$ 417,403	$ 519,458
PSP nominal	$ 80,000	$ 42,500	$ 177,641	$ 364,566	$ 467,794
TSP deflated	$ 56,338	$ 27,951	$ 106,155	$ 231,695	$ 261,918
PSP deflated	$ 56,338	$ 27,951	$ 105,258	$ 202,909	$ 235,908
TSFT nominal	$ 10.00	$ 18.26	$ 24.18	$ 41.68	$ 31.88
PSFT nominal	$ 10.00	$ 18.26	$ 23.97	$ 36.41	$ 28.71
TSFT deflated	$ 7.04	$ 12.02	$ 14.33	$ 23.16	$ 16.08
PSFT deflated	$ 7.04	$ 12.02	$ 14.20	$ 20.26	$ 14.48
OTHERS					
SQFT	8,000	2,327	7,410	10,014	16,293
AGE	74	106	113	107	99
TIME	5	5	11	11	10
MR	5.77	5.06	6.39	9.83	12.07
CCI	139.76	149.74	163.90	172.06	185.13
NUMBER OF PROJECTS	1	2	9	28	126

TABLE B-6 (CONTINUED)

PROJECT MEANS BY YEAR ENDED

	1981	1982	1983	1984	1985
SPENDING					
TSP nominal	$ 587,297	$ 530,168	$ 513,842	$ 366,385	$ 526,135
PSP nominal	$ 5[illegible],390	$ 404,322	$ 385,965	$ 274,865	$ 397,854
TSP deflated	$ 275,[illegible]	$ 231,035	$ 219,219	$ 152,128	$ 218,506
PSP deflated	$ 243,399	$ 177,203	$ 164,616	$ 114,492	$ 165,564
TSFT nominal	$ 34.61	$ 39.00	$ 42.63	$ 38.68	$ 33.49
PSFT nominal	$ 30.55	$ 29.74	$ 32.02	$ 29.02	$ 25.32
TSFT deflated	$ 16.23	$ 17.00	$ 18.19	$ 16.06	$ 13.91
PSFT deflated	$ 14.34	$ 13.04	$ 13.66	$ 12.09	$ 10.54
OTHERS					
SQFT	16,971	13,594	12,054	9,472	15,711
ROE	100	95	98	96	94
TIME	10	8	9	9	15
MR	14.09	13.07	9.53	9.82	8.80
CCI	199.09	223.23	235.92	247.97	247.94
NUMBER OF PROJECTS	250	525	712	294	38

TABLE B-7

PROJECT COUNT BY TAX CREDIT PERIOD

	0% HRTC	10% HRTC	25% HRTC	TOTAL
GOVERNMENT FUNDING				
Used	6	126	443	575
Did not use	39	337	1,033	1,409
CONSTRUCTION TYPE				
Wood	12	103	388	503
Brick, Etc.	33	360	1,088	1,481
USE ON COMPLETION				
Residential	23	285	979	1,287
Commercial,Other	22	178	497	697
HISTORIC DISTRICT				
Located in	25	325	1,194	1,544
Not located in	20	138	282	440
REGION				
Northeast	21	273	658	952
Midwest	8	55	339	402
Southeast	7	97	395	499
West	9	38	84	131
NUMBER OF PROJECTS	45	463	1,476	1,984

TABLE B-8

PROJECT COUNT BY REGION

	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	357	105	82	31
Did not use	595	297	417	100
CONSTRUCTION TYPE				
Wood	183	66	218	36
Brick, Etc.	769	336	281	95
USE ON COMPLETION				
Residential	731	241	281	34
Commercial,Other	221	161	218	97
HISTORIC DISTRICT				
Located in	779	298	410	57
Not located in	173	104	89	74
NUMBER OF PROJECTS				
0% HRTC Period	21	8	7	9
10% HRTC Period	273	55	97	38
25% HRTC Period	656	339	395	84
TOTAL	952	402	499	131

TABLE B-9

PROJECT COUNT BY TAX CREDIT PERIOD BY REGION

	CB AREA			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	4	2	0	0
Did not use	17	6	7	9
CONSTRUCTION TYPE				
Wood	5	1	2	4
Brick, Etc.	16	7	5	5
USE ON COMPLETION				
Residential	11	5	4	3
Commercial, Other	10	3	3	6
HISTORIC DISTRICT				
Located in	13	6	4	2
Not located in	8	2	3	7
NUMBER OF PROJECTS	21	8	7	9

TABLE B-9 (CONTINUED)

PROJECT COUNT BY TAX CREDIT PERIOD BY REGION

	10% NRTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	89	6	18	13
Did not use	184	49	79	25
CONSTRUCTION TYPE				
Wood	41	8	42	12
Brick, Etc.	232	47	55	26
USE ON COMPLETION				
Residential	196	30	50	9
Commercial, Other	77	25	47	29
HISTORIC DISTRICT				
Located in	210	37	62	16
Not located in	63	18	35	22
NUMBER OF PROJECTS	273	55	97	38

TABLE B-9 (CONTINUED)

PROJECT COUNT BY TAX CREDIT PERIOD BY REGION

	22% HRTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	264	97	64	18
Did not use	394	241	330	68
CONSTRUCTION TYPE				
Wood	137	57	174	20
Brick, Etc.	521	281	220	66
USE ON COMPLETION				
Residential	524	206	227	22
Commercial, Other	134	132	167	64
HISTORIC DISTRICT				
Located in	556	255	344	39
Not located in	102	83	50	47
NUMBER OF PROJECTS	658	338	394	86

TABLE B-10

PROJECT COUNT BY YEAR STARTED

	1976	1977	1978	1979	1980
GOVERNMENT FUNDING					
Used	0	2	4	19	73
Did not use	4	14	24	64	144
CONSTRUCTION TYPE					
Wood	0	4	8	21	43
Brick, Etc.	4	12	20	62	174
USE ON COMPLETION					
Residential	1	12	12	52	141
Commercial, Other	3	4	16	31	76
HISTORIC DISTRICT					
Located in	2	6	19	47	162
Not located in	2	10	9	36	55
REGION					
Northeast	0	8	15	50	135
Midwest	1	4	3	6	17
Southeast	2	0	6	14	51
West	1	4	4	13	14
NUMBER OF PROJECTS					
0% HRTC Period	4	16	25	0	0
10% HRTC Period	0	0	3	82	216
25% HRTC Period	0	0	0	1	1
TOTAL	4	16	28	83	217

TABLE B-10 (CONTINUED)

PROJECT COUNT BY YEAR STARTED

	1981	1982	1983	1984	1985
GOVERNMENT FUNDING					
Used	57	263	113	41	3
Did not use	182	470	366	131	10
CONSTRUCTION TYPE					
Wood	54	210	115	46	2
Brick, Etc.	185	523	364	126	11
USE ON COMPLETION					
Residential	128	478	332	122	9
Commercial, Other	111	255	147	50	4
HISTORIC DISTRICT					
Located in	174	578	400	147	9
Not located in	65	155	79	25	4
REGION					
Northeast	123	302	232	87	0
Midwest	50	173	109	28	11
Southeast	47	209	120	50	0
West	19	49	18	7	2
NUMBER OF PROJECTS					
0% HRTC Period	0	0	0	0	0
10% HRTC Period	162	0	0	0	0
25% HRTC Period	77	733	479	172	13
TOTAL	239	733	479	172	13

TABLE B-11

PROJECT COUNT BY YEAR ENDED

	1976	1977	1978	1979	1980
GOVERNMENT FUNDING					
Used	0	0	0	4	31
Did not use	1	2	8	24	95
CONSTRUCTION TYPE					
Wood	0	0	4	3	34
Brick, Etc.	1	2	4	25	92
USE ON COMPLETION					
Residential	0	1	5	16	78
Commercial,Other	1	1	3	12	48
HISTORIC DISTRICT					
Located in	0	1	4	16	89
Not located in	1	1	4	12	37
REGION					
Northeast	0	1	5	17	76
Midwest	0	1	1	1	10
Southeast	1	0	1	9	24
West	0	0	1	2	16
NUMBER OF PROJECTS					
0% HRTC Period	1	2	9	12	10
10% HRTC Period	0	0	0	16	116
25% HRTC Period	0	0	0	0	0
TOTAL	1	2	9	28	126

TABLE B-11 (CONTINUED)

PROJECT COUNT BY YEAR ENDED

	1981	1982	1983	1984	1985
GOVERNMENT FUNDING					
Used	74	125	258	75	8
Did not use	176	400	454	219	30
CONSTRUCTION TYPE					
Wood	58	116	200	75	13
Brick, Etc.	192	409	512	219	25
USE ON COMPLETION					
Residential	150	293	519	201	24
Commercial, Other	100	232	193	93	14
HISTORIC DISTRICT					
Located in	174	401	588	246	25
Not located in	76	124	124	48	13
REGION					
Northeast	147	197	357	147	5
Midwest	33	130	142	61	23
Southeast	53	143	194	70	5
West	17	55	19	16	5
NUMBER OF PROJECTS					
0% HRTC Period	7	1	3	0	1
10% HRTC Period	235	82	12	1	1
25% HRTC Period	8	442	697	293	36
TOTAL	250	525	712	294	38

TABLE B-12

PERCENTAGE OF PROJECTS BY TAX CREDIT PERIOD

	0% HRTC	10% HRTC	25% HRTC	TOTAL
GOVERNMENT FUNDING				
Used	13	27	30	29
Did not use	87	73	70	71
CONSTRUCTION TYPE				
Wood	27	22	26	25
Brick, Etc.	73	78	74	75
USE ON COMPLETION				
Residential	51	62	66	65
Commercial,Other	49	38	34	35
HISTORIC DISTRICT				
Located in	56	70	81	78
Not located in	44	30	19	22
REGION				
Northeast	46	59	44	48
Midwest	18	12	23	20
Southeast	16	21	27	25
West	20	8	6	7
NUMBER OF PROJECTS	45	463	1,476	1,984

TABLE B-13

PERCENTAGE OF PROJECTS BY REGION

	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	38	26	16	24
Did not use	62	74	84	76
CONSTRUCTION TYPE				
Wood	19	16	44	27
Brick, Etc.	81	84	56	73
USE ON COMPLETION				
Residential	77	60	56	26
Commercial,Other	23	40	44	74
HISTORIC DISTRICT				
Located in	82	74	82	56
Not located in	18	26	18	44
PERCENTAGE OF PROJECTS				
0% HRTC Period	2	2	2	7
10% HRTC Period	29	14	19	29
25% HRTC Period	69	84	79	64

TABLE B-14

PERCENTAGE OF PROJECTS IN EACH TAX CREDIT PERIOD BY REGION

	OF HRTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	19	25	0	0
Did not use	81	75	100	100
CONSTRUCTION TYPE				
Wood	24	13	29	44
Brick, Etc.	76	87	71	56
USE ON COMPLETION				
Residential	52	63	57	33
Commercial,Other	48	37	43	67
HISTORIC DISTRICT				
Located in	62	75	57	22
Not located in	38	25	43	78
NUMBER OF PROJECTS	21	8	7	9

TABLE B-14 (CONTINUED)

PERCENTAGE OF PROJECTS IN EACH TAX CREDIT PERIOD BY REGION

	IRS MSTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	33	11	19	34
Did not use	67	89	81	66
CONSTRUCTION TYPE				
Wood	15	15	43	32
Brick, Etc.	85	85	57	68
USE ON COMPLETION				
Residential	72	55	52	24
Commercial, Other	28	45	48	76
HISTORIC DISTRICT				
Located in	77	67	64	42
Not located in	23	33	36	58
NUMBER OF PROJECTS	273	55	97	38

TABLE B-14 (CONTINUED)

PERCENTAGE OF PROJECTS IN EACH TAX CREDIT PERIOD BY REGION

	25% HRTC			
	NORTHEAST	MIDWEST	SOUTHEAST	WEST
GOVERNMENT FUNDING				
Used	40	29	16	21
Did not use	60	71	84	79
CONSTRUCTION TYPE				
Wood	21	17	44	23
Brick, Etc.	79	83	56	77
USE ON COMPLETION				
Residential	80	61	58	26
Commercial, Other	20	39	42	74
HISTORIC DISTRICT				
Located in	84	75	87	45
Not located in	16	25	13	55
NUMBER OF PROJECTS	658	338	394	86

TABLE B-15

PERCENTAGE OF PROJECTS BY YEAR STARTED

	1976	1977	1978	1979	1980
GOVERNMENT FUNDING					
Used	0	13	14	23	34
Did not use	100	87	86	77	66
CONSTRUCTION TYPE					
Wood	23	27	24	27	15
Brick, Etc.	77	73	76	73	85
USE ON COMPLETION					
Residential	25	75	43	63	65
Commercial, Other	75	25	57	37	35
HISTORIC DISTRICT					
Located in	50	38	68	57	75
Not located in	50	62	32	43	32
REGION					
Northeast	0	50	54	60	62
Midwest	25	25	11	7	8
Southeast	50	0	21	17	24
West	25	25	14	16	6
PERCENTAGE OF PROJECTS					
0% HRTC Period	100	100	89	0	0
10% HRTC Period	0	0	11	99	99
25% HRTC Period	0	0	0	1	1

TABLE B-15 (CONTINUED)

PERCENTAGE OF PROJECTS BY YEAR STARTED

	1981	1982	1983	1984	1985
GOVERNMENT FUNDING					
Used	24	36	24	24	23
Did not use	76	64	76	76	77
CONSTRUCTION TYPE					
Wood	25	75	43	63	65
Brick, Etc.	75	25	57	37	35
USE ON COMPLETION					
Residential	54	65	69	77	69
Commercial,Other	46	35	31	23	31
HISTORIC DISTRICT					
Located in	73	79	84	85	69
Not located in	27	21	16	15	31
REGION					
Northeast	51	41	48	51	0
Midwest	21	24	23	16	85
Southeast	20	29	25	29	0
West	8	6	4	4	15
PERCENTAGE OF PROJECTS					
0% HRTC Period	0	0	0	0	0
10% HRTC Period	68	0	0	0	0
25% HRTC Period	32	100	100	100	100

TABLE B-16

PERCENTAGE OF PROJECTS BY YEAR ENDED

	1976	1977	1978	1979	1980
GOVERNMENT FUNDING					
Used	0	0	0	14	25
Did not use	100	100	100	86	75
CONSTRUCTION TYPE					
Wood	0	0	50	11	27
Brick, Etc.	100	100	50	89	73
USE ON COMPLETION					
Residential	0	50	63	57	62
Commercial,Other	100	50	37	43	38
HISTORIC DISTRICT					
Located in	0	50	50	57	71
Not located in	100	50	50	43	29
REGION					
Northeast	0	50	63	61	60
Midwest	0	50	13	4	8
Southeast	100	0	13	29	19
West	0	0	11	6	13
PERCENTAGE OF PROJECTS					
0% HRTC Period	100	100	100	43	8
10% HRTC Period	0	0	0	57	92
25% HRTC Period	0	0	0	0	0

TABLE B-16 (CONTINUED)

PERCENTAGE OF PROJECTS BY YEAR ENDED

	1981	1982	1983	1984	1985
GOVERNMENT FUNDING					
Used	30	24	36	26	21
Did not use	70	76	64	74	79
CONSTRUCTION TYPE					
Wood	46	22	28	26	34
Brick, Etc.	54	78	72	74	66
USE ON COMPLETION					
Residential	60	56	73	68	63
Commercial,Other	40	44	27	32	37
HISTORIC DISTRICT					
Located in	70	76	83	84	66
Not located in	30	24	17	16	34
REGION					
Northeast	59	38	50	50	13
Mideast	13	25	20	21	61
Southeast	21	27	27	24	13
West	7	10	3	5	13
PERCENTAGE OF PROJECTS					
0% HRTC Period	3	0	0	0	4
10% HRTC Period	94	16	2	1	1
25% HRTC Period	3	84	98	99	95

APPENDIX C

TABLE ACCOMPANYING REGRESSION RESULTS AND IMPLICATIONS (CHAPTER 7)

TABLE C-1

DETAILS OF REGRESSION RESULTS

Total Spending per Square Foot

Variable	Expected Sign	Coefficient	Standard Error	t-statistic	Significance Level
TC1	+	3.33	2.56	1.30	.1935
TC2	+	3.91	2.63	1.49	.1376
OF	+	- .16	.76	- .21	.8308
MR	-	- .23	.35	- .66	.5106
CCI	+	- .01	.16	- .05	.9570
SQFT	-	- .02	.02	-1.66	.0966*
CONS	-	-2.32	.81	-2.88	.0040***
AGE	+	.04	.01	4.00	.0001***
TIME	+	.07	.05	1.32	.1874
USE	-	-2.01	.75	-2.68	.0075***
MD	-	-2.15	.84	-2.55	.0108**
NE		-2.65	1.47	-1.81	.0709*
MW		-3.30	1.51	-2.19	.0290**
SE		-2.72	1.49	-1.83	.0676*
Intercept		17.73	16.54	1.07	.2842
R-Square	.0254				
Adjusted R-Square	.0185				
F-Statistic	3.668***				
Degrees of Freedom	1,993				

* Significant at .10 level (two-tail test)
** Significant at .05 level (two-tail test)
*** Significant at .01 level (two-tail test)

TABLE C-1 (CONTINUED)

DETAILS OF REGRESSION RESULTS

Private Spending per Square Foot

Variable	Expected Sign	Coefficient	Standard Error	t-statistic	Significance Level
TC1	+	1.35	2.02	.67	.5051
TC2	+	- .44	2.08	- .21	.8327
GF	+	- .07	.60	- .12	.9051
MR	-	- .22	.28	- .80	.4220
CCI	+	- .02	.13	- .20	.8456
SQFT	-	- .02	.01	-1.74	.0822*
CONS	-	-1.89	.64	-2.98	.0029***
AGE	+	.03	.01	4.00	.0001***
TIME	+	.04	.04	.97	.3303
USE	-	-1.41	.59	-2.39	.0170**
MD	-	-1.67	.66	-2.52	.0123**
NE		-2.28	1.16	-1.98	.0492**
MW		-2.96	1.19	-2.49	.0128**
SE		-2.43	1.17	-2.07	.0391**
Intercept		19.06	13.05	1.46	.1443
R-Square	.0319				
Adjusted R-Square	.0250				
F-Statistic	4.632***				
Degrees of Freedom	1,983				

* Significant at .10 level (two-tail test)
** Significant at .05 level (two-tail test)
*** Significant at .01 level (two-tail test)

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