THE DETERMINANTS OF INTERMETROPOLITAN DIFFERENCES IN NORMAL VACANCY RATES AND OFFICE SPACE RENTS

by

PETROS STAVROU SIVITANIDES

Diploma in Architectural Engineering
National Technical University of Athens, Greece
(1982)

M.C.P. Georgia Institute of Technology
(1985)

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Signature of Author ______________________________
Department of Urban Studies and Planning
September 28, 1990

Certified by ______________________________
William C. Wheaton
Associate Professor of Economics
and Urban Studies and Planning
Dissertation Supervisor

Accepted by ______________________________
Langley Keyes
Chair, Ph.D. Committee

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Petros Sivitanides

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Abstract

During the last decade, managers of new pools of investment capital, representing domestic and foreign pension funds and private investors, have been developing national investment strategies in real estate. The commercial real estate market has been one of their primary targets and locational diversification a major characteristic of their investment strategies. Such a locational diversification requires an evaluation of different market conditions at various locations. Yet, simple comparisons of vacancy rates and rents across markets cannot provide indications regarding differences in supply-demand imbalances and implicit equilibrium rents. A meaningful comparison of markets requires the identification and explanation of the structural parameters of each market, that is, its normal vacancy rate and normal rent.

Despite significant differences across metropolitan office markets in their normal vacancy and rental rates, there has been no systematic analysis of the underlying determinants of these differences. As a result of the excess supply of office space and double digit vacancy rates in the major office markets during the eighties, the theoretical and empirical literature alike have focused on the intertemporal behavior of these markets, rather than their cross-sectional differences. Within this context, a number of empirical studies have documented the importance of a normal vacancy rate in determining the magnitude of excess demand or supply and, furthermore, intertemporal price behavior.

Against this background, the dissertation focuses on the identification and explanation of intermetropolitan cross-section differences in normal vacancy rates and office space rents. Based on landlord and tenant search theories, we first define the normal vacancy rate and then propose a statistical model for explaining its cross-section variations. The empirical formulation of this model attempts to capture differences across markets in terms of effective space demand and effective space supply. It, therefore, accounts for such variables, as tenant size, lease length, office employment growth, office space stock, space rents and stock growth.

Subsequently, we proceed with the analysis of intermetropolitan rent differentials. For this purpose we specify a disequilibrium model of the office market. This decomposes rent levels into an implicit equilibrium component, which depends on demand and supply variables and the normal vacancy rate, and a disequilibrium component, which depends on the magnitude and the persistence of the deviation of the nominal vacancy rate from the normal vacancy rate.

The two models are tested using estimates of hedonic rent indices, estimates of the normal vacancy rate and time series data on metrowide office space demand and supply variables. The empirical results support our hypotheses. Cross-section variations in normal vacancy rates are explained to a great extent by differences in factors that affect landlord and tenant search procedures. Cross-section variations in office space rents are explained by differences in supply and demand factors, the normal vacancy rate and the disequilibrium state of the market.

Dissertation Supervisor:
William C. Wheaton, Associate Professor
Department of Economics and Urban Studies and Planning

CHAPTER I

INTRODUCTION

During the last decade, managers of new pools of investment capital, representing domestic and foreign pension funds and private investors, have been developing national investment strategies in real estate. One major characteristic of these strategies is locational diversification. Such a diversification requires adequate understanding of the structural characteristics of each market and the underlying determinants of vacancy and price variations across markets. The understanding of these structural differences is instrumental in comparing and evaluating the profit potential of real estate investments at alternative locations.

The commercial real estate market has been one of the primary targets of institutional investors. The 1980's have been marked by excess supply of office space and double digit vacancy rates in the major metropolitan markets. This was mostly the result of a fast growth in the office space stock, rather than a dramatic drop in office employment growth. In the light of these evolutions, the real estate literature has focused on the intertemporal behavior of office space rents in the presence of supply-demand imbalances. A number of studies have documented the importance of normal vacancy rate in determining the magnitude of excess demand or supply and, furthermore, intertemporal price behavior. Yet, despite significant variations across metropolitan markets in their levels of normal vacancy rates and office space rents, there has been no systematic analysis of the underlying factors that determine such variations.

1. The Objectives and Scope of the Study

Given the limited literature[1/] on the nature and the determinants of structural differences among local office space markets, the study has two primary objectives. First, to theoretically define and empirically identify the normal vacancy rate and implicit equilibrium rent (normal rent). Second, to explain differences across markets in normal vacancy rates, implicit equilibrium rents and prevailing office space rents.

By understanding the exogenous factors that determine cross-sectional variations in the normal vacancy rate across local office markets, one can estimate the normal vacancy rate for each market, if appropriate cross-section data are available. Given these estimates and data on nominal vacancy rates, one can then compare the degree and the nature of

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1/ Using a model based primarily on landlord behavior theories, Shilling, Sirmans and Corgel (1987) have so far made the only attempt to study cross-section variations in normal vacancy rates.

disequilibrium (excess demand or excess supply) in each metropolitan market.

By understanding the exogenous variables that determine differences in office space rents, one can make comparative assessments regarding trends in office space rents and potential revenues in various local markets. Such understanding can eventually contribute to a more sophisticated comparison of alternative locations and, therefore, a more prudent locational diversification of real estate investment portfolios. The derivation of theoretical models for such an analysis, however, requires first the understanding of the intertemporal behavior of metropolitan markets, as well as the degree to which these markets behave independently. If, for example, office markets are mostly at equilibrium and move simultaneously, then any cross-section differences in rents should simply be explained by differences in long-run equilibrium factors. The experience of the past thirty years has shown, however, that the office market is highly cyclical with long cycles. In addition, it is generally accepted in the literature (Hekman, 1985) that local office markets may to a significant extent behave independently.

The formulation, therefore, of a model for the explanation of cross-section differentials in office space rents has to accordingly take into account the cyclical instability and the somewhat autonomous behavior characterizing local markets. Given these characteristics, it is very likely that, at a given point in time, disequilibrated metropolitan office markets are at different stage of their cycle. The analysis of cross-section office space rent differentials requires, therefore, a disequilibrium modeling of the office space market, which will properly take into account such differences in their disequilibrium state. Such differences can be accounted for, if (among other factors) the normal vacancy rate is known. To provide such estimates, a rent adjustment equation must be estimated.

Research Questions

Given the objectives of the study, there are four critical questions that need to be addressed. These are presented below:

(1) First, what is the model of the intertemporal behavior of the office space market, and what are its implications with respect to cross-sectional differences in space rents and vacancy rates?

(2) Second, what are the theoretical determinants of cross section variations in normal vacancy rates, and which is the empirical model that can capture these theoretical determinants?

(3) Third, given the office market model, how can the normal rent be defined, and how can its cross-section variations be explained?

(4) Fourth, given disequilibrated local markets, which theoretical and empirical specifications can explain cross-section differences in office space rents?

The first question calls for a review of the time series literature on office markets and the development and description of a full model of the intertemporal behavior of the office market. This requires the explicit consideration of the demand for office space, the supply of office space and, especially, the rent adjustment process.

The second question calls for the estimation of a rent adjustment equation for each market and the subsequent use of the estimated parameters for the calculation of the normal vacancy rate. Furthermore, the identification of the theoretical determinants of variations across markets in this rate requires a review of search, matching and landlord behavior theories, as applied to the commercial real estate market.

The third question calls for the theoretical and empirical formulation of a normal rent model. Such model can be derived by studying the steady-state properties of the intertemporal office market model.

Finally, the fourth question calls for the formulation of a disequilibrium rent model. Such a model has to take into account both equilibrium factors, such as demand and supply variables, and disequilibrium factors, such as the deviation of the nominal vacancy rate from the normal vacancy rate.

2. Methodology of the Study

Market Definition

An important methodological issue that emerges in analyzing office space markets is the locational or geographical definition of the market. Assuming that data are available at all three levels, metropolitan, city, and suburban, then two options are available: 1) consider the metropolitan market as one reasonably unified market, or 2) consider the metropolitan market as segmented, that is consisting of two reasonably independent markets, namely, a central city and a suburban market.

Most office market studies have focused on central city markets (Shillings, Sirmans, and Gorgel, 1987) or on both central city and suburban markets (Hekman, 1985; Voith and Crown, 1988). The latter do not clarify whether the segmentation of the metropolitan office market into central city and suburbs is made on theoretical or on purely technical grounds, because of data constraints.

Whatever the reason, none of these studies has presented a clear theoretical argument of whether the metropolitan market should be considered as a unified market or not. Hekman (1985) correctly argues that the suburban office market is more heterogeneous, but he fails to specify a suburban-specific demand function for office space. In fact, he employed the same metrowide demand function for both the central city and the suburban markets included in his sample. This problem is common in most empirical studies, which focus either on central city or suburban markets. In these studies usually a location-specific dependent variable in conjunction with metrowide independent variables for demand are used.

Besides the fact that specific central city and suburban data are hard to find, there is another significant technical problem in adopting such segmentation. In some metropolitan areas, such as Boston, the "central city" office space market extends beyond the central city political boundaries. The reverse may also be true; in some metropolitan areas, such as Atlanta, the "central city" office market is confined in a considerably smaller geographical area than the one specified by the central city political boundaries.

Given such technical problems as those just described and the generally accepted argument that there is a reasonably strong locational substitutability between suburban and central city locations, we consider the metropolitan market as a unified market and focus our analysis on the metropolitan level.

Nature of the Study

This dissertation, then, is in substance a macroeconomic analysis of office markets, in the sense that mostly aggregate and average measures on the metropolitan level are used in addressing the major research questions. However, in the beginning of the study, microeconomic analysis for the estimation of hedonic rent indices is also employed. For the construction of these indices, information on rental rates and other lease, quality and locational characteristics of individual properties is utilized.

Although the study primarily focuses on cross-section variations in vacancy rates and rents, time-series analysis is also used in addressing both theoretical and empirical issues. In particular, time series analysis is used in the theoretical specification of the normal rent and the disequilibrium rent model, the examination of the rent adjustment process and the estimation of normal vacancy rates.

Techniques and Data

Regression analysis is the primary statistical technique used for testing the hypotheses regarding the determinants of intermetropolitan differences in normal vacancy rates and office space rents. Most of the empirical data used in the estimation of statistical models have been provided by Coldwell Banker, one of the nation's largest commercial real estate brokers. In particular, we obtained from this source more than twenty thousand individual property records for the major metropolitan areas in the country, as well as semiannual time series information for the period 1955-1989. The time series database includes information regarding metrowide vacancy rates, office space stock and employment structure in major metropolitan areas. Metrowide office space construction costs per square foot were obtained from the 1989 "Means Square Foot Estimates".

3. Organization of the Study

This study is organized into two major parts: the theoretical part, which includes chapters II through IV, and the empirical part, which includes chapters V through VIII.

Chapter II reviews the time-series literature on office markets. In particular, it examines the intertemporal behavior of office markets, and explores how demand, supply and the rent adjustment process contribute to such a behavior. It also develops the full model of the office space market, studies its steady-state properties, defines the normal vacancy rate and the normal rent, and examines the dynamic behavior of the model in response to exogenous demand shocks.

The full understanding of the implications of the intertemporal office market model requires first an assessment of how independently local markets behave. For this reason, in Chapter III we review the historical trends in four major office space markets, namely, Atlanta, Boston, Dallas and San Francisco. This review provides strong evidence that local markets behave independently to a significant extent. The analysis, also provides some preliminary indications that there are significant structural differences across local markets.

Given these findings, Chapter IV develops a theoretical framework for explaining cross section variations in normal vacancy rates and office space rents. In particular, it addresses the issue of the identification of the normal vacancy rate and reviews search, matching and landlord behavior theories, in order to pinpoint its theoretical determinants. In addition, it addresses the issue of the identification and explanation of the normal rent. Finally, it deals with the specification of a disequilibrium office rent model that decomposes office space rent to an equilibrium and a disequilibrium component, defines these two components, and explores their relationship with the structural vacancy and the vacancy-rent cycle.

Chapter V, the first chapter of the empirical part, describes the data and the econometric model used for the estimation of hedonic rent indices for 24 major metropolitan areas for the period 1980-1988. These estimates show that there are indeed significant differences in office rents across metropolitan markets.

Chapter VI presents the empirical model and discusses the estimates of the rent adjustment equation in 19 metropolitan areas. It also presents and discusses alternative estimates of the structural vacancy rate based on the results obtained from the rent adjustment equation.

Chapter VII translates the theoretical model of the determinants of cross-section variations in normal vacancy rates into an empirical model, and presents and discusses the empirical estimates.

Chapter VIII describes the data and the empirical models used for the explanation of cross-section differences in normal and current office space rental rates, and presents and discusses the estimation results.

4. Summary of Empirical Findings

Examination of the estimated parameters and test statistics lead to the following conclusions:

1) The normal vacancy rate and normal rent do vary significantly across metropolitan markets. The former varies from 5.5% in San Francisco to 16.6% in Phoenix. The latter varies from $16 in Oklahoma to $35.4 in New York.

2) Surprisingly, the normal vacancy rate in most markets is very volatile through time.

3) Cross section differences in the normal vacancy rate are attributable to differences in factors affecting the behavior of office tenants and landlords. Such factors include tenant size, lease length, office employment growth, stock growth rate, size of stock and prevailing rents.

4) The prevailing office space rents are a function of a normal rent component and a disequilibrium component. The former depends on such long-run demand and supply factors, as office employment, the ratio of office employment to total employment, construction costs and the normal vacancy rate. The latter depends on the magnitude and persistence of the deviation of the nominal vacancy rate from the normal vacancy rate.

CHAPTER II

THE TIME SERIES LITERATURE AND THE INTERTEMPORAL BEHAVIOR OF THE OFFICE SPACE MARKET

Before we proceed to the theoretical and empirical aspects of the cross-section analysis of office markets, it is important to review the time series literature and understand how office markets behave intertemporally.

1. The Time-Series Literature and the Office Market Model

The historic evolutions in the national office market indicate that its intertemporal behavior is characterized by considerable cyclical instability. Vacancies, rents and new construction have been fluctuating considerably around their steady-state levels during the last three decades.

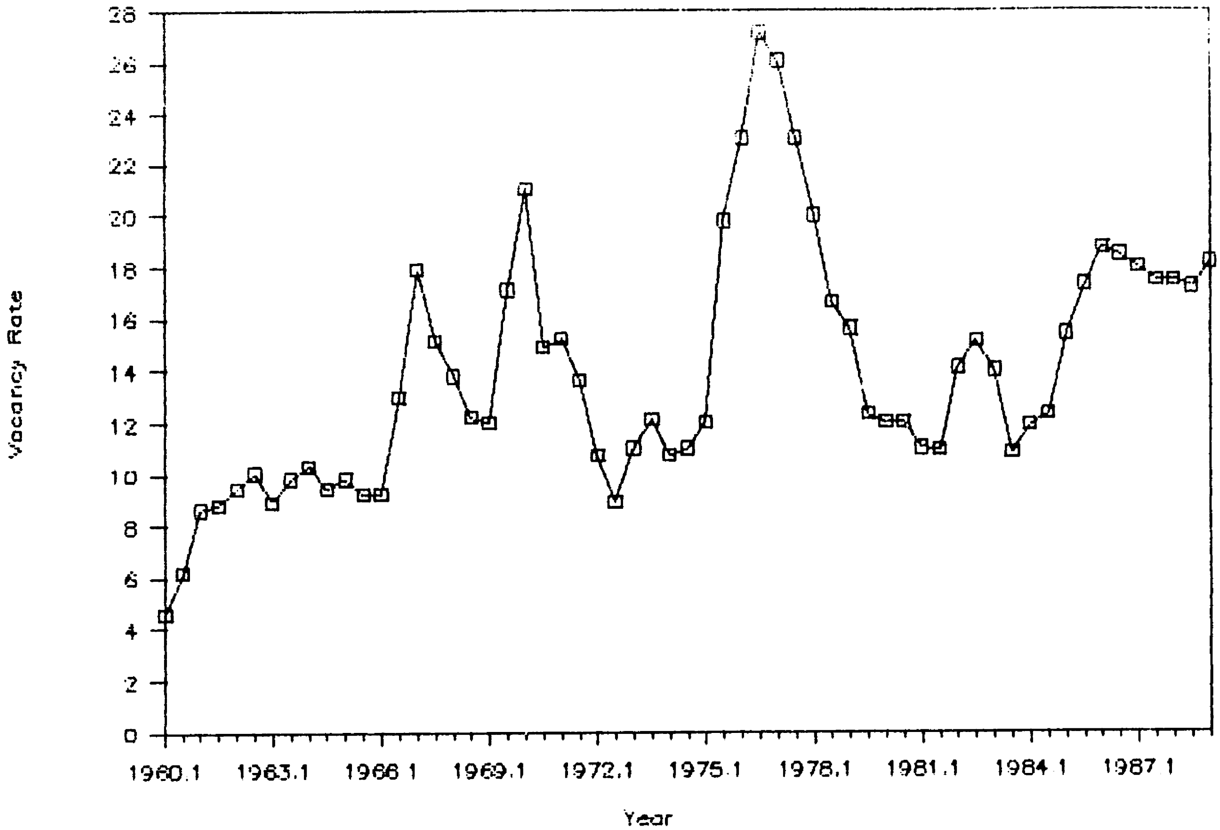
The commercial real estate market has experienced three major cycles since the 1950s. Office space construction in the country peaked in the late 1950's, in 1971 and, most recently, in 1981. Evidently, the three peaks in office construction have been followed by three peaks in the national vacancy rate. From a low of below 5% in the 1950's, the national vacancy rate rose to a high of 8.5% in the mid-sixties, fell to 4% in the late sixties, rose to 14% by mid-seventies, fell to 5% by 1979 and is currently up to an all-time high of 15%. An important characteristic of this cyclical behavior of both new construction and the vacancy rate is the long periodicity of the cycle, which is roughly 10 years (Wheaton, 1987).

Individual metropolitan area data indicate that local markets have exhibited similar behavioral patterns, as far as vacancies and new construction are concerned. In the Atlanta market, for example, the vacancy rate peaked in 1967, 1970, 1977, 1983, and 1987. In 1977 the market reached an all time high vacancy rate of 27% (Graph 1). Completions in metropolitan Atlanta have also exhibited a cyclical pattern. In particular, they peaked in 1965, 1970, 1974, 1982 and 1985. In the latter year completions reached an all time high of 4.7 million square feet (Graph 2).

The Los Angeles market presents another example of the cyclical instability of the local office markets in the post World War II period. It is interesting to note that vacancy rates in this market have been fluctuating considerably less than in the Atlanta market. During the 1960's, for example, the vacancy rate was almost constant-- ranging from 10% to 13%. Vacancies in 1975 reached an all time high of 24%, fell to an all time low of 2% in 1981, peaked to 17% in 1983 and remained there till 1988 (Graph 3). Completions, however, have exhibited a more cyclical pattern than vacancy rates; they peaked in 1967, 1972, 1983 and, most recently, in 1986.

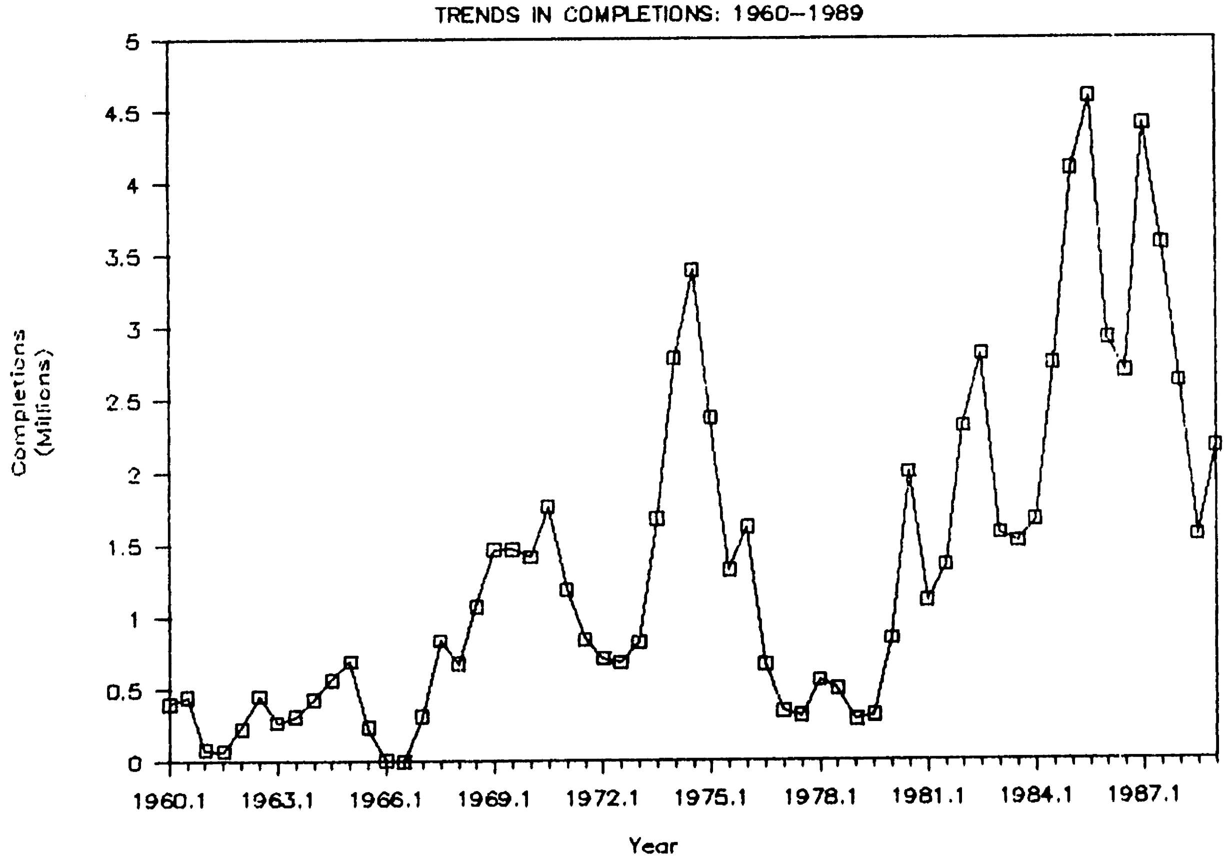
GRAPH 1: METROPOLITAN ATLANTA

TRENDS IN VACANCY RATE: 1960–1989



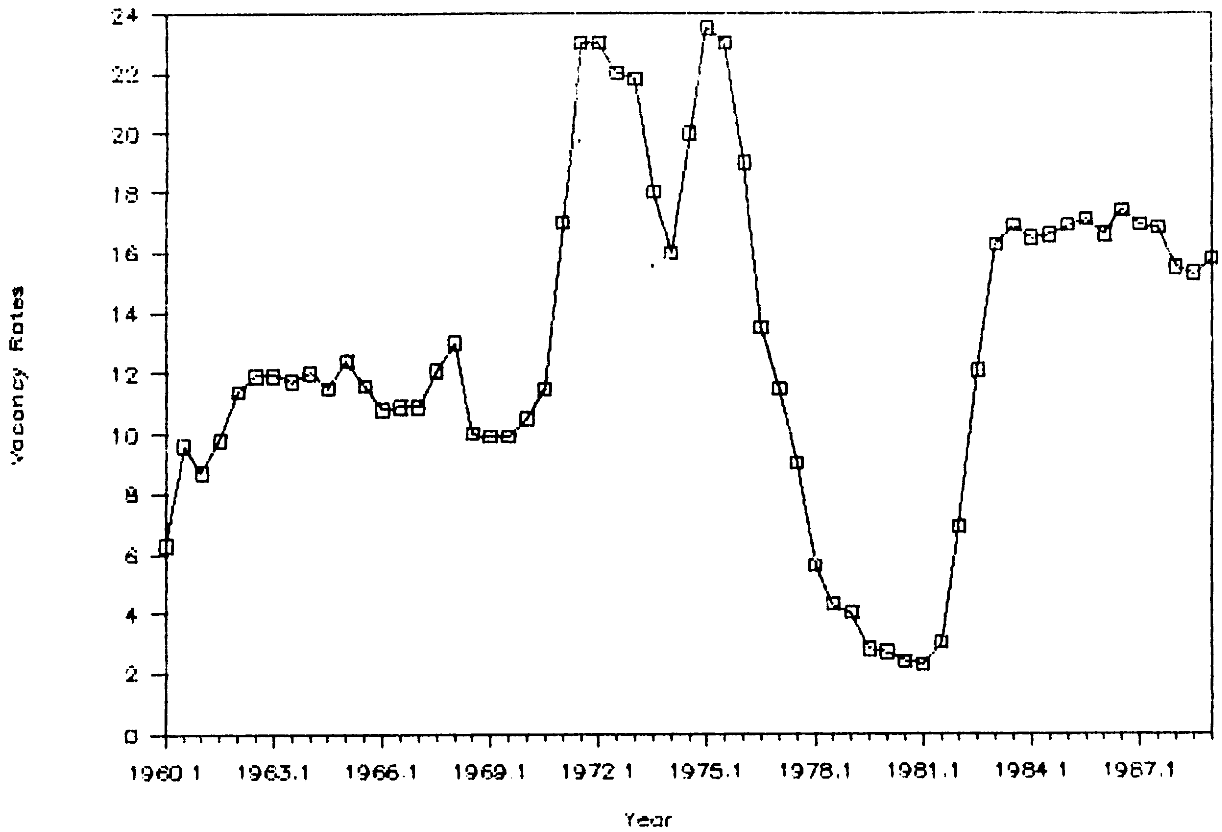
GRAPH 2: METROPOLITAN ATLANTA

TRENDS IN COMPLETIONS: 1960–1989



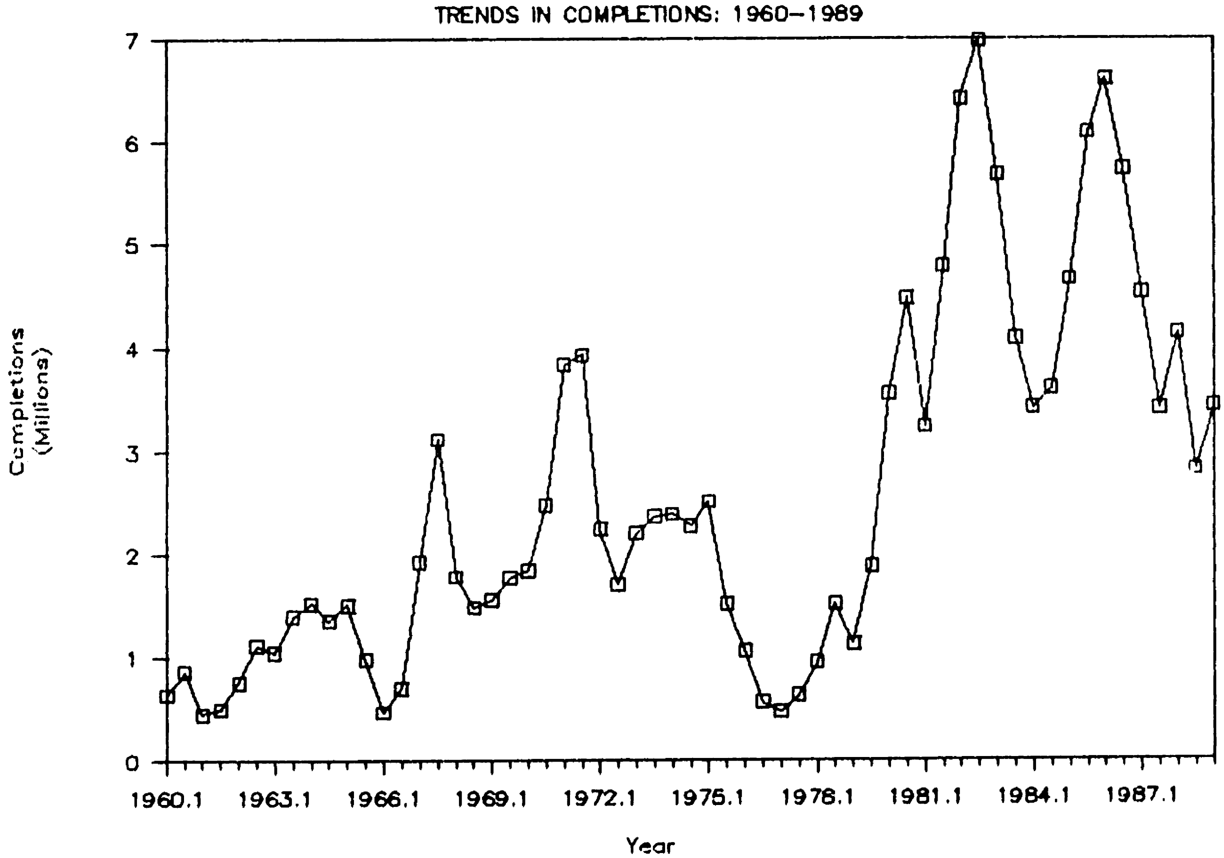
GRAPH 3: METROPOLITAN LOS ANGELES

TRENDS IN VACANCY RATES: 1960–1989



GRAPH 4: METROPOLITAN LOS ANGELES

TRENDS IN COMPLETIONS: 1960–1989



Notably, in 1983 they reached an all time high of seven million square feet (Graph 4).

To understand the causes of the cyclical behavior of the office space market we have to examine the demand for office space, the supply of office space and the price adjustment mechanism.

The Demand for Office Space

Survey based findings indicate that roughly 75%-80% of occupied office space in urban areas is demanded by firms whose SIC is the Finance-Insurance-Real Estate and Service category (Rosen, 1983; Hekman, 1985; Wheaton, 1987). The rest of it comes from administrative activities of manufacturing firms and other sectors. An important feature of the office market, which differentiates it from other markets, is the long duration of rental contracts (5-10 years). Given such duration, typically only a small fraction (roughly 10%) of the tenants in the market over any given year are in a legal position to move. The clear implication is that the market is made on the margin, and that it is new and growing firms that constitute the bulk of office space demand (Wheaton, 1987).

Firm demand for office space depends mostly on its price and the firm's growth prospects. Like any commodity, firm demand for office space should be negatively affected by higher rents. Furthermore, in the light of anticipations of future growth, firms will demand more space or require options on contiguous space within a building to allow them to easily expand. Based on the above, we can write the ex ante long run demand for office space as a function of office space rents (R) and office employment (OE):

$$D(t) = D[R(t), OE(t)] \tag{1}$$

An underlying trend of the American office market during the post World War II period has been the long-run growth in office employment (OE) and, consequently, the increasing demand for office space (Wheaton, 1987). Rosen (1983) suggests that employment growth in the key service industries, which are the primary sources of demand for office space, depends on the performance of the economy, corporate profits and the particular industry mix of the market under consideration.

Predicting, however, employment growth in these sectors, as well as other sectors that demand office space at a lesser extent, has been a difficult task for suppliers. For this reason, the difficult-to-predict fluctuations in office employment have been one of the primary causes of the observed cyclical instability in the national office market (Wheaton and Torto, 1987).

It is often assumed in the housing and office literature, that the ex ante demand is always realized and thus equal to the amount of occupied stock (DiPasquale and Wheaton, 1988). This relationship is described by equation (2), where OS(t) denotes the occupied stock, V(t) denotes the current vacancy and S(t) denotes the current stock:

$$D(t) = OS(t) = (1-V(t))\ S(t) \tag{2}$$

The Supply for Office Space

The intertemporal behavior of the supply of office space is described in most studies by a stock flow model (Wheaton and Torto, 1987; Rosen, 1983; Rosen and Smith, 1983). This model postulates that the supply of office space during period t is equal to the previous period's stock S(t-1) minus depreciation plus that period's completions C(t). This relationship is described by equation (3) where δ denotes the depreciation rate:

$$S(t) = S(t-1) - \delta\ S(t-1) + C(t) \tag{3}$$

The change in stock at any time t is, therefore, given by the equation:

$$\dot{S} = C(t) - \delta\ S(t-1) \tag{4}$$

If completions are equal to the depreciated stock, then there will be no change in the stock of office space. If completions are higher than depreciation, then the stock of office space will increase.

Completions during period t are actually a function of new construction starts during some periods back. These are affected by profitability factors, that is, the costs and revenues associated with the production and ownership of office space. The main input costs in the production of office space are construction costs, land costs, and interest rates. Revenues from ownership of office space are primarily determined by the market rental rates. Thus, the major determinants of the supply of office space are construction costs (CC), land costs (LC), rents (R) and interest rates (i) (Rosen, 1983; Hekman, 1985).

Another factor that may affect the construction of office space are tax laws. Rosen (1983) introduced in the supply function, tax laws affecting commercial real estate development, but their effect on new construction proved to be statistically insignificant. We can, therefore, write the new construction function as:

$$NC(t) = S[CC(t), R(t), LC(t), i(t)] \qquad (5)$$

For a given rental income and higher input costs, new construction should be smaller, while for given input costs and higher rental income it should be greater.

Wheaton (1987) claims that supply causes cyclical instability in the office market because it is more price elastic than demand. His argument is based on empirical evidence which indicates that the vacancy elasticity of new construction is almost 3 times higher than the vacancy elasticity of absorption.

Vacancy Rate

According to many analysts (Rosen, 1983; Hekman, 1985; Wheaton, 1987), the discrepancy between the demand for and the supply of office space at any point in time (t) is described by the vacancy rate V(t), which equals to the ratio of the vacant stock (VS(t)) over the total stock (S(t)) in the market:

$$V(t) = \frac{VS(t)}{S(t)} = \frac{S(t) - D(t)}{S(t)} \qquad (6)$$

If the total stock equals to the quantity demanded, then the current vacancy will be zero. If the current stock is larger than the quantity demanded, then the vacancy rate will be positive. In the case of excess demand, however, there is a problem, exactly because the vacancy rate can not take negative values. As DiPasquale and Wheaton (1988) suggest, if markets are supply constrained (with zero or low vacancy), then the vacancy rate provides only limited information about the tightness of the market.

Rent Adjustment

The cyclical pattern observed in office space vacancies and new construction is primarily driven by the rent adjustment mechanism. As the conventional economic theory suggests, whenever demand and supply become unbalanced, rents adjust accordingly to bring the market back into equilibrium.

The issue of the rent adjustment process in the commercial real estate market has attracted a great deal of attention by the literature. (Rosen, 1983; Hekman, 1985; Shillings, Sirmans, and Gorgel, 1987; Wheaton, and Torto, 1988). It is generally accepted in this literature that excess demand or supply of office space, triggered either by stochastic fluctuations in office employment or imperfect expectations on the part of office space suppliers with respect to future demand, alter the equilibrium vacancy rate. This change triggers, in turn, a rent adjustment mechanism, which will eventually eliminate supply-demand imbalances and return the vacancy rate at its structural or normal level. The normal vacancy rate, analogous to the natural unemployment rate, represents the optimal stock of vacant units required for the normal operation of the market (we elaborate more on the definition of the normal vacancy rate in the next section).

The rent adjustment mechanism is not instantaneous. As Rosen and Smith (1983) point out, market frictions, such as high transactions and search costs, slow supply responses, credit market imperfections and the existence of long-term contracts may all impede the quick adjustment of rents. Thus, at a given point in time, prevailing office space rents may not completely clear the market.

If rents are such that the office space demanded exceeds the available supply less the normal vacant stock, then the vacancy rate will be less than normal and upward pressure will be exerted on rents. Similarly, if rents are such that the office space demanded is smaller than the available supply less the normal vacant stock, the vacancy rate will be above its normal level, and downward pressure will be exerted on rents; in addition new construction will be lower than its market-clearing level.

The speed at which the market moves toward equilibrium depends, among other factors, upon the supply-side response and speed-of-rental price adjustment. This discussion implies that the rate of change in rents depends upon the vacancy rate, and that variations in the arguments in the demand or supply function will be reflected initially in vacancy rates (Rosen and Smith, 1983).

Rosen (1983), Rosen and Smith (1983), and Shilling, Sirmans and Gorgel (1988) suggest that the rent adjustment is also affected by changes in operating expenses and that it should be stronger, when the imbalance between demand and supply is larger. Finally, Wheaton and Torto (1988) present evidence, indicating that the structural vacancy rate in the office market may have been increasing through time.

Despite some differences in the estimated equations, the basic model that all the time series studies use to describe the rent behavior within markets through time is the following:

$$\dot{R} = (R(t) - R(t-1))/ R(t-1) = \alpha(V^* - V(t) \qquad (7)$$

where $R(t)$ = office space rent at period t
V^* = structural or normal vacancy rate
$V(t)$ = current vacancy
α = rate of adjustment

This model is a particular form of Walrasian price adjustment, which postulates that the change in prices is positively related to the degree of "excess demand" (DiPasquale and Wheaton, 1988):

$$R(t) - R(t-1) = \alpha[D(t) - S(t)] \qquad (8)$$

In a similar way, the rental adjustment model postulates that the rent change during each period is a function of the difference of that period's vacancy rate from the structural vacancy rate. Given the above discussion, the excess demand or supply in the office market is not represented by the prevailing vacancy V(t) but by V*-V(t), that is, its difference from the normal rate (V*). When the difference is positive, that is the nominal vacancy rate is below its normal level, there should be excess demand, and the change in rents will be positive. If the difference is negative, there should be excess supply, and the change in office space rents will be negative.

Concluding Remarks

Equations (1) through (8) describe the full model of the intertemporal behavior of the office market. Historical evidence suggests that the major characteristics of this behavior are the unpredictable fluctuations in demand, the high price elasticity of supply, the slow adjustment of rents to demand and supply imbalances due to long lease agreements and other frictions, and the slow adjustment of supply to demand changes due to the pipeline effect. All these factors shape a behavioral pattern which is characterized by cyclical instability, persistence of supply-demand imbalances and slow movements in rental rates (Wheaton, 1987).

3. The Steady-State Properties of the Office Market Model

We now proceed with the study of the steady-state properties of the full time-series model of the office space market. According to the conventional economic theory, a market is at its steady state, when prices and quantities remain constant. Therefore, the office space market will be in a steady state if two conditions hold: 1) rent change is zero, and 2) the office space stock is constant:

$$\dot{R} = 0; \quad \text{and} \quad \dot{S} = 0 \tag{9}$$

According to the rent adjustment equation, the first condition will be satisfied only when the nominal vacancy rate equals to the normal vacancy rate. This can be derived by equating (7) with zero and solving for the vacancy rate:

$$\dot{R} = \alpha \text{ (} V^* - V(t) = 0$$

$$\Longrightarrow V^* - V(t) = 0 \quad \Longrightarrow \quad V^* = V(t) \tag{10}$$

Hence, when the market is at its steady state, the nominal vacancy rate (V(t)) should be at its normal level (V*). Furthermore, for the system to remain at its steady state, the vacancy rate should remain at its normal level. Assuming constant office space demand, this requires that the stock of office space remains constant or, similarly, that the stock change equals zero. By setting equation (4) equal to zero and solving for completions (C(t)), we show that this will be true only when completions equal the depreciated stock:

$$\dot{S} = C(t) - \delta S(t-1) = 0 \tag{11}$$

$$C(t) = \delta S(t-1) \tag{12}$$

Since at a steady state the office space stock is by definition constant then we can rewrite (12) as follows:

$$C(t) = \delta\, S(t) \tag{13}$$

Given the two steady-state conditions described by (9), the steady-state or normal rent (R*), as we will call it hereafter, is the rent that equates the total stock (S(t)) to the sum of space demanded (D(t)) and the normal vacant stock (V* S(t)) and, at the same time, secures that new construction equals the depreciated stock. The first property of the steady-state rent can be derived from equation (6) after substituting V(t) for V*:

$$V(t) = \frac{S(t) - D(t)}{S(t)} = V^* \tag{14}$$

or:

$$S(R^*) = D(R^*) + V^*\, S(R^*) \tag{15}$$

The second property can be derived from (13), by simply expressing new construction and the stock as functions of R*:

$$C(R^*) = \delta\, S(R^*) \tag{16}$$

By substituting (16) in (15) we can then derive the equation for the steady-state rent that satisfies both conditions:

$$D(R^*) = \frac{C(R^*)}{\delta} (1-V^*) \tag{17}$$

According to (17), the steady-steady rent is the one that equalizes demand with the product of the ratio of completions over the depreciation rate and the normal occupancy rate (1-V*).

In summary, then, we can distinguish three steady state properties of the office space market model. The first is that the nominal vacancy rate is at its normal level; the second is that new construction is equal to the depreciated stock; and the third is that office space stock equals the sum of the desired stock and the normal vacant stock.

4. The Dynamic Behavior of the Office Market Model

In order to provide an explicit description of the dynamic behavior of the office space market through the described model, let's assume that while at a steady state as described above, the market experiences a demand shock in the form of a demand increase of the magnitude of k square feet. This will disturb the steady state equilibrium and its impact will reflected in a decrease of the vacancy rate below its normal level. This can be derived by substituting the new demand function in equation (6):

$$V(t+1) = \frac{S(t) - D(t) - K}{S(t)} = \frac{VS^* - K}{S(t)} < V^* \qquad (18)$$

As equation (18) indicates, the increase in effective demand by k will result to a decrease in the vacant stock below its normal level. Since the total stock of office space is fixed, the decrease of the vacant stock will translate into a decrease in the nominal vacancy rate below its normal level. This, in turn, will trigger the rent adjustment mechanism. As the deviation of the nominal vacancy from the normal vacancy rate becomes positive, rents will respond with a positive change ($\dot{R}>0$), which is proportional to this deviation [$V^*- V(t)$], and start moving above their steady state level. Thus, prevailing rents at time t+1 can be expressed as:

$$R(t+1) = R^* + \dot{R} = R^* + \alpha\, [V^* - V(t)] \qquad (19)$$

As the vacancy rate and its deviation from its normal level increase, the rate by which rents are rising will increase as well. As prevailing office rents increase, new construction (which is function of rents) will also increase at a rate higher than the depreciation rate. This will result in a positive change in the office stock:

$$C(t) > \delta\, S(t) \qquad (20)$$

and:

$$\dot{S}(t) = C(t) - \delta\, S(t) > 0 \qquad (21)$$

As the aggregate stock increases, the vacant stock will start gradually increasing and the vacancy rate will start rising. Rent increases do not only boost new construction, but also affect negatively the demand for office space, which, in turn, will cause the vacancy rate to rise faster. As the vacancy rate starts rising, rents continue to increase, but now at a decreasing rate, as the deviation of the vacancy rate from its structural level becomes increasingly smaller. As the current vacancy returns to its structural level, the rate of change becomes equal to zero and rents stop increasing to reach a new steady state level. This new steady rent is the one that equalizes the stock with the sum of the desired stock (D(R*)) and the normal vacant stock (S(R*)):

$$\bar{S}(\bar{R}^*) = \bar{D}(\bar{R}^*) + V^* \bar{S}(\bar{R}^*) \qquad (22)$$

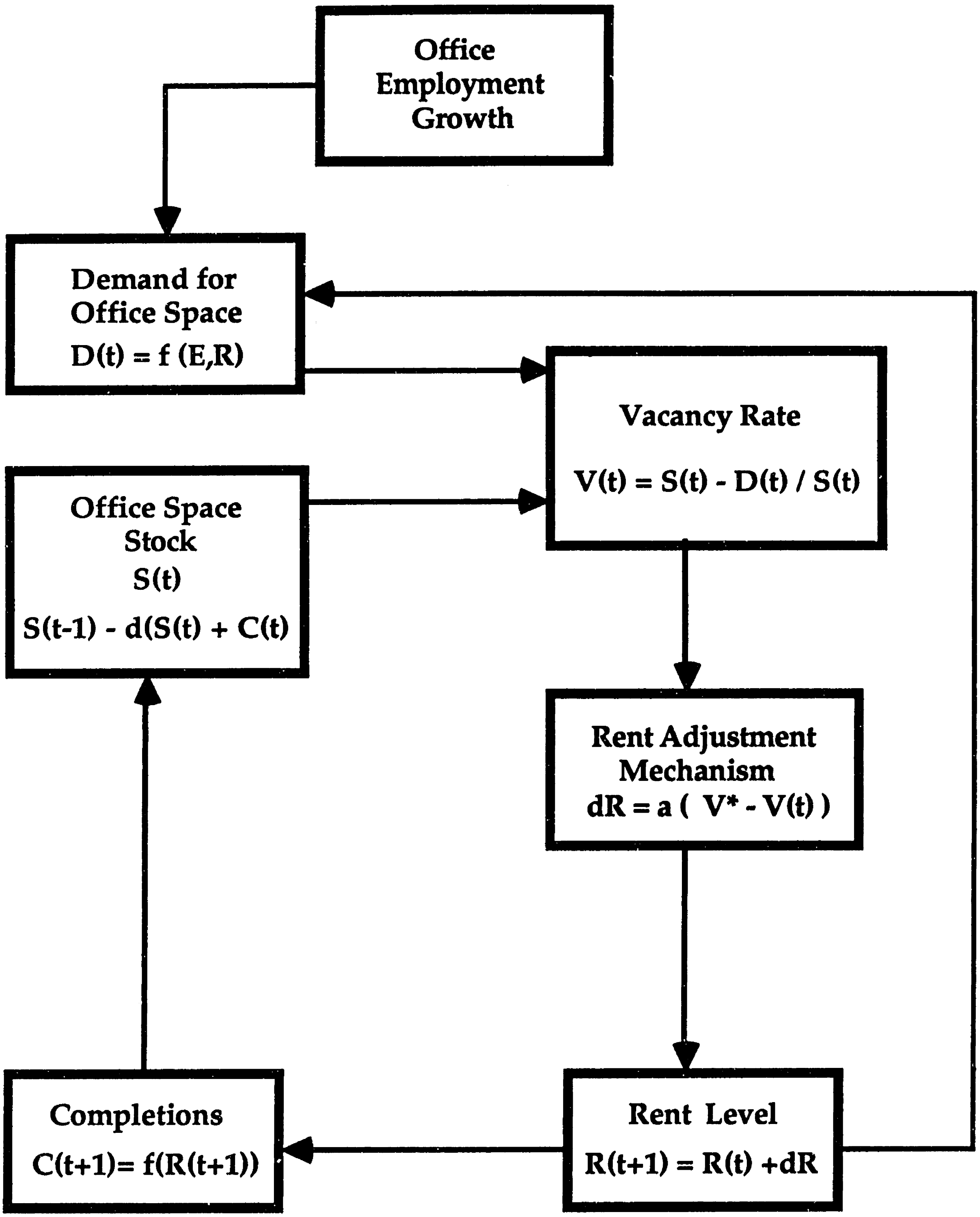
The described smooth movement of the market from one steady state to another, without having rents overshoot or new construction overreact to rent increases may be unrealistic. The reason lies in the frictions that prevail in most urban real estate markets, such as imperfect information (both on the supply and the demand side) and imperfect expectations on the part of developers. In fact, reality suggests that the steady-state rent is not reached at the end of the first cycle, but rather after a series of converging cycles. If the rent adjustment and the reaction of new construction were smooth, then we should observe only increasing rents and no oversupply in the market. The existence of repeated vacancy rate and new construction cycles indicates that the rent overshoots or undershoots. Otherwise, the vacancy rate should gradually return to its normal level and the market should stabilize with no subsequent rent decreases.

In the simulation results presented in Table 1 and Graphs 5 and 6, we describe exactly this behavioral response of repeated cycles to a demand shock that takes place gradually in three periods (from period 2 to period 4). This demand shock is caused by increases in office employment. Figure 1 describes the workings of the model and the interaction between the major variables. The exogenous employment growth affects the vacancy rate, which, in turn, triggers a rent change and shapes the rent level of the next period. The new rent level then triggers a change in the quantity of the desired stock (movement along the demand curve) and stimulates a new level of completions. The new level of completions and the new level of demand reshape the vacancy rate, and the cycle is repeated all over until the vacancy rate returns to its normal level.

It has to be noted that the model assumes a myopic behavior on the part of developers. Given the construction lag, there is a gap between the time the investment decision is made and the time the project comes out in the market. Thus, theoretically the investment decisions of developers are based on their expectations regarding rents and demand during the

FIGURE 1

THE OFFICE MARKET MODEL



period the building will be completed.

The process of the formulation of such expectations can be described by four alternative models: 1) the myopic expectations model, which postulates that investors assume that prices during the next period will be equal to prevailing prices during this period, 2) the trend expectations model, which postulates that changes in prices each period equal the change in prices during the previous period, 3) the adaptive expectations model, which postulates that investors correct their forecasts for the future based on the magnitude of their mistake in previous forecasts and 4) the rational expectations model, which postulates that investors can perfectly predict future prices, based on information available in the present.

The trend models usually produce more volatile results than the myopic expectations models, while the adaptive and rational expectations models produce less volatile results.

As shown in Table 1, the values of demand, office space stock, vacancy rate, change in rents, rents and new construction in period 1 and 77 are at their steady state values before and after the demand shock, respectively. We have assumed a 40 million square feet total stock of office space, a 10% structural vacancy rate, a 1.0 rate of rent adjustment, and 0.01 depreciation rate.

The movements of the three key variables of the model, that is, vacancy, rents and new construction can be observed in Graphs 5 and 6. As Graph 5 shows, the vacancy rate decreases

TABLE 1
OFFICE MARKET BEHAVIOR: DEMAND SHOCK SIMULATION

Period	Office Employment	Office Space Demand (Square Feet)	Office Space Stock (Square Feet)	Vacancy Rate (%)	Change in Rent (%)	Rent	New Construction (Square Feet)
1	180,000	36,000,000	40,000,000	10.00	0.000	$10.00	400,000
2	187,200	37,440,000	40,000,000	6.40	0.000	$10.00	400,000
3	192,816	38,424,372	40,000,000	3.94	0.036	$10.36	472,000
4	197,000	39,010,762	40,072,000	2.65	0.061	$10.99	597,582
5	197,000	38,692,491	40,268,862	3.91	0.074	$11.80	759,142
6	197,000	38,409,672	40,625,315	5.45	0.061	$12.51	908,704
7	197,000	38,185,532	41,131,767	7.14	0.045	$13.08	1,016,481
8	197,000	38,038,132	41,727,030	8.84	0.029	$13.46	1,091,304
9	197,000	37,976,659	42,401,063	10.43	0.012	$13.61	1,122,508
10	197,000	37,999,971	43,099,561	11.83	-0.004	$13.55	1,110,674
11	197,000	38,097,807	43,779,240	12.93	-0.018	$13.31	1,061,012
12	197,000	38,253,391	44,402,459	13.85	-0.030	$12.91	981,791
13	197,000	38,449,372	44,940,216	14.44	-0.038	$12.41	883,451
14	197,000	38,636,346	45,373,264	14.78	-0.044	$11.86	778,160
15	197,000	38,870,248	45,691,691	14.89	-0.048	$11.29	658,757
16	197,000	39,107,642	45,893,532	14.79	-0.049	$10.74	548,405
17	197,000	39,310,209	45,983,002	14.51	-0.048	$10.23	445,579
18	197,000	39,492,010	45,968,751	14.09	-0.045	$9.77	353,294
19	197,000	39,649,372	45,862,358	13.55	-0.041	$9.37	273,415
20	197,000	39,780,279	45,677,149	12.91	-0.035	$9.03	206,965
21	197,000	39,883,863	45,427,343	12.20	-0.029	$8.77	154,384
22	197,000	39,960,030	45,127,454	11.45	-0.022	$8.58	115,736
23	197,000	40,009,037	44,791,915	10.68	-0.015	$8.45	90,844
24	197,000	40,031,621	44,434,840	9.91	-0.007	$8.40	79,380
25	197,000	40,028,623	44,069,872	9.17	0.001	$8.40	80,902
26	197,000	40,001,142	43,710,075	8.49	0.008	$8.47	94,852
27	197,000	39,950,568	43,367,826	7.88	0.015	$8.60	120,524
28	197,000	39,878,702	43,054,671	7.38	0.021	$8.79	157,004
29	197,000	39,787,899	42,781,129	7.00	0.026	$9.02	203,097
30	197,000	39,681,215	42,556,415	6.76	0.030	$9.29	257,251
31	197,000	39,562,532	42,388,102	6.67	0.032	$9.59	317,497
32	197,000	39,436,589	42,281,717	6.73	0.033	$9.91	381,427
33	197,000	39,308,908	42,240,327	6.94	0.033	$10.23	446,240
34	197,000	39,185,551	42,264,163	7.28	0.031	$10.54	508,858
35	197,000	39,072,735	42,350,379	7.74	0.027	$10.83	566,120
36	197,000	38,976,258	42,493,065	8.28	0.023	$11.08	615,098
37	197,000	38,901,029	42,683,173	8.86	0.017	$11.27	653,285
38	197,000	38,850,468	42,909,625	9.46	0.011	$11.39	678,950
39	197,000	38,825,215	43,159,479	10.04	0.005	$11.46	691,251
40	197,000	38,828,026	43,419,146	10.57	-0.000	$11.45	690,342
41	197,000	38,853,923	43,675,297	11.04	-0.005	$11.39	677,197
42	197,000	38,900,539	43,915,740	11.42	-0.010	$11.27	653,534
43	197,000	38,963,532	44,130,117	11.71	-0.014	$11.11	621,532
44	197,000	39,038,309	44,310,343	11.90	-0.017	$10.92	583,599
45	197,000	39,119,955	44,450,843	11.99	-0.019	$10.71	542,155

46	197,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	197,000	39,336,641	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	197,000	39,384,395	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
49	197,000	39,434,532	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	197,000	39,495,307	44,522,485	11.29	-0.016	$9.76	351,621
51	197,000	39,544,954	44,428,381	10.99	-0.013	$9.63	326,419
52	197,000	39,582,627	44,311,011	10.67	-0.010	$9.54	307,296
53	197,000	39,607,335	44,175,197	10.34	-0.007	$9.47	294,500
54	197,000	39,620,495	44,027,945	10.01	-0.003	$9.44	288,074
55	197,000	39,620,888	43,875,739	9.70	-0.000	$9.44	287,874
56	197,000	39,609,638	43,724,956	9.41	0.003	$9.47	293,565
57	197,000	39,587,689	43,581,192	9.16	0.006	$9.52	304,726
58	197,000	39,556,296	43,450,107	8.96	0.008	$9.60	320,662
59	197,000	39,517,005	43,336,268	8.81	0.010	$9.70	340,607
60	197,000	39,471,629	43,243,512	8.72	0.012	$9.82	363,640
61	197,000	39,422,208	43,174,716	8.69	0.013	$9.94	388,727
62	197,000	39,370,942	43,131,696	8.72	0.013	$10.07	414,751
63	197,000	39,320,107	43,115,130	8.80	0.013	$10.20	440,555
64	197,000	39,271,952	43,124,533	8.93	0.012	$10.32	464,999
65	197,000	39,228,571	43,158,287	9.11	0.011	$10.44	487,020
66	197,000	39,191,788	43,213,724	9.31	0.009	$10.53	505,691
67	197,000	39,163,044	43,287,278	9.53	0.007	$10.60	520,282
68	197,000	39,143,312	43,374,687	9.76	0.005	$10.65	530,298
69	197,000	39,133,047	43,471,239	9.98	0.002	$10.68	535,509
70	197,000	39,132,163	43,572,036	10.19	0.000	$10.68	535,948
71	197,000	39,140,164	43,672,263	10.38	-0.002	$10.66	531,896
72	197,000	39,156,020	43,767,437	10.54	-0.004	$10.62	523,848
73	197,000	39,178,453	43,853,611	10.66	-0.005	$10.56	512,460
74	197,000	39,205,954	43,927,535	10.75	-0.007	$10.49	498,501
75	197,000	39,236,900	43,986,760	10.80	-0.007	$10.41	482,792
76	197,000	39,269,659	44,029,684	10.81	-0.008	$10.33	466,163
77	197,000	39,302,667	44,055,550	10.79	-0.008	$10.25	449,408

==

Equations:

(1) D(t) = E(220 - 2R(t))

(2) S(t) = S(t-1)*(1-0.01) + C(t-1)

(2) C(t-1) = -1,600,000 + 200,000*R(t-1)

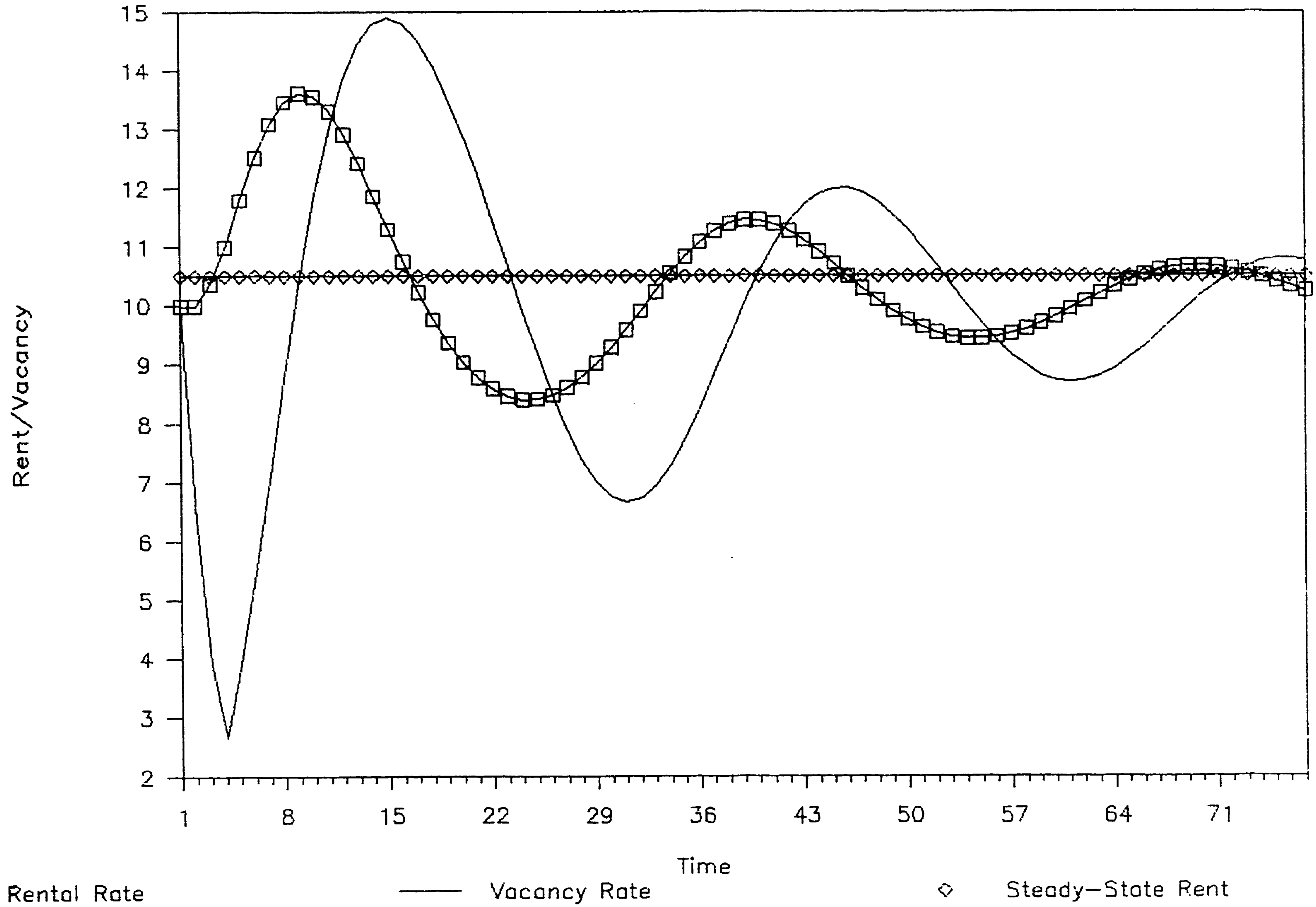
(3) V(t) = (D(t) - S(t))/S(t)

(4) R(t) = R(t-1) + dR(t-1)

(5) dR(t-1) = 1.0*(V* - V(t-1))

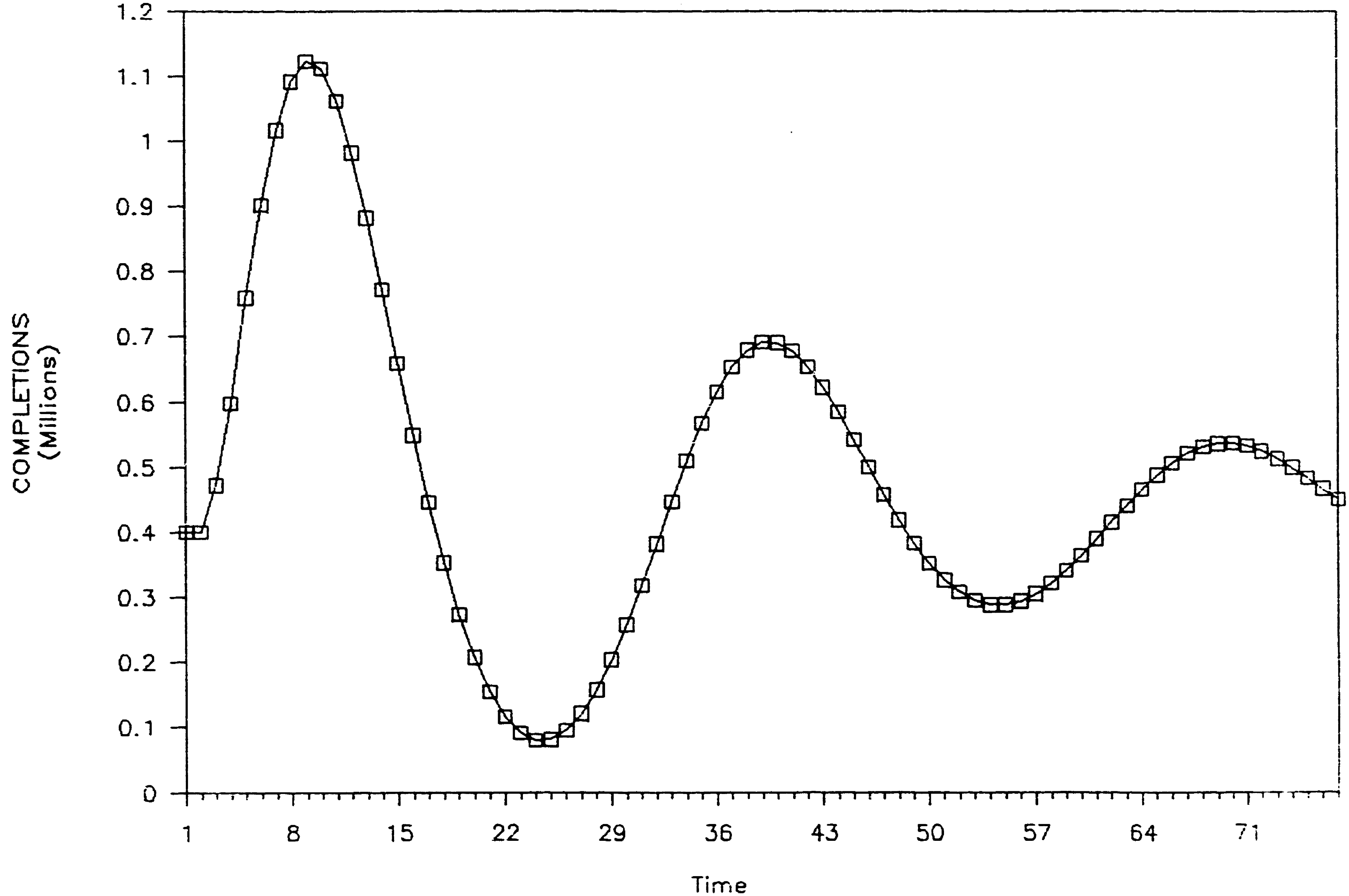
GRAPH 5: DEMAND SHOCK SIMULATION

RENT—VACANCY MOVEMENTS



GRAPH 6: DEMAND SHOCK SIMULATION

MOVEMENTS IN NEW CONSTRUCTION



as much as 7%, as office employment gradually increases. However, as rents rise way above their normal level and new construction begins increasing rapidly in period 4, it starts rising. As an excessive amount of new office space enters the market, the vacancy rate rises considerably above its normal level to become as high as 15%. So a new vacancy cycle takes place, but now above the structural rate (see Graph 5). The vacancy rate will gradually start increasing above the structural rate until it reaches a maximum, and then it will start decreasing until it returns to the structural rate. According to equation (7), this new vacancy cycle above the structural rate will now trigger a cycle of decreasing rents.

As soon as the vacancy rate rises above the structural level, rents will start decreasing at an increasing rate, but only until the vacancy rate reaches a maximum. As the vacancy rate starts returning from that maximum to the normal rate, rents will continue to decrease but now at a decreasing rate. These will reach a minimum when the current vacancy returns to its structural level. As rents fall below their steady state level, a new cycle of supply shortages is triggered, and the process is repeated all over. As Graph 5 indicates, the amplitude of the rent-vacancy cycles is decreasing through time and gradually levels off at their normal values. New construction (Graph 3) follows a similar intertemporal pattern oscillating up and down, until it stabilizes at a level equal to the depreciated stock.

5. Implications on Cross-Section Analysis of Office Markets

To understand the implications of the above conclusions with respect to the cross-sectional analysis of local office markets, we have to examine the extent to which these markets behave independently. If they do not behave independently, the cross-section analysis of differences in office space rents does not have to take into account the extent of equilibrium or disequilibrium.

The theoretical and empirical literature on office markets strongly support (either implicitly or explicitly) the argument that metropolitan office markets do behave to a significant extent independently. It is true that local office space markets experience similar influences from national macroeconomic policies and capital market trends. These are, however, also sufficiently differentiated in terms of local influences, so that their overall behavior is not identical cross-sectionally. The assumption that all variables affecting local markets are all moving at the same rate and direction is very likely to be false. As Hekman (1985) correctly points out:

> "For one thing, the growth rate of demand for office space differs markedly between cities of different sizes because the employment composition of cities differs and employment sectors grow at different rates. In a shift share framework this is the share factor. The shift factor results from the different growth rates of cities, for example between the Frostbelt and the Sunbelt."

In order to lend empirical support to the above arguments, in the following chapter we review the trends in four major metropolitan office space markets over the last thirty years.

CHAPTER III

TRENDS IN METROPOLITAN OFFICE MARKETS: 1960-1989

As already mentioned, to fully understand the implications of the model of the intertemporal behavior of the office space market in the cross-section analysis of local markets, we have to assess the extent to which these markets behave independently. For this reason, we review and compare the historic evolutions, during the last thirty years, in four major office space markets: Atlanta, Boston, Dallas and San Francisco. We specifically focus on three variables: office employment, office space stock and the vacancy rate. We also review the office rental rates estimates for the four markets for the period 1980-1989.[a] In order to make a preliminary assessment of structural differences, we focus on the vacancy-completion dynamics and the way these dynamics compare across markets. This analysis is based on data provided by Coldwell Banker and the U.S. Department of Commerce.

1. Trends in Office Employment

As discussed earlier, an appropriate proxy for the levels of demand for office space is employment in Finance, Insurance and Real Estate (FIRE), as well as, a large portion (36%) of

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[a] The estimation procedure is explained in Chapter V.

employment in the Service sector. According to building surveys, employees in these two industries occupy roughly 75% of leased office space (Wheaton, 1987). Therefore, hereafter, we will refer to the sum of employment in FIRE and 36% of employment in services as office employment.

Table 2 and Graph 7 provide the trends in office employment in the four markets under consideration from 1960 until 1989. These data support the argument that demand for and, therefore, absorption of office space varies both through time and across local markets. The levels of office employment, as well as their aggregate growth rates, vary considerably across markets during the period 1960-1989. In 1988, the former range from 217,480 in San Francisco to 418,080 in Boston, in 1988; the latter range from 144.5% in Boston to 364.4% in Atlanta.

Annual office employment growth rates vary also intertemporally and across markets (Table 3, Graphs 8,9,10, and 11). In Atlanta, for example, the annual growth rate ranges from -2.00% to 12.2%. In almost every year from 1960 to 1989 annual office employment growth rates have been considerably different in the four markets. An extreme example of such diversity is 1987. During this year, office employment in the Atlanta market grew by 9.3%, in the Boston market grew by less than half of that rate (4.37%), in the Dallas market decreased by 2% and in the San Francisco increased at a minimal rate of 1.16%.

TABLE 2
TRENDS IN OFFICE EMPLOYMENT(1): 1960-1989
(In Thousands)

YEAR	ATLANTA	BOSTON	DALLAS	SAN FRANCISCO
1960	49.748	171.000	54.724	84.496
1961	53.964	175.444	56.928	93.060
1962	56.384	180.844	61.244	96.788
1963	59.676	183.624	66.652	100.372
1964	63.780	187.920	69.068	104.068
1965	65.420	190.036	72.240	105.400
1966	70.748	192.924	74.988	108.464
1967	72.748	207.668	80.804	109.736
1968	77.996	213.740	87.220	117.292
1969	82.164	218.392	90.280	121.840
1970	86.988	224.764	100.280	127.444
1971	93.436	225.408	101.556	124.976
1972	97.892	225.832	106.200	127.196
1973	104.292	234.752	112.320	135.476
1974	113.620	238.116	118.268	141.180
1975	108.400	234.004	116.588	144.696
1976	112.104	233.400	120.992	150.596
1977	114.624	243.160	126.968	155.956
1978	124.536	260.736	138.232	166.508
1979	134.884	276.112	148.072	177.464
1980	142.272	289.040	159.352	185.992
1981	147.904	299.240	170.548	192.804
1982	151.772	307.564	179.108	198.100
1983	156.376	315.088	192.288	194.944
1984	169.888	327.524	215.756	201.904
1985	185.200	354.128	234.380	203.688
1986	192.356	373.228	247.364	210.152
1987	210.252	389.524	242.420	212.596
1988	220.924	409.560	247.232	214.800
1989	231.040	418.040	248.256	217.840

Notes: (1) Estimated as the sum of employment in FIRE and 36% of the employment in services.

Source: Coldwell Banker

GRAPH 7

TRENDS IN OFFICE EMPLOYMENT: 1960–1989

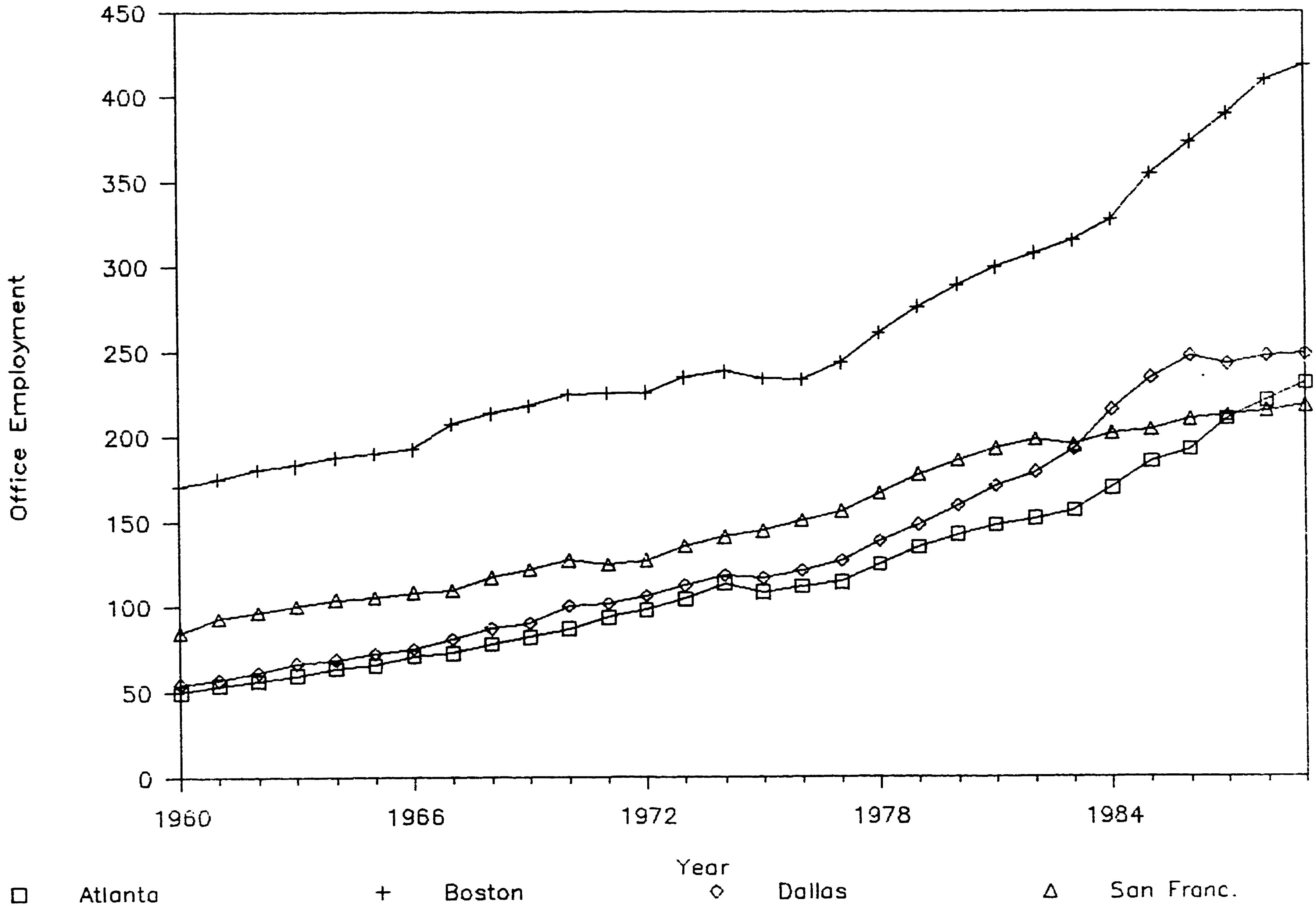


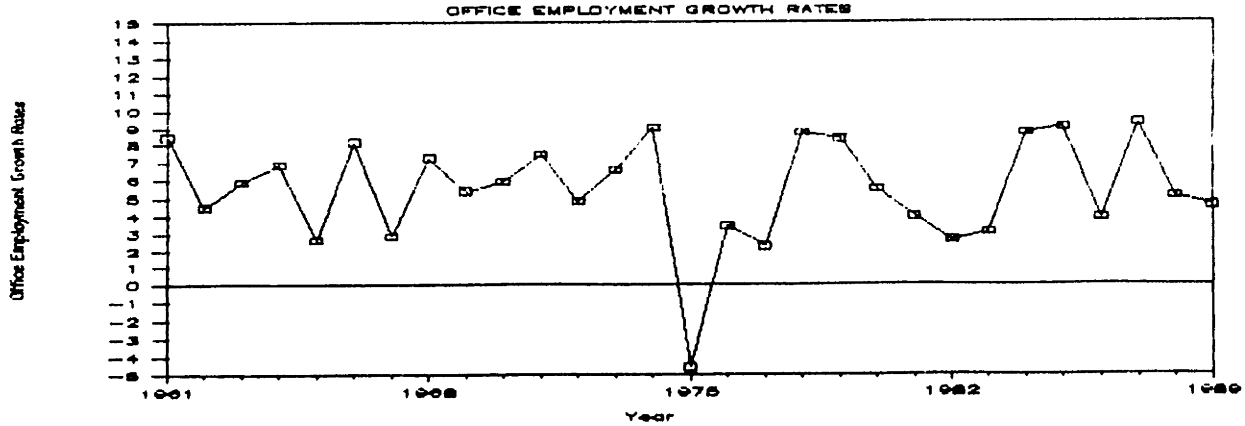
TABLE 3
OFFICE EMPLOYMENT GROWTH RATES: 1960-1989
(In Percent)

YEAR	ATLANTA	BOSTON	DALLAS	SAN FRANCISCO
1961	8.47	2.60	4.03	10.14
1962	4.48	3.08	7.58	4.01
1963	5.84	1.54	8.83	3.70
1964	6.88	2.34	3.62	3.68
1965	2.57	1.13	4.59	1.28
1966	8.14	1.52	3.80	2.91
1967	2.83	7.64	7.76	1.17
1968	7.21	2.92	7.94	6.89
1969	5.34	2.18	3.51	3.88
AVERAGE	5.75	2.77	5.74	4.18
1970	5.87	2.92	11.08	4.60
1971	7.41	0.29	1.27	-1.94
1972	4.77	0.19	4.57	1.78
1973	6.54	3.95	5.76	6.51
1974	8.94	1.43	5.30	4.21
1975	-4.59	-1.73	-1.42	2.49
1976	3.42	-0.26	3.78	4.08
1977	2.25	4.18	4.94	3.56
1978	8.65	7.23	8.87	6.77
1979	8.31	5.90	7.12	6.58
AVERAGE	5.16	2.41	5.13	3.86
1980	5.48	4.68	7.62	4.81
1981	3.96	3.53	7.03	3.66
1982	2.62	2.78	5.02	2.75
1983	3.03	2.45	7.36	-1.59
1984	8.64	3.95	12.20	3.57
1985	9.01	8.12	8.63	0.88
1986	3.86	5.39	5.54	3.17
1987	9.30	4.37	-2.00	1.16
1988	5.08	5.14	1.98	1.04
1989	4.58	2.07	0.41	1.42
AVERAGE	5.56	4.25	5.38	2.09

Source: Estimated on the basis of data provided by Coldwell Banker

GRAPH 8: ATLANTA, 1960—1989

OFFICE EMPLOYMENT GROWTH RATES

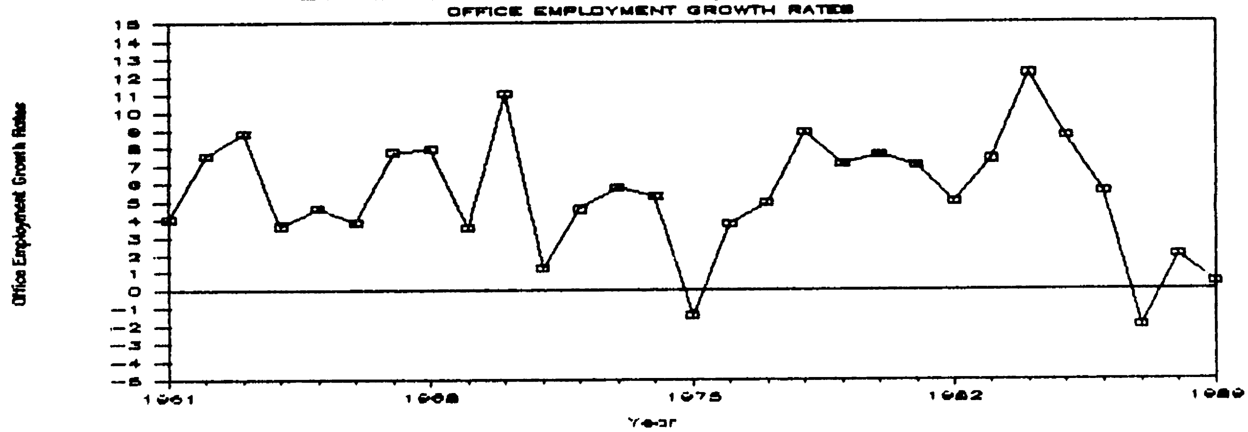


GRAPH 9: BOSTON, 1960—1989

OFFICE EMPLOYMENT GROWTH RATES

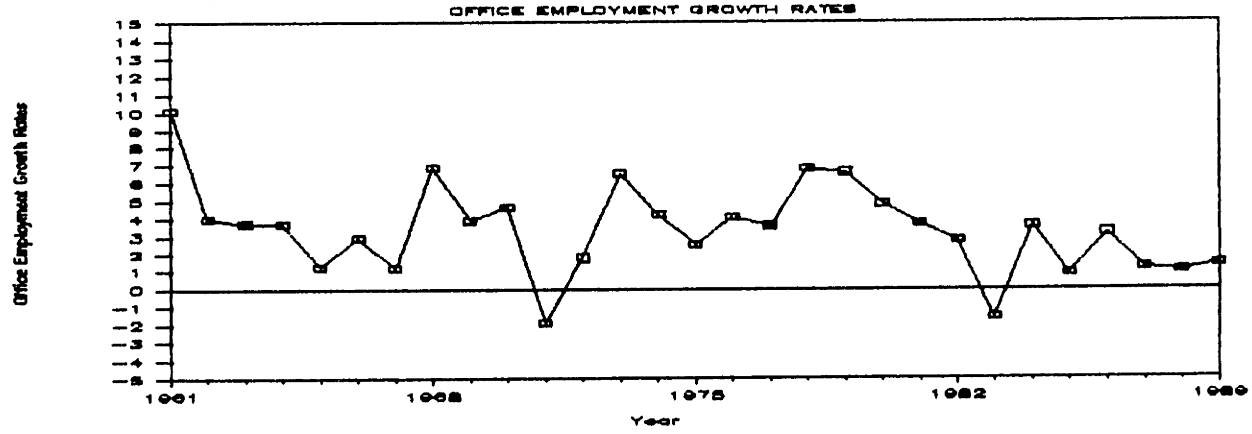
GRAPH 10: DALLAS, 1960—1989

OFFICE EMPLOYMENT GROWTH RATES



GRAPH 11: SAN FRANCISCO, 1960—1989

OFFICE EMPLOYMENT GROWTH RATES



Although the 10-year average annual growth rates presented in Table 3 conceal significant cross-section differences in annual rates, they still indicate that there is some cross-sectional variation in the long-run growth rates. In all three decades (1960's, 1970's, and 1980's) the average annual growth rate varies from 2% to 6% across the four markets. The data indicate that the trends in these long-run annual growth rates also differ cross-sectionally. In particular, in Atlanta and Dallas, the 10-year average has remained pretty much stable at 5-5.5% during the last 30-years. In Boston, however, it increased from 2.77% in the 1960's to 4.25% in the 1980's, while in San Francisco it decreased from 4.18% in the 1960's to 2.09% in the 1980's.

2. Trends in Office Space Supply

The data regarding office space supply in the four markets under consideration, for the period 1960-1989, indicate that supply of office space varies both through time and across markets. The office space stock in Atlanta grew in thirty years by an amazing 1820% to reach 72.745 millions square feet in 1989 (Table 4 and Graph 12). The supply of office space grew vastly in Dallas by 1376%, from 7.698 millions square feet in 1960 to 113.657 millions square feet in 1989. The 30-year growth in office space supply in Boston and San Francisco was considerably smaller, 352% and 365%, respectively. By 1989 Boston had 81.628 millions square feet of office space and San

TABLE 4
TRENDS IN OFFICE SPACE STOCK[1]: 1960-1989
(In Millions of Square Feet)

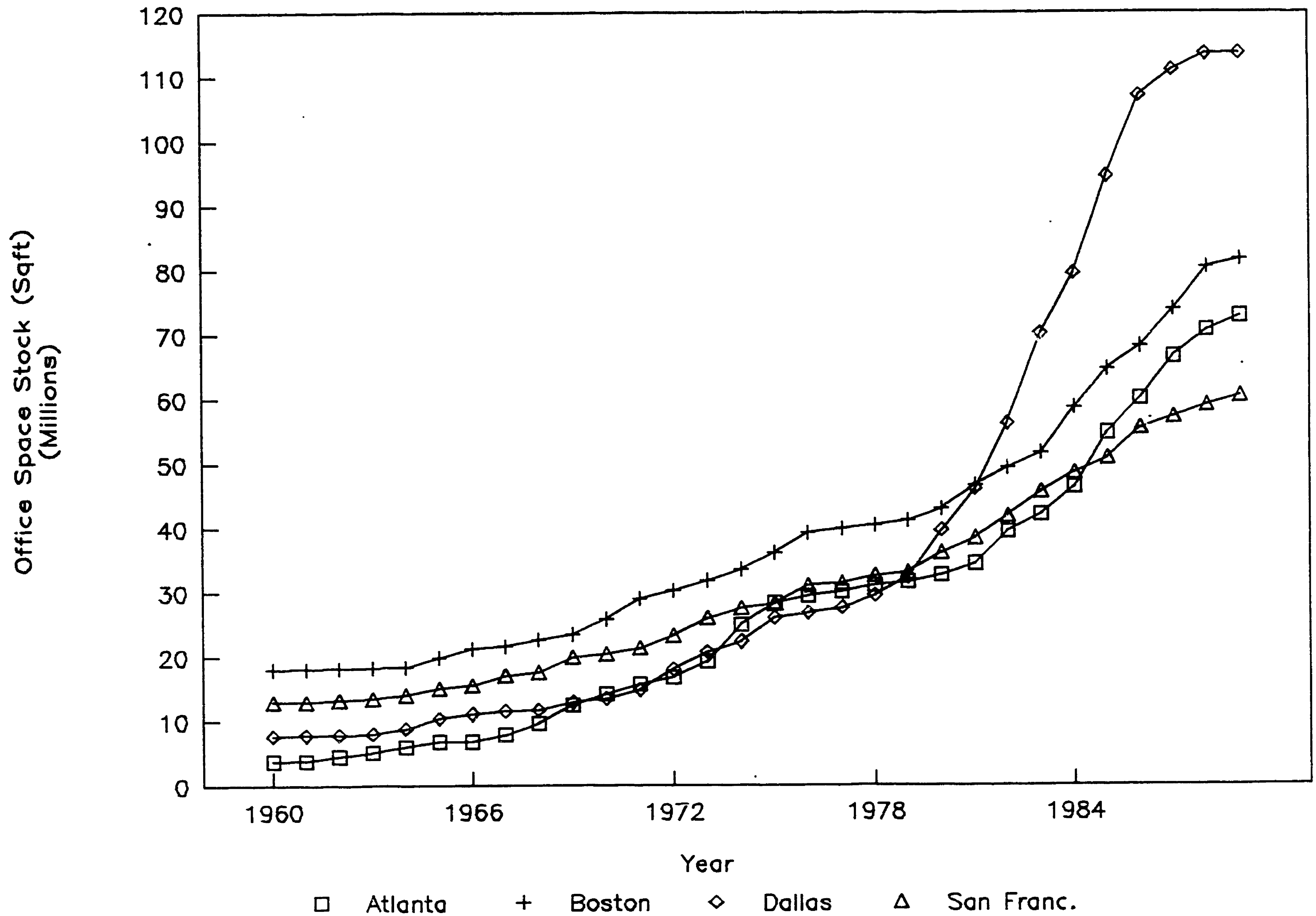
YEAR	ATLANTA	BOSTON	DALLAS	SAN FRANCISCO
1960	3.788	18.062	7.698	12.982
1961	3.879	18.112	7.820	12.982
1962	4.530	18.144	7.874	13.234
1963	5.110	18.224	7.990	13.455
1964	5.981	18.361	8.844	14.083
1965	6.798	19.839	10.386	15.088
1966	6.798	21.246	11.064	15.557
1967	7.877	21.588	11.569	17.046
1968	9.624	22.665	11.667	17.588
1969	12.504	23.428	12.928	19.886
1970	14.201	25.815	13.428	20.437
1971	15.693	28.963	14.823	21.253
1972	16.723	30.303	18.059	23.211
1973	19.164	31.857	20.675	25.916
1974	24.953	33.510	22.290	27.519
1975	28.299	36.082	26.003	28.200
1976	29.416	39.208	26.725	31.008
1977	30.067	39.881	27.601	31.403
1978	30.987	40.347	29.386	32.517
1979	31.582	41.080	32.315	33.034
1980	32.639	42.903	39.530	36.072
1981	34.375	46.529	46.029	38.358
1982	39.392	49.240	56.131	41.775
1983	42.018	51.605	70.063	45.551
1984	46.262	58.680	79.462	48.521
1985	54.714	64.605	94.525	50.766
1986	60.010	68.092	107.011	55.386
1987	66.498	73.853	111.013	57.146
1988	70.579	80.398	113.505	59.005
1989	72.745	81.628	113.657	60.435
30-Year Growth	1820%	352%	1376%	365%

Notes: 1. Includes only multi-tenant buildings

Source: Coldwell Banker

GRAPH 12

TRENDS IN OFFICE SPACE SUPPLY:1960–1989



Francisco 60.435 millions square feet.

Annual stock growth rates vary both through time and across markets. Both time-series and cross-section variations in these rates are considerably greater than fluctuations in office employment growth rates. In Atlanta during the last 30 years, for example, the annual stock growth rate has been ranging between 0% and 30.2% (Table 5, Graphs 13, 14, 15, and 16). In Dallas, this has been ranging between 0.13% and 24.82%.

In almost every year from 1960 to 1989 annual stock growth rates have been considerably different in the four markets under consideration. A good example of such diversity is 1982. During this year office space in the Atlanta market grew by 14.59%, in Boston by 5.83%, in Dallas by 21.95% and in San Francisco by 8.91%. The 10-year averages presented in Table 5 indicate that there are also significant differences in long-run office space growth rates. During the 1960's, for example, office space in Atlanta grew at an average annual rate of 14.5%, in Boston at 2.97%, in Dallas at 6.07%, and in San Francisco at 4.93%.

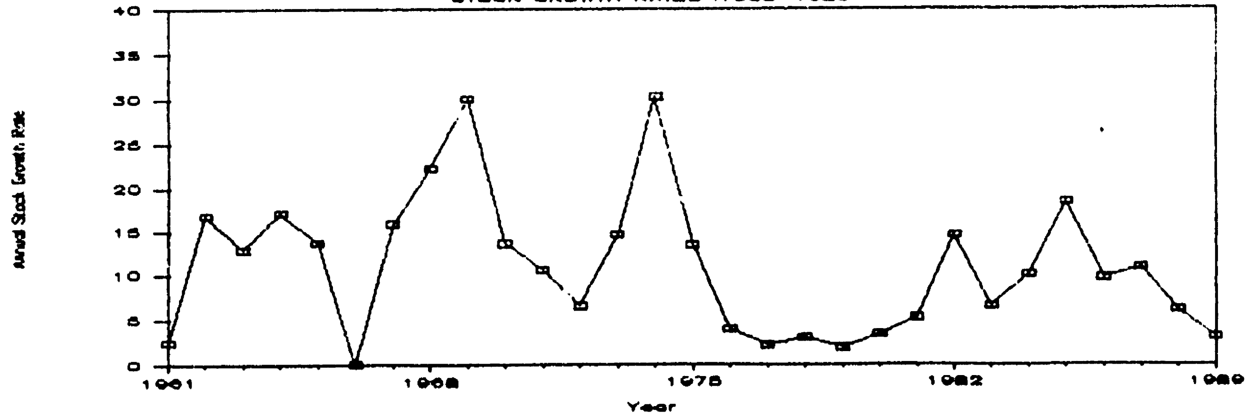
The data indicate that there are also significant differences across markets regarding the trends in these long-run annual stock growth rates. The 10-year average annual stock growth rate in Atlanta, for example, has fallen from 14.52% in the 1960's to 9.4% in the 1980's; in Boston it has increased from 2.97% in the 1960's to 7.46% in the 1980's; in

TABLE 5
OFFICE SPACE STOCK GROWTH RATES: 1960-1989
(In Percent)

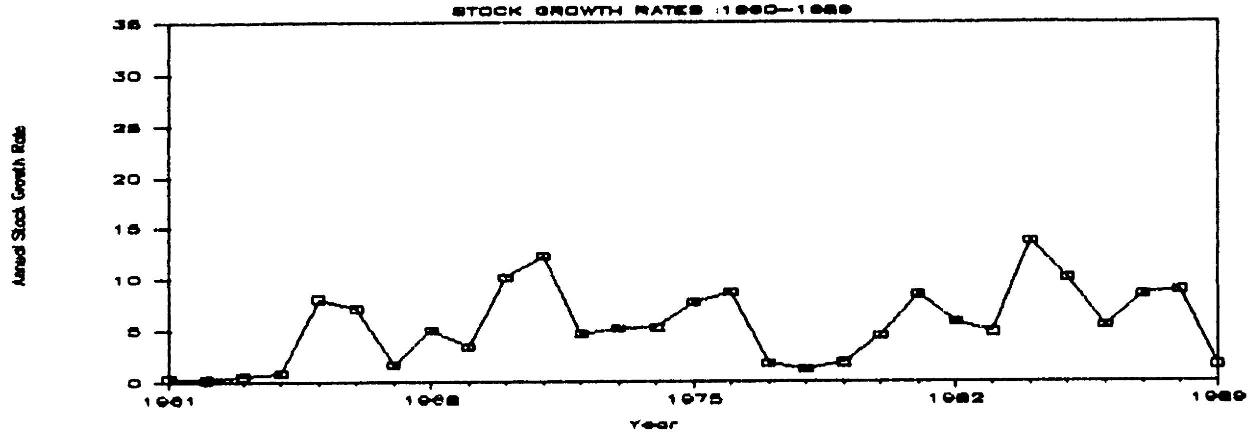
DATE	ATLANTA	BOSTON	DALLAS	SAN FRANCISCO
1961	2.40	0.28	1.58	0.00
1962	16.78	0.18	0.69	1.94
1963	12.80	0.44	1.47	1.67
1964	17.05	0.75	10.69	4.67
1965	13.66	8.05	17.44	7.14
1966	0.00	7.09	6.53	3.11
1967	15.87	1.61	4.56	9.57
1968	22.18	4.99	0.85	3.18
1969	29.93	3.37	10.81	13.07
AVERAGE	14.52	2.97	6.07	4.93
1970	13.57	10.19	3.87	2.77
1971	10.51	12.19	10.39	3.99
1972	6.56	4.63	21.83	9.21
1973	14.60	5.13	14.49	11.65
1974	30.21	5.19	7.81	6.19
1975	13.41	7.68	16.66	2.47
1976	3.95	8.66	2.78	9.96
1977	2.21	1.72	3.28	1.27
1978	3.06	1.17	6.47	3.55
1979	1.92	1.82	9.97	1.59
AVERAGE	9.60	5.35	10.41	5.54
1980	3.35	4.44	22.33	9.20
1981	5.32	8.45	16.44	6.34
1982	14.59	5.83	21.95	8.91
1983	6.67	4.80	24.82	9.04
1984	10.10	13.71	13.42	6.52
1985	18.27	10.10	18.96	4.63
1986	9.68	5.40	13.21	9.10
1987	10.81	8.46	3.74	3.18
1988	6.14	8.86	2.24	3.25
1989	3.07	1.53	0.13	2.42
AVERAGE	9.41	7.46	12.77	5.93

Source: Estimated on the basis of data provided by Coldwell Banker

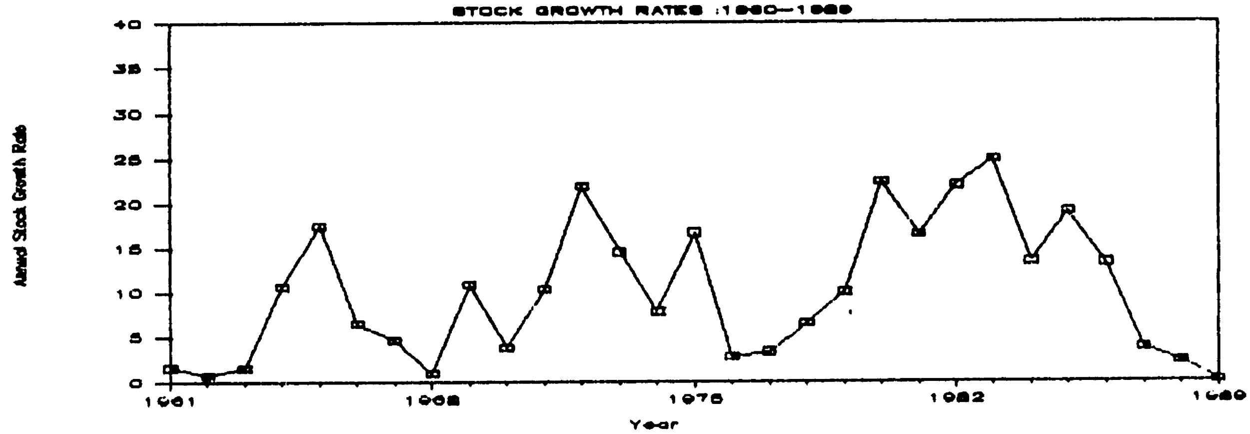
GRAPH 13: ATLANTA
STOCK GROWTH RATES :1960–1989



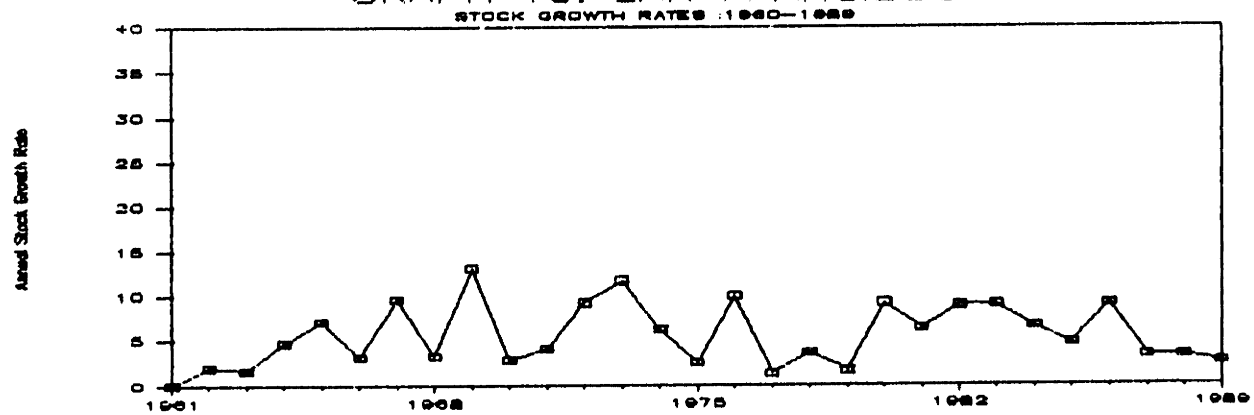
GRAPH 14: BOSTON
STOCK GROWTH RATES :1960–1989



GRAPH 15: DALLAS
STOCK GROWTH RATES :1960–1989



GRAPH 16: SAN FRANCISCO
STOCK GROWTH RATES :1960–1989



Dallas it has also increased from 6.07% in the 1960's to 12.77% in the 1980's; and in San Francisco it has slightly increased from 4.93% in the 1960's to 5.93% in the 1980's.

3. Trends in Vacancy Rates

A comparison between the aggregate office employment and stock growth rates during the period 1960-1989 indicates that the former are considerably smaller than the latter in all four markets. In particular, the discrepancy between the aggregate growth in office space stock and office employment is 1465% in Atlanta, 208% in Boston, 1023% in Dallas and 209% in San Francisco. These data suggest that, on aggregate, completions of new office space were considerably larger than absorption. As the model of the intertemporal behavior of the office space market suggests, this should cause a positive change in the vacancy rate and increasing imbalances between demand and supply.

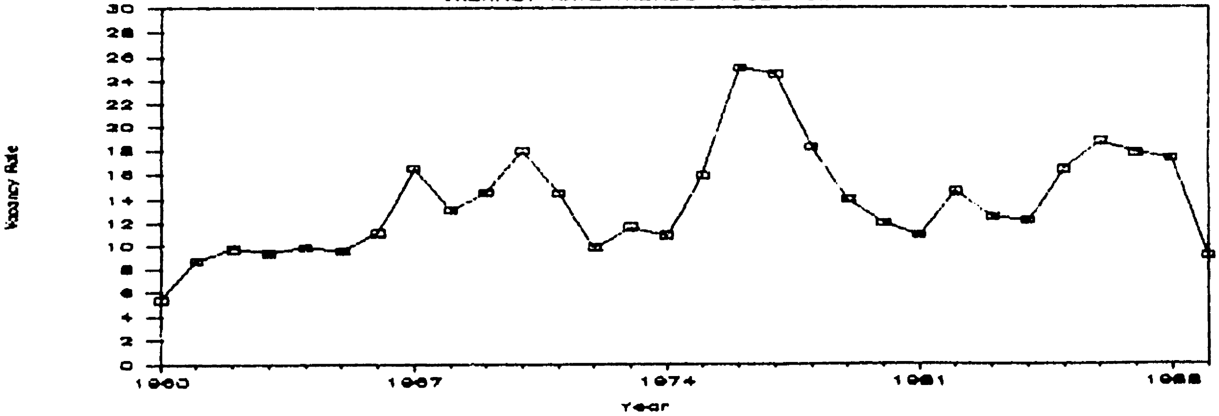
As Table 6 and Graphs 17, 18, 19 and 20 indicate, vacancy rates have been indeed increasing through time. In Atlanta, the vacancy rate became as high as 16% in the 1960's, as high as 25% in the 1970's and as high as 18.65% in the 1980's. In Boston the vacancy rate became as high as 10.1% in the 1960's, as high as 14.35% in the 1970's, and as high as 14.05% in the 1980's. In Dallas, it increased up to 16.2% in the 1960's, 26.35% in the 1970's, and 27.85% in the 1980's. While the vacancy rate in the San Francisco market did not exceed the

TABLE 6
TRENDS IN VACANCY RATES: 1960-1989
(In Percent)

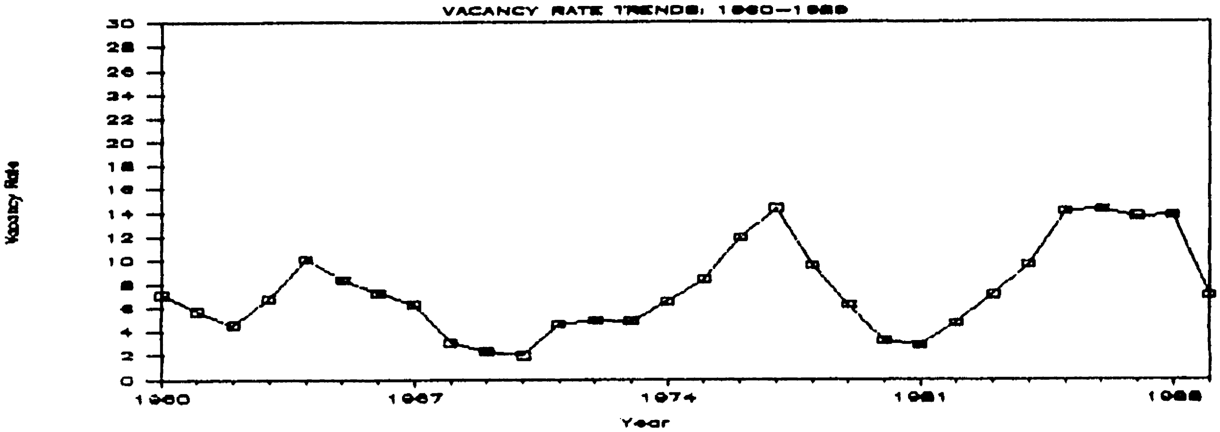
YEAR	ATLANTA	BOSTON	DALLAS	SAN FRANCISCO
1960	5.4	7.15	10.25	10.8
1961	8.7	5.75	10.1	8.25
1962	9.7	4.55	10.1	8.3
1963	9.35	6.8	11	7.5
1964	9.85	10.1	14	6.8
1965	9.5	8.35	17.8	8.75
1966	11.1	7.25	14.75	9.9
1967	16.5	6.3	16.2	11.2
1968	13	3.05	12.35	10.25
1969	14.55	2.35	7.25	8.1
AVERAGE	10.77	6.17	12.38	8.99
1970	17.95	2	4.65	9.95
1971	14.4	4.6	18.4	13
1972	9.8	5	26.35	12.15
1973	11.55	4.9	21.35	11
1974	10.85	6.55	17.15	8.8
1975	15.9	8.4	16.4	8.85
1976	25.05	11.85	15.5	10.75
1977	24.5	14.35	9.05	10.85
1978	18.3	9.55	6	5.05
1979	13.95	6.25	6.75	3.05
AVERAGE	16.23	7.35	14.16	9.35
1980	12	3.2	6.7	2.5
1981	10.95	2.85	7.95	1.1
1982	14.6	4.7	16.7	5.5
1983	12.4	7.15	21.95	10
1984	12.1	9.65	21.15	13.4
1985	16.35	14.05	22.4	15.4
1986	18.65	14.2	26.5	18.95
1987	17.75	13.65	27.8	17
1988	17.35	13.7	27.85	15.85
1989	9.1	7.1	13.3	8.1
AVERAGE	14.13	9.03	19.23	10.78

Source: Coldwell Banker

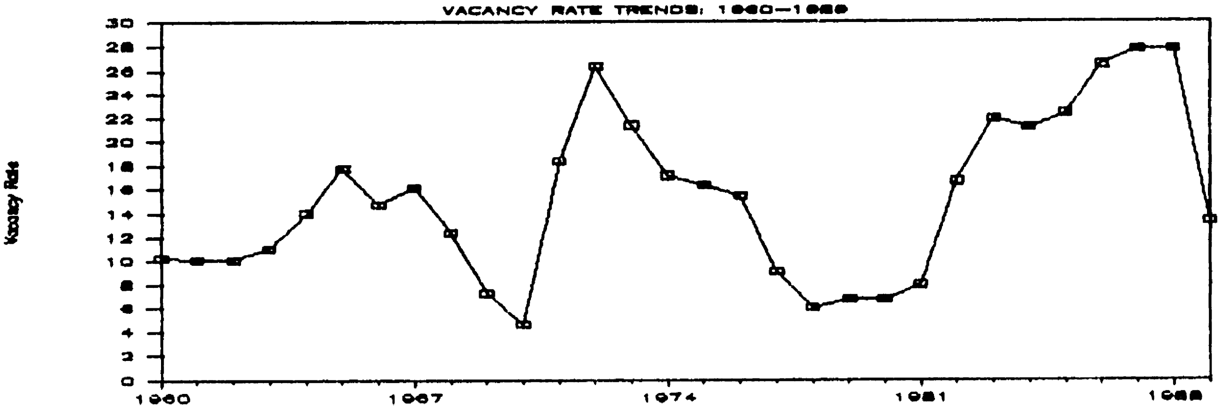
GRAPH 17: ATLANTA
VACANCY RATE TRENDS: 1960–1989



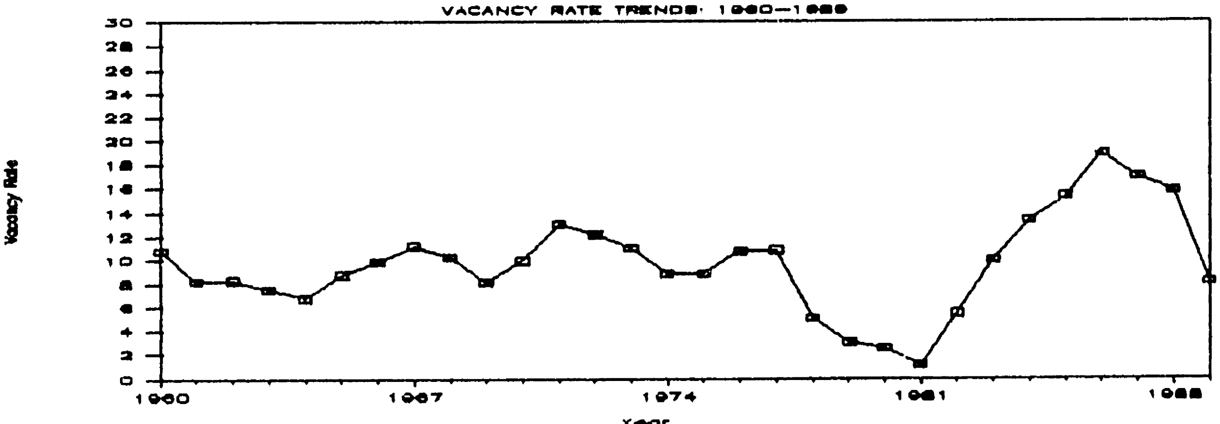
GRAPH 18: BOSTON
VACANCY RATE TRENDS: 1960–1989



GRAPH 19: DALLAS
VACANCY RATE TRENDS: 1960–1989



GRAPH 20: SAN FRANCISCO
VACANCY RATE TRENDS: 1960–1989



12.2% in the 1960's and the 1970's, it became as high as 18.95% in the 1980's.

We can observe significant cross-section variations in the vacancy rate across markets. A good example of cross-sectional variations in the vacancy rate is 1972. During this year the nominal vacancy rate was 9.8% in Atlanta, 5% in Boston, 26.35% in Dallas and 12.15% in San Francisco. We can also observe significant differences in the long-run vacancy rates represented by the 10-year averages in Table 6. During the 1980's, for example, the average vacancy rate was 14.13% in Atlanta, 9.03% in Boston, 19.23% in Dallas and 10.78% in San Francisco. These great differences in the long-run vacancy rates suggest that the structural vacancy rates in these markets may be considerably different as well. In such a case differences in nominal vacancy rates alone will not provide an accurate account of differences in the nature and magnitude of supply-demand imbalances among markets. We can make some preliminary assessments of such differences by examining how trends in vacancy rates relate to trends in completions in the four markets under consideration.

4. Vacancy Rate Trends and Completion Trends

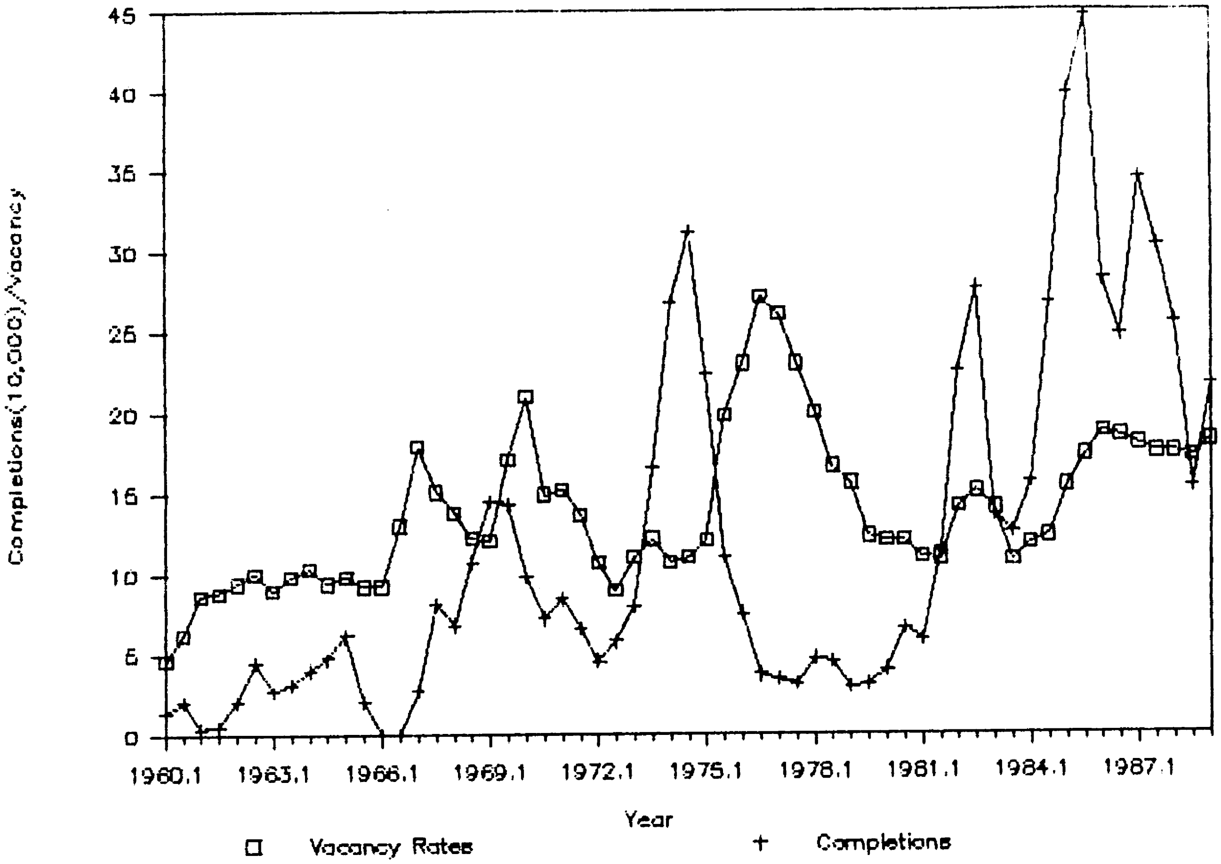
In examining the relationship between trends in vacancy rate and completions, we have to take into account the construction lag since vacancy rates and the office space rents affect new construction at the time the investment decision is made. This time is usually four semesters before the project is completed; for this reason in this analysis we relate completions with the vacancy rate lagged four periods back.

From Graph 21 we can see that when completions in the Atlanta market were rising sharply from 1971.1 to 1972.2, the vacancy rate four periods back was falling from 16% to 8.5%. In the event of the sharp rise in vacancy rates which reached an all time high of 27.5% in 1976 completions fell sharply and remained low until the beginning of the 1980's. New construction started picking up, only after the vacancy rate fell to 13%. During the 1980's completions started rising sharply in 1984 in response to declining vacancies two years back, from 16% to 13%.

Similar comparisons between vacancy rate and completion trends clearly indicate that the same levels of vacancy rate maybe related to different new construction dynamics in different local markets. We have seen, for example, in Atlanta that during the 1970's new construction was rising rapidly, when vacancy rates were declining from 16% to 10%. During the same period in the Boston market, however, when the vacancy rate was rising from 10% to 16% and vice versa, new construction was falling sharply or stabilizing at its 15-year lowest levels (Graph 22). A similar comparison can be made during the 1980's, when new construction in Boston was falling sharply when the vacancy rate was rising from 10% to 16%. The paradox is that as the vacancy rate was leveling at 16%, a new

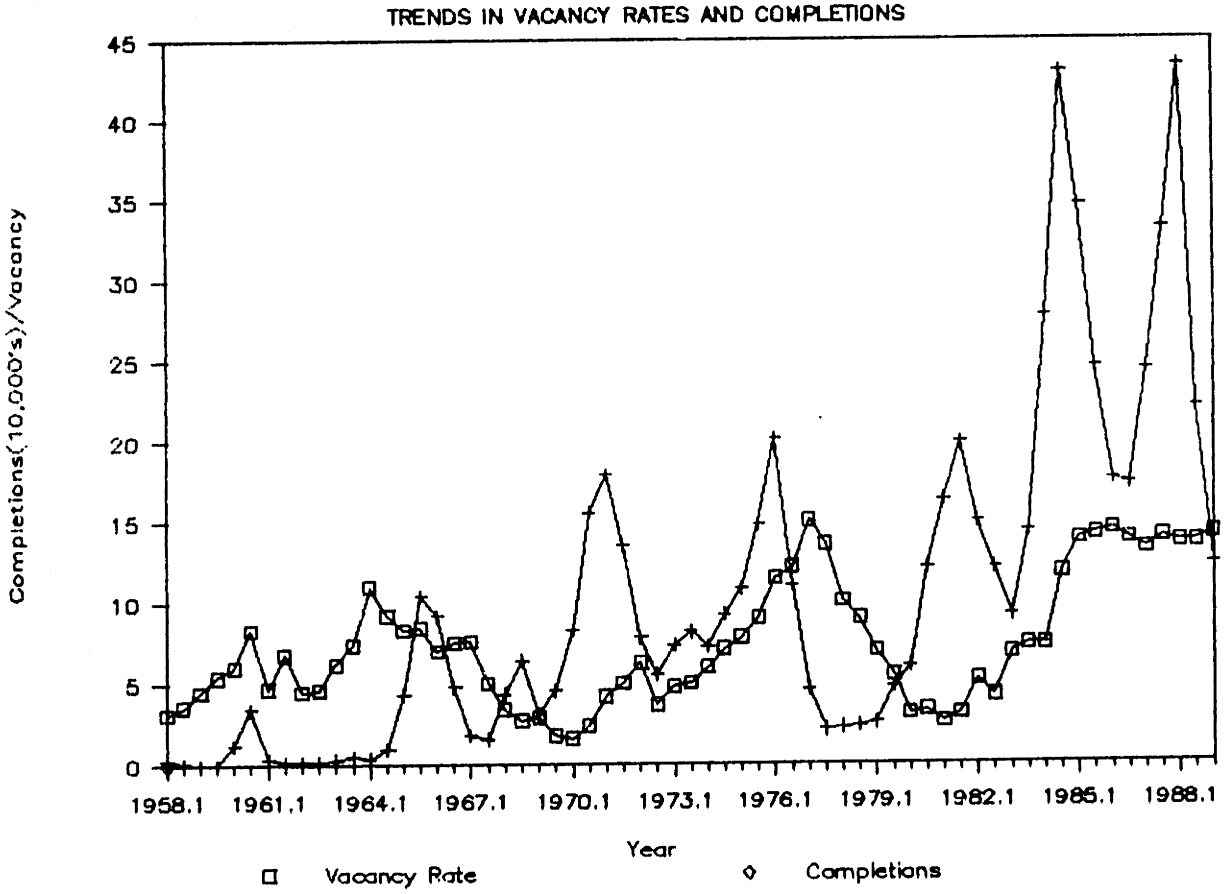
GRAPH 21: METROPOLITAN ATLANTA

TRENDS IN VACANCY RATES AND COMPLETIONS



GRAPH 22: METROPOLITAN BOSTON

TRENDS IN VACANCY RATES AND COMPLETIONS



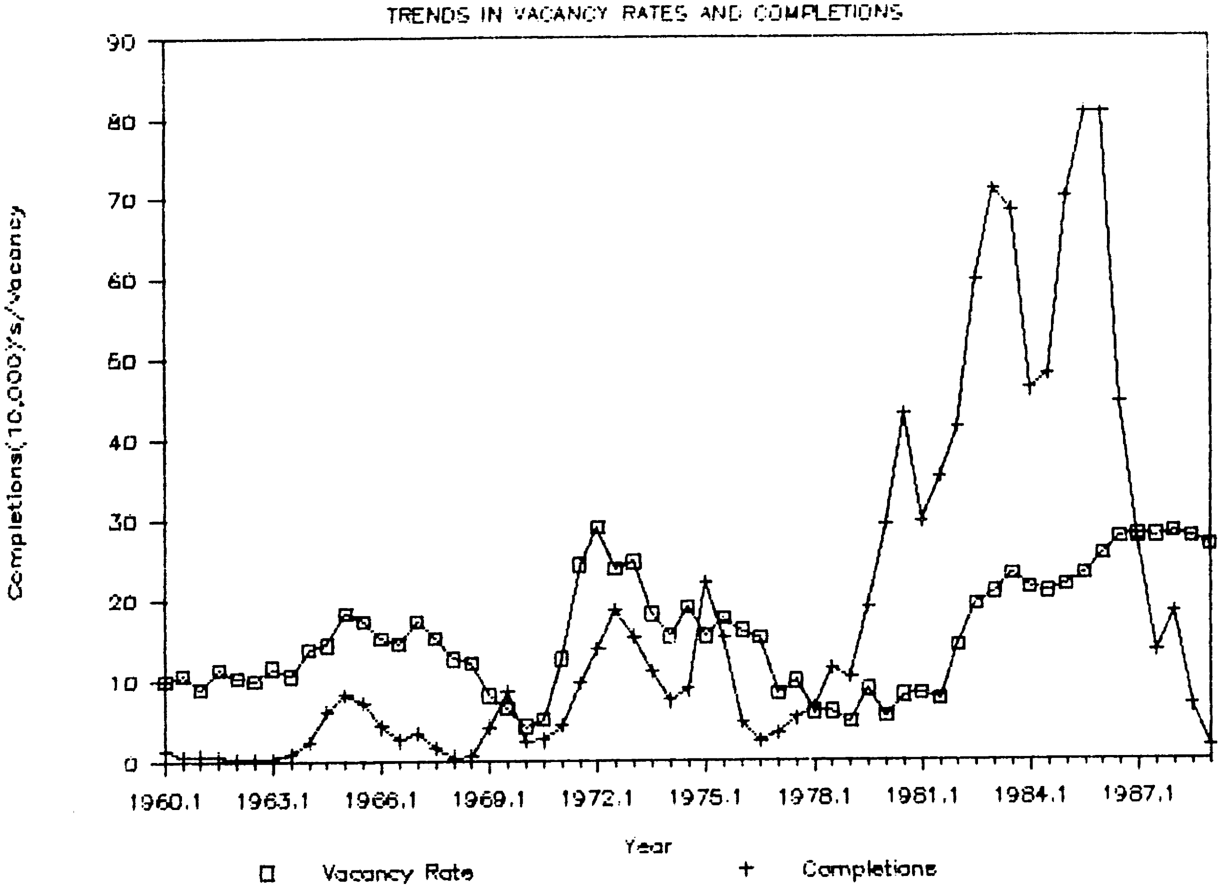
wave of sharply rising new construction levels took place in the mid-1980's.

An examination of the vacancy rate-completion dynamics in Dallas provides some additional highlights of the significant structural differences among local office space markets. During the 1970's, new construction started picking up twice. The first time, this rose for only two periods, when the vacancy rate was falling from 24% to 18%; the second time, it started rising slowly when the vacancy rate declined to about 16% and then took off as the vacancy rate was further declining from 8% to 4% (Graph 23). During the 1980's the vacancy rate started rising fast above 10% to reach 20%. Surprisingly when the vacancy rate rose to 22% and then fell back to 20% new construction took off again. However, it decreased sharply as the vacancy started rising again above 20%.

As Graph 24 shows, the pattern of new completions in San Francisco is extremely fluctuating, falling and rising sharply every two or three periods. Notably, from 1960 till 1989, completions peaked 10 times. This pattern makes very difficult any attempt to correlate evolutions in new construction with evolutions in the vacancy rate. This highly fluctuating pattern explains why Rosen (1983) failed to explain variations in new construction in the San Francisco market using historic data.

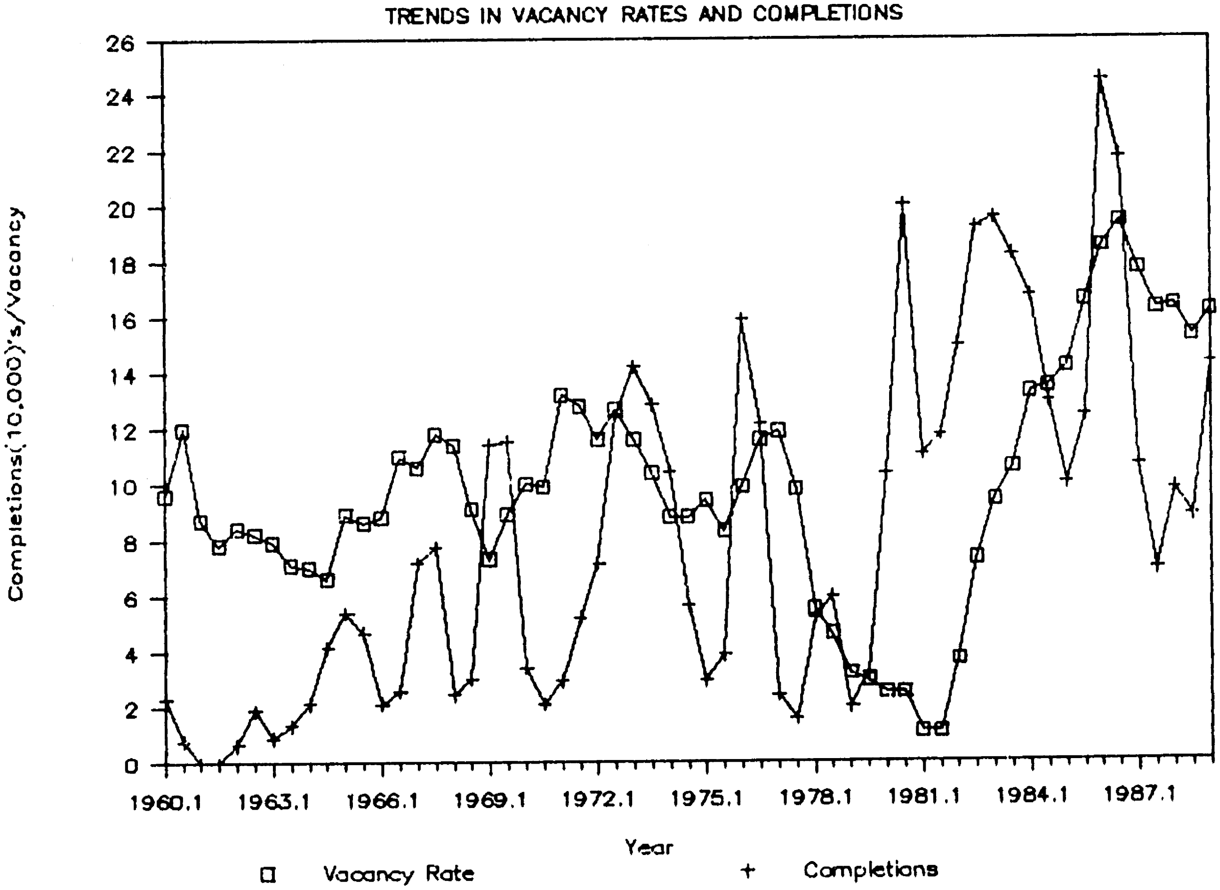
GRAPH 23: METROPOLITAN DALLAS

TRENDS IN VACANCY RATES AND COMPLETIONS



GRAPH 24: METROPOLITAN SAN FRANCISCO

TRENDS IN VACANCY RATES AND COMPLETIONS



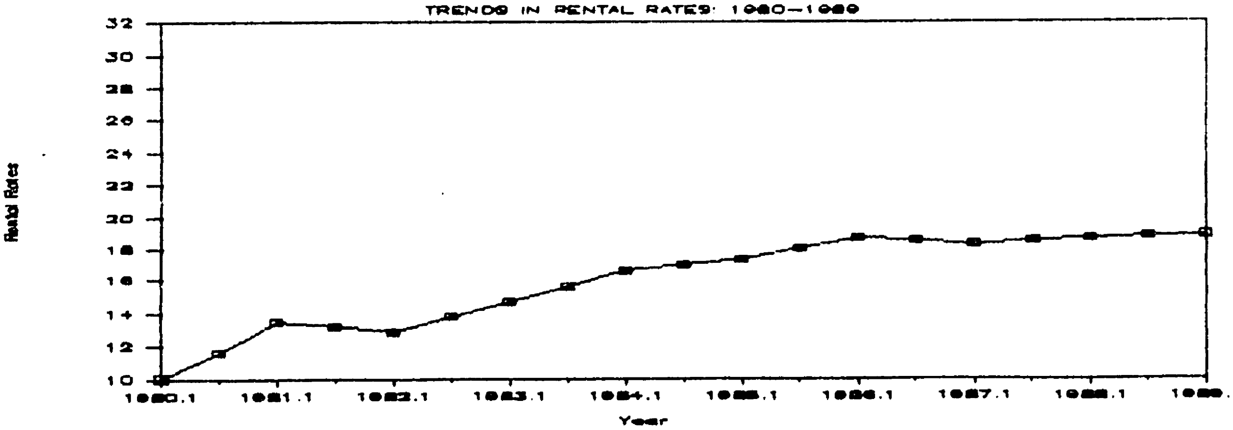
4. Office Space Rental Rates: 1980-1988

Rental rate data are available only for the period 1980-1989. These have been estimated through hedonic regression analysis using a database of individual lease transaction records. The estimation procedure and the full results of these estimates are presented in chapter V. Here we review only the rental rate evolutions in the four markets under consideration.

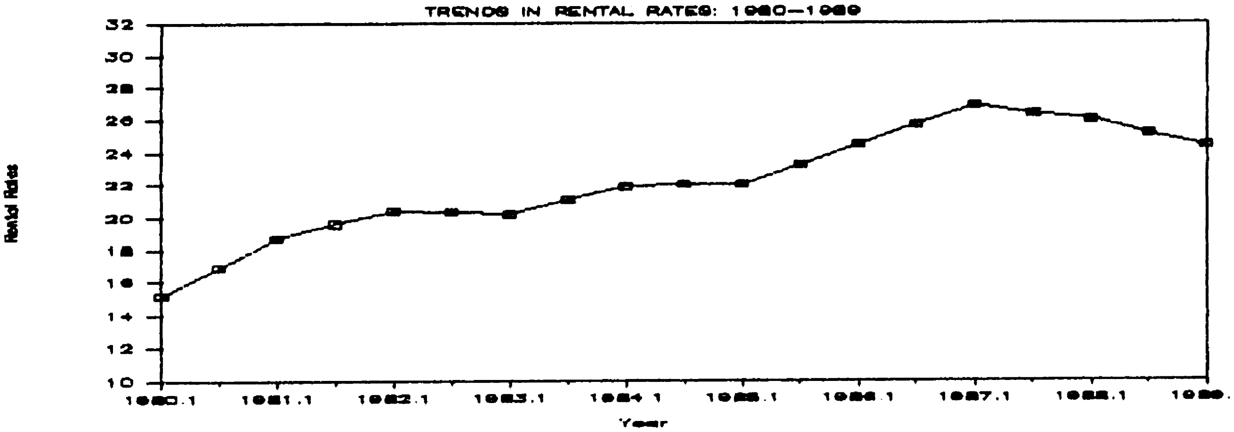
TABLE 7
TRENDS IN OFFICE SPACE RENTAL RATES: 1980-1989

	ATLANTA	BOSTON	DALLAS	SAN FRANCISCO
1980.1	$10.0	$15.2	$13.1	$18.4
1980.2	11.6	16.9	14.2	21.3
1981.1	13.5	18.7	15.4	24.6
1981.2	13.2	19.6	16.7	27.3
1982.1	12.9	20.4	18.1	30.4
1982.2	13.8	20.3	18.2	29.5
1983.1	14.7	20.2	18.4	28.7
1983.2	15.6	21.1	18.3	29.1
1984.1	16.6	21.9	18.2	29.5
1984.2	17.0	22.0	19.0	28.5
1985.1	17.3	22.0	19.8	27.5
1985.2	18.0	23.2	18.8	24.9
1986.1	18.6	24.5	17.8	22.5
1986.2	18.5	25.7	16.0	22.6
1987.1	18.3	26.9	14.3	22.6
1987.2	18.5	26.4	13.9	23.2
1988.1	18.6	26.0	13.4	23.9
1988.2	18.8	25.2	12.5	24.2
1989.1	18.9	24.4	11.7	24.6

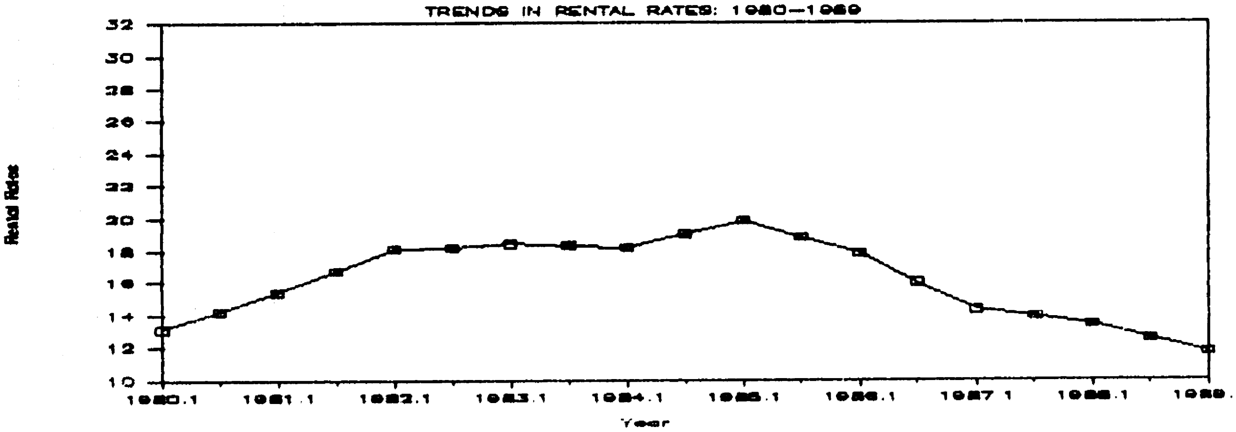
GRAPH 25: ATLANTA
TRENDS IN RENTAL RATES: 1980–1989



GRAPH 26: BOSTON
TRENDS IN RENTAL RATES: 1980–1989



GRAPH 27: DALLAS
TRENDS IN RENTAL RATES: 1980–1989



GRAPH 28: SAN FRANCISCO
TRENDS IN RENTAL RATES: 1980–1989

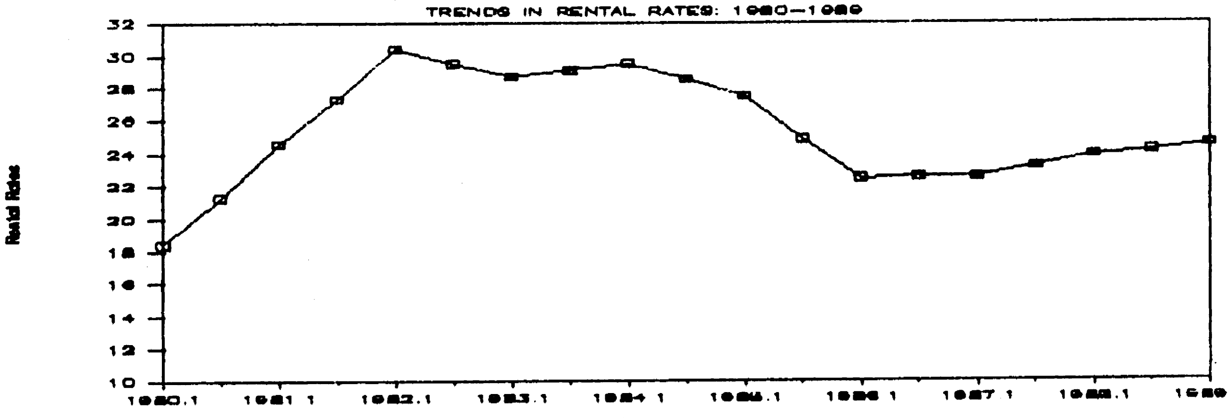


Table 7 and Graphs 25, 26, 27, and 28 indicate clearly that there are significant differences among the four markets in terms of the levels and intertemporal evolution of nominal office space rents. In Atlanta nominal rents vary from $10 to $18.6; in Boston from $15.2 to $26.9; in Dallas from $13.1 to $18.6; and in San Francisco from $18.4 to $30.4 (Table 7). Rental rates were increasing in all four markets from 1980 to 1982 with the exception of the Atlanta market which experienced a slight decrease in nominal rents between 1981 and 1982. In Atlanta rental rates kept increasing until 1986, but remained stagnant between 1986 and 1989 (Graph 25). In Boston nominal rents kept increasing until 1987, but they were decreasing between 1987 and 1989 (Graph 26). In Dallas rental rates were stagnant between 1982 and 1984, increasing between 1984 and 1985 and sharply decreasing between 1985 and 1989 (Graph 27). Finally in San Francisco office space rents were decreasing between 1982 and 1986 and slightly increasing between 1986 and 1989 (Graph 28).

Conclusion

The review of the levels and trends in office employment, office space supply, office space vacancy rates, and rental rates, in Atlanta, Boston, Dallas, and San Francisco, shows that indeed local office space markets exhibit significantly different behavioral patterns. This evidence supports the argument that local markets behave to a significant extent independently. Therefore, the cross section analysis of local office space markets has to take into account possible differences in supply-demand imbalances. Such differences can be accounted for, by examining differences in the nominal vacancy rates, only if the structural vacancy rate is invariable across markets. The comparison of the vacancy rate-completions trends has shown, however, that markets with the same vacancy rates may experience different rent and new construction dynamics. This suggests that there may be non-negligible differences in the normal vacancy rate across markets and furthermore implies that a simple comparison of nominal vacancy rates may provide inaccurate indications of cross section differences in the nature and magnitude of supply-demand imbalances. Similarly, cross-section comparison of nominal rents may provide inaccurate indications of differences in the implicit equilibrium rent across local markets. For these reasons a meaningful comparison of office markets requires identification and explanation of the structural characteristics of local markets, that is, the normal vacancy rate and the normal rent.

CHAPTER IV

CROSS-SECTION ANALYSIS OF THE OFFICE MARKETS: IDENTIFYING AND EXPLAINING THE NORMAL VACANCY RATE AND THE NORMAL RENT

It has been well established by now that, at a given point in time, metropolitan markets may be at a different stage of their rent-vacancy cycle. It has been also well documented that the concept of structural or normal vacancy rate is instrumental in identifying the extent and nature of market disequilibrium (Shillings, Sirmans, and Gorgel, 1987; Wheaton and Torto, 1989). Given the variability of this rate across markets, a simple comparison of nominal vacancy rates is not likely to provide an accurate account of intermetropolitan differences in the magnitude of supply-demand imbalances.

Given the rent-vacancy cycle, such differences should accordingly be associated with discrepancies between prevailing and implicit equilibrium rents. Thus, a simple comparison of prevailing office space rents is not likely to provide an accurate account of differences in implicit equilibrium or normal rents across markets.

It is critical, therefore, when comparing markets cross-sectionally, to take into account potential differences in supply-demand imbalances. For this reason, it is important to examine more closely how the normal vacancy rate and the normal rent can be identified and how their intermetropolitan variations can be explained. Before we proceed to such analysis, we briefly review the existing cross-section studies on non-residential real estate markets.

1. Review of Existing Cross-Section Studies

The vast majority of the literature on non-residential real estate markets focuses on how these markets behave intertemporally, rather than on how they compare cross-sectionally (Rosen 1983; Hekman, 1985; Wheaton and Torto,1987; Shilling, Sirmans, and Gorgel, 1987; Wheaton and Torto, 1988; Voith and Crown, 1988). The few studies relevant to the issues examined in this dissertation are reviewed below.

Cross-section Variations in Structural Vacancy Rates

Notably, only one of the studies cited above has attempted to explain cross-sectional variations in normal vacancy rates across office markets. In particular, using annual data on office buildings from 1960 to 1975, Shillings, Sirmans and Gorgel (1987) have estimated the rent adjustment equation and the normal vacancy rate for 17 central city office markets. Their findings indicate that there are significant differences in the normal vacancy rate across these markets. In attempting to theoretically explain these variations, they draw from the optimal inventory theory. Within this context, they argue that the level of normal vacancy rate for each city should strongly be correlated with the information costs of arranging and leasing space and the level of demand uncertainty prevailing in the market. Their empirical equation includes a number of independent variables, namely, the annual average change in the stock of office space during the period 1960-1970, the change in non-manufacturing employment from 1960 to 1970, the change in metropolitan population from 1960 to 1970, the average annual property tax rate for the period 1966-1976 and the average office rent during the period 1960-1975. Their model explains 67% of intercity variations in normal vacancy rates. Yet, only one of their five independent variables, namely, the average rent, proved to be statistically significant.

It is important to note at this point that this study suffers from two shortcomings. It fails to identify some unrealistic premises of the optimal inventory theory (which are presented in the next section) and it fails to indicate how the particular variables included in the empirical model relate to the theoretical premises of the study.

Cross-section Variations in Space Rents

The only analyst that examines the determinants of office space rents is Hekman (1985). In particular, Hekman considers that the supply of office space is fixed in the short-run and, consequently, the prevailing market rents are exclusively attributable to the influence of demand forces and the vacancy rate. The vacancy rate in this approach is assumed to represent the degree of mismatching between supply and demand.

Hekman's study, however, does not actually address the issue of intermetropolitan rent differences, since the empirical models are estimated with pooled data. Such an estimation technique fails to separate the intra-metropolitan time series effect from the inter-metropolitan cross-section effect.

Hekman is also the only analyst who, although indirectly, empirically addresses the issue of a disequilibrium component in office rents by including the current vacancy in the rent equation. The appropriateness of his model in testing such a hypothesis is, however, questionable, since it implicitly assumes that the structural or normal vacancy rate is invariable across markets. This is contrary to the empirical findings both in the office market (Shillings, Sirmans, and Gorgel, 1987; Voith and Crone, 1988) and the housing market (Rosen and Smith, 1983).

In this review of cross-section studies it is appropriate to mention the work of Ozanne and Thibodeau (1983), who examined the determinants of intermetropolitan differences in housing rents and prices. The two analysts use a long run equilibrium approach, postulating that price differences are attributable to the underlying factors that affect the long run demand and supply of housing. Their empirical findings validate the hypothesis that a large portion of intermetropolitan variations in housing rents is explained by differences in long run demand and supply factors.

2. Identifying and Explaining the Normal Vacancy Rate

Identifying the Normal Vacancy Rate

The concept of the normal vacancy rate has been repeatedly used as a means for measuring the level of excess demand or supply in the office market. This notion is reflected in the traditional rent adjustment model presented in equation (23) below:

$$\dot{R} = \alpha \, (V - V^{*}) \tag{23}$$

This model postulates that when the vacancy rate is at its normal level, the rent change is equal to zero or, equivalently, that demand equals supply.

This rent adjustment model, widely used by a number of analysts (Shillings, Sirmans, and Gorgel, 1987), assumes that the normal vacancy rate remains constant over a period of time. This assumption allows the statistical estimation of equation (23) by regressing the rent change on a constant and the current vacancy V(t):

$$\dot{R} = bo + b1\ V(t) \tag{24}$$

where:

$bo = \alpha\ V^*$

$b1 = \alpha$

Given the above formulation, the structural vacancy rate can be calculated by first estimating equation (14) and then taking the ratio of the constant term (bo) over the coefficient of the vacancy variable (b1).

Existing Theoretical Explanations of the Normal Vacancy Rate

The most often cited theoretical justification for the normal vacancy rate in the real estate literature (Shilling, Sirmans and Gorgel, 1987) draws from the capital goods inventory theory. According to this theory, the normal vacancy rate is analogous to the optimal inventory of capital goods. In short, the desired level of vacancies affects the landlords' flexibility in dealing with fluctuations in demand and tenant turnover. Thus, due to the relatively long duration of commercial leases, landlords hold vacant office space as a buffer stock, in order to capitalize on opportunities to supply units at higher rents, during periods of increasing demand.

Firm behavior theories suggest that the desired level of inventory depends upon the expected level of revenues, expected changes in prices, the cost of holding inventories and the stage of the business cycle (Feldstein and Anerbach 1976, Blinder 1982). By analogy, the optimal level of vacant office space should depend on demand expectations, expected revenues and the marginal cost of holding vacant units. Voith and Crone (1988) suggest that, particularly in the office market, the optimal inventory is determined by landlord expectations with respect to absorption rates, office rents and prevailing construction and operating costs.

Departing from this definition, Shillings, Sirmans and Gorgel (1987) argue that when the nominal vacancy is at its "optimal" level, the market is at equilibrium. Furthermore, they hypothesize and empirically test that when the nominal vacancy rate is below (above) this "optimal" level, the market is undersupplied (oversupplied) and thus rents are rising (falling), in order to bring the market back to equilibrium.

The definition of the normal vacancy rate based on the premises of the inventory theory presents two basic shortcomings. First, it fails to connect the notion of the "normal" vacancy rate with the rent adjusting behavior of landlords. In short, this theory does not provide any explicit rationale of why landlords should be raising asking rents when the vacancy rate is below its "optimum" level.

Second, the validity of the inventory theory is questionable. The notion that, under the burden of huge mortgage payments, landlords would be reluctant to rent a unit at current rents, simply because they expect that they may obtain higher rents in the future, is difficult to consider as realistic. If landlords expect higher rents, they are not likely to risk losing a current tenant with the hope that they will find another tenant in the future willing to pay higher rents. It would seem more reasonable for them to lease the vacant space at current rents to any tenant who is willing to rent now and shorten the lease term, or structure the lease in a way that it will allow renegotiation of lease terms (including rental rates) at a reasonably short time. In this way the landlord can keep the space occupied and, more or less, take advantage of any rent increases in the future.

If we accept, then, that expectations regarding higher rents in the future can be handled by appropriately structuring lease agreements, there is no rationale for any landlord to consider any level of vacancy as desirable, or even normal. Within this framework, we can argue that the theories that explain the normal vacancy as a deliberately held vacant stock may be unrealistic.

Two alternative theories for the explanation of the normal vacancy rate have been discussed in the literature, one by Rosen and Smith (1983) and one by Hendershott and Haurin (1988). According to Rosen and Smith, in a manner analogous to the labor market, the normal vacancy rate in the rental housing market represents the normal stock of vacant units required to facilitate the search processes of both tenants and landlords. Rosen and Smith, however, fail to elaborate on this definition and, furthermore, explicitly explain how such a definition relates to the rent adjusting behavior of landlords.

The second alternative definition is centered around the notion of optimal vacancy duration. According to Hendershott and Haurin (1988), landlords choose to keep a unit vacant because they expect that, by waiting, they will obtain a rent high enough to cover the cost of keeping the unit vacant. This opportunity cost includes the rent lost, the interest earnings and the extra maintenance costs incurred. The landlords' dilemma, then, reflects a trade off between the level of rent and the duration of vacancy during the year (f*). Thus, landlords will ultimately set real rents at a level that will maximize their profits (rental income-cost of holding vacant units).

Within this framework, Hendershott and Haurin conclude that the natural vacancy rate is the product of the units that are vacant each year (P) and that vacancy duration (VD*) for which excess supply in the market is zero. Based on this definition, they argue that variation across markets in natural vacancy rates is attributable to differences in P and VD*. Markets with higher construction and mobility rates, for example, will have a higher P, while less homogeneous markets will a have higher VD*. Like Rosen and Smith (1983), however, Hendershott and Haurin (1988) fail to explain why rents should, for example, be rising when the nominal vacancy rate is below its "optimum" level.

Developing a More Complete Explanation

Departing from the above definitions, we can develop an explanation, justifying why rents can be increasing with positive vacancy, even if the desired level of vacancies by individual landlords is zero.

According to the conventional economic theory, price adjustments are the result of market disequilibrium. Hence, we argue that the central issue regarding the normal vacancy rate and the rent adjusting behavior of landlords is not whether any level of vacancies is desirable or optimal, but how any level of vacancies relates to supply-demand imbalances.

As most real estate analysts argue, renting real estate is a time consuming process that requires a significant search and bargaining process on the part of both tenants and landlords. In such a market, we have simply vacant units and lookers. The latter may represent new office firms or existing firms considering to move. The amount of vacant space at any period is not the excess, but the available supply. Similarly, the number of lookers represents the ex ante demand for office space. We can then define the market equilibrium as the state at which the number of vacant units equals the number of lookers. This equality, however, requires that there is perfect matching between lookers and vacant space. Yet, many lookers may enter the market, but may be unable to find the desired type of space (Wheaton, 1989). In such a case, the actual equality between vacant space and matched tenants would require that the total number of lookers is greater than the number of vacant units by a percentage equal to the mismatching rate.

Based on this "equilibrium" definition, we can then define normal vacant stock as the level of stock that equates the effective amount of vacant office space supplied by landlords to the effective amount of office space demanded by office space lookers.

From a landlord's point of view, this equilibrium state is reflected in a certain frequency of tenant visits/unit/period. It is very likely that, through their experience, landlords are well aware of the "normal" frequency of tenants/unit/period during periods when the demand for office space equals the existing vacant stock. Given such knowledge, they can compare this "normal" frequency of tenant arrivals to the prevailing one and adjust rents accordingly. Suppose, for example, that the number of lookers considerably exceeds the number of vacant units. In such a case, the owners of the few vacant units will experience an unusually high number of tenant visits per unit. This will make them realize that there are supply shortages, thereby inducing them to raise asking rents for the available vacant units. This explanation suggests that it is quite possible to observe increasing rents with positive vacancy, even if the desired level of vacancy is zero.

Based on this framework, we suggest that the normal vacant stock in each market depends on two sets of factors: 1) those factors that determine effective demand for office space by lookers and 2) those factors that determine effective supply of office space by landlords holding vacant units.

Effective Demand for Space

The effective demand for vacant space depends primarily on three factors: a) the tenant arrival function, b) the length of the tenant search effort and c) the mismatching rate. The greater the number of tenant arrivals per unit, the greater the amount of office space demanded and, consequently, the greater the normal vacant stock. For the same number of tenant arrivals, however, effective demand for office space per period may vary, depending on the length of the tenant search effort. If tenants, for example, decide to devote more time for search before they actually rent office space, then the effective amount of space demanded per period and the normal vacancy will be smaller. For the same number of tenant arrivals, the effective demand for office space may also vary depending on the mismatching rate. If a market, for example, has a greater mismatching rate than another, then for the same number of lookers, both the effective demand for office space and the normal vacancy rate will be smaller.

We can study the tenant arrival function in the office market, using a model developed for the housing market by Stull

(1984). This model postulates the following simple tenant arrival function:

$$S = A\,(1-BR), \tag{25}$$

where A is the arrival parameter, representing the number of apartment hunters, who could arrive at a given period if rents were zero. This is what Stull calls the propensity for the housing market to generate arrivals. The number of actual arrivals is then a fraction of this measure and declines with asking rent by a rate determined by B, the rent sensitivity parameter. An obvious property of the rental probability function is that rental probability declines as rent increases. This is because increased rent reduces the number of arrivals at any given time and decreases the probability that tenants drawn from a given rent offer distribution will be willing to rent the unit once this has been inspected.

This tenant arrival function is perfectly applicable to the office space market. In such a case, A would denote the propensity of the office space market to generate arrivals. Such a propensity should depend on office employment growth and tenant turnover. In particular, we would expect that, holding the level of vacancies constant, markets with higher office employment growth rate and turnover will generate a higher number of lookers and, therefore, necessitate a higher normal vacancy rate.

As already argued, for the same rate of tenant arrivals, the effective demand for office space may vary, depending on the length of the tenant search effort. The length of the tenant search effort, in turn, depends on tenant search behavior. It is believed that tenants face an optimization problem, the objective function of which is to minimize their shelter costs. These include rental, transaction and search costs. Tenants will be willing to extend their search effort and accept higher search costs, only if they expect that such an extension will result in long-term savings in rental costs. The length of the tenant search effort, therefore, depends on the probability of realizing rent savings by extending search. Such a probability depends primarily on the size and heterogeneity of the stock, as well as the dispersion of office space rents. In particular, the probability of realizing rent savings by extending the search effort should be increasing, as the size of the stock, the heterogeneity of the stock and rent dispersion increases. Tenants will also be inclined to extend their search effort, if they are forced by long-term lease agreements to commit themselves at a certain location for many years.

The mismatching rate also affects effective tenant demand. This depends on how the quality mix and size of available office space compares to the character of lookers. In general, we would expect that the probability for mismatching is smaller in larger markets, which are more diversified, both in terms of location and quality of office space. Compared to markets with smaller office space stock, such markets should be characterized by a smaller normal vacancy rate.

Effective Supply

The second set of factors that potentially affect the normal vacancy rate relate to the effective supply of vacant units. There is an issue of effective supply because the vacant stock may not reflect the effective supply of vacant units as perceived by landlords. Landlords do not only care about how many vacant units they have, but also, as argued by Hendershott and Haurin (1988), about how long these units remain vacant.

Although, normally, any landlord would like to rent all vacant units immediately, there should be some variations across markets in the desired vacancy durations, depending primarily on landlord expectations with respect to market conditions. Based on prevailing and expected market conditions, landlords may determine a minimum desirable absorption rate. If units are absorbed at a rate higher than this minimum, landlords may consider raising asking rents by an amount which depends on the deviation of the actual absorption rate from the minimum desirable rate. If this is true, for the same tenant frequency and vacancy but for a higher desired absorption rate, the extent of disequilibrium will be greater, implying thereby a lower normal vacant stock.

In order to demonstrate the validity of this argument, consider the following example of two markets, A and B, each with 10% nominal vacancy rate and a 4% monthly tenant absorption rate. The landlords in market A know that a huge office complex will be coming out in a few months and expect that this will exert a significant downward pressure on office space rents. They, therefore, evaluate that they must fill vacancies very rapidly, let's say at a rate of 50% vacant units per month, or 5% of total stock. Given that we assume an actual absorption rate of 4% per month, landlords in market A will be induced to furthermore reduce rents, in order to increase absorption rates up to the desirable level.

Landlords in market B know that the market is becoming strong, with possibly increasing absorption in the near future. Thus, they evaluate that they will be more than happy if they rent 25% of vacant units or 2.5% of total stock per month. Hence, in market B the desired absorption rate or effective vacancy (2.5%) is well below the actual absorption rate (4%). In this market landlords may very well conclude that things are much better than they thought and, therefore, they may be induced to raise asking rents.

This example demonstrates clearly that markets with the same tenant demand and nominal vacancy may have different implicit normal vacancy rates, exactly because of differences in the desired minimum duration of vacancies. Given that local market conditions vary considerably cross-sectionally, landlord expectations should play an important role in explaining intermetropolitan variations in the normal vacancy rate. Assuming a myopic behavioral model, such evaluations and expectations should be determined by recent completion, absorption and employment growth rates. High current completion rates, for example, may be linked to rapidly decreasing rents in the future. This, in turn, will contribute toward a higher effective vacancy rate and thus a lower normal vacancy rate. High current absorption or employment growth will increase the acceptable vacancy duration, decrease the effective vacant stock per period and exercise an upward pressure on the normal vacancy rate.

Based on this analysis, we hypothesize that inter-metropolitan variations in the normal vacancy rate should be explained by variations in office employment growth rates (EG), tenant turnover (TT), prevailing office space rents (R), length of the tenant search effort (SE), mismatching rate (MR) and landlord expectations regarding the strength of the market (LE).

3. Identifying and Explaining the "Normal Rent"

In order to understand the underlying differences in current and future office pricing patterns across markets it is necessary to identify the normal rent and explain its cross-section variations.

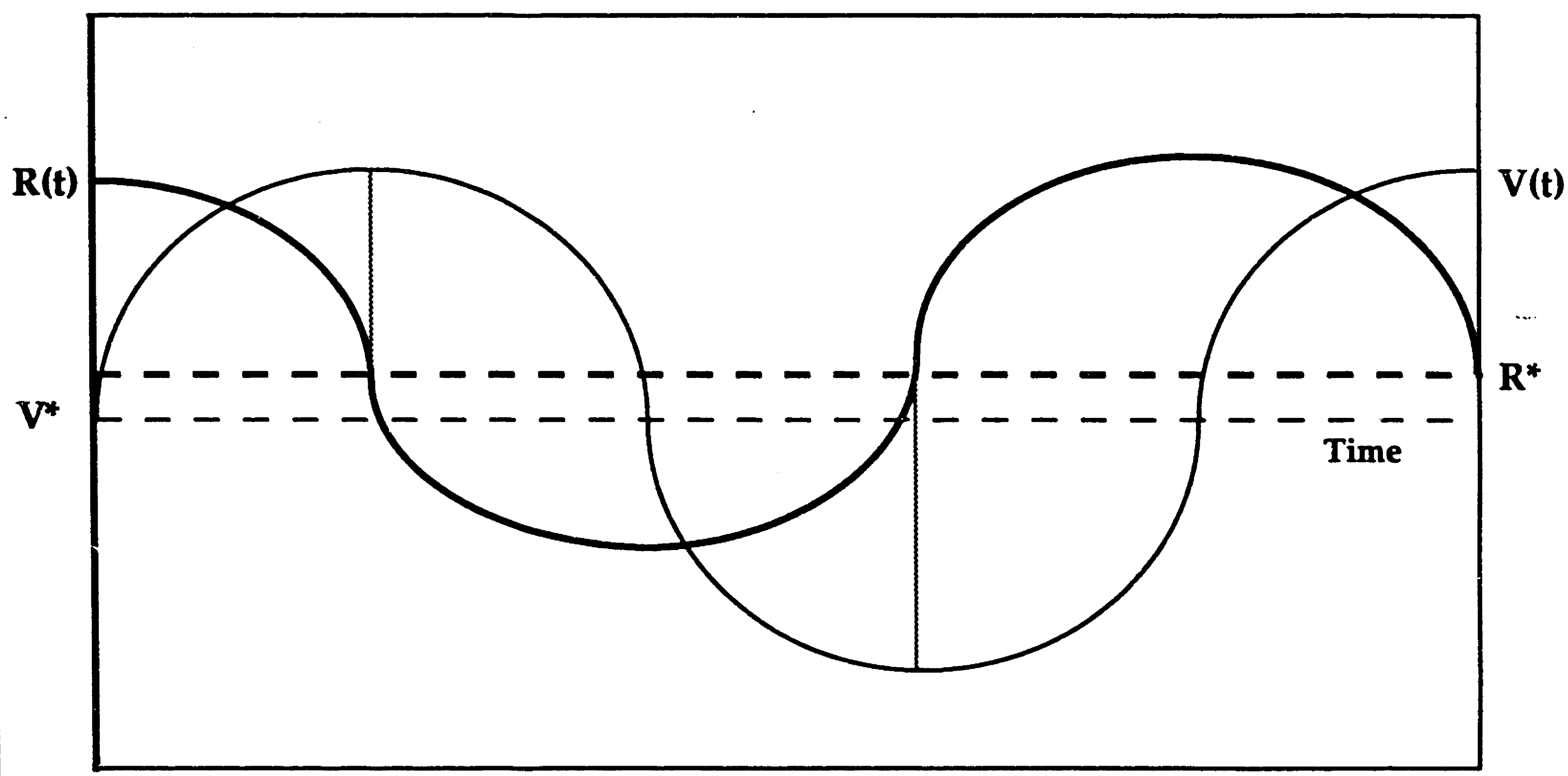
The simulation results (Graph 5) and the theory of converging repeated cycles suggest that the normal rent is not the observed rent at the time the vacancy rate passes through its normal level to reach a maximum. At that point the rent is overshooting, that is, it is above its normal level; otherwise, there wouldn't be any excess stock in the market in subsequent periods. Since the normal rent is reached through a pattern of repeated and converging cycles, this is actually observed when the vacancy rate reaches its peak or trough, that is when the vacancy rate is at a minimum or maximum (see Figure 2, Figure 3 and Graph 5).

The explanation of the variations of the normal rents across markets requires the identification of its determinants. As we have concluded in the discussion of the steady-state properties of the office market model, the normal rent is the rent that equalizes demand to the product of the ratio of completions over the depreciation rate and normal occupancy rate:

$$D(R^*) = \frac{C(R^*)}{\delta}(1-V^*) \qquad (26)$$

We can use this definition as the basis for identifying the determinants of normal rents. These are the factors that affect office space demand, the new construction of office

FIGURE 2
THE RENT ADJUSTMENT PROCESS



V* = Normal Vacancy Rate
R* = Steady - State Rent

space and the exogenously determined normal vacancy rate. As suggested, the demand for office space depends primarily on the level of office employment (OE) and office rents (R). The level of new construction depends on input costs, such as construction costs (CC) and interest rates (i), and revenues, such as office space rents R(t). We can, therefore, substitute D(t) and C(t) in (26) with the respective exogenous variables and solve for R(t)* to derive the reduced-form equation for normal rent. Given the high mobility of capital and the nationwide integration of capital markets, it is generally accepted that variations across markets in interest rates are minimal. For this reason, a model attempting to capture cross-sectional differences in office space supply and demandfunctions can legitimately omit the interest rate variable. The reduced-form equation for normal rent is derived below:

$$D[OE(t), R(t)^*, OE(t)] = (1-V^*)\, S[CC(t), R(t)^*] \tag{27}$$

Therefore:

$$R(t)^* = F1[OE(t), CC(t), V^*)] \tag{28}$$

Based on equation (28), we can therefore hypothesize that differences in normal rent across markets should be explained by differences in the level of office employment (OE), construction costs (CC) and the normal vacancy rate (V*).

Office employment should have a positive impact on normal rent. Higher levels of office employment will shift the demand curve upwards, resulting to a higher equilibrium rent. The impact of construction costs on office space rents should also be positive. According to the conventional economic theory, for a given price and higher input costs, firms will produce a smaller output. This will shift the supply schedule upwards, resulting to a higher equilibrium rent. The impact of the normal vacancy rate should be positive, since for a given level of supply a higher level of normal vacant stock would reduce the effective amount of office space available for renting. This is equivalent to an upward shift of the supply curve, which eventually leads to higher equilibrium or steady state rents.

4. Explaining Intermetropolitan Differences in Current Office Space Rents

Given the documented cyclical instability in the office market, it is very likely that at a given period each metropolitan market is at different stage of its cycle. Some markets may be roughly at equilibrium, while some others may be in disequilibrium. In addition, in some markets excess demand or supply may be smaller than others. These differences in supply-demand imbalances will be reflected in prevailing market rents, which are the product of the interaction between demand and supply. For this reason, the factors that explain cross-section variations in the normal or implicit equilibrium office space rent can not fully explain variations in prevailing rents in disequilibrated office markets that behave independently. In such a case, the explanation of cross-sectional office space rent differentials requires a theoretical definition of rents that will take into account differences regarding the degree of market disequilibrium. For this reason, the disequilibrium approach seems more appropriate in analyzing the determinants of intermetropolitan office space rent differentials.

According to the disequilibrium model presented by Bowden (1978), the current market price P(t) can be decomposed into two components: 1) an implicit equilibrium component (P(t)*), which, given the values of the exogenous demand and supply variables, would clear the market and 2) a disequilibrium component, which, by definition, equals the difference between the current price P(t) and the implicit equilibrium price P(t)*:

$$P(t) = P(t)^* + [P(t) - P(t)^*] \qquad (29)$$

Based on the above model and the described rent adjustment behavior taking place in office space markets, we can likewise define current office space rents R(t) as the sum of two components: 1) an equilibrium component, that is, the steady-state rent reached at some period t-n when the vacancy rate was at its most recent minimum or maximum, and 2) a disequilibrium component DR(t), which is the sum of the rent changes from period t-n up to period t under consideration (Figure 3). Such a decomposition of current rents (R(t)) is described by equation (30) below:

$$R(t) = R(t-n)^* + DR(t) = R(t-n)^* + \int_{t-n}^{t} dR\, dt \qquad (30)$$

This specification poses one critical question with respect to the determinants of the disequilibrium rent component, which, as shown in (30), is actually the cumulative rent change from period t-n until period t. Based on the traditional rent adjustment model, we can derive the equation for this cumulative rent change by simply expressing the rent change during each period as a function of the deviation of the nominal vacancy rate from its normal level and then summing rent changes up:

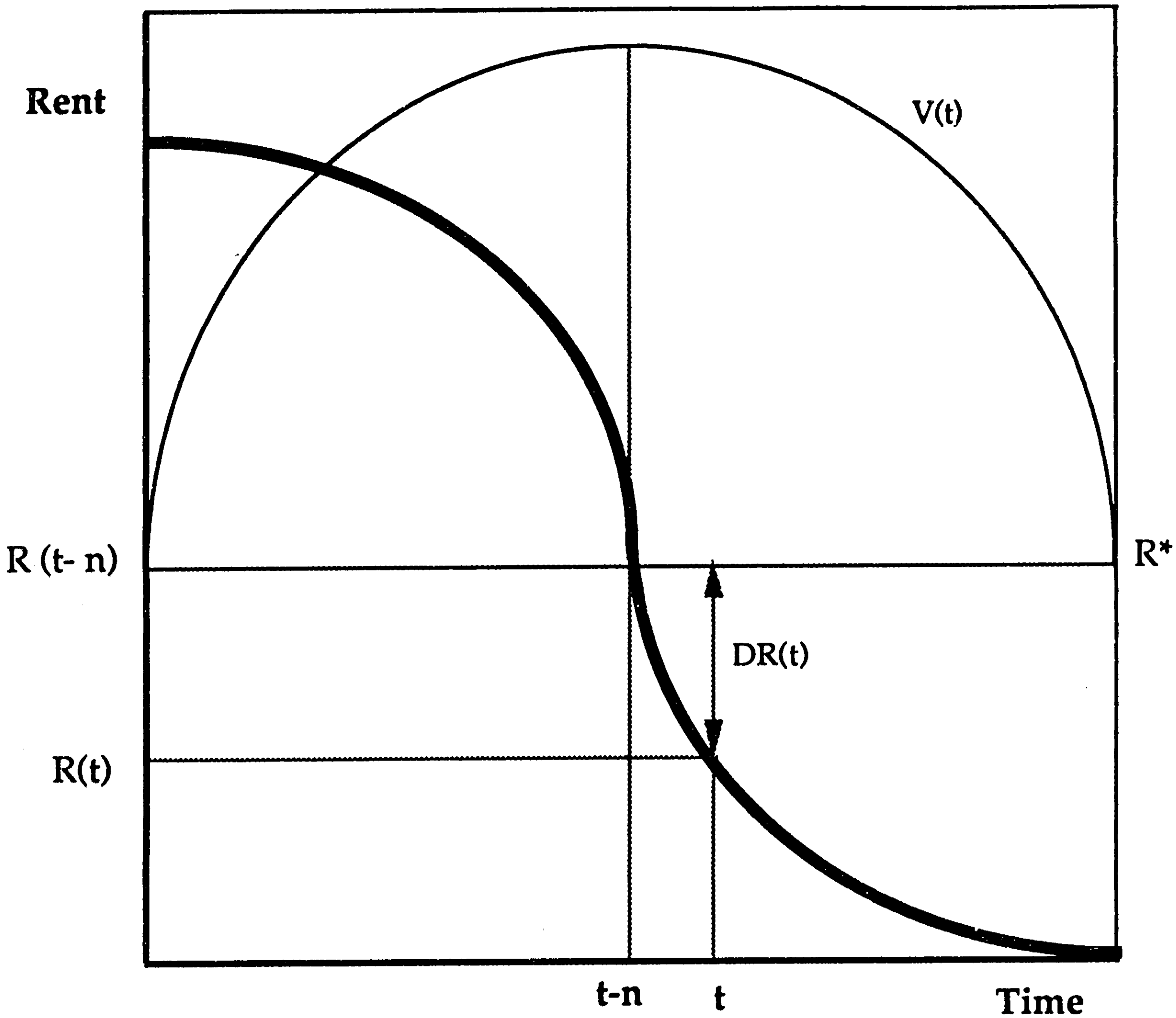
$$\dot{R}(t-n+1) = \alpha\ [(V^* - V(t-n+1)]$$

$$\dot{R}(t-n+2) = \alpha\ [(V^* - V(t-n+2)]$$

$$\ldots\ldots\ldots = \ldots\ldots\ldots\ldots\ldots\ldots$$

$$\dot{R}(t) = \alpha\ [(V^* - V(t)]$$

FIGURE 3
A DISEQUILIBRIUM MODEL OF OFFICE RENT



R* : Normal Rent

DR(t) : Disequilibrium Deviation of Current Rent from the Normal Rent

Therefore:

$$DR = \int_{t-n}^{t} dR\ dt \ = \alpha \int_{t-n}^{t} (V^* - V(t)) \qquad (31)$$

Based on equation (31) we can hypothesize that the major determinant of the disequilibrium rent component in our model is the cumulative deviation of the nominal vacancy rate from its normal level since period t-n. Given the determinants of the normal rent and the disequilibrium deviation, we can now fully specify the disequilibrium model for office rents described by equation (30). Below we discuss two options with respect to the specification and estimation of this model.

The first option is to consider R* as an exogenous variable. Such a model specification allows 1) the estimation of R* with a separate equation, using exogenous demand and supply variables and 2) the direct use of the observed rent during period t-n, when the vacancy V(t) reached its most recent peak as R* in equation (31). This option is described by the following two equations:

$$R(t-n)^* = F[OE(t-n),\ CC(t-n),\ V^*] \qquad (32)$$

$$R(t) = R(t-n)^* + \int_{t-n}^{t} [\ V^* - V(t)]\ dt \qquad (33)$$

The assumption underlying equation (32) is that there is a certain price level R*(t-n) which, given the current values of the exogenous demand and supply variables, would clear the market (Bowden, 1978).

The disequilibrium component in equation (33) represents a negative or a positive deviation from this implicit rent (R*(t-n)), by an amount proportional to the excess supply or demand during this period. If, for example, a considerable amount of excess stock of office space exists in the market, the normal rent R*(t-n) will be higher than the current rent and the disequilibrium deviation will, therefore, be negative. In such a case, the following conditions should hold:

$$R(t) < R^*(t-n); \; dR(t) < 0 \qquad (34)$$

It is worth noting at this point that the number of periods (n) for which each market might have remained in disequilibrium is most likely variable, exactly because metropolitan markets move independently to a significant extent. Thus, equations (32) and (33) can not be estimated with pure cross-sectional data.

The second option is to consider the steady-state rent (R*) as an endogenous variable, determined by the prevailing demand and supply variables (during period t-n) and the normal vacancy rate. In such a case, the disequilibrium rent model is represented by the single equation (35) below:

$$R(t) = F[\ OE(t-n),\ CC(t-n),\ V^*(t-n) + \int_{t-n}^{t} [\ V^* - V(t)]\ dt \qquad (35)$$

It is very likely, however, that the estimates of such equation will be biased, because of 1) collinearity between the normal vacancy rate and the cumulative deviation of the current vacancy from the normal vacancy rate and 2) simultaneity between R(t) and V*.

In summary, based on equations (35) and (36), we can hypothesize that cross-section differences in office space rents in period t are attributable to differences in the implicit equilibrium rent and the cumulative deviation of the nominal from the normal vacancy rate from period t-n through period t.

P A R T II: E M P I R I C A L A N A L Y S I S

CHAPTER V

ESTIMATION OF HEDONIC RENT INDICES

In order to test the determinants of intermetropolitan variations in office space rents it is necessary to develop first a rent index. This index should control for differences in lease and building characteristics across markets. As such, it will enable us to isolate intermetropolitan variations in office rents that are exclusively due to differences in aggregate demand and supply variables.

A number of analysts, namely, Clapp (1980), Hough and Kratz (1983), Brennan, Cannaday and Colwell (1984), as well as Wheaton (1984) have used hedonic pricing models to explain intra-urban or inter-jurisdictional differences in office space rents. Ozanne and Thibodeau (1983) have used a similar model in order to develop metropolitan house price indices and furthermore test the determinants of inter-metropolitan differences in housing rents and prices. It is appropriate, therefore, to estimate office space rent indices using hedonic analysis, and data on individual office space leases.

1. The Hedonic Price Theory

The term hedonic price modeling is typically used in the literature to refer to the procedure of regressing the price of differentiated goods on quantities of characteristics or attributes associated with each good. The estimated coefficients are termed hedonic prices, and are interpreted as the consumer's implicit valuations of the characteristics or attributes of the good. The general hedonic price model is of the form:

$$P(z) = \mathbf{p}\ \mathbf{z} \qquad (38)$$

In equation (38), P(z) is the market price of a good which is described by the vector of attributes or characteristics **z**. The vector **p** is the vector of implicit or hedonic prices. In a simple linear regression, **p** represents the vector of regression coefficients (Dale-Johnson, 1982).

The hedonic theory, first introduced in the analysis of real estate markets by Rosen (1974), can easily be applied to the office space market. Office space is a commodity with multiple attributes, such as size, quality, location, etc. The basic premise of the hedonic analysis of office space rents is that there is a well-specified relationship between market rent and these characteristics. Even though no two units which are traded may be identical, the market price of each characteristic is formed by the intersection of the demand and supply schedules for the characteristic, the result of multiple transactions between buyers and sellers (Rosen, 1974).

2. The Specification of the Empirical Model

There are two major issues in formulating an empirical model based on the hedonic price theory. The first issue is the specification of the functional form of the model. The theory does not give any guidance as to the appropriate functional form of equation (38). For this reason we review the functional forms used by a number of studies that estimated office space rental rates using hedonic regression models (Clapp, 1980; Hough and Kratz, 1983; Brennan, Cannaday, and Colwell, 1984; and Wheaton, 1984).

Hough and Kratz (1983) estimated four functional forms: linear, logarithmic (log in independent variables), semi-log (log in rent), and log-linear. Based on Box-Cox tests, they concluded that the linear and logarithmic models were superior to the other forms. Clapp used a log-linear model. Based on a series of Box-Cox/Box-Tidwell type transformations and likelihood ratio tests, Brennan, Cannaday, and Colwell (1984) conclude that the log-linear and the logarithmic models provided the best estimates. Finally, Wheaton (1984) used a linear model to examine the influence of commercial property tax rates on office space rents.

The findings of these studies indicate that, in general, the logarithmic functional forms represent better the empirical relationship between office space rents and office space characteristics. This is supported by the belief that percentage changes in rents are related to percentage changes in these characteristics. Linear regression models postulate that dollar amount changes in rents are related to unit changes in the characteristics of office space. Based on the above discussion we specify a multiplicative relationship between office space rents and office space characteristics, as described in equation (39):

$$R = bo \; Xi^{b} \; e^{b \; Di} \qquad (39)$$

In this equation, X represents the vector of office space characteristics that are continuous variables (such as age or size) and D represents a vector of office space characteristics that can only be represented by dummy variables (such as, low-rise of high-rise, or zip code location).

The second issue in translating the hedonic price theory into an empirical model is the determination of the independent variables. A complete hedonic price model of the office space market should include all characteristics that may vary in office space lease transactions. Such characteristics can be classified into three major categories: 1) lease characteristics, 2) physical characteristics of the space and the building containing the space, and 3) locational characteristics of the building containing the space. Lease features, that may vary across transactions include the date of lease execution, term or duration of the lease, "workletter" cost, number of months in rental abatement, the treatment of the operating expenses[3] , whether a CPI escalation clause is included, whether there is a "stop" or "base year escalation" associated with the landlord's obligation to bear increases in operating expenses, and the amount of the "stop" (if there is one). Brennan, Cannaday, and Colwell (1984) document empirically the statistical significance of most of these lease characteristics in determining variations in rental rates across lease transactions (Brennan, Cannaday, and Colwell, 1984).

The physical characteristics of the building-- containing the office space associated with the lease agreement-- that may vary across transactions are age, size both in terms of square feet and number of floors, and quality (for example class A, or class B). The physical characteristics of the units within the same building may vary in terms of size, loss factor, that is total square feet paid but not used, and vertical location (Brennan, Cannaday and Colwell, 1984). Finally, micro-location factors that may vary across transactions, include proximity to CBD, access to other business service clusters in the urban

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[3]. Usually, operating expenses are treated in two different ways. **Gross leases** provide that the tenant pays a flat sum. Out of this sum the landlord gets to keep what remains after paying all operating expenses. Alternatively, if the lease agreement is a **net lease**, the tenant pays all expenses and gives the landlord a flat fee (Shilling, Sirmans, and Corgel, 1987)

area, access to airports, access to labor and customers, and neighborhood quality and amenities.

Ideally, our empirical model should include all these variables. However, as in any empirical study, data constraints force an empirical model specification that includes only a few of these variables. The database with the individual lease transactions that have been provided by Coldwell Banker includes the following variables: metropolitan area, date the lease was executed, term of the lease agreement, square feet covered by the lease agreement, base contract rent (including operating expenses), height of the building the space is located in (high rise or low rise), and the zip-code location of the building. These data and their sources are described in more detail in Table 8. Given these data, we can write equation (39) in a more explicit form:

$$R = bo\ L^{b1}\ S^{b2}\ e^{b3\ H\ +\ b4\ Z1\ +\ ..+\ b3+i\ Zi\ +\ b4+i\ Y1\ +..+\ b3+i+n\ Yn} \quad (40)$$

where L = Term of the lease agreement
S = Amount of square feet covered by the contract
H = Height dummy[4]
Zi = Zip code dummies[5]
Yn = Year the contract was signed[6]

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4. This dummy variable takes the value 1 if the space is located in a high rise building and the value zero if the space is located in a low rise building.

5. Each zip code dummy takes the value 1 if the office space is located within a specific zip code and the value 0 if the property is located out of this specific zip code.

6. Each year dummy takes the value of 1 if the contract was signed during a specific year and the value 0 if the contract has not been signed during the specific year.

TABLE 8
DATA USED FOR THE ESTIMATION OF HEDONIC RENT INDICES

Variable Name	Description of Data Used	Data Source
CONTRACT BASE RENT	Gross contract rent including operating expenses. Does not account for free rent and other rental concessions	Coldwell Banker lease transaction file. Includes records from 1979 to 1989 for the 50 major metropolitan areas in the country
LEASE LENGTH	The number of years covered by the lease agreement	As above
YEAR	The year during which the lease agreement was signed	As above
TYPE	Whether the building is low-rise (less than four stories) or high-rise (four or more stories)	As above
SIZE	Amount of square feet of office space covered by the lease agreement	As above
ZIP CODE	Zip code in which the space is located	As above

The zip code dummies have been introduced in equation (40) in order to control for the impact of locational differences on rents. The most important variables missing from our model are quality of space, age of building, micro-location factors describing the immediate locational environment of each property, and lease terms, such as escalation clauses, concessions, and loss factors. The zip code dummy may provide some control for differences in quality if there is a prevalent quality of buildings in each zip and the properties included in the sample happen to be of that prevalent quality.

The year dummies have been introduced in equation (40) in order to allow for the estimation of a time series for the rent index. In order to transform equation (40) into a linear model that can be estimated with ordinary least squares we take logs in both sides. The hedononic equation used for the estimation of the rent index is described by equation (41):

$$R = b_0 + b_1 \log L + b_2 \log S + b_3 H + b_4 Z_1 + \ldots + b_{4+i} Z_i + b_{4+i+1} Y_1 + \ldots + b_{4+i+n} Y_n \quad (41)$$

There are some variations among the hedonic models estimated for the various metropolitan areas in terms of the number of zip code dummies and the year dummies. The number of zip code dummies (i) varies from one to six, depending on the particular locational distribution of available leases in each metropolitan area. The upper limit (six) has been arbitrarily determined. The number of year dummies varies from three to nine, depending again on the time distribution of leases within each metropolitan area. Zip code and year dummies were included only for the zips and the years for which at least ten observations were available.

3. Estimates of the Hedonic Model and the Office Rent Indices

We estimated two alternative hedonic models for the metropolitan areas for which a sufficient number of observations was available: 1) the model described by equation (41), using a sample that included both high-rise and low-rise buildings, and (2) the model described by equation (41) without the height dummy (H) and restricting the sample only to high-rise buildings. Table 9 presents the results obtained from the estimation of these two models for the Atlanta metropolitan area. The regression results for all metropolitan areas presented in Appendix II.

The calculation of rent indices from the hedonic regression estimates requires a good understanding of the meaning of the coefficients in equation (41). The interpretation of these coefficients becomes somewhat complicated because of the presence of the zip code and the year dummies.

The econometric theory postulates that, for a variable that can be classified in n categories, n-1 dummies should be included. In our original sample, for example, the variable describing the type of the building takes two values, one for high-rise and two for low-rise. To account, then, for variations in the type of property, we include in our model one dummy variable to denote the leases involving a high rise building. In a so specified model, the impact of the default category, that is the low-rise is reflected in the constant term. The same is true for the default zip code dummy and the default year dummy.

Within this framework, the coefficient of each zip code dummy reflects how much the rent in that zip is higher or lower than the rent in the default zip, which in most markets is the central city zip with the largest number of leases. So, the zip code that commands the highest rent is the one with the highest positive coefficient. If the coefficients of all the zip code dummies are negative, this means that the zip that commands the highest rent in the market is the default zip. Similarly, the coefficient of each year dummy reflects how much the rent during that year is higher or lower than the rent during the default year i.e., 1989.

We used the estimated coefficients of the hedonic equations to calculate (for each year) the rental rate per square foot for a 3-year, 10,000 square feet lease, in a high-rise building at the best location (the zip with the highest positive coefficient). In order, for example, to calculate the office space rent index for Atlanta for 1987, we use the following formula:

$$R = bo*3^{b1} * 10,000*^{b2}\ e^{b3 + b6 + b17} \qquad (42)$$

$$R = 2.40*3^{0.085}*10,000^{0.010}*e^{0.13-0.031+0.085} = 18.3$$

In this formula b_0, b_1, b_2, b_3, b_6, and b_{17} represent the estimates of the constant, the coefficient of the lease length variable, the coefficient of the square feet variable, the coefficient of the property type variable, the highest zip code dummy coefficient, and the coefficient of the year dummy for 1987, respectively, for the Atlanta market (Table 9). The estimates presented in Table 9 show that the location commanding the highest rent premium in the Atlanta market is zip 30305 (it has the highest positive coefficient). The location commanding the lowest rent premium is zip 30080 (it has the lowest coefficient). Notice also, in Table 9, that the coefficients of the dummy variables that account for the years 1986, 1987, and 1988 are statistically insignificant. These statistics indicate that during these years office rents were not statistically different from the rents prevailing during the default year i.e, 1989. Finally, the hedonic model appears to explain a greater portion of rent variation in the sample that includes all types of office buildings (both high-rise and low-rise) rather than the sample that includes only high rise buildings.

TABLE 9
HEDONIC RENT ESTIMATES
FOR METROPOLITAN ATLANTA

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
CONSTANT	2.48575	33.58662	one	2.54091	29.35671
LOGSQFT[1]	0.0101003	1.12854	logsqft	0.0158853	1.50801
LOGLENG[2]	0.0851859	4.95748	logleng	0.10281	4.16146
HIGH[3]	0.13746	6.9427			
D1980[4]	-0.63491	-11.85652	d1980	-0.44948	-2.66156
D1981	-0.33516	-6.84873	d1981	-0.2804	-3.90163
D1982	-0.38353	-8.99627	d1982	-0.36499	-7.33615
D1983	-0.25095	-6.03938	d1983	-0.26734	-5.21127
D1984	-0.12926	-3.24558	d1984	-0.17505	-3.32267
D1985	-0.0882353	-2.3043	d1985	-0.12404	-2.58011
D1986	-0.0141163	-0.37454	d1986	0.0200668	0.44473
D1987	-0.0318072	-0.91306	d1987	-0.00109047	-0.0253622
D1988	-0.0160401	-0.43612	d1988	0.0105147	0.23196
Z30305[5]	0.0858799	3.66121	z30305	0.0893832	3.92635
Z30328	0.056024	2.22062	z30328	0.0732524	2.35399
Z30345	0.000471525	0.0170669	z30345	-0.0855137	-2.00044
Z30080	-0.15909	-4.9941	z30080	-0.13342	-1.59851
Z30092	0.021217	0.52638			
Z30067	-0.0981199	-2.19234			

Number of Observations	590	Number of Observations	310
R-squared	0.61545	R-squared	0.52601
Corrected R-squared	0.60332	Corrected R-squared	0.50182
Sum of Squared Residuals	19.77363	Sum of Squared Residuals	7.93127
Standard Error	0.18609	Standard Error	0.16425
Durbin-Watson Statistic	1.84607	Durbin-Watson Statistic	1.7177
Mean of Dependent Variable	2.63564	Mean of Dependent Variable	2.76079

Notes: 1. Natural logarithm of square feet covered by the lease
2. Natural logarithm of the length of the lease
3. Dummy variable for the height of the building (1=high rise)
4. Dummy variable for year 1980 (1=lease was executed in 1980)
5. Dummy variable for zip (1=property is located in zip 30305)

TABLE 10
NOMINAL OFFICE SPACE RENTS: 1980-1988

	1980	1981	1982	1983	1984	1985	1986	1987	1988
ATLANTA	10.0	13.5	12.9	14.7	16.6	17.3	18.6	18.3	18.6
BOSTON	15.2	18.7	20.4	20.2	21.9	22.0	24.5	26.9	26.0
CHICAGO	15.7	15.6	16.6	19.2	20.8	21.9	21.9	20.8	23.6
CINCINNATI	NA	12.1	13.2	15.4	14.7	14.4	13.0	13.9	14.8
DALLAS	13.1	15.4	18.1	18.4	18.2	19.8	17.8	14.3	13.4
DENVER	16.4	20.2	22.6	21.7	19.6	20.4	14.7	13.8	13.3
HOUSTON	12.3	14.8	17.3	18.1	16.6	15.3	12.8	10.5	10.9
KANSAS	10.2	11.0	12.7	13.1	14.1	15.4	16.5	15.0	14.3
LOS ANGELES	17.9	23.7	23.7	22.7	24.7	25.5	26.2	27.3	27.5
MIAMI	15.3	18.0	26.7	22.9	26.8	23.9	23.2	23.5	20.4
MINNEAPOLIS	12.5	14.1	15.2	13.8	12.7	14.1	17.1	17.1	15.8
NEW ORLEANS	NA	NA	18.6	19.6	19.6	20.2	21.4	15.0	17.9
NEW YORK	NA	25.6	32.6	31.4	32.4	32.5	33.1	31.7	32.9
OKLAHOMA	NA	12.1	14.9	13.5	14.6	12.9	9.6	8.5	9.2
PHILADELPHIA	13.6	14.0	18.3	16.4	16.7	17.4	18.5	20.4	21.6
PHOENIX	15.0	17.0	18.8	20.3	21.1	22.0	22.2	20.7	18.2
PORTLAND	15.8	15.6	16.3	17.0	17.7	16.5	16.2	16.0	15.9
SACRAMENTO	15.6	16.6	20.1	18.5	18.5	19.3	19.7	19.8	21.1
SAINT LOUIS	NA	NA	13.2	14.5	15.2	14.7	15.5	15.1	16.0
SAN DIEGO	17.3	19.2	20.8	23.4	23.6	25.3	25.7	25.4	25.2
SAN FRANCISCO	18.4	24.6	30.4	28.7	29.5	27.5	22.5	22.6	23.9
SEATTLE	14.5	15.4	16.5	17.4	17.8	17.3	18.6	18.3	18.0
TAMPA	NA	NA	15.7	16.2	19.0	20.4	20.3	20.0	15.4
WASHINGTON	17.2	18.9	19.0	20.1	23.3	25.6	25.3	26.0	28.1
Minimum	10	11	12.7	13.1	12.7	12.9	9.6	8.5	9.2
Maximum	18.4	25.6	32.6	31.4	32.4	32.5	33.1	31.7	32.9
Spread	8.4	14.6	19.9	18.3	19.7	19.6	23.5	23.2	23.7
Standard Dev.	2.36	3.95	5.11	4.45	4.83	4.79	5.08	5.56	5.78

The hedonic rent estimates for all the markets are presented in Table 10. The empirical evidence indicates that there are indeed considerable differences in the levels of office space rents across metropolitan areas. In 1988, nominal office space rents ranged from $9.2/sf in Oklahoma to $32.9/sf in New York. Nominal rental rates were below $15 per square foot in Cincinnati, Dallas, Denver, Houston and Oklahoma, and above $25 per square foot in Boston, Los Angeles, New York and Washington D.C.

It is interesting to examine the variation of nominal office space rents across markets through the years, using some simple measures of dispersion, such as range and standard deviation. The smaller spread between the minimum and maximum office space rent in 1980, relative to all other subsequent years, is attributable to the fact that there are no rent estimates for this year for New York. Office space rents in this market are considerably higher than any other market.

Table 10 indicates that the spread between the minimum and the maximum office space rent as well as the standard deviation have been increasing through the years. The difference between the minimum and the maximum rent, for example, increased by 62%, that is, from $14.6 in 1981 to $23.7 in 1988. Such changes in the spread of office space rents across markets could be attributable to any combination of three factors: 1) intertemporally variable inflation rates, 2) cross-sectional differences in the rate of rental adjustment and 3) cross-sectional differences in supply-demand imbalances. We can, therefore, understand better changes regarding the variability of office space rents across markets by adjusting them for inflation. The next section examines more analytically the levels and trends of real office space rents in the major markets during the period 1980-1988.

4. Real Office Space Rental Rates: 1980-1988

Wheaton and Torto (1989) have empirically documented that the rent adjustment process is better reflected in changes in real office space rents rather than changes in nominal rents. We therefore adjusted the nominal rent estimates for inflation, using the general consumer price index. The Statistical Abstract of the United States provides location-specific inflation rates for only few of the cities included in our sample. Given these data constraints, and the generally accepted argument that inflation rates do not vary considerably cross-sectionally, we used the national inflation rate for all markets.

Table 11 presents the real office space rents (1980 constant dollars) in the 24 markets included in our sample during the period 1980-1988, along with some measures of variability. The spread between the minimum and the maximum real rents appears to be considerably smaller than the spread of nominal rents. In particular, the difference between the minimum and the maximum real rent in 1988 was $15.6, while the respective spread of nominal rents was $23.7. Table 11 also indicates that the difference between the minimum and the maximum, as well as the standard deviation are relatively constant through time. This suggests that the increasing

TABLE 11
REAL OFFICE SPACE RENTS: 1980-1988
(In 1980 Constant Dollars)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
ATLANTA	10.00	11.91	10.52	11.45	12.47	12.49	13.06	12.51	12.24
BOSTON	15.20	16.50	16.63	15.74	16.45	15.88	17.20	18.39	17.11
CHICAGO	15.70	13.77	13.53	14.96	15.62	15.81	15.38	14.22	15.53
CINCINNATI	NA	10.68	10.76	12.00	11.04	10.39	9.13	9.50	9.74
DALLAS	13.10	13.59	14.76	14.33	13.67	14.29	12.50	9.77	8.82
DENVER	16.40	17.83	18.43	16.91	14.72	14.73	10.32	9.43	8.75
HOUSTON	12.30	13.06	14.10	14.10	12.47	11.04	8.99	7.18	7.17
KANSAS	10.20	9.71	10.35	10.21	10.59	11.12	11.58	10.25	9.41
LOS ANGELES	17.90	20.92	19.32	17.68	18.55	18.41	18.39	18.66	18.10
MIAMI	15.30	15.89	21.77	17.84	20.13	17.25	16.29	16.06	13.43
MINNEAPOLIS	12.50	12.44	12.39	10.75	9.54	10.18	12.01	11.69	10.40
NEW ORLEANS	NA	NA	15.16	15.27	14.72	14.58	15.02	10.25	11.78
NEW YORK	NA	22.59	26.58	24.46	24.33	23.46	23.24	21.67	21.66
OKLAHOMA	NA	10.68	12.15	10.52	10.96	9.31	6.74	5.81	6.06
PHILADELPHIA	13.60	12.36	14.92	12.78	12.54	12.56	12.99	13.94	14.22
PHOENIX	15.00	15.00	15.33	15.81	15.85	15.88	15.59	14.15	11.98
PORTLAND	15.80	13.77	13.29	13.24	13.29	11.91	11.37	10.94	10.47
SACRAMENTO	15.60	14.65	16.39	14.41	13.89	13.93	13.83	13.53	13.89
SAINT LOUIS	NA	NA	10.76	11.30	11.42	10.61	10.88	10.32	10.53
SAN DIEGO	17.30	16.95	16.96	18.23	17.72	18.26	18.04	17.36	16.59
SAN FRANCISCO	18.40	21.71	24.78	22.36	22.16	19.85	15.80	15.45	15.73
SEATTLE	14.50	13.59	13.45	13.56	13.37	12.49	13.06	12.51	11.85
TAMPA	NA	NA	12.80	12.62	14.27	14.73	14.25	13.67	10.14
WASHINGTON	17.20	16.68	15.49	15.66	17.50	18.48	17.76	17.77	18.50
Minimum	10.00	9.71	10.35	10.21	9.54	9.31	6.74	5.81	6.06
Maximum	18.40	22.59	26.58	24.46	24.33	23.46	23.24	21.67	21.66
Spread	8.40	12.89	16.22	14.26	14.80	14.15	16.50	15.86	15.60
Standard Dev.	2.36	3.48	4.16	3.46	3.63	3.46	3.57	3.80	3.81

Sources: Estimated hedonic rent indices
U.S. Department of Commerce. Statistical Abstract of the United States.

variability of nominal office space rents across markets observed during the period 1980-1988 maybe attributable to an increasing inflation rate.

The evolutions in real rents during the period 1980-1982 were similar in all metropolitan areas included in our sample. During this period, real office space rents increased. The greater increase occurred in San Francisco where rents rose by 35%, that is, from $18.40 in 1980 to $24.78 in 1982. After 1982 four different rent change patterns took place in the various markets: 1) a pattern of increasing rents, 2) a pattern of stagnating (constant or slightly fluctuating) rents, 3) a mixed pattern with rents increasing until 1985 or 1986 and then decreasing, and finally 4) a pattern of predominantly decreasing rents. Table 12 groups the 24 markets on the basis of these four patterns.

Among the markets included in the sample, a pattern of slightly increasing real rents took place in a major Southeastern market, namely Atlanta, and three major Eastern markets, namely Boston, Philadelphia, and Washington D.C. Washington D.C. experienced the greater increase in real rents (19.6%) during the period 1982-1988. In Atlanta, despite some slight decreases in 1987 and 1988, real office space rents in 1988 were by 16.35% higher than their 1982 levels. In Philadelphia, after a sharp decrease in 1983, real office space rents started recovering and by 1988 they had increased by 11.26% over their 1983 levels. Finally, in Boston, in 1988 real office space rents were only by 2.88% higher than their 1982 levels.

TABLE 12
REAL OFFICE SPACE RENTS: 1980-1988
(In 1980 Constant Dollars)

	(1) 1980	(2) 1981	(3) 1982	(4) 1983	(5) 1984	(6) 1985	(7) 1986	(8) 1987	(9) 1988	(10)[1]
INCREASING REAL RENTS										
ATLANTA	10.00	11.91	10.52	11.45	12.47	12.49	13.06	12.51	12.24	16.35%
BOSTON	15.20	16.50	16.63	15.74	16.45	15.88	17.20	18.39	17.11	2.88%
PHILADELPHIA	13.60	12.36	14.92	12.78	12.54	12.56	12.99	13.94	14.22	11.26%
WASHINGTON	17.20	16.68	15.49	15.66	17.50	18.48	17.76	17.77	18.50	19.43%
STAGNATING REAL RENTS										
CHICAGO	15.70	13.77	13.53	14.96	15.62	15.81	15.38	14.22	15.53	
LOS ANGELES	17.90	20.92	19.32	17.68	18.55	18.41	18.39	18.66	18.10	
SAINT LOUIS	NA	NA	10.76	11.30	11.42	10.61	10.88	10.32	10.53	
SAN DIEGO	17.30	16.95	16.96	18.23	17.72	18.26	18.04	17.36	16.59	
SACRAMENTO	15.60	14.65	16.39	14.41	13.89	13.93	13.83	13.53	13.89	
INCREASING-DECREASING REAL RENTS										
MINNEAPOLIS	12.50	12.44	12.39	10.75	9.54	10.18	12.01	11.69	10.40	
KANSAS	10.20	9.71	10.35	10.21	10.59	11.12	11.58	10.25	9.41	
NEW ORLEANS	NA	NA	15.16	15.27	14.72	14.58	15.02	10.25	11.78	
TAMPA	NA	NA	12.80	12.62	14.27	14.73	14.25	13.67	10.14	
DECREASING REAL RENTS										
CINCINNATI	NA	10.68	10.76	12.00	11.04	10.39	9.13	9.50	9.74	-18.80%
DALLAS	13.10	13.59	14.76	14.33	13.67	14.29	12.50	9.77	8.82	-41.45%
DENVER	16.40	17.83	18.43	16.91	14.72	14.73	10.32	9.43	8.75	-48.25%
HOUSTON	12.30	13.06	14.10	14.10	12.47	11.04	8.99	7.18	7.17	-49.15%
MIAMI	15.30	15.89	21.77	17.84	20.13	17.25	16.29	16.06	13.43	-38.30%
NEW YORK	NA	22.59	26.58	24.46	24.33	23.46	23.24	21.67	21.66	-18.50%
OKLAHOMA	NA	10.68	12.15	10.52	10.96	9.31	6.74	5.81	6.06	-50.12%
PHOENIX	15.00	15.00	15.33	15.81	15.85	15.88	15.59	14.15	11.98	-21.85%
PORTLAND	15.80	13.77	13.29	13.24	13.29	11.91	11.37	10.94	10.47	-21.20%
SAN FRANCISCO	18.40	21.71	24.78	22.36	22.16	19.85	15.80	15.45	15.73	-36.52%
SEATTLE	14.50	13.59	13.45	13.56	13.37	12.49	13.06	12.51	11.85	-11.90%

Notes: 1. Percent change during the period 1982-1988

A pattern of stagnating rents took place in a number of markets located in the West, such as Los Angeles, San Diego and Sacramento, as well as in two markets located in the Central region, namely Saint Louis, and Chicago. A mixed pattern of increasing-decreasing rents took place in Minneapolis, Kansas and New Orleans. Finally, a pattern of primarily decreasing real rents after 1982 has been observed in 12 out of the 24 markets included in the sample. Most of these markets, such as, Miami, Dallas, Houston, Denver, Phoenix, San Francisco, Portland and Seattle are located in the South and West. Also New York, the major Eastern office space market, experienced an 18.5% decrease in real rents during the period 1982-1988. The major decreases in real office space rents during the period 1982-1988 took place in markets located in the South, such as Houston, Denver, Dallas, and Miami. In these markets, real rents decreased by 49.15%, 48.25%, 41.45%, and 38.30%, respectively.

The above analysis indicates that, after 1982, only the major markets <u>located in the East</u> (with the exception of New York) experienced sustainable <u>increases</u> in real office space rents. On the contrary, the major markets in the South and West experienced systematic decreases with the exception of a few major markets located in Southern California.

5. Contract Rents Vs Effective Rents

In evaluating the variability of office space rents across markets and through time, it is important to keep in mind that the estimates presented in Tables 11 and 12 represent contract and not effective rents. According to some data collected by the Society of Industrial and Office Realtors in 1988, the discrepancy between contract rents and effective rents ranges from a minimum of 5% in New York to a maximum of 30% in Dallas (Table 13). It is obvious that contract rents are actually higher than effective rents since they do not account for rental income losses due to concessions.

TABLE 13
DISCOUNT FACTOR DUE TO CONCESSIONS IN 1988

CITY	DISCOUNT FACTOR
ATLANTA	12% - 18%
BOSTON	10% - 20%
CINCINNATI	11% - 15%
DALLAS	20% - 30%
DENVER	16% - 20%
HOUSTON	11% - 15%
LOS ANGELES	11% - 15%
MIAMI	6% - 10%
MINNEAPOLIS	16% - 20%
NEW YORK	5% - 15%
OKLAHOMA	9% - 12%
PHILADELPHIA	10% - 20%
PHOENIX	6% - 10%
SACRAMENTO	0% - 5%
SAN FRANCISCO	6% - 10%
SEATTLE	16% - 20%
TAMPA	11% - 15%
WASHINGTON DC	11% - 15%

Source: Society of Industrial and Office Realtors. 1989. "1989 Guide to Industrial and Office Real Estate Market." Washington, DC: SIOR.

Differentials across markets in terms of effective rents may be greater than respective differentials in contract rents. As indicated by Table 13, cross-sectional differences in the magnitude of rent discounts due to concessions may vary from 0% to 15%. This suggests that contract rent differentials may understate effective rent differentials roughly by 15% at maximum.

The existence of such a bias is also supported by previous findings suggesting that local markets behave independently. The difference between contract rent and effective rent depends primarily on concessions. Concessions, in turn, are a function of excess supply. The greater the amount of excess vacant space in a local market, the greater the concessions landlords have to accept in order to attract tenants. Since it has been theoretically and empirically established that local markets do behave independently, significant differences in terms of excess supply are very likely to exist across markets at a given point in time.

In the face of soft markets, landlords are more reluctant to decrease contract rents, and more willing to give concessions. Hence, it is very likely that differences in the softness of the market are reflected less on contract rents and more on effective rents. For this reason, the measures of dispersion provided both in Table 10 and Table 11 may understate the cross-sectional variability of effective office space rents across markets.

It is equally likely that changes in real contract rents through time understate the actual decreases in the income earning capacity of office buildings in the various markets. This means that the post-1982 decreases in effective rents in the major Southern and Eastern markets may be even greater than what our estimates suggest. Furthermore, it is equally likely that effective rents have not been increasing in Atlanta, Boston, Philadelphia and Washington, the four markets that experienced increases in real contract rents. However, nothing can be done to eliminate these biases because of the lack of data.

CHAPTER V

THE RENT ADJUSTMENT PROCESS AND THE ESTIMATION OF THE NORMAL VACANCY RATE

1. Existing Empirical Models of the Rent Adjustment Process

In order to empirically analyze both the determinants of cross-section differences in office rents and normal vacancy rates we have to first estimate the normal vacancy rate for each metropolitan market. This can be calculated on the basis of the estimated parameters of the rent adjustment equation.

The rent adjustment process in the office market has been examined empirically by Hekman (1985), Shilling, Sirmans and Corgel (1987), and Wheaton and Torto (1988). Hekman used a questionable model formulation to examine the rent adjustment process in the office market. The dependent variable in his model is rent level and not rent change as in the traditional adjustment models presented both in the housing and the office market. This raises questions as to whether his model addresses directly the issue of the rent adjustment process or the determinants of variation in rent levels.

Shilling, Sirmans and Corgel (1987) and Wheaton and Torto (1988) have used traditional rent adjustment models. In particular, the former use a linear model, in which the rent change is a function of the deviation of the nominal vacancy rate from a constant normal rate and changes in operating expenses (E).

$$\dot{R} = bo + b1\,\dot{E} - b2\,V + \dot{R}\,V \qquad (43)$$

In order to allow for non-constant slopes they introduce an interactive term, comprised of the rate of change in rent times the vacancy rate. Shilling, Sirmans and Corgel suggest that the underlying assumptions of this model are two: the first is that landlords expect future vacancy rates to tend toward an intertemporally constant normal level of vacancies that can be estimated on the basis of past experiences. The second is that commercial leases are gross leases, since in the case of net leases rents should be unaffected by changes in operating expenses.

The Shilling, Sirmans and Corgel model, however, may be misspecified because of the inclusion of the dependent variable, that is, the change in rents in the left hand side of the equation. Such a functional form may thus produced biased estimates because of a simultaneity problem.

Wheaton and Torto (1988) estimate two rent adjustment models. Their first model postulates that the percentage change in real rents is a function of the difference of the nominal vacancy rate from an intertemporally constant normal vacancy:

$$R(t)/(R(t-1) - 1 = \alpha\ [\ V^* - V(t-1)] \qquad (44)$$

Their second model is specified so that it allows for a trending structural vacancy rate ($V^* = b + ct$).

$$R(t)/R(t-1) - 1 = \alpha \, [\, b + ct - V(t-1) \,] \qquad (45)$$

One potential problem of these traditional rent adjustment models is that vacancies and office space rents may be determined jointly. In such a case, these models will result to biased estimates because of a specification error.

Some issues not addressed by these models relate to the intertemporal variability of the normal vacancy rate, and the time dimension of the vacancy measure used by landlords to evaluate the softness of the market. As discussed in chapter IV the normal vacancy rate is affected by variables such as employment growth, tenant turnover, completions etc. The historical data reviewed in the third chapter of this dissertation indicate that such variables vary considerably through time. It is, therefore, reasonable to assume that the normal vacancy rate will follow to some extent intertemporal fluctuations in such variables.

Another issue relates to the time dimension of the vacancy measure used by landlords in order to assess the extent of supply shortages or surpluses in the market. It is very likely that they are not using the last semester's estimate of the vacancy rate but, rather the average vacancy rate over the last two or three semesters, for a number of reasons. First, such an average will eliminate any large inaccuracies in the last semester's or any other single semester's estimate. Second, a 3-semester average gives a better picture of an established vacancy rate in the market than the one-semester vacancy rate. Some analysts, such as Shillings, Sirmans, and Corgel (1987) and Wheaton and Torto (1988) have used annual or semiannual vacancy rates, respectively.

2. Developing Alternative Rent Adjustment Models

In order to address the above issues, we estimated four alternative rent adjustment models for each metropolitan area. Below, we review each of these models and show how the normal vacancy rate can be estimated in each case.

<u>Model 1</u>

First we estimate a simple rent adjustment model described by equation (31). In this model, the rent change is regressed on a constant and the nominal vacancy rate. The normal vacancy rate can be estimated by dividing the constant term of the statistical equation with the coefficient of the vacancy variable.

<u>Model 2</u>

Second, to address the issue of the time dimension of the vacancy measure, used by landlords to assess the extent of oversupply in the market, we estimate model 2. This model which considers the rent change as a function of the deviation of a 3-period average nominal vacancy rate from the normal rate is described by equation (46):

$$R(t)/R(t-1) = \alpha \left[n V^* - \left(\int_{t-n-3}^{t-n} V(t-n)\, dt \right)/3 \right. \qquad (46)$$

where n = lag due to market frictions[7]

The statistical equation for this model is then:

$$R(t)/R(t-1) = b_0 - b_1 \left(\int_{t-n-3}^{t-n} V(t)\, dt \right)/3 \qquad (47)$$

where $b_0 = \alpha V^*$

$b_1 = \alpha$

Therefore, the normal vacancy rate can be estimated as:

$$V^* = b_0 / b_1 \qquad (48)$$

Model 3

Third, to account for the impact of factors that may intertemporally affect the normal vacancy rate we estimate a

7. Market frictions such as inadequate information of landlords regarding the current vacancy rates, long-term contracts, and the lengthy search effort and negotiation process between landlords and tenants may extent the period between the vacancy change and the rent change to more than one semester. Given that our observations are semiannual, this formulation allows more than one semester lags between the rent change and the vacancy change.

model that includes variables such as absorption, or employment growth, or completions, or change in vacancy. This relationship is described by equation (49) while the estimated statistical model is described by equation (50):

$$R(t)/R(t-1) - 1 = \alpha[\ b + c\ X(t-m) - V(t-n)] \tag{49}$$

$$R(t)/R(t-1) - 1 = b_0 + b_1 X(t-m) - b_2\ V(t-n) \tag{50}$$

where $b_0 = \alpha b$
$b_1 = \alpha c$
$b_2 = \alpha$
m,n = lags due to market frictions

Therefore, the normal vacancy rate can be estimated as follows:

$$V* = b + c\ X(t-m) = (b_0 / b_2) + (b_1 / b_2)\ X(t-m) \tag{51}$$

In equation (51) X represents variables that potentially affect the normal vacancy rate. Given the limited observations in our sample we restrict the number of independent variables to two. For this reason we estimate alternative versions of (50) using each time a different variable for X, such as absorption[8], completions[9], office employment growth[10], and change in

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8. We define absorption as the difference between the occupied stock in period t and the occupied stock during period t-1:

$$OS(t) - OS(t-1) = A(t)$$

9. We define as completions the difference between the office space stock in period t and the stock in period t-1:

vacancy[11] in order to see which one fits the data best.

As discussed in chapter IV, higher absorption is associated with higher effective demand for office space. Given the formulation of our rent adjustment model, described by equation (49), we should obtain a positive sign for the absorption rate for the following reason. As absorption increases the normal vacancy rate increases and the difference (V*(t)-V(t)) as well. In turn, as this difference increases, the rent change increases too.

The same rationale is applicable to the office employment growth variable which is again another proxy for effective office space demand. The logic and the mathematics are exactly the same as in the case of the absorption variable. We,

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$$S(t) - S(t-1) = C(t)$$

10. Office employment growth (EG) for each period has been calculated using the following formula:

$$EG = (OE(t) - OE(t-1)) / OE(t-1)$$

Office employment OE(t) has been calculated using the following formula:

$$OE(t) = FIRE(t) + 0.36\ SERV(T)$$

Where FIRE(t) = Employment in Finance, Insurance, and Real Estate in period t
SERV(t) = Employment in Services in period t

11. The change in vacancy for each period DV(t) has been calculated using the following formula:

$$DV(t) = (C(t) - At)) / S(t)$$

where C(t) = Completions in period t
A(t) = Absorption in period t
S(t) = Office space stock in period t

therefore, expect a positive sign for the office employment growth variable.

Completions should have a negative effect on the normal vacancy rate. The reason is that under the assumption of myopic expectations, landlords in markets with higher level of completions in the present will also expect higher level of completions in the future. In anticipation of a softer market, they will be inclined to hold a smaller inventory of vacant units at any given time. Given the formulation of our rent adjustment model described by equation (49), we should obtain a negative sign for the completion variable for the following reason. As completions increase the normal vacancy rate decreases, and the difference $(V^*(t)-V(t))$ falls as well. In turn, as this difference decreases, the rent change decreases too.

Finally, the change in vacancy should have a positive effect on the normal vacancy rate. We have estimated the change in vacancy as the difference between absorption and completions over the total stock of office space. Thus, as the difference between absorption and completions increases the change in vacancy will increase too, indicating that the difference between demand and supply is increasing or, equivalently, that the market becomes stronger. Under the assumption of myopic expectations, landlords in markets with a higher change in vacancy in the present will anticipate that the market will continue to become stronger in the future.

Within this framework, they will be less reluctant to decrease rents in order to reduce their vacant stock, exerting thereby an upward pressure on the normal vacancy rate. Given the formulation of our rent adjustment model described by equation (49), we should obtain a positive sign for the change in vacancy for the following reason. As the change in vacancy increases, the normal vacancy rate increases and the difference (V*(t)-V(t)) rises as well. In turn, as this difference increases, the rent change increases as well.

<u>Model 4</u>

Fourth, to address both the impact of demand and supply variables that potentially affect landlord behavior and the normal vacancy rate, and the time dimension of the nominal vacancy measure we estimated Model 4 below:

$$R = \alpha[\; (\; b + c \; X(t-m) \; - \; (\int_{t-n-3}^{t-n} V(t-n) \; dt \;)/3 \qquad (52)$$

Based on this model, we can derive the statistical equation (53):

$$dR(t) = b_0 + b_1 X(t-m) + b_2 CV(t) \qquad (53)$$

where:

$$CV(t) = [\int_{t-n-3}^{t-n} V(t-n)\, dt]/3$$

$$b_0 = \alpha\, b$$
$$b_1 = \alpha\, c$$
$$b_2 = \alpha$$

Therefore, the normal vacancy rate can be estimated as follows:

$$V^* = b + c\, X(t-m) = (b_0 / b_2) + (b_1 / b_2)\, X(t-m) \qquad (54)$$

3. The Empirical Estimates of the Rent Adjustment Models

We estimated the above rent adjustment models for 24 metropolitan areas for which we could obtain a sufficiently long semiannual time series. The data used for the estimation of the alternative rent adjustment equations come from two sources. The rent data used for the calculation of the dependent variable, that is, the rent change, have been produced through hedonic estimates presented in the previous chapter. The sources of the data used for these estimates are described in Table 12. All other data used for the estimation of the rent adjustment models come from another database provided by Coldwell Banker. A printout of all the variables included in this database is included in Appendix 3. The variables that have been drawn from this database as well as their sources are described in Table 14.

Data availability varies across markets. In most major markets data on vacancy rates and rents are available from 1980 to 1989. For some markets, such as Cincinnati, New York and Oklahoma, vacancy and rent data are available for the period 1981-1989, while for others such as Saint Louis, New Orleans and Tampa, rent data are not available before 1982. For this reason, we estimated the rent adjustment models in two ways: 1) by using for each metropolitan area the available observations, and 2) by using observations for the same period for all markets, that is, from 1982 to 1989. Given, however, that none of these estimates produced any acceptable regressions for Saint Louis, New Orleans and Tampa, we also estimated the rent adjustment equation for the remaining markets using observations from 1981 to 1989.

Our sample provides for a reasonable geographical diversification, since it includes both older Northeastern and Midwestern cities, as well as the newer high growth cities of the West and South. The results of the rent adjustment estimates indicate that Model 4 is superior in explaining variations in rent changes through time.

Table 15 presents the estimates of the four models for the Atlanta and the Dallas market. We can in both cases see that the addition of another variable that affects the normal vacancy rate and the substitution of the one-period vacancy for

TABLE 14

DATA USED FOR THE ESTIMATION OF THE RENT ADJUSTMENT EQUATION

Variable Name & Formula Used to Calculate it	Description of Data Used	Data Source
PERCENTAGE CHANGE IN REAL RENTS R(t)-R(t-1)/R(t-1)	Rent index for each market deflated with national consumer price index (CPI) using 1980 as basis. The rent index has been estimated through hedonic regression analysis for each market using individual lease transaction data for each market.	Statistical Abstract of the U.S. 1989. Lease transaction files provided by Coldwell Banker. The specific variables included in this file have been described in Table 8
VACANCY RATE	Percent of office space recorded as vacant in each market	Quarterly survey of office buildings conducted by Coldwell Banker in the 50 major metropolitan areas in the country
ABSORPTION (1-V(t))*S(t)-(1-V(t-1))*S(t-1)	Vacancy rate (V) and total office space stock (S)	Quarterly survey of office buildings conducted by Coldwell Banker in the 50 major metropolitan areas in the country recording vacancy rate and year each building was completed
COMPLETIONS S(t) - S(t-1)	Total office space Stock in each period (S)	Quarterly survey of office buildings conducted by Coldwell Banker in the 50 major metropolitan areas in the country recording vacancy rate and year each building was completed

Table 14 Continued

Variable Name & Formula Used to Calculate it	Description of Data Used	Data Source
OFFICE EMPLOYMENT GROWTH E(t)-E(t-1)/E(t-1)	Employment in Finance, Insurance and Real Estate and Services (E)	U.S. Department of Commerce, 202 Employment Survey
CHANGE IN VACANCY A(t)-C(t)/S(t)	Absorption (A) Completions (C) Total office space stock (S)	See above

the three-period average considerably raise the R-squared and the t-statistics of the equation. In Atlanta, for example, the addition of absorption in the model raised the R-squared by 17 percentage points (from 0.07 to 0.24) and the substitution of the one-period vacancy for the three-period average raised it by an additional 11 percentage points (from 0.24 to 0.35). In Dallas, the addition of the change in vacancy in the model raised the R-squared by 21 percentage points (from 0.42 to 0.63) and the substitution of the one-period vacancy with the three-period average by an additional 9 percentage points (from 0.63 to 0.72).

TABLE 15
ALTERNATIVE RENT ADJUSTMENT ESTIMATES FOR ATLANTA

	Constant	Vacancy	3-Period Average Vacancy	Absorption	R-Squared
MODEL 1	5.00 (.92)	-0.37 (-1.00)	-	-	0.07
MODEL 2	8.57 (1.45)	-	-0.63 (-1.53)	-	0.14
MODEL 3	6.81 (1.31)	-1.06 (-2.01)	-	0.0038 (1.73)	0.24
MODEL 4	10.48 (1.93)	-	-1.32 (-2.63)	0.0037 (2.03)	0.35

ALTERNATIVE RENT ADJUSTMENT ESTIMATES FOR DALLAS

	Constant	Vacancy	3-Period Average Vacancy	Change in Vacancy	R-Squared
MODEL 1	4.68 (1.64)	-0.44 (-3.19)	-	-	0.42
MODEL 2	4.77 (1.84)	-	-0.48 (-3.58)	-	0.47
MODEL 3	8.63 (3.13)	-0.58 (-4.61)	-	99.17 (2.74)	0.63
MODEL 4	9.02 (3.89)	-	-0.63 (-5.70)	107.42 (3.39)	0.72

Source: See Table 12 which describes the data used for the estimation of the rent adjustment equations and their sources

It is obvious from Table 15 that Model 4 provides a clearly better fit than the other three models. The implications of these findings are very important in that they contradict the conventional assumption that the normal vacancy rate is intertemporally constant. These results actually lend empirical support to the hypothesis that the structural vacancy rate is not intertemporally constant and that it fluctuates considerably depending on changes in demand and/or supply variables that affect landlord and tenant search efforts. The results suggest that, on average, higher absorption and growth rates contribute to a higher structural vacancy rate, while higher levels of new construction to a lower structural vacancy rate.

The results of the estimates of Model 4 for 19 metropolitan areas are presented in Table 16. In this table we do not include five metropolitan areas for which we were not able to obtain an acceptable estimate of the rent adjustment equation.

The Intrametropolitan Rent Adjustment Function

The regression results indicate that the intrametropolitan rent adjustment function is not quite the same in the country's various metropolitan areas. Although all the intrametropolitan rent adjustment functions have a basic common variable, the vacancy rate, they differ in two respects: 1) in terms of the lag structure, and 2) in terms of the second independent variable. Seemingly, in many metropolitan areas it takes up to three semesters for rents to react to high vacancies. Only in two metropolitan areas, namely Miami and Cincinnati, current rent changes are associated with current vacancy rates indicating thereby that landlords are able to respond more quickly to excess vacancies.

Variations in the nature of the second independent variable in the model indicate that in each metropolitan area different variables shape landlord behavior. In some metropolitan areas, such as, in Boston, Cincinnati, Kansas and Minneapolis, for example, landlord behavior is affected by current or past office employment growth rates; in most metropolitan areas in the West coast, such as San Francisco, and San Diego this is rather affected by current or past levels of absorption of office space; in others, such as, Denver, Houston, Oklahoma and Portland by the levels of recent or current completions of new office space; and in a few, namely, Chicago, Dallas, Los Angeles, and Washington the change in the vacancy rate appears to be most influential.

Differences in the factors that affect landlord behavior may be attributable to differences in prevailing norms within the development community in each market. In some markets, for example, the majority of developers and real estate investors may use absorption as the major indicator of market strength because this is the measure that has been traditionally used

TABLE 16
THE INTRAMETROPOLITAN RENT ADJUSTMENT PROCESS

$R(t)-R(t-1)/R(t-1) = a + b\ V^{1}(t\text{-}Lag) + c\ X(t\text{-}Lag)$

Metropolitan Area	a	b	Lag	X	Lag	c	R**2
ATLANTA	10.48 (1.93) [2]	-1.32 (-2.62)	3	ABSORPTION	1	0.0037 (2.03)	0.35
BOSTON	-2.76 (-1.34)	-0.52 (-2.69)	3	GROWTH	2	303.59 (2.83)	0.43
CHICAGO	9.58 (4.08)	-0.72 (-3.75)	3	DVACANCY	0	203.05 (2.94)	0.64
CINCINNATI	10.69 (1.86)	-1 (2.07)	0	GROWTH	3	207.86 (1.79)	0.25
DALLAS	9.02 (3.89)	-0.63 (-5.99)	3	DVACANCY	1	107.42 (3.39)	0.72
DENVER	17.36 (5.03)	-0.69 (-5.99)	3	COMPLETION	1	-0.0044 (-6.15)	0.76
HOUSTON	20.84 (2.79)	-0.83 (-3.30)	3	COMPLETION	2	-0.0018 (-3.05)	0.46
KANSAS [3]	12.69 (4.13)	-1.23 (-4.20)	3	GROWTH	2	104.48 (1.80)	0.6
LOS ANGELES [4]	4.75 (2.74)	-0.38 (-2.89)	3	DVACANCY	0	194.22 (4.02)	0.53
MIAMI	1.8 (4.98)	-0.49 (-2.01)	0	ABSORPTION	2	0.0077 (1.08)	0.22
MINNEAPOLIS	-5.86 (-1.78)	-0.51 (-2.72)	1	GROWTH	2	672.33 (4.81)	0.67
NEW YORK	1.57 (0.79)	-0.63 (-2.34)	1	ABSORPTION	3	0.0013 (2.36)	0.43
OKLAHOMA	11.11 (2.39)	-0.75 (-3.49)	2	COMPLETION	1	-0.0099 (-2.70)	0.48
PHILADELPHIA	0.53 (0.165)	-1.3 (-3.79)	2	ABSORPTION	0	0.0089 (4.64)	0.64

Table 16 Continued

Metropolitan Area	a	b	Lag	X	Lag	c	R**2
PHOENIX	3.74 (1.39)	-0.24 (-1.74)	1	NA [5]	NA	NA	0.18
PORTLAND	6.56 (4.41)	-0.29 (-5.7)	3	COMPLETION	3	-0.01 (-5.3)	0.74
SAN DIEGO	0.16 (0.15)	-0.28 (-4.92)	3	ABSORPTION	1	0.0036 (3.04)	0.65
SAN FRANCISCO	-6.48 (-2.75)	-0.45 (-3.04)	1	ABSORPTION	0	0.0098 (4.47)	0.63
WASHINGTON DC [6]	6.35 (4.50)	-0.5 (-3.98)	3	DVACANCY	0	124.29 (3.07)	0.63

Notes: 1. Three-period average vacancy rate
2. T-statistics in parenthesis
3. Estimated using observations from 1980:2 to 1988:1
4. Estimated using observations from 1980:2 to 1989:1
5. NA: Not applicable
6. Estimated using observations from 1982:2 to 1989:1

Source: See Table 12 which describes the data used for the estimation of the rent adjustment equations and their sources

for such purpose, or because it is the only relative variable for which reliable, up-to-date information exists; or because historical circumstances have proved that none of alternative measures of market strength are better.

The Rate of Rental Adjustment

It is also interesting to review differences across office space markets in terms of the rate of rental adjustment, which in our model is represented by the coefficient b of the vacancy rate. Our estimates indicate that there are significant differences across markets in terms of the rate of adjustment or, equivalently, the percentage decrease in rents caused by one percentage point increase in the nominal vacancy rate.

This rate of adjustment ranges in our sample from 0.24 in Phoenix to 1.32 in Atlanta. It is interesting to note that the markets located in the West coast exhibit the lowest rates of office rental adjustment. In particular, the rate of rental adjustment in San Diego, Los Angeles and San Francisco during the 1980's was 0.28, 0.38, and 0.45, respectively. The rental adjustment process seems to be faster in markets located in the South, where the rate of rental adjustment takes values over 0.5. In particular, the rate of adjustment in some major Southern markets, such as Atlanta, Dallas and Houston was 1.32, 0.63 and 0.83, respectively. The rate of adjustment seems to be relatively slow in some major Eastern markets, such as Boston, Washington DC and New York (0.5, 0.5 and 0.6, respectively).

4. Estimating the Average Normal Vacancy Rate

Using the parameter estimates of the rent adjustment models and the average values of absorption, completions, office employment growth and change in vacancy during the period 1980-1988, we derived alternative estimates of the average structural vacancy rate in each market. The data used for the calculation of these average normal vacancy rates are exactly the same with those we used to estimate the alternative rent adjustment models. These data and their sources have been described in detail in Table 14. The alternative estimates of the average normal vacancy rate are presented in Table 17, along with the 9-year average nominal vacancy rate. The sixth column in this table presents the average structural vacancy rate based on the parameter estimates of Model 4, using observations from 1981 to 1989 for all markets.

These estimates show that the average normal vacancy rate in most metropolitan areas during the 1980's was between 10% and 15%. The markets for which most of the alternative estimates of the normal vacancy rate are below 10% are Boston, New York, Oklahoma city, Portland and San Francisco.

It is interesting to compare the average nominal vacancy rate with the estimates of the average normal vacancy rate. Table 15 indicates that in many metropolitan markets, such as Dallas, Denver, Houston, Oklahoma, Phoenix, Portland and San Francisco, there is a significant diversity between the average

TABLE 17
ALTERNATIVE ESTIMATES OF
AVERAGE NORMAL VACANCY RATES

METROPOLITAN AREA	9-YEAR AVERAGE NOMINAL VACANCY	ONLY VACANCY	ONLY 3-PERIOD VACANCY AVERAGE	VACANCY & OTHER VARIABLE	3-PERIOD VACANCY AVERAGE & OTHER VARIABLE	3-PERIOD VACANCY AVERAGE & OTHER VARIABLE 81-89 OBSERV.
	(1)	(2)	(3)	(4)	(5)	(6)
ATLANTA	14.74	15.95	15.81	16.19	16.19	13.50
BOSTON	8.95	8.80	6.65	9.66	9.35	7.00
CHICAGO	11.12	14.40	12.49	15.85	12.35	12.31
CINCINNATI	14.35	14.46	NA	14.88	14.57	14.57
DALLAS	19.24	15.78	9.28	13.03	10.52	12.31
DENVER	18.36	11.16	8.06	11.70	12.05	11.99
HOUSTON	20.60	15.72	13.53	13.10	9.66	11.31
KANSAS	13.46	11.36	NA	11.38	11.36	15.94
LOS ANGELES	12.28	11.27	NA	10.65	10.11	NA
MIAMI	13.30	16.24	14.75	17.90	13.49	NA
MINNEAPOLIS	11.48	12.80	NA	12.13	10.79	10.79
NEW YORK	6.70	7.03	6.44	5.02	5.2	5.20
OKLAHOMA	17.45	5.32	4.94	11.06	9.61	9.61
PHILADELPHIA	10.30	11.69	NA	10.11	8.95	10.00
PHOENIX	17.25	10.59	15.46	11.14	10.74	15.45
PORTLAND	14.14	NA	7.51	6.77	6.26	6.27
SAN DIEGO	16.37	12.78	17.44	12.91	12.14	12.80
SAN FRANCISCO	10.75	10.69	9.61	9.99	9.05	8.90
WASHINGTON	9.77	14.32	10.83	13.00	12.02	12.02

NOTE: NA=Non Available

Source: Estimated on the basis of data provided by Coldwell Banker

nominal vacancy rate and the average normal vacancy rate. The most extreme example of such a diversity is Oklahoma, where the average nominal vacancy rate is 17.45% and the highest estimate of the average normal vacancy rate is by six percentage points lower, that is, 11.06%.

These findings may have some important empirical implications. In the absence of normal vacancy estimates, researchers may be tempted to use the average nominal vacancy rate over a period during which this moves from very low to quite high levels. The period over which this study has focused is indeed a similar one, with nominal vacancy rates moving from as low as 1% to historically high levels of over 20% in many markets. Our findings suggest that it would be misleading to use the average nominal vacancy rate as a proxy for the average normal vacancy rate during this period. Such an approximation would suffer from considerable upward bias, especially in the case of such markets, as Houston, Dallas, Denver, Oklahoma, Phoenix, Portland and San Diego. The use of the average nominal vacancy rate in these markets as a proxy for the normal vacancy rate would result to a <u>considerable underestimation of excess supply</u>.

As expected, the different models have produced different normal vacancy rates. This is reasonable, since the different model specifications are based on different assumptions regarding the normal vacancy rate. The considerable differences between the estimates based on 1980-1989 observations (column 5 in Table 17) from those based on 1981-1989 observations (column 6 in Table 17) are not surprising. They are simply due to the smaller size of the sample and therefore, its sensitivity to the addition or removal of observations.

These findings explain why our estimates of the normal vacancy rates are considerably different from the estimates of Shilling, Sirmans and Corgel (1987). Using data on rents, vacancies and operating expenses for the period 1960 to 1976, these analysts have estimated that the normal vacancy rate in Atlanta (central city) is 6.32%. Our estimates of the normal vacancy rate for the Atlanta metropolitan area range from 12% to 16%. Chicago presents another example of such a diversity between the two estimates. The Shillings, Sirmans and Gorgel estimate for the structural vacancy rate in the Chicago central city is 4.05% while our estimate for the Chicago metropolitan area varies from 11% to 16%.

There are three reasons for these differences. The first is that we have used different models for our estimates. The second is that our estimates refer to metropolitan areas and not exclusively to central cities. It was not possible to estimate the rent adjustment equation for central cities because of the lack of time-series data on central city vacancies. Voith and Crone (1988) present evidence indicating that the vacancy rates in the suburbs are higher than those in central cities. Our metro-wide vacancy rates should, therefore, be higher than those for central cities. Consequently our estimates of normal vacancy rate based on these nominal rates should be higher. Finally, the third reason is that we have used observations for a different time period, that is, 1980-1989.

5. Variation in Normal Vacancy Rates: 1980-1988

As we have empirically documented, the normal vacancy rate is affected by such variables, as absorption, office employment growth, completions and changes in the vacancy rate. Given that these fluctuate considerably through time, it is very likely that the normal vacancy rate fluctuates through time as well. For this reason, it makes sense to estimate annual normal vacancy rates for each market for the period 1980-1988. The extent to which these rates fluctuate through time will provide an indication of how sensitive they are to intertemporal changes in these crucial office market variables. If the normal vacancy rate is very volatile through time, this means that it is very sensitive to variables that influence landlord and tenant search processes. If it fluctuates only slightly through time, it means that either the market did not experience significant changes in these variables or that the normal vacancy rate is very little affected by significant changes in these variables.

Using the coefficients from the estimates of Model 4 and the annual values of the variables that affect landlord and tenant search processes (absorption, completions, office employment growth rate, and change in vacancy), we calculated annual normal vacancy rates for each market for the period 1980-1988. In doing so, we used the same data used for the estimation of the rent adjustment equation. These data and their sources are described in detail in Table 14.

The estimates presented in Table 18 clearly indicate that the normal vacancy rate, in almost all the markets in our sample, is very volatile. An extreme example of the great volatility of the normal vacancy rate is Denver where it ranges from -2.31% to 25.16%.

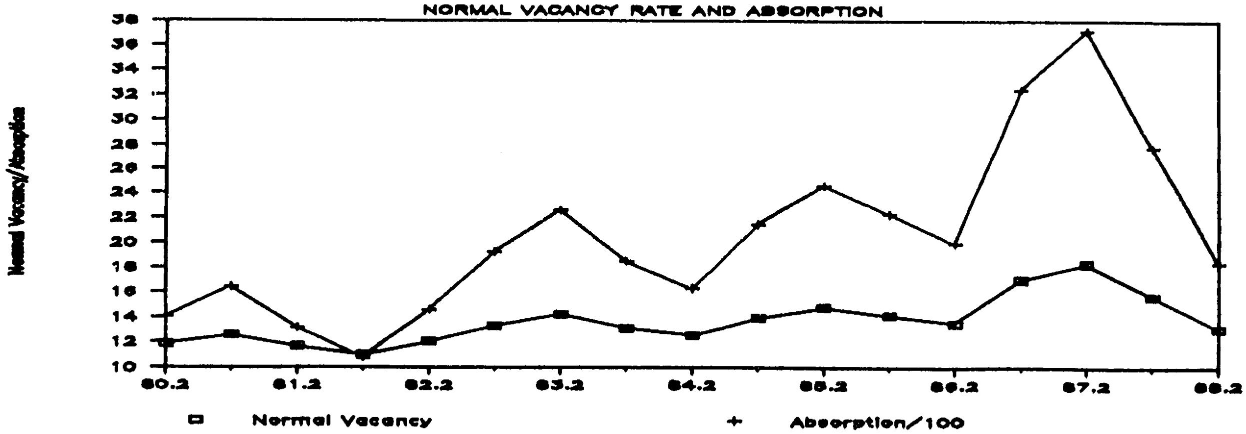
TABLE 18
ANNUAL NORMAL VACANCY ESTIMATES: 1980-1988

Metro Area	1980	1981	1982	1983	1984	1985	1986	1987	1988
ATLANTA	11.88	12.09	11.50	13.79	12.82	14.37	13.83	17.69	14.39
BOSTON	7.92	5.60	3.47	1.96	5.05	12.28	14.05	7.47	8.50
CHICAGO	18.02	15.69	11.44	6.58	12.32	10.71	8.40	13.81	16.22
CINCINNATI	13.93	13.53	11.79	11.13	12.15	16.54	17.97	16.29	16.29
DALLAS	12.69	15.34	4.42	7.29	17.75	11.37	10.63	13.39	13.93
DENVER	6.74	6.98	-2.31	-1.95	10.96	5.48	19.11	23.18	25.16
HOUSTON	16.03	12.21	7.61	-0.07	7.30	19.56	22.16	24.42	25.10
KANSAS	10.84	10.90	10.56	9.71	12.34	11.82	11.12	13.25	11.07
LOS ANGELES	21.85	13.75	-6.03	-3.81	12.43	9.84	11.16	14.64	15.62
MIAMI	8.93	16.49	9.68	14.92	18.06	12.09	10.45	18.25	16.88
MINNEAPOLIS	17.49	16.88	-1.31	-3.57	22.90	22.83	15.55	12.66	9.58
NEW YORK	11.64	8.56	3.71	3.69	5.26	4.38	3.20	6.16	10.71
OKLAHOMA	8.35	8.54	-5.63	11.62	6.65	13.79	13.14	14.81	13.90
PHILADELPHIA	6.25	6.30	8.35	6.40	8.85	11.84	13.40	17.69	8.27
PHOENIX	15.45	15.45	15.45	15.45	15.45	15.45	15.45	15.45	15.45
PORTLAND	1.17	-3.83	3.53	9.07	-3.60	7.28	8.31	11.76	9.93
SAN DIEGO	10.56	12.07	11.91	4.16	19.29	13.08	13.42	16.31	14.82
SAN FRANCISCO	20.73	20.17	-1.26	7.19	1.71	-3.37	7.44	21.67	9.05
WASHINGTON	14.97	14.58	9.67	7.39	13.99	9.26	10.56	12.84	16.49

These results clearly suggest that the normal vacancy rate is very sensitive to changes in variables that affect landlord and tenant behavior. Graphs 30, 31 and 32 compare the movements of the normal vacancy rate with the movements of

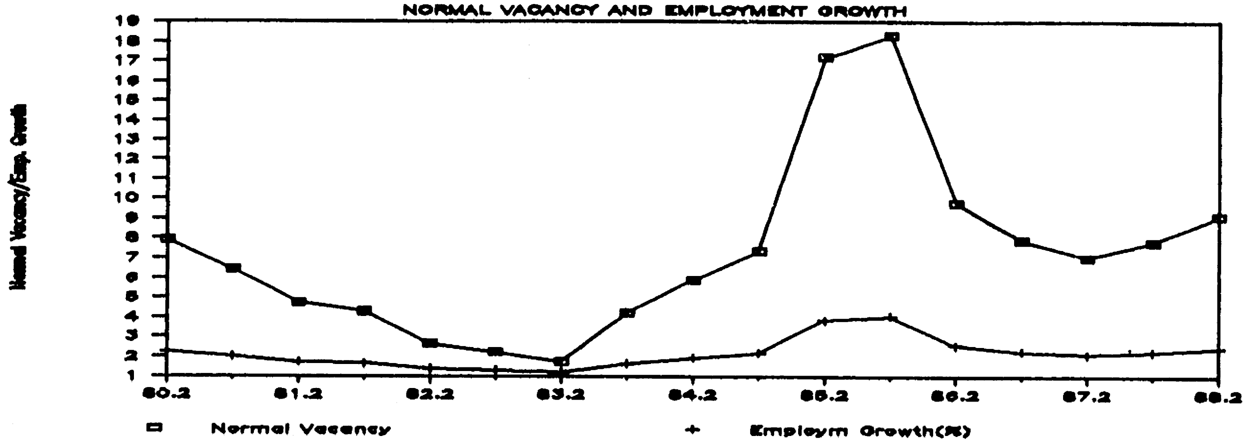
GRAPH 29: ATLANTA

NORMAL VACANCY RATE AND ABSORPTION



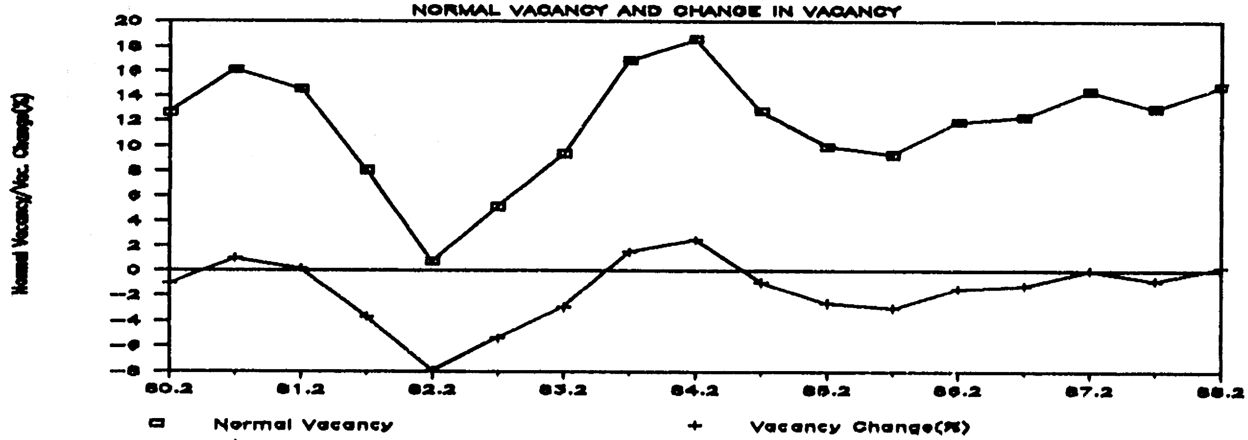
GRAPH 30: BOSTON

NORMAL VACANCY AND EMPLOYMENT GROWTH



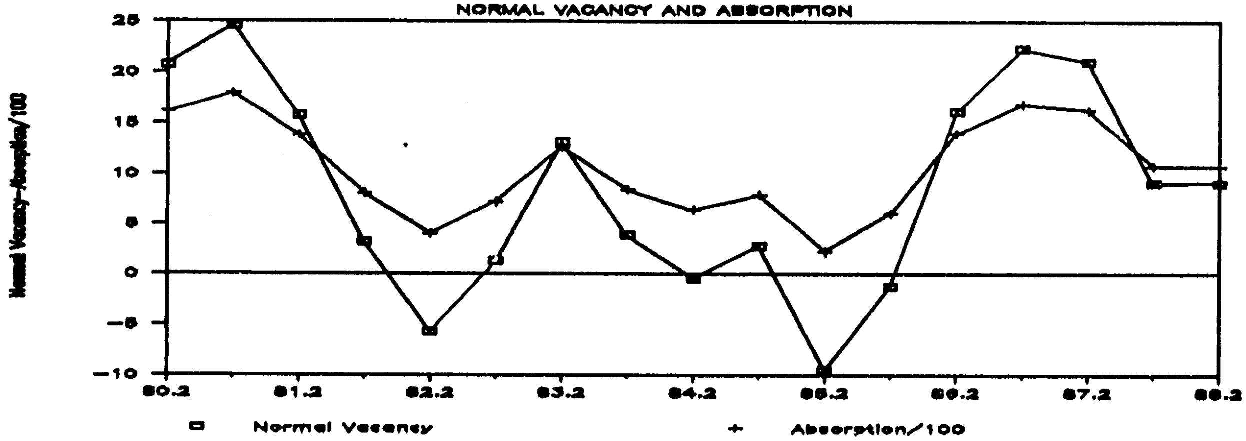
GRAPH 31: DALLAS

NORMAL VACANCY AND CHANGE IN VACANCY



GRAPH 32: SAN FRANCISCO

NORMAL VACANCY AND ABSORPTION



crucial office space demand or supply variables (absorption or change in vacancy) for Boston, Dallas, and San Francisco, respectively. These graphs indicate that the normal vacancy rate is in fact even more volatile than absorption and changes in vacancy. This is especially obvious in the case of Boston (Graph 30) and San Francisco (Graph 32). This is not an unreasonable finding. As repeatedly argued in the real estate literature, landlords often overreact to changes in market variables. The normal vacancy rate does not fluctuate a lot in four markets: in Phoenix, where no market variable was found to affect the normal vacancy rate and therefore, it is constant thought time; in Kansas, where this fluctuates from 10%-12%; in Cincinnati, where it ranges from 13% to 18%; and in Atlanta, where it fluctuates from 11% to 17%. As Graph 29 indicates, the reason for the relatively small fluctuations of the normal vacancy rate in Atlanta is not the lack of large fluctuations in absorption (the variable that was found to affect the level of the normal vacancy rate in this market), but rather the insensitivity of the normal vacancy rate to such rather large fluctuations.

6. Assessing the Extent of Disequilibrium in Local Office Markets

We can use the estimates of the normal vacancy rate to assess the imbalances between demand and supply in local office markets. Such imbalances are reflected in the deviation of the nominal vacancy rate from the normal vacancy rate ($V^*(t) - V(t)$). The data used to calculate these deviations is the nominal vacancy rate obtained from the quarterly survey carried out by Coldwell Banker and the normal vacancy rate we estimated. These deviations for the period 1980-1988 are presented in Table 19. Positive deviations indicate that the nominal vacancy rate is below its normal level and, therefore, reflect supply shortages. Negative deviations indicate that the nominal vacancy rate is above its normal level and, therefore, reflect supply surpluses.

As Table 19 indicates, almost all markets in our sample were experiencing supply shortages from 1980 to 1981. The only exceptions to this pattern were Philadelphia and Portland which were experiencing slight supply surpluses. By 1983, however, only 3 out of the 19 markets in our sample were experiencing supply shortages, while the remaining markets were experiencing supply surpluses. In most markets these kept increasing until 1986.

After 1986 we can observe some reduction in supply surpluses in most markets. In a number of markets, however, namely, Atlanta, Kansas, Miami, Minneapolis, Oklahoma, Philadelphia, Portland, San Diego and San Francisco supply surpluses increased in 1988.

Although these evolutions clearly reveal some similarities in the timing of the movement of local office space markets from excess demand to excess supply, there are

TABLE 19
ANNUAL NORMAL VACANCY ESTIMATES
AND NOMINAL VACANCIES

		1980	1981	1982	1983	1984	1985	1986	1987	1988
ATLANTA	(1)	11.9	12.1	11.5	13.8	12.8	14.4	13.8	17.7	14.4
	(2)	12.0	11.0	14.1	14.0	11.9	15.4	18.8	18.0	17.5
	(3)	-0.1	.1	-2.6	-0.2	0.9	-1.0	-5.0	-0.3	-3.1
BOSTON	(1)	7.9	5.6	3.5	2.0	5.1	12.3	14.1	7.5	8.5
	(2)	3.1	2.6	5.2	6.9	7.4	13.9	14.5	13.3	13.7
	(3)	4.8	3.0	-1.7	-4.9	-2.3	-1.6	-0.4	-5.8	-5.2
CHICAGO	(1)	18.0	15.7	11.4	6.6	12.3	10.7	8.4	13.8	16.2
	(2)	4.7	5.3	7.0	11.0	13.2	13.4	14.9	15.6	15.0
	(3)	13.3	10.4	4.4	-4.4	-0.9	-2.7	-6.5	-1.8	1.2
CINCIN	(1)	13.9	13.5	11.8	11.1	12.2	16.5	18.0	16.3	16.3
	(2)	6.9	9.6	11.4	12.4	13.0	19.8	19.8	14.8	14.0
	(3)	7.1	3.9	0.4	-1.3	-0.8	-3.3	-1.8	1.5	2.3
DALLAS	(1)	12.7	15.3	4.4	7.3	17.8	11.4	10.6	13.4	13.9
	(2)	5.4	8.3	14.1	20.8	21.4	21.7	25.4	27.9	28.2
	(3)	7.3	7.0	-9.7	-13.5	-3.6	-10.3	-14.8	-14.5	-14.3
DENVER	(1)	6.7	7.0	-2.3	-2.0	11.0	5.5	19.1	23.2	25.2
	(2)	3.0	2.7	6.8	21.4	27.5	24.2	26.0	26.9	26.8
	(3)	3.7	4.3	-9.1	-23.4	-16.5	-18.7	-6.9	-3.7	-1.6
HOUSTON	(1)	16.0	12.2	7.6	-0.1	7.3	19.6	22.2	24.4	25.1
	(2)	7.0	6.3	8.9	17.9	28.1	27.0	28.8	30.8	30.6
	(3)	9.0	5.9	-1.3	-18.0	-20.8	-7.4	-6.6	-6.4	-5.5
KANSAS	(1)	10.8	10.9	10.6	9.7	12.3	11.8	11.1	13.2	11.1
	(2)	8.8	8.7	7.5	10.2	12.5	13.7	18.3	21.0	20.5
	(3)	2.0	2.2	3.1	-0.5	-0.2	-1.9	-7.2	-7.8	-9.4
LOS ANGELES	(1)	21.9	13.7	-6.0	-3.8	12.4	9.8	11.2	14.6	15.6
	(2)	2.7	2.3	6.9	16.3	16.5	16.9	16.6	16.9	15.5
	(3)	19.2	11.4	-12.9	-20.1	-4.1	-7.1	-5.4	-2.3	0.1
MIAMI	(1)	8.9	16.5	9.7	14.9	18.1	12.1	10.4	18.2	16.9
	(2)	1.5	2.1	5.3	10.0	13.6	18.1	22.0	23.4	24.5
	(3)	7.4	14.4	4.4	4.9	4.5	-6.0	-11.6	-5.2	-7.6
MINNEAPOLIS	(1)	17.5	16.9	-1.3	-3.6	22.9	22.8	15.5	12.7	9.6
	(2)	1.4	2.8	8.3	11.5	12.1	14.1	17.6	16.7	18.9
	(3)	16.1	14.1	-9.6	-15.1	10.8	8.7	-2.1	-4.0	-9.3

Table 19 Continued

		1980	1981	1982	1983	1984	1985	1986	1987	1988
NEW YORK	(1)	11.6	8.6	3.7	3.7	5.3	4.4	3.2	6.2	10.7
	(2)	1.6	1.8	3.2	5.5	6.2	8.4	9.2	8.7	10.9
	(3)	10.0	6.8	0.5	-1.8	-0.9	-4.0	-6.0	-2.5	-0.2
OKLAHOMA	(1)	8.3	8.5	-5.6	11.6	6.6	13.8	13.1	14.8	13.9
	(2)	2.3	1.5	7.2	10.8	21.0	22.4	24.3	24.7	27.7
	(3)	6.1	7.0	-12.8	0.8	-14.4	-8.6	-11.2	-9.9	-13.8
PHILADELPHIA	(1)	6.2	6.3	8.3	6.4	8.9	11.8	13.4	17.7	8.3
	(2)	3.3	7.6	8.4	9.8	10.3	11.2	14.6	12.8	14.8
	(3)	2.9	-1.3	-0.1	-3.4	-1.4	0.6	-1.2	4.9	-6.5
PHOENIX	(1)	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
	(2)	6.0	7.9	8.4	14.1	19.5	23.5	28.1	24.7	23.1
	(3)	9.5	7.5	7.0	1.3	-4.1	-8.1	-12.7	-9.3	-7.7
PORTLAND	(1)	1.2	-3.8	3.5	9.1	-3.6	7.3	8.3	11.8	9.9
	(2)	2.6	6.3	9.0	14.2	17.9	19.0	20.5	18.7	19.1
	(3)	-1.4	-10.1	-5.5	-5.1	-21.5	-11.7	-12.2	-6.9	-9.2
SAN DIEGO	(1)	10.6	12.1	11.9	4.2	19.3	13.1	13.4	16.3	14.8
	(2)	4.5	3.0	11.5	23.2	18.7	18.9	23.1	22.4	22.1
	(3)	6.1	9.1	0.4	-19.0	0.6	-5.8	-9.7	-6.1	-7.3
SAN FRANCISCO	(1)	20.7	20.2	-1.3	7.2	1.7	-3.4	7.4	21.7	9.1
	(2)	2.5	1.1	3.7	9.4	13.3	14.2	18.5	17.7	16.4
	(3)	18.2	19.1	-5.0	-2.2	-11.6	-17.6	-11.1	4.0	-7.3
WASHINGTON	(1)	15.0	14.6	9.7	7.4	14.0	9.3	10.6	12.8	16.5
	(2)	2.5	2.2	3.5	12.2	10.3	12.3	14.4	16.2	13.5
	(3)	12.5	12.4	6.2	-4.8	3.7	-3.0	-3.8	-3.4	3.0

Notes: (1) Normal Vacancy Rate
(2) Nominal Vacancy Rate
(3) Disequilibrium Deviation

significant cross-sectional differences in terms of the magnitude of these imbalances. In 1980, for example, the nominal vacancy rate in Kansas was 2.63 percentage points lower than the normal vacancy rate, while in Minneapolis this was 16 percentage points below its normal level. In 1988 the discrepancy between the nominal and the normal vacancy rates was ranging from 3 percentage points in Washington DC to -14.3 percentage points in Oklahoma (Table 17).

7. Market Disequilibrium and Real Rent Change

One of the most important findings of this chapter is that the concept of an intertemporally variable normal vacancy rate is a powerful tool in understanding intertemporal changes in office space rents across markets. In order to gain a better understanding of how the concept of an intertemporally variable normal vacancy rate can help explain different trends in office rents in the various markets, we review the normal vacancy, nominal vacancy and real rent evolutions in Atlanta, Boston, Dallas and San Francisco.

In Atlanta (Graph 33), we see that real rents were slightly increasing during 1984, 1985 and 1986 in response to increases in the nominal vacancy rate and simultaneous decreases in the normal vacancy rate during 1983, 1984 and 1985. Likewise in 1986 and 1987 in Boston, real rents were increasing (despite historically high nominal vacancy rates), as the normal vacancy rate during 1985 and 1986 shot up to levels equal to the prevailing nominal vacancy rate (Graph 34). In Dallas, real rents were falling faster than previous years during 1986 and 1987, as the gap between the nominal vacancy and the normal vacancy rate was increasing in 1985 and 1986 (Graph 35). Finally, in San Francisco in 1985 and 1986 real office rents were falling sharply, as the discrepancy between the nominal vacancy and the normal vacancy increased sharply in 1984 and 1985 (Graph 36). In 1988, real office space rents in San Francisco were increasing (despite historically high nominal vacancies), as the normal vacancy rate during the previous year shot above 20%.

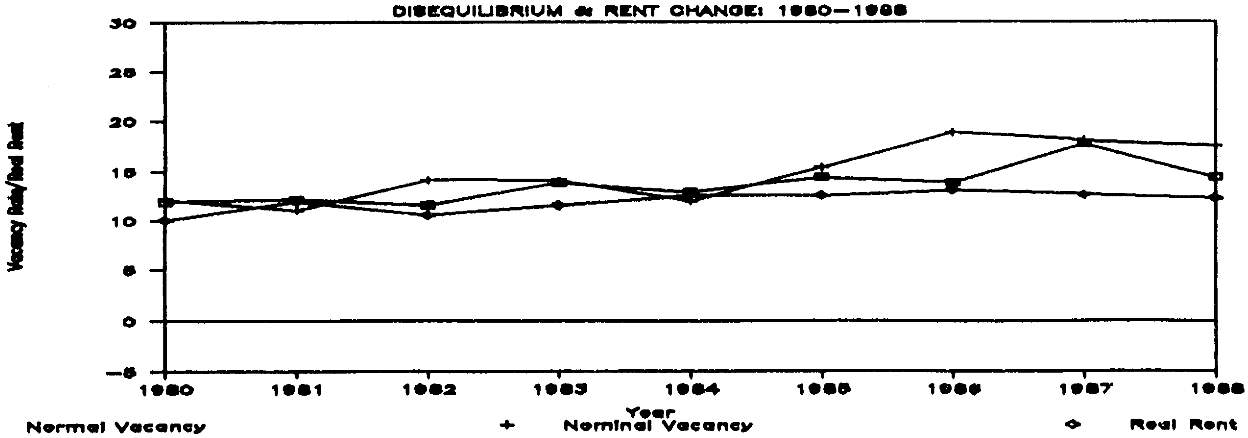
8. Biases in the Estimates of the Rent Adjustment Equation and the Normal Vacancy Rate

Our estimates of the normal vacancy rate must be upwardly biased, because contract rents instead of effective rents have been used. As explained earlier, contract rents overstate effective rents, especially during periods of oversupply. In 1988, the discrepancy in some markets between contract rent and effective rent was as high as 20%. Similarly, changes in contract rents, especially after 1984, when most major office markets entered into serious disequilibrium, understate intertemporal changes in effective rents. The use of effective rents instead of contract rents might have resulted in lower estimates of the normal vacancy rate.

To understand this argument consider the simple rent adjustment equation where the rent change equals the product of

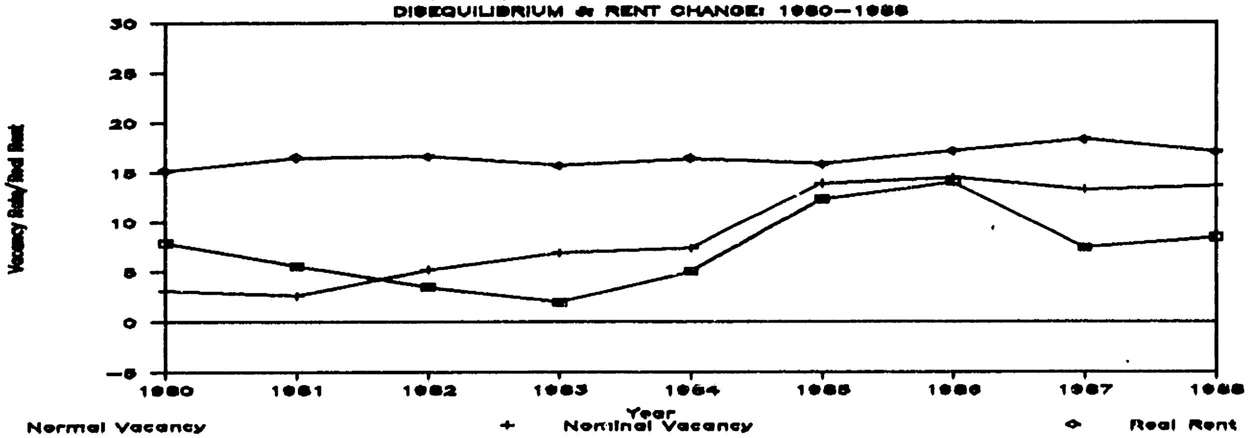
GRAPH 33: ATLANTA

DISEQUILIBRIUM & RENT CHANGE: 1980–1988



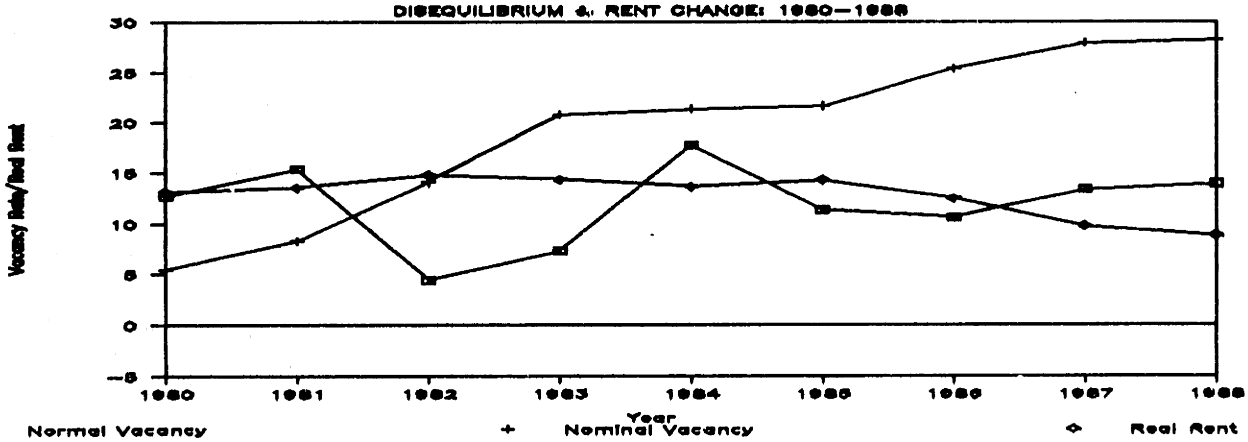
GRAPH 34: BOSTON

DISEQUILIBRIUM & RENT CHANGE: 1980–1988



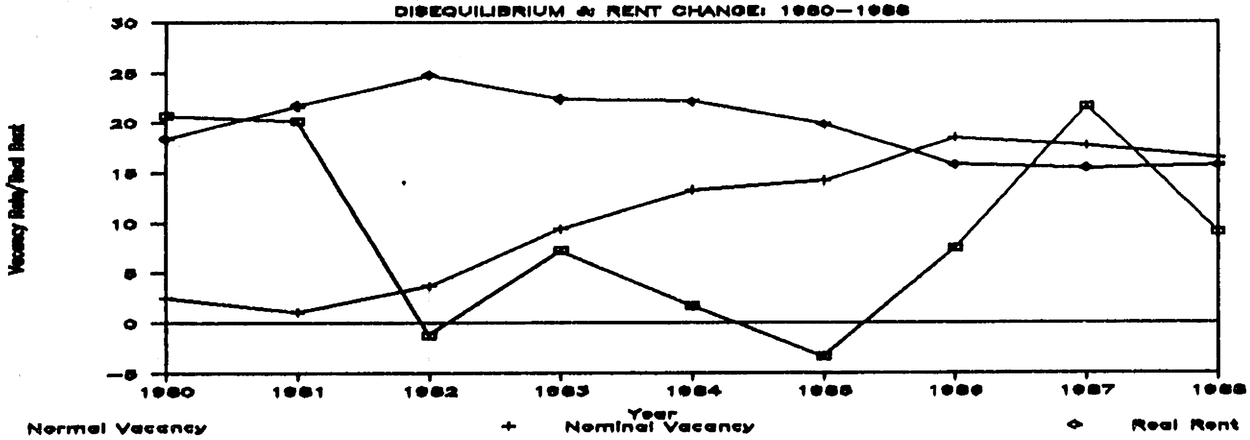
GRAPH 35: DALLAS

DISEQUILIBRIUM & RENT CHANGE: 1980–1988



GRAPH 36: SAN FRANCISCO

DISEQUILIBRIUM & RENT CHANGE: 1980–1988



the rate of rental adjustment and the difference of the nominal vacancy rate from the normal vacancy rate. Now assume that the right hand side of this equation, that is, the rent change increases (in absolute terms), while the nominal vacancy rate remains constant. Under these assumptions the equality will hold only if any of the following three conditions hold: (1) the rate of rental adjustment increases (in absolute terms), (2) the normal vacancy rate decreases, or (3) both (1) and (2) simultaneously hold. This suggests that estimates of the rate of rental adjustment may be biased downwards (in absolute terms) while estimates of the normal vacancy rate may be biased upwards. Based on the data presented by the Society of Office and Industrial Realtors, it can be inferred that the magnitude of these biases in some markets, such as Boston, Denver, Minneapolis, Philadelphia and Seattle may be as high as 15%-20%. In the case of Dallas this bias maybe as high as 25%.

7. Conclusion

This chapter has presented empirical evidence supporting the argument that the concept of an intertemporally variable normal vacancy rate is more powerful in explaining real office rent changes through time than the concept of an intertemporally constant rate. The estimated normal vacancy rate has proven to be very sensitive to changes in variables that affect landlord and tenant behavior, such as office space absorption, office space completions, office employment growth rate and changes in the nominal vacancy rate.

These findings put the whole theory of the structural vacancy rate, originally perceived as an intertemporally constant benchmark rate, in a new perspective. This assumption is very convenient, because it theoretically justifies a simple rent adjustment model that includes only the nominal vacancy rate, and allows the actual estimation of this structural vacancy rate. Our findings, however, give empirical support to the argument that this benchmark rate is extremely volatile, jumping up and down many percentage points every year. Given, then, this extreme volatility of the normal vacancy rate and the number of diverse factors that cause it, the question is whether it is really useful at all.

The empirical results presented in this chapter also indicate that there are significant differences across office space markets in terms of the rent adjustment process. Landlord and tenant behavior, that shape the normal vacancy rate, have been found to be affected by different variables in the different markets. Also the rate of the rental adjustment appears to vary considerably across markets. This rate seems to be the lowest in markets located in the West coast.

CHAPTER VI

EXPLAINING CROSS-SECTION DIFFERENCES IN NORMAL VACANCY RATES

In this chapter we attempt to explain the variations across office markets in the estimated average normal vacancy rate during the period 1980-1988. In particular, we attempt to test the hypothesis that cross-section variations in the normal vacancy rate are attributable to structural differences in terms of factors that relate to tenant and search processes.

The theoretical investigation of such processes in the first part of this dissertation, has led to the conclusion that differences across markets in the normal vacancy rate should be explained by differences in a number of factors: 1) employment growth (EG), 2) tenant turnover (T), 3) prevailing rents (R), 4) length of tenant search effort (SE), 5) mismatching rate (MR), and 6) landlord expectations with respect to the strength of the market (LE). We can therefore write a reduced-form equation which describes this relationship:

$$V^* = F[\ EG,\ T,\ R,\ SE,\ MR,\ LE\ ] \qquad (55)$$

1. The Empirical Model

In order to test the hypothesis presented above we have to operationalize the variables included in (55). We use as dependent variable the estimates of the average normal vacancy rate during the period 1980-1988, presented in the previous chapter. We operationalize the six independent variables included in equation (55) as follows:

Office Employment Growth: In order to capture cross-sectional differences in office employment growth we use the average annual office employment growth rate in each market, during the period 1980-1988, based on employment data provided by the U.S. Department of Commerce (202 Employment Survey). Rosen and Smith (1983) have argued that markets with faster growth have higher tenant turnover. Likewise, we expect that in rapidly growing markets a larger proportion of office tenants will consider moving to new space than in slow growth markets. The BOMA office tenant survey found that 68% of changes in office space needs are attributable to expansion due to internal growth. Thus, for the same effective vacancy and higher employment growth, the difference between effective supply and effective demand will be smaller (in absolute terms), thereby implying a higher effective normal vacancy rate. We expect, therefore, to obtain a positive coefficient for this variable.

Tenant Turnover: In order to capture differences across markets in terms of tenant turnover (T) we use two variables: 1) average tenant size (TS) and 2) the length of the lease (L). The impact of tenant size on turnover should be negative, given that smaller tenants have higher mobility rates. A recent survey of office tenant moves contacted by BOMA International (1988) found that 62% of the firms, that decide to move at any particular year are small firms occupying less than 10,000 square feet of office space. Rosen and Smith (1983) have found that rental housing markets with more mobile renters have higher normal vacancy rates. In a similar fashion, we would expect that markets with smaller tenant size will have a higher turnover and thus a higher normal vacancy.

The length of the lease should have significant impact on office tenant turnover. The recent survey conducted by BOMA International (1988) found that 30% of the office tenants considering to move were doing so because their leases were expiring. The effect of the length of the lease on tenant turnover should be negative, since longer lease agreements contribute to smaller turnover at any given time.

<u>Office Space Rents</u>: In order to capture differences across markets in terms of prevailing office space rents we use the average rent during the period 1980-1988 (see Table 20 for description of this variable and sources). As argued in the theoretical part, the office rent is one of the major factors affecting the tenant arrival function and, furthermore, effective office space demand at a given period. For the same effective vacancy and higher rents, effective demand will be smaller and excess supply larger. This, in turn, implies a lower effective normal vacancy rate. A negative coefficient, therefore, is expected for the rent variable.

Length of Tenant Search Effort: In order to capture differences in the length of tenant search effort across markets we used two variables: 1) average length of leases (L) and 2) the size of the stock (S). The lease length should have a positive effect on the length of search effort since it will induce prospective tenants to prolong their search efforts. This will reduce effective tenant demand and exercise a downward pressure on the normal vacancy rate. A negative coefficient, therefore, is expected for this variable.

To capture differences across markets in terms of the size of the stock we use the average office space stock during the period 1980-1988, based on data provided by Coldwell Banker. The impact of the size of the stock on the length of the tenant search effort should be positive, since tenants in larger markets are likely to prolong their search effort in order to inspect more buildings and more locations. The ultimate impact of the size of the stock on the normal vacancy rate, however, is not clear because it also affects positively the normal vacancy rate through the mismatching rate.

Mismatching Rate: To capture differences across markets in terms of the mismatching rate, we use the average size of the stock and the average stock growth rate during the period 1980-1988. It is expected that, in markets with larger and consequently more heterogeneous stock, the mismatching rate is smaller and, therefore, effective demand for office space larger. This, in turn, will result to a higher normal vacancy rate. The same argument is valid in markets with a higher stock growth rate, where more new space is available each period to prospective tenants. The ultimate impact of these two variables on the normal vacancy rate, however, is not clear because of their positive effect on the length of the search effort. If the impact of the size of the stock on the mismatching rate is larger than its impact on the length of the search effort, we would expect to obtain a positive coefficient for these two variables. Otherwise, we would expect to obtain a negative coefficient.

Landlord Expectations with Respect to Market Strength: In order to capture intermetropolitan differences in terms of landlord expectations (LE), we used the average stock growth rate (SG) during the period 1980-1989 (EG). We argue that the impact of this variable on the expectations of landlords, who have already taken into account the average office employment growth rate should be negative. The reason is that, for the same employment growth rate and higher stock growth rate, landlords will expect smaller demand for their buildings in the near future. This will increase the desired absorption rate in the present and, consequently, the effective vacancy rate. For the same effective demand for office space, this would result to larger amount of excess supply and, therefore, to a lower normal vacancy rate. The ultimate impact of the stock growth rate on the normal vacancy rate, however, is not clear because, as discussed earlier, it also affects the mismatching rate and the length of the search effort.

Based on the above specification of the variables that affect landlord and tenant search processes we estimated the following simple, linear model:

$$V* = bo + b1\ TS + b2\ S + b3\ L + b4\ R + b5\ EG + b6\ SG \quad (56)$$

where
TS = Tenant size
S = Total office space stock
L = Length of the lease
R = Prevailing rent
EG = Employment growth rate
SG = Stock growth rate

2. The Empirical Results

We estimated equation (56) using cross-section data obtained from Coldwell Banker, for the 19 metropolitan areas included in our sample. These data and their sources are described in detail in Table 20. We alteratively used as dependent variables all the different estimates of the structural vacancy rate. The series that produced the best regression is the one that primarily consists of estimates of the rent adjustment equation using observations from 81-89 (Column 6 in Table 13). For two areas for which these estimates were very low (Minneapolis, and Boston) we used the higher estimates of the normal vacancy rate in column (5).

The empirical results of this model presented in Table 21 are very encouraging and consistent with the theory. We

TABLE 20
DATA USED FOR THE ESTIMATION OF
INTERMETROPOLITAN DIFFERENCES IN NORMAL VACANCY RATES

Variable Name & Formula Used to Calculate it	Description of Data Used	Data Source
AVERAGE NORMAL VACANCY RATE (bo/b1)+(b2*X/b1)	The coefficients bo, b1, b2 have been obtained from the estimates of the rent adjustment equation. X represents the average absorption, completions, office employment growth, or change in vacancy during the period 1981-1989 for each market	See Table 12 in which all the sources of the data used for the estimation of the rent adjustment equation are described.
AVERAGE TENANT Size (Tensize)	The average amount of square feet of office space occupied by office tenants in each market in 1989	Coldwell Banker annual tenant survey, 1989.
AVERAGE OFFICE EMPLOYMENT GROWTH Rate (Gro2) E(1989)-E(1981)/ E(1989)*9	Office employment data were used to estimate the average annual growth rate of office employment during the period 1981-1989	U.S. Department of Commerce, 202 Employment Survey
OFFICE SPACE STOCK (St)	The total amount of of officc space in each market in 1989	Quarterly survey of office buildings conducted by Coldwell Banker in the 50 major metropolitan areas in the country recording vacancy rate and year each building was completed
AVERAGE RENT (Rent)	The average of the estimated hedonic rent in each market during the period 1981-1989	See Table 8 which describes the data used for the estimation of these indices and their sources

Table 20 continued

Variable Name & Formula Used to Calculate it	Description of Data Used	Data Source
STOCK GROWTH RATE (Stgr) S(1989)-S(1981)/ S(1989)*9	Office space stock data were used to estimate the average annual growth rate of office space stock during the period 1981-1989	Quarterly survey of office buildings conducted by Coldwell Banker in the 50 major metropolitan areas in the country recording vacancy rate and year each building was completed
AVERAGE LENGTH OF LEASE (Length)	The ratio of the sum of the lease length of all cases available for each market for the period 1981-1989 over the total number of cases	Coldwell Banker lease transaction file. Includes records from 1979 to 1989 for the 50 major metropolitan areas in the country

obtained the expected signs and high t-statistics for most of the variables included in the model, and a high R-squared. In particular, we obtained negative sign for tenant size (TS) and the average rent (NR), and positive sign for office employment growth (EG), stock growth rate (SG), the size of the stock (S) and the length of the lease (L).

The low t-statistics for the lease length and the stock growth variable are probably attributable to multi-collinearity. A correlation matrix indicates that the correlation coefficient between the lease length variable and average rents is 0.77. This may be result of the fact that for longer leases landlords set rents higher in order to

TABLE 21
THE DETERMINANTS OF CROSS-SECTION DIFFERENCES IN NORMAL VACANCY RATES

Dependent Variable: Normal Vacancy

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
one	11.57210	6.24500	1.85302
tensize	-1.00754e-003	3.84592e-004	-2.61976
gro2	1.47796	1.00080	1.47677
st	3.80866e-005	1.44281e-005	2.63975
rent	-0.41216	0.15295	-2.69475
stgr	1.19613e+002	96.15516	1.24396
length	1.38357	1.68432	0.82144

Number of Observations	19
R-squared	0.77068
Corrected R-squared	0.65602
Sum of Squared Residuals	42.05867
Standard Error of the Regression	1.87213
Durbin-Watson Statistic	2.46276
Mean of Dependent Variable	11.00789

Notes: 1) ONE = Constant
2) TENSIZE = Average Tenant Size (in Square Feet)
3) GRO2 = Average Office Employment Growth Rate, 1980-1988
4) ST = Total Office Space Stock in 1988 (in Square Feet)
5) RENT= Average Rent, 1980-1988
6) STGR = Average Stock Growth Rate, 1980-1988
7) LENGTH = Average Lease Length, 1980-1988 (in Years)

minimize losses from future market rent increases. The correlation between stock growth and office employment growth is 0.65. Again, this indicates that in fast growth areas developers accelerate accordingly their production activities. Given the relatively low t-statistic of the lease length variable and the stock growth variable we dropped them from equation (56) and re-estimated the new equation. By dropping these two variables we produced considerably higher t-statistics for all the remaining variables and a slightly higher adjusted R-squared.

The results of this model are presented in Table 22. The negative sign of the tenant size variable validates the assertion that markets with larger proportion of small office tenants have higher turnover than markets with smaller proportion of small office tenants. Thus, markets with smaller average tenant size will tend to have higher normal vacancy rates. The positive sign of the average office employment growth variable verifies that, indeed fast growth markets have also higher turnover than slow growth markets and, therefore, higher normal vacancy rates. The positive sign of the stock variable suggests that the negative impact of this variable on the mismatching rate is greater than its positive impact on the length of tenant search efforts. Thus, markets with a larger stock of office space tend to have a higher normal vacancy rate. Finally, the negative sign of the average rent indicates that markets with higher rents have lower normal vacancy rate.

TABLE 22
THE DETERMINANTS OF CROSS-SECTION DIFFERENCES IN NORMAL VACANCY RATES

Dependent Variable: Normal Vacancy

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
one	18.59392	2.93405	6.33729
tensize	-1.03696e-003	3.51944e-004	-2.94637
gro2	2.34770	0.70457	3.33208
st	4.09735e-005	1.41058e-005	2.90472
rent	-0.38897	0.11451	-3.39686
Number of Observations		19	
R-squared		0.73580	
Corrected R-squared		0.66032	

Notes: 1) ONE = Constant
2) TENSIZE = Average Tenant Size (in Square Feet)
3) GRO2 = Average Office Employment Growth Rate, 1980-1988
4) ST = Total Office Space Stock in 1988 (in Square Feet)
5) RENT= Average Rent, 1980-1988

A shortcoming of the presented estimates is the relatively small number of degrees of freedom, which is due primarily to the small number of available observations.

3. Statistical Biases

The estimates of the normal vacancy equation maybe biased in a number of different ways. A first source of bias is the dependent variable, that is, the average normal vacancy rate, because it has been estimated on the basis of changes in contract rather than effective rents. As explained earlier, cross-sectional variations in contract rents may understate cross-sectional variations in effective rents. By the same rationale, variations in contract rent changes and the estimated normal vacancy rates may understate variations in effective rent changes and actual normal vacancy rates. If variations in the dependent variable are biased downwards, then the estimated coefficients and the constant of the equation may be biased downwards as well. This suggests that the impact of tenant size, employment growth, level of stock and rents on the actual normal vacancy rate may be, in absolute terms, greater than what suggested by the estimated coefficients.

Statistical biases may also be potentially present because of the omission of important variables. An important variable missing from the normal vacancy equation is the dispersion in rents, which may affect the length of tenant search effort and, furthermore, the effective tenant demand at a given period. Yet the estimated statistical model includes the size of office stock which may reflect with reasonable accuracy inter-metropolitan variations in rent dispersion. Thus, we don't expect that the estimates of the normal vacancy rate present any serious biases because of omitting important independent variables.

A third source of statistical biases is multi-collinearity. It is possible that such biases are present in our estimates because of collinearity between rent levels and stock. Despite the fact that there are some differences across markets in terms of the magnitude of excess supply, total stock variations should reasonably reflect variations in office employment levels, which, in turn, are strongly associated with cross-section variations in office rent levels.

Finally, the tenant size variable is another source of potential bias. Due to data constraints, we have used 1988 data for the tenant size variable, while the dependent variable and the other independent variables represent averages for the period 1980-1988. The direction of the bias introduced in the data because of this inconsistency depends on whether the average size of office tenants has been increasing or decreasing during this period. If it has been decreasing the 1988 tenant size is biased downwards. If, however, it has been increasing, the 1988 tenant size variable is biased upwards. Whatever, however, the direction of the bias introduced regarding the magnitude of this independent variable, it is difficult to make any statements regarding its impact on the coefficients of all independent variables included in the model.

CHAPTER VII

EXPLAINING CROSS-SECTION DIFFERENCES IN OFFICE SPACE RENTS

This chapter deals with the empirical testing of two main hypotheses regarding intermetropolitan differences in office space rents. The first hypothesis postulates that differences across markets in the normal rent are explained by differences in office employment, construction costs and the normal vacancy rate. The second hypothesis postulates that cross-section differences in office space rent levels are explained by cross section differences in the most recently reached normal rent and the cumulative deviation of the vacancy rate from its normal level since the market entered into disequilibrium. Below, we first review the empirical models used to test these hypotheses and then we present and discuss the estimation results.

1. The Empirical Models

Explaining Differences in Normal Rents

In formulating an empirical model the functional form must be specified and the independent variables to be included in the model must be selected. Given that the functional form of the normal rent equation is not a priori known we estimate two alternative model specifications one log-log and one linear.

The mathematical formulation of the rent determination equation suggests that a log-log model may be more representative of the relationship between the normal rent and its determinants. In order to derive this model we write the equilibrium equation in a multiplicative form and then take logs on both sides:

$$D(OE, R) = S(CC, R)\ NO^* \qquad (60)$$

$$OE^a\ R^b = k\ CC^c\ R^d NO^* \qquad (61)$$

$$\Longrightarrow \quad R^{b-d} = k\ CC^c R^d\ OE^{-a}\ NO^* \qquad (62)$$

$$(b-d) \log R = \log k + c \log CC - a \log OE + \log NO^* \qquad (63)$$

$$\Longrightarrow \log R = b_0 + b_1 \log CC + b_2 \log OE + b_3 \log NO^* \qquad (64)$$

where NO^* = Normal Occupancy Rate $(1-V^*)$
b_0 = $\log k / b-d$
b_1 = $c / b-d$
b_2 = $-a / b-d$
b_3 = $1 / b-d$

The simple multiplicative form in the office space demand and supply functions described in (61) is to an extent arbitrary. For this reason, we also estimate a simple reduced form linear model. The estimated statistical equation is:

$$R^* = b_0 + b_1\ CC + b_2\ OE + b_3\ NO^* \qquad (65)$$

The second issue in the specification of the empirical model explaining variations in the normal rent across markets is the selection of independent variables that best represent the theoretical arguments. The empirical determination of the dependent variable, that is, the normal rent, is not straight forward. Theoretically we defined the normal rent as the observed rent during the period that the nominal vacancy rate was at its last peak or trough. Inspection of the vacancy rate data for the period 1980-1988 suggests, however, that the most recent peak is not clearly identifiable. The reason is that in most markets the vacancy rate rose sharply in 1986 or 1987 and then was fluctuating slightly. Given such a pattern, we defined as vacancy peak the 15% of the most recent maximum vacancy value. Then we identified as normal rent the rent during the period that the nominal vacancy rate first exceeded this value.

As far as the empirical specification of the independent variables is concerned, there are no questions as to which variables should be included for construction costs and the normal occupancy rate. The former is available, and the latter has been calculated from the estimates of the rent adjustment equation. There are some questions, however, as to whether differences in office employment best reflect the variations in office space demand across markets. It is very likely that differences in total employment reflect better such variations. It is also very likely that structural differences among local economies, captured by variations of the share of office space using sectors in total employment, are also related to cross-section variations in office space demand. It is likely, for example, that in markets where the service sector is larger relative to the overall economy, the office firms are on average more profitable, and thus willing to pay higher rents; or they may demand more space per employee for the same reason.

For these reasons we experiment with a number of different proxies: office employment as defined earlier, total metropolitan employment, and the ratio of total employment over office employment. For each market, these variables refer to a period t-n during which the nominal vacancy rate was at its most recent peak.

The results show that cross-section variations in the demand for office space are best captured by the combination of office employment (OE) and the ratio of the total employment over the office employment (TO). We, therefore, present the results of the estimates of the following statistical equations:

$$\log R = b_0 + b_1 \log OE + b_2 \log TO + b_3 \log CC + b_4 NO^* \quad (67)$$

$$R = b_0 + b_1 OE + b_2 TO + b_3 CC + b_4 NO^* \quad (68)$$

We expect to obtain a positive sign for the coefficient of the construction cost and the office employment variable. We expect a negative sign for the ratio of total employment over the office employment, since a greater ratio will reflect smaller office employment share in the economy and therefore smaller profitability and/or smaller square feet per employee ratio.

Explaining Cross-Section Variations in Prevailing Office Rents

The specification of the empirical model for the testing of the second hypothesis is simpler, and there are no questions as to the appropriate functional form or the variables to be included. The mathematical rent equation can directly be translated into the linear statistical equation below:

$$R(t) = b_0 + b_1 R^* + b_2 D(t) \tag{69}$$

where

R^* = The Most Recently Reached Normal Rent

$$D(t) = \int_{t-n}^{t} (V(t) - V^*) \, dt \tag{70}$$

The dependent variable (R(t)) is the observed rent at any period after the market has reached its most recent minimum or maximum nominal vacancy rate. The normal rent variable (R^*) is the most recently reached normal rent which has already been empirically specified. Finally, the disequilibrium component (D(t)) it is the sum of the deviations of the nominal vacancy rate from the normal vacancy rate (which has been estimated from the rent adjustment equation), from the period the nominal vacancy rate was at its most recent minimum or maximum until the period under consideration.

Given that this equation is estimated for a period during which all markets have supply surpluses, we expect to obtain a positive sign for the normal rent component (R^*) and a negative sign for the disequilibrium rent component ($D(t)$).

2. The Empirical Results

The Determinants of the Normal Rent:

We estimated the simple linear and the log-log models, using data on office employment and its share in total employment provided by the U.S. Department of Commerce. For the construction cost variable we used the construction cost/square foot for an average quality, 15-story office building. We obtained this information from Means Square Foot Estimates. We calculated the normal occupancy rate by subtracting the estimated normal vacancy rate of each market from one. These data and their sources are presented in Table 23.

The empirical results are consistent with the theory and support the hypothesis that cross-section variations in office space normal rents are explained by differences in demand and supply factors, such as, office employment, the ratio of total employment over office employment, construction costs and the normal vacancy rate.

TABLE 23
DATA USED FOR THE ESTIMATION OF
INTERMETROPOLITAN DIFFERENCES IN NORMAL OFFICE SPACE RENTS

Variable Name & Formula Used to Calculate it	Description of Data Used	Data Source
NORMAL RENT	The estimated hedonic rent during the period in which the nominal vacancy was at its most recent maximum	See Table 8 in which all the sources of the data used for the estimation of the rent adjustment equation are described.
OFFICE EMPLOYMENT (OE)	Employment in Finance, Insurance and Real Estate and Services (E)	U.S. Department of Commerce, 202 Employment Survey
RATIO OF TOTAL EMPLOYMENT OVER OFFICE EMPLOYMENT (TO)	Total employment and office employment	U.S. Department of Commerce, 202 Employment Survey
OFFICE SPACE CONSTRUCTION COSTS (CC)	Construction costs per square feet for a 15-story office building.	Means Square Foot Costs. 1988. R.S. Kingston, MA: R.S. Means Company, Inc.
AVERAGE NORMAL VACANCY RATE (SV) (bo/b1)+(b2*X/b1)	The coefficients bo, b1, b2 have been obtained from the estimates of the rent adjustment equation. X represents the average absorption, completions, office employment growth, or change in vacancy during the period 1981-1989 for each market	See Table 12 in which all the sources of the data used for the estimation of the rent adjustment equation are described.

As indicated in Table 24, we obtained satisfactorily high t-statistics and the correct signs for all the variables in both the linear and the log-log model. In particular, we obtained positive signs for office employment, construction costs and the normal vacancy rate and a negative sign for the ratio of total over office employment.

The positive sign of office employment suggests that larger markets have higher rents. This verifies the hypothesis of a rising supply schedule. The economic theory postulates that a rising supply curve is usually the result of scarcities of factors of production. In the case of the production of office space the scarce input primarily responsible for a rising supply schedule is most likely land.

It is interesting to note that accounting for variations in the share of the office using sectors in the economy proved to be one of the most important variables in explaining inter-metropolitan differences in normal rents. The negative sign of this variable shows that normal rents are higher in markets in which the office using sectors constitute a larger share of the economy (and the ratio of total employment to office employment is smaller). This finding verifies indirectly our hypothesis that the willingness to pay for office space, in such markets, is on average higher, because of higher profitability.

The positive sign of the construction cost variable indicates that markets with higher construction costs have higher normal rents, as their supply schedule shifts upwards.

TABLE 24
ORDINARY LEAST SQUARES ESTIMATION OF THE NORMAL RENT EQUATION

Dependent Variable: Normal Rent

THE LINEAR MODEL

Independent Variable	Estimated Coefficient	t-Statistic
ONE	13.04859	1.06637
OE	7.91995e-003	2.58361
TO	-5.24480	-4.03624
CC	0.27663	2.49247
SV	1.00797	3.45860
Number of Observations	19	
R-squared	0.81	

THE LOG-LOG MODEL

Independent Variable	Estimated Coefficient	t-Statistic
ONE	-0.74637	-0.28147
LOG OE	0.16638	2.66309
LOG TO	-1.08327	-2.63120
LOG CC	0.95053	1.76676
LOG NOR	-4.19354	-2.48662
Number of Observations	19	
R-squared	0.72	

Notes: 1) ONE = Constant
2) OE = Office Employment (FIRE + 0.36* SERV)
3) TO = Total Employment / Office Employment
4) CC = Construction Costs / Square Foot
5) NOR = Normal Occupancy Rate (1 - V*)
6) SV = Normal Vacancy Rate (V*)

Finally, the positive sign of the normal vacancy rate indicates that markets with higher normal vacancy rates have also higher normal rents. This finding verifies our hypothesis that higher normal vacant stock requirements shift the supply curve upwards. Given that the supply schedule is somewhat inelastic, such a shift is associated with higher steady state rents.

The linear model explained 81% of the variation in normal rents across markets. The log-log model explained 72% of the variation in the logarithm of office space rent. The unexplained variation may be due to inaccuracies of our normal rent index, unaccounted variations in the demand for and the supply of office space and inaccuracies of the normal occupancy rate.

A shortcoming of the presented empirical testing of the determinants of intermetropolitan differences in office space rents is again the relatively small number of degrees of freedom.

The Disequilibrium Model of Office Space Rents:

The disequilibrium model of office space rents decomposes current rents into two components: 1) the normal rent, and 2) a disequilibrium deviation, that is, the difference between current rents and the normal rent. In Table 25 we present such a decomposition for the 1988 rents.

TABLE 25
REAL NORMAL RENTS (1980 BASIS)
AND DISEQUILIBRIUM DEVIATION

Metropolitan Area	Real Normal Rent	Absolute Disequilibrium Deviation	Percentage Disequilibrium Deviation (%)	Real Rent 1988
ATLANTA	$13.06	($0.82)	-6.28	$12.24
BOSTON	15.88	1.23	7.75	17.11
CHICAGO	15.81	-0.28	-1.77	15.53
CINCINNATI	10.39	-0.65	-6.26	9.74
DALLAS	12.50	-3.68	-29.44	8.82
DENVER	14.73	-5.98	-40.60	8.75
HOUSTON	14.10	-6.93	-49.15	7.17
KANSAS	11.58	-2.17	-18.74	9.41
LOS ANGELES	17.68	0.42	2.38	18.10
MIAMI	16.29	-2.86	-17.56	13.43
MINNEAPOLIS	11.69	-1.29	-11.04	10.40
NEW YORK	21.66	0.00	0.00	21.66
OKLAHOMA	5.81	0.25	4.30	6.06
PHILADELPHIA	14.22	0.00	0.00	14.22
PHOENIX	15.88	-3.90	-24.56	11.98
PORTLAND	13.29	-2.82	-21.22	10.47
SAN DIEGO	17.30	-0.71	-4.10	16.59
SAN FRANCISCO	15.80	-0.07	-0.44	15.73
WASHINGTON	18.48	0.02	0.11	18.50

Sources: Estimated hedonic rent indices
U.S. Department of Commerce. 1989. Statistical Abstract

As shown in this table the real normal rent in our sample varies from $5.81 in Oklahoma City to $21.66 in New York. The absolute disequilibrium deviation (1988 real rents minus normal rents) varies from -$6.93 in Denver to $1.23 in Boston. The percentage disequilibrium deviation also varies considerably across markets. In particular, it ranges from -49.15% in Houston to 7.75% in Boston. These data verify one of the major arguments of this study: that a cross-section comparison of current office space rents will not provide an accurate picture of cross-section differences in implicit equilibrium rents.

TABLE 26
DATA USED FOR THE ESTIMATION OF INTERMETROPOLITAN DIFFERENCES IN OFFICE SPACE RENTS

Variable Name & Formula Used to Calculate it	Description of Data Used	Data Source
OFFICE SPACE RENT	The estimated hedonic rent in each market during	See Table 8 which describes the data used for the estimation of these indices and their sources
NORMAL RENT (Normal)	The estimated hedonic rent during the period in which the nominal vacancy was at its most recent maximum	See Table 8 which describes the data used for the estimation of these hedonic rent indices and their sources.
CUMULATIVE DEVIATION of the nominal vacancy from the average normal vacancy rate since the period it was at its most recent maximum until the period under consideration (Dev)	Nominal vacancy rate and average normal vacancy rate	Quarterly survey of office buildings conducted by Coldwell Banker in the 50 major metropolitan areas in the country For the average normal vacancy rate see Table 14 in which all the sources of the data used for the estimation of the rent adjustment equation are described.

We estimated the disequilibrium model of office space rents for 1988 and 1987. Table 26 describes the data used and their sources. The estimation results for both years are presented in Table 27. These are consistent with the theory. We obtained considerably high t-statistics and the right sign for both independent variables. In particular, we obtained a positive sign for the normal rent component and a negative sign for the disequilibrium rent component.

TABLE 27
ESTIMATES OF THE DISEQUILIBRIUM RENT EQUATION

Dependent Variable: Office Space Rent		
1 9 8 8		
Independent Variable	Estimated Coefficient	t-Statistic
ONE	0.77191	0.30412
NORMAL	1.05194	9.43637
DEV	-5.23360e-002	-3.77401
Number of Observations	19	
R-squared	0.88	
1 9 8 7		
ONE	-0.40547	-0.16596
NORMAL	1.06072	9.49808
DEV	-4.98043e-002	-2.99891
Number of Observations	19	
R-squared	0.86	

Notes: 1) NORMAL = Most Recently Reached Normal Rent
2) DEV = Cumulative Deviation of the Vacancy Rate from its Normal Level

3. Statistical Biases

It is possible that the estimates of the normal office rent equation present some biases. First of all, the estimated coefficients of this equation may be downwardly biased because the dependent variable reflects variations in contract and not effective rents. As previously argued, cross-sectional variations in contract rents may understate cross-sectional variations in effective rents.

A second caveat associated with the reliability of the normal rent estimates is the great number of independent variables relative to the size of the sample.

The estimates of the prevailing rent equation may also be biased because, again, of the use of contract rents both for the dependent variable, as well as, the normal rent in the left hand side of the equation. Both variables should, therefore, be upwardly biased. It is very likely, however, that the normal rent (which has been identified as the prevailing contract rent when the nominal vacancy was at its more recent maximum) is biased to a greater extent than the prevailing rent variable in the left hand side of the equation. If this upward bias is reflected only on the estimated coefficient of the normal rent variable, it is very likely that the actual impact of this variable is greater than what our estimates suggest. If the upward bias in the normal rent variable has affected the coefficient of both independent variables included in the estimated equation, then it is difficult to say in which direction each coefficient maybe biased.

Finally, another bias maybe present in the estimates of the prevailing rent equation. Since, it is likely that the estimates of the normal vacancy are upwardly biased, it is equally likely that the cumulative deviation of the nominal vacancy rate from the normal vacancy rate (the second independent variable in the prevailing rent equation) is downwardly biased. This means that, keeping all other things constant, the coefficient of the second independent variable maybe upwardly biased. In other words, the sensitivity of rents to the deviation of the nominal vacancy rate from the normal vacancy rate maybe smaller than what suggested by the estimates.

CONCLUSIONS

1. Theoretical Analysis

The theoretical analysis of the office market behavior has strongly suggested that a meaningful comparison of local markets requires identification of their structural parameters, that is, the normal vacancy rate and the normal rent. The concept of the normal vacancy rate is instrumental in identifying differences in disequilibrium state both within markets through time and across markets at a given time. Given the significance of the normal vacancy rate both in time series and cross section analyses of office markets, the identification of the determinants of its variations across markets is important.

In order to explain cross section variations in the normal vacancy rate search and matching theories have been reviewed. Building on the existing studies a theory has been, subsequently, developed. Based on the conventional economic theory we define the normal vacant stock as the stock required to satisfy effective demand for office space. As such, it should be determined by factors affecting effective demand for vacant office space, such as employment growth, tenant turnover, mismatching rate, and the length of the tenant search effort. It should also be determined by factors affecting effective supply of office space, such as landlord perceptions and expectations regarding market strength.

Office space markets differ not only in terms of nominal and normal vacancy rates but also in terms of prevailing and implicit equilibrium rents. The former argument has been verified through hedonic rent estimates. The second argument has been also verified by empirically identifying the normal rent for each market. Given the cyclical behavior of the office space market, we have concluded that this can be identified as the observed rent when the nominal vacancy rate is at a minimum or a maximum. The major empirical findings regarding these issues are summarized in the next section.

In order to explain the determinants of intermetropolitan differences in prevailing office space rents we adopted a disequilibrium approach. The reason is that review of historic data has shown that local markets behave to a significant extent independently. Therefore, it is very likely that, at a given point in time, differences in supply demand imbalances across markets are present. Such, differences should be reflected on prevailing office space rents. Thus, it became apparent that a model of office space rents estimated with cross-section data has to appropriately take into account differences in terms of supply demand imbalances.

Based on this approach and the rent adjustment behavior, the prevailing office space rent was defined as the sum of an implicit equilibrium component, the normal rent, and a disequilibrium component. The latter has been simply defined as the sum of the rent changes from the time the normal rent was reached up to the period under consideration. According to the traditional rent adjustment equation, this aggregate rent change is a function of the sum of the deviations of the current vacancy rate from the normal vacancy rate. Based on this analysis, it has been hypothesized that cross-sectional variations in prevailing office space rents are attributable to differences in the implicit equilibrium or normal rent and the cumulative deviation of the nominal from the normal vacancy rate.

In order to explain the determinants of differences across office space markets in terms of the normal rent we examined the steady state properties of the office market model. From this analysis we concluded that the steady state or normal rent is the rent that will in the long run equate the supply of office space with the sum of the demand for office space and the normal vacant stock. Based on this definition it has been hypothesized that the determinants of the normal rents are office space demand variables, such as office employment, supply variables, such as office space construction costs, and the normal vacancy rate.

2. The Empirical Analysis

The empirical analysis of the above issues has provided some interesting conclusions in terms of cross-sectional differences among office space markets. First, data on the evolutions in the major office markets in the country support the argument that local markets behave to some extent independently. Second, there are indeed significant differences across markets with respect to some critical market variables, such as normal rents and normal vacancy rates.

The estimation of alternative rent adjustment equations in the 24 metropolitan areas included in our sample indicate that, contrary to the conventional belief, the concept of an intertemporally variable normal vacancy rate is most powerful in explaining real rent changes through time. This is a very important finding, given that most empirical studies of the rent adjustment process (both in the housing and the office market) have used models that are based on the assumption of an intertemporally constant normal vacancy rate.

Our estimates indicate that the normal vacancy rate fluctuates considerably through time, as the factors that affect effective demand for and supply of office space change considerably from period to period. Such factors are absorption rate, completions, office employment growth rates, and the change in the vacancy rate. In particular, the estimated statistics indicate that in the presence of strong absorption rates or employment growth higher effective demand for office space exerts an upward pressure on the normal vacancy rate. On the contrary, in the light of high levels of new completions desired absorption rates by landlords and, therefore, effective supply, is higher contributing in this way to a lower structural vacancy rate.

Our estimates show that the rent adjustment function varies across markets in terms of the nature of the variables that affect the normal vacancy rate, the lag structure by which these affect office space rents, and the rate of rental adjustment. The vacancy lag varies from one to three semesters, with the latter prevailing in most markets. The rate of rental adjustment varies from -0.24 in Phoenix to -1.32 in Atlanta. It seems that markets located in the West coast have the slowest rate of rental adjustment which is below -.50. The observed differences across markets in the factors that affect landlord behavior and the rate of rental adjustment are probably attributable to different norms and structural frictions prevailing in each market.

The empirical estimates of the normal vacancy rate show that this is indeed variable across markets and through time. The 9-year average (1980-1988), for example, varies from 5% in New York to 16% in Houston. These variations have been almost fully explained by cross-section differences in such structural characteristics as tenant size, the size of the stock, office space rents, the office employment growth rate and the stock growth rate. Our findings suggest that office space markets with a smaller tenant size, larger stock, lower rents, higher office employment growth rate and a higher stock growth rate should be characterized by a higher normal vacancy rate.

No geographic pattern has been observed with respect to variations in the average normal vacancy rate. The markets with an average normal vacancy rate below 10% (i.e. Boston, New York, Oklahoma City, Portland, and San Francisco), for example, are not concentrated in a single geographic region. In addition, other markets located in the East and West coast, such as Washington DC and San Diego have average normal vacancy rates above 10%.

It should be noted here that it is very likely that the average normal vacancy rate estimates are upwardly biased. The reason for this is that the independent variable in the estimated rent adjustment equations is change in real contract rents, which does not account for income losses due to concessions. This may understate decreases in real effective rents that took place in local office space markets during the period 1980-1988. A survey contacted in 1988 by the Society of Industrial and Office Realtors reports that rent discounts due to concessions varies in most major office space markets from a low of 5% to a high of 20%.

The estimated hedonic rent indices show that there are also significant differences in office space rents across markets. In 1988, for example, nominal contract office rents vary from $9.2/sqft in Oklahoma to $32.9/sqft in New York, indicating thus a $23 differential. The dispersion of nominal office space rents, as measured by the standard deviation, seems to be increasing during the period 1980-1988. However, this seems to be a result of increasing inflation rates rather than increasing differences in real rents. The cross-sect[illegible] standard deviation appears to remain relatively constant in the case of real contract rents.

The empirical estimates of this study support the hypothesis that a significant portion of the cross-section differences in contract office space rents is explained by differences in the normal rent and the cumulative deviation of the nominal vacancy rate from the normal vacancy rate, since the period office space rents reached their normal level. These empirical findings validate the hypothesis that the deviation of prevailing rents from this normal rent is greater in markets, where the magnitude and the persistence of the excess demand or supply (as measured by the deviation of the nominal vacancy from the normal vacancy) is greater. In 1988, for example, rents in Dallas, with 14% excess vacancy, were 29.44% below their implicit equilibrium level, while rents in Atlanta, with only 0.2% excess vacancy, were only by 6% below this level.

In order to test the hypothesis regarding the determinants of cross-section variations in implicit equilibrium office rents we first empirically identified this variable. To do this we used the estimated time series of rent indices and a time series of nominal vacancy data from Coldwell Banker. Based on this information, we identified the normal rent as the prevailing rent during the period the nominal vacancy rate was at its ost recent maximum.

The cross-sectional variations in this normal rent were explained to a great extent by office space demand and supply factors and the normal vacancy rate. The empirical results strongly verify the two hypotheses of this study regarding the normal rent: 1) that it is indeed the observed rent when the nominal vacancy is at a maximum or a minimum and 2) that its cross-sectional variations are explained by differences in office employment levels, the ratio of office employment to total employment, construction costs and the normal vacancy rate.

These findings suggest that office markets with higher office employment, smaller share of total employment to office employment, higher construction costs and higher normal vacancy rate have higher implicit equilibrium rents. Within this context, the considerably higher levels of rents in New York seem to be attributable to considerably higher levels of office employment, higher share of office employment in total employment and higher construction costs; in San Francisco, to considerably higher construction costs and lower ratio of total to office employment.

Overally, it can be argued that the empirical results have substantiated all the hypotheses developed in this dissertation regarding the determinants of inter-metropolitan variations in normal vacancy rates, prevailing office space rents and implicit equilibrium office space rents.

3. Practical Applications

The findings of this dissertation have some important practical applications.

First, the dissertation develops an improved methodology for assessing and comparing supply-demand imbalances across local office space markets. The empirical results of this study have substantiated the argument that the use of the average nominal vacancy rate over a long period of time as a proxy of the normal vacancy rate may be quite misleading. A better methodology is, therefore, required for the identification of normal vacancy rates. Such a methodology has been already suggested and empirically applied in a few empirical studies in the housing and the office space market (Rosen and Smith, 1983; Shillings, Sirmans and Gorgel, 1986), as well as in this study.

This dissertation has not invented a new methodology for estimating the normal vacancy rate. It has, however, presented evidence, which suggests that the methodology used by all the up to date empirical studies might have been based on an erroneous assumption. All previous studies have estimated models that are based on the assumption of an intertemporally constant vacancy rate. Our findings, however, suggest that such an assumption may be unrealistic. It is very likely, then, that such previous studies might have led to inaccurate estimates of the normal vacancy rate. This dissertation, therefore, has introduced an improved model which can be used by real estate analysts for identifying the normal vacancy rate in local markets and, furthermore, for more accurately assessing and cross sectionally comparing supply-demand imbalances.

Such evaluation is very important in assessing the risk and profitability of real estate investments at alternative locations. Let's look, for example, at Table 17, presenting supply-demand imbalances in 19 markets. As shown in this table, in 1988, Portland is characterized by a 19.1 nominal vacancy rate and a 9.2% excess vacancy. San Diego, however, appears with a 22.1% nominal vacancy but with only a 7.3% excess vacancy. Based on such a comparison, real estate investors could very well conclude that in 1988, it is San Diego and not Portland that offered more profitable opportunities. A more in-depth analysis of the implications of the findings of this study, however, suggests that caution and more information is needed before characterizing these markets. The most important practical message of this dissertation is that the relationship between nominal vacancies, structural vacancies and rent change is much more volatile and complex than what it has been so far assumed. Markets which in one year are characterized by stable or slightly increasing real rents and appear to be balanced in terms of demand and effective supply, may become considerably "unbalanced" in the next year and experience decreases in rents because of significant movements in the rent adjusting behavior of landlords. Similarly, historically high vacancy rates do not necessarily imply that real office space rents will be declining sharply during subsequent periods. It is likely that movements in other market variables, such as absorption, may renter landlords reluctant to lower rents, even in the face of high vacancies.

A common practice followed by real estate analysts and investors when projecting the income stream expected to be earned by an income producing property is the simple extrapolation of recent rates of rent change. Our findings suggest that such a practice may lead to serious miscalculations, especially when the market is characterized by high vacancies. The reason is that due to the extreme volatility of the structural vacancy rate, the rate of rent change is also extremely volatile through time and, as such, difficult to predict. This means that in the presence of high vacancies a small rent decrease may be followed by a huge rent decrease, depending on the movements of other variables that affect landlord behavior (i.e., absorptior, office employment growth and new construction). In this case, the simple extrapolation technique would result to serious overestimation of the income earning capacity of the property in the near future. This furthermore implies that successful real estate investment during periods of a serious oversupply in the market requires the estimation of structural forecasting models.

Second, the study has also provided a cross-sectional model for the prediction of the average normal vacancy rate.

Actually, we can use the estimated coefficients of the normal vacancy equation along with forecasts of the independent variables (tenant size, office employment growth, rents, and size of the stock) to predict the levels of normal vacancies in the various local markets. These estimates can then be compared with exogenous forecasts of the nominal vacancies to predict the path of supply-demand imbalances in the future.

Third, another contribution of this study is the development of a methodology for identifying and forecasting the implicit equilibrium rent, that is, the rent the market is supposed to settle down when it reaches its steady state equilibrium.

The notion of implicit equilibrium rent is practically very useful in that it provides a benchmark, against which investors can compare and evaluate current rent levels. Real estate investors and decision makers can compare the implicit equilibrium rent with the prevailing rent and see by how much the latter deviates from the former, both in absolute and in percentage terms. Such a comparison, for example, would indicate that in 1988 the prevailing rent in Denver was by $6/sqft or 40% below its equilibrium level, while in Atlanta, this was only by $0.80/sqft or 6% below its equilibrium level. This provides another indication of the extent and direction of disequilibrium in each market, both in dollar and percentage terms.

Taken together with a measure for excess vacancies, this deviation can then provide for a complete assessment of the extent of market disequilibrium. When the market is oversupplied, it provides a minimum high at which the rent will rebound when the market returns to equilibrium. When the market is undersupplied, it gives a maximum low, rents will fall when supply comes in line with demand.

A wise use of this implicit equilibrium rent for investment decisions requires, however, the knowledge of the timing by which rents will move upwardly or downwardly. This is another area where the findings of the study can be useful. In particular, we can use the estimated coefficients of the rent adjustment equation for each market, along with exogenous forecasts of nominal vacancies and variables affecting the normal vacancy rate, to forecast the time path of rents.

This can be actually done by estimating the full model of the office space market (that is, in addition a demand and a supply equation must be estimated) with historic data and then calibrating the model using forecasts of the exogenous variables. This exercise can provide useful insights with respect to the future path of new construction, vacancies and rents.

Overally, it can be argued that the major practical contribution of this study lies in the area of disequilibrium analysis of office space markets. In particular: (1) the study provided a methodology for assessing and comparing the extend of disequilibrium across markets not only in terms of extess vacancies, but also in terms of the deviation of prevailing rents from implicit equilibrium rents and 2) presented empirical evidence suggesting that landlord behavior and the resulting rent changes in seriously disequilibrated markets are much more complex and volatile than what assumed by the simple traditional model of the rent adjustment process. The practical extension of the latter is that the use of simple trend techniques in assessing the future income earning capacity of office buildings when office markets are soft may be quite misleading. Accurate prediction of the time path of rents requires estimation of structural models.

4. Extensions

Several refinements and extensions of this work can be proposed. First, a more accurate assessment of cross-sectional variations in office space rents and normal vacancy rates can be carried out by using effective instead of contract rents. The former are more accurate because they account for income losses due to concessions, which are heavily used by landlords when the market is soft.

Second, more accurate hedonic rent indices can be developed using more complete property records that allow for the consideration of differences among buildings in terms of quality, age, and microlocation factors.

Third, the intrametropolitan rent adjustment equation can be estimated with more time series observations. The availability of sufficiently long time series can allow the exploration of additional theoretical and empirical formulations with more complicated assumptions. The possibility, for example, of different rates of adjustment when the nominal vacancy is above or below the normal vacancy, as well as a different implicit normal vacancy rate when there is excess demand or excess supply must be further investigated.

Finally, the accuracy of our cross-section tests of the determinants of the normal vacancy rates and office space rents can be enhanced by expanding the sample of office markets included in the analysis.

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APPENDIX I.

COLDWELL BANKER LEASE TRANSACTION DATA

This appendix describes the data used for the estimation of hedonic rent indices for each metropolitan area. Each case represents a lease transaction record. Each lease transaction is described by three numerical variables and three qualitative variables. The three numerical variables are:

SQUARE FEET: The amount of square feet involved in the transaction

LENGTH OF THE LEASE: The number of years for which the lease agreement is valid

ANNUAL RENT/PER SQUARE FOOT: The annual contract rent per square foot. This is the base rent and includes utilities and other operating expenses. It does not take, however, into account rental discounts due to concessions.

The three qualitative variables include:

DATE: The year the lease agreement has been signed

LOCATION: This variable indicates whether the property involved in the lease transaction is located in the suburbs of the central city. A value of 1 indicates central city location while a value of 2 indicates a suburban location.

TYPE: This variable denotes whether the building involved in the lease transaction is low rise (3 storeys or less) or high rise (more than 3 storeys). A value of 1 indicates a high rise building and a value of 2 indicates a low rise building.

ZIP CODE: This variable denotes the zip code location of the property involved in the lease transaction.

Below we present descriptive statistics for numerical variables and frequencies for qualitative variables for those metropolitan areas that have been analyzed in one way or another in this study.

Metropolitan Area: ATLANTA

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.53329e+003	Standard deviation	1.30380e+004
Minimum	1.00100e+003	Skewness	7.03751
Maximum	1.77990e+005	Kurtosis	71.26388
Valid observations	662		

Variable: Length of the Lease

Mean	3.84592	Standard deviation	1.78169
Minimum	0.00000e+000	Skewness	0.87826
Maximum	10.00000	Kurtosis	5.05681
Valid observations	662		

Variable: Annual Rent/Square Foot

Mean	15.10240	Standard deviation	6.32583
Minimum	1.44000	Skewness	1.78628
Maximum	48.00000	Kurtosis	8.89763
Valid observations	662		

2. Qualitative Variables: Frequencies

Variable: Date

	1979	1980	1981	1982	1983
Count	1	23	39	50	57
Percent	0.15	3.47	5.89	7.55	8.61

	1984	1985	1986	1987	1988
Count	66	77	82	132	95
Percent	9.97	11.63	12.39	19.94	14.35

	1989
Count	40
Percent	6.04

Variable: Location

	1	2
Count	520	142
Percent	78.55	21.45

Variable: Type
662 valid observations

	1	2
Count	353	309
Percent	53.32	46.68

Variable: Zip Code

	30067	30080	30092	30305	30328
Count	24	88	30	123	99
Percent	3.63	13.29	4.53	18.58	14.95

	30339	30345
Count	217	81
Percent	32.78	12.24

Metropolitan Area: BOSTON

Variable: Square Feet

Mean	6.63126e+003	Standard deviation	1.27573e+004
Minimum	1.00400e+003	Skewness	4.83160
Maximum	1.04670e+005	Kurtosis	30.66697
Valid observations	304		

Variable: Length of the Lease

Mean	3.96711	Standard deviation	2.16305
Minimum	0.00000e+000	Skewness	0.92762
Maximum	13.00000	Kurtosis	4.90232
Valid observations	304		

Variable: Annual Rent/Square Foot

Mean	19.81711	Standard deviation	6.86062
Minimum	1.92000	Skewness	0.77991
Maximum	45.00000	Kurtosis	4.80064
Valid observations	304		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982	1983	1984
Count	13	16	26	39	41
Percent	4.28	5.26	8.55	12.83	13.49

	1985	1986	1987	1988	1989
Count	53	39	30	34	13
Percent	17.43	12.83	9.87	11.18	4.28

Variable: Location

	1	2
Count	226	78
Percent	74.34	25.66

Variable: Type

	1	2
Count	185	119
Percent	60.86	39.14

Variable: Zip Code

	1701	1801	1803	2108	2109
Count	20	24	34	34	113
Percent	6.58	7.89	11.18	11.18	37.17

	2142	2158
Count	41	38
Percent	13.49	12.50

Metropolitan Area: CHICAGO

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.36364e+003	Standard deviation	1.80468e+004
Minimum	1.00100e+003	Skewness	17.00352
Maximum	4.94525e+005	Kurtosis	4.18620e+002
Valid observations	1329		

Variable: Length of the Lease

Mean	4.04740	Standard deviation	2.54360
Minimum	0.00000e+000	Skewness	1.03118
Maximum	14.00000	Kurtosis	3.97896
Valid observations	1329		
Valid observations	1329		

Variable: Annual Rent/Square Foot

Mean	16.31596	Standard deviation	7.39576
Minimum	4.05000	Skewness	1.62846
Maximum	54.79000	Kurtosis	6.71918
Valid observations	1329		

2. Qualitative Variables: Frequencies

Variable: Date

	1978	1979	1980	1981	1982
Count	1	3	52	51	81
Percent	0.08	0.23	3.91	3.84	6.09

	1983	1984	1985	1986	1987
Count	149	187	187	170	219
Percent	11.21	14.07	14.07	12.79	16.48

	1988	1989
Count	149	80
Percent	11.21	6.02

Variable: Location

	1	2
Count	701	628
Percent	52.75	47.25

Variable: Type

	1	2
Count	938	391
Percent	70.58	29.42

Variable: Zip Code

	60008	60195	60521	60601	60604
Count	131	177	320	202	230
Percent	9.86	13.32	24.08	15.20	17.31

	60606	60611
Count	155	114
Percent	11.66	8.58

Metropolitan Area: CINCINNATI

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.18324e+003	Standard deviation	8.81701e+003
Minimum	1.00400e+003	Skewness	3.60649
Maximum	8.00000e+004	Kurtosis	20.53254
Valid observations	411		

Variable: Length of the Lease

Mean	3.91484	Standard deviation	3.84455
Minimum	0.00000e+000	Skewness	12.47053
Maximum	70.00000	Kurtosis	2.12797e+002
Valid observations	411		

Variable: Annual Rent/Square Foot

Mean	14.18389	Standard deviation	7.42450
Minimum	4.08000	Skewness	2.18251
Maximum	47.52000	Kurtosis	8.14197
Valid observations	411		

2. Qualitative Variables: Frequencies

Variable: Date

	1981	1982	1983	1984
Count	21	36	29	64
Percent	5.11	8.76	7.06	15.57

	1985	1986	1987	1988	1989
Count	63	74	69	38	16
Percent	15.33	18.00	16.79	9.25	3.89

Variable: Location

	1
Count	411
Percent	100.00

Variable: Type

	1	2
Count	193	218
Percent	46.96	53.04

Variable: Zip Code

	45202	45242	45246
Count	160	166	85
Percent	38.93	40.39	20.68

Metropolitan Area: DALLAS

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	7.25123e+003	Standard deviation	2.10773e+004
Minimum	1.01100e+003	Skewness	13.55044
Maximum	4.46032e+005	Kurtosis	2.52160e+002
Valid observations	802		

Variable: Length of the Lease

Mean	3.98379	Standard deviation	3.34171
Minimum	0.00000e+000	Skewness	12.79789
Maximum	76.00000	Kurtosis	2.70086e+002
Valid observations	802		

Variable: Annual Rent/Square Foot

Mean	14.73642	Standard deviation	6.28118
Minimum	4.10000	Skewness	1.89239
Maximum	48.00000	Kurtosis	9.00108
Valid observations	802		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	46	45	46
Percent	5.74	5.61	5.74

	1983	1984	1985	1986	1987
Count	85	108	100	108	90
Percent	10.60	13.47	12.47	13.47	11.22

	1988	1989
Count	89	77
Percent	11.10	9.60

Variable: Location

	1	2
Count	560	242
Percent	69.83	30.17

Variable: Type

	1	2
Count	508	294
Percent	63.34	36.66

Variable: Zip Code

	75039	75062	75075	75201	75234
Count	95	72	75	94	105
Percent	11.85	8.98	9.35	11.72	13.09

	75240	75243
Count	133	228
Percent	16.58	28.43

Metropolitan Area: DENVER

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.97713e+003	Standard deviation	1.83645e+004
Minimum	1.00400e+003	Skewness	11.83615
Maximum	3.89265e+005	Kurtosis	2.08887e+002
Valid observations	967		

Variable: Length of the Lease

Mean	3.69286	Standard deviation	1.67795
Minimum	0.00000e+000	Skewness	0.87187
Maximum	13.00000	Kurtosis	6.48104
Valid observations	967		

Variable: Annual Rent/Square Foot

Mean	14.19270	Standard deviation	6.81578
Minimum	2.52000	Skewness	1.96098
Maximum	48.00000	Kurtosis	8.43039
Valid observations	967		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	45	75	84
Percent	4.65	7.76	8.69

	1983	1984	1985	1986	1987
Count	83	78	105	143	142
Percent	8.58	8.07	10.86	14.79	14.68

	1988	1989
Count	127	70
Percent	13.13	7.24

Variable: Location

	1	2
Count	401	566
Percent	41.47	58.53

Variable: Type

	1	2
Count	453	514
Percent	46.85	53.15

Variable: Zip Code

	80014	80111	80112	80202	80206
Count	142	316	108	147	87
Percent	14.68	32.68	11.17	15.20	9.00

	80222	80237
Count	68	99
Percent	7.03	10.24

Metropolitan Area: HOUSTON

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	8.03741e+003	Standard deviation	1.69230e+004
Minimum	1.00100e+003	Skewness	5.89288
Maximum	1.86252e+005	Kurtosis	47.21770
Valid observations	921		

Variable: Length of the Lease

Mean	4.19001	Standard deviation	3.30049
Minimum	0.00000e+000	Skewness	10.65872
Maximum	74.00000	Kurtosis	2.18811e+002
Valid observations	921		

Variable: Annual Rent/Square Foot

Mean	13.99033	Standard deviation	6.73123
Minimum	4.06000	Skewness	2.43009
Maximum	47.88000	Kurtosis	11.12163
Valid observations	921		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	86	147	112
Percent	9.34	15.96	12.16

	1983	1984	1985	1986	1987
Count	84	87	84	83	95
Percent	9.12	9.45	9.12	9.01	10.31

	1988	1989
Count	75	49
Percent	8.14	5.32

Variable: Location

	1
Count	921
Percent	100.00

Variable: Type

	1	2
Count	711	210
Percent	77.20	22.80

Variable: Zip Code

	77002	77027	77042	77057
Count	436	182	149	154
Percent	47.34	19.76	16.18	16.72

Metropolitan Area: KANSAS

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	4.55003e+003	Standard deviation	7.36766e+003
Minimum	1.00500e+003	Skewness	6.39290
Maximum	8.83150e+004	Kurtosis	60.61216
Valid observations	321		

Variable: Length of the Lease

Mean	3.00623	Standard deviation	1.33228
Minimum	0.00000e+000	Skewness	0.27320
Maximum	10.00000	Kurtosis	4.97050
Valid observations	321		

Variable: Annual Rent/Square Foot

Mean	12.67467	Standard deviation	5.65499
Minimum	4.75000	Skewness	3.18616
Maximum	43.32000	Kurtosis	15.32076
Valid observations	321		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982	1983
Count	12	21	41	79
Percent	3.74	6.54	12.77	24.61

	1984	1985	1986	1987	1988
Count	50	25	20	28	24
Percent	15.58	7.79	6.23	8.72	7.48

	1989
Count	15
Percent	4.67

Variable: Location

	2
Count	321
Percent	100.00

Variable: Type

	1	2
Count	108	213
Percent	33.64	66.36

Variable: Zip Code

	66210	66211	66212
Count	160	72	89
Percent	49.84	22.43	27.73

Metropolitan Area: MIAMI

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.26361e+003	Standard deviation	1.08406e+004
Minimum	1.01500e+003	Skewness	7.65667
Maximum	1.56000e+005	Kurtosis	92.27039
Valid observations	417		

Variable: Length of the Lease

Mean	3.92806	Standard deviation	2.59523
Minimum	0.00000e+000	Skewness	0.93579
Maximum	15.00000	Kurtosis	3.88552
Valid observations	417		

Variable: Annual Rent/Square Foot

Mean	17.96233	Standard deviation	7.35489
Minimum	4.50000	Skewness	1.33723
Maximum	48.00000	Kurtosis	5.31489
Valid observations	417		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982	1983
Count	8	43	60	49
Percent	1.92	10.31	14.39	11.75

	1984	1985	1986	1987	1988
Count	58	28	47	61	32
Percent	13.91	6.71	11.27	14.63	7.67

	1989
Count	30
Percent	7.19

Variable: Location

	1	2
Count	355	62
Percent	85.13	14.87

Variable: Type

	1	2
Count	230	187
Percent	55.16	44.84

Variable: Zip Code

	33014	33016	33126	33131	33134
Count	36	26	52	167	57
Percent	8.63	6.24	12.47	40.05	13.67

	33166
Count	79
Percent	18.94

Metropolitan Area: NEW YORK

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.47879e+003	Standard deviation	1.03146e+004
Minimum	1.07700e+003	Skewness	5.31713
Maximum	1.07593e+005	Kurtosis	41.23601
Valid observations	302		

Variable: Length of the Lease

Mean	5.51987	Standard deviation	3.16615
Minimum	0.00000e+000	Skewness	0.40486
Maximum	13.00000	Kurtosis	1.90121
Valid observations	302		

Variable: Annual Rent/Square Foot

Mean	26.77563	Standard deviation	9.80331
Minimum	1.32000	Skewness	-0.17978
Maximum	50.00000	Kurtosis	3.00782
Valid observations	302		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982	1983	1984
Count	2	40	46	24	29
Percent	0.66	13.25	15.23	7.95	9.60

	1985	1986	1987	1988	1989
Count	37	40	28	42	14
Percent	12.25	13.25	9.27	13.91	4.64

Variable: Location

	1
Count	302
Percent	100.00

Variable: Type

	1	2
Count	294	8
Percent	97.35	2.65

Variable: Zip Code

	10016	10017	10022	10036
Count	66	110	91	35
Percent	21.85	36.42	30.13	11.59

Metropolitan Area: OKLAHOMA

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	4.35405e+003	Standard deviation	5.80294e+003
Minimum	1.00200e+003	Skewness	4.97479
Maximum	5.65200e+004	Kurtosis	37.23502
Valid observations	355		

Variable: Length of the Lease

Mean	2.64507	Standard deviation	1.90693
Minimum	0.00000e+000	Skewness	1.06291
Maximum	15.00000	Kurtosis	7.69709
Valid observations	355		

Variable: Annual Rent/Square Foot

Mean	10.67901	Standard deviation	7.85328
Minimum	4.25000	Skewness	3.14984
Maximum	48.00000	Kurtosis	13.15835
Valid observations	355		

2. Qualitative Variables: Frequencies

Variable: Date

	1981	1982	1983	1984	1985
Count	2	15	9	30	36
Percent	0.56	4.23	2.54	8.45	10.14

	1986	1987	1988	1989
Count	51	67	61	84
Percent	14.37	18.87	17.18	23.66

Variable: Location

	1
Count	355
Percent	100.00

Variable: Type

	1	2
Count	203	152
Percent	57.18	42.82

Variable: Zip Code

	73102	73108	73112	73116
Count	65	66	118	106
Percent	18.31	18.59	33.24	29.86

Metropolitan Area: PHILADELPHIA

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.46102e+003	Standard deviation	1.06242e+004
Minimum	1.02000e+003	Skewness	4.35892
Maximum	8.18900e+004	Kurtosis	24.87161
Valid observations	551		

Variable: Length of the Lease

Mean	4.64428	Standard deviation	2.29952
Minimum	0.00000e+000	Skewness	0.87919
Maximum	14.00000	Kurtosis	4.31735
Valid observations	551		

Variable: Annual Rent/Square Foot

Mean	17.36519	Standard deviation	5.57980
Minimum	2.76000	Skewness	1.46003
Maximum	50.15000	Kurtosis	8.13259
Valid observations	551		

2. Qualitative Variables: Frequencies

Variable: Date

	1979	1980	1981	1982	1983
Count	1	7	25	22	61
Percent	0.18	1.27	4.54	3.99	11.07

	1984	1985	1986	1987	1988
Count	66	86	89	82	68
Percent	11.98	15.61	16.15	14.88	12.34

	1989
Count	44
Percent	7.99

Variable: Location

	1	2
Count	300	251
Percent	54.45	45.55

Variable: Type

	1	2
Count	322	229
Percent	58.44	41.56

Variable: Zip Code

	19004	19046	19087	19102	19103
Count	85	14	152	116	115
Percent	15.43	2.54	27.59	21.05	20.87

	19106	19107
Count	23	46
Percent	4.17	8.35

Metropolitan Area: PHOENIX

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	5.07942e+003	Standard deviation	1.03691e+004
Minimum	1.00200e+003	Skewness	8.65981
Maximum	2.01600e+005	Kurtosis	1.25508e+002
Valid observations	1202		

Variable: Length of the Lease

Mean	3.39933	Standard deviation	1.72996
Minimum	0.00000e+000	Skewness	1.02639
Maximum	12.00000	Kurtosis	5.54986
Valid observations	1202		

Variable: Annual Rent/Square Foot

Mean	15.58028	Standard deviation	7.26450
Minimum	2.88000	Skewness	1.92270
Maximum	48.00000	Kurtosis	8.50771
Valid observations	1202		

2. Qualitative Variables: Frequencies

Variable: Date

	1978	1979	1980	1981	1982
Count	12	14	84	74	96
Percent	1.00	1.16	6.99	6.16	7.99

	1983	1984	1985	1986	1987
Count	141	125	124	162	217
Percent	11.73	10.40	10.32	13.48	18.05

	1988	1989
Count	108	45
Percent	8.99	3.74

Variable: Location

	1	2
Count	772	430
Percent	64.23	35.77

Variable: Type

	1	2
Count	334	868
Percent	27.79	72.21

Variable: Zip Code

	85012	85016	85202	85258	85282
Count	387	385	212	99	119
Percent	32.20	32.03	17.64	8.24	9.90

Metropolitan Area: PORTLAND

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	5.75967e+003	Standard deviation	1.17397e+004
Minimum	1.01400e+003	Skewness	10.62167
Maximum	2.29225e+005	Kurtosis	1.76669e+002
Valid observations	784		

Variable: Length of the Lease

Mean	3.87883	Standard deviation	2.14883
Minimum	0.00000e+000	Skewness	1.24061
Maximum	15.00000	Kurtosis	6.21437
Valid observations	784		

Variable: Annual Rent/Square Foot

Mean	13.833[illegible]7	Standard deviation	7.38165
Minimum	0.96000	Skewness	2.23423
Maximum	48.00000	Kurtosis	9.02603
Valid observations	784		

2. Qualitative Variables: Frequencies

Variable: Date

	1979	1980	1981	1982	1983
Count	1	49	52	58	117
Percent	0.13	6.25	6.63	7.40	14.92

	1984	1985	1986	1987	1988
Count	74	105	97	100	84
Percent	9.44	13.39	12.37	12.76	10.71

	1989
Count	47
Percent	5.99

Variable: Location

	1	2
Count	601	183
Percent	76.66	23.34

Variable: Type

	1	2
Count	301	483
Percent	38.39	61.61

Variable: Zip Code

	97005	97034	97035	97201	97204
Count	105	56	22	280	95
Percent	13.39	7.14	2.81	35.71	12.12

	97221	97223
Count	73	153
Percent	9.31	19.52

Metropolitan Area: SAN DIEGO

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	4.26871e+003	Standard deviation	6.82523e+003
Minimum	1.00500e+003	Skewness	5.96896
Maximum	8.72500e+004	Kurtosis	51.93182
Valid observations	1722		

Variable: Length of the Lease

Mean	3.59001	Standard deviation	2.08458
Minimum	0.00000e+000	Skewness	1.06169
Maximum	18.00000	Kurtosis	5.88511
Valid observations	1722		

Variable: Annual Rent/Square Foot

Mean	16.20671	Standard deviation	6.84028
Minimum	4.20000	Skewness	1.26277
Maximum	48.00000	Kurtosis	6.83999
Valid observations	1722		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	105	107	134
Percent	6.10	6.21	7.78

	1983	1984	1985	1986	1987
Count	187	239	206	173	211
Percent	10.86	13.88	11.96	10.05	12.25

	1988	1989
Count	227	96
Percent	13.18	5.57

Variable: Location

	1	2
Count	1328	394
Percent	77.12	22.88

Variable: Type

	1	2
Count	536	1186
Percent	31.13	68.87

Variable: Zip

	92008	92037	92101	92108	92111
Count	228	166	383	712	233
Percent	13.24	9.64	22.24	41.35	13.53

Metropolitan Area: SEATTLE

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	5.38539e+003	Standard deviation	9.82890e+003
Minimum	1.00400e+003	Skewness	6.29716
Maximum	1.18667e+005	Kurtosis	56.42083
Valid observations	1313		

Variable: Length of the Lease

Mean	3.91394	Standard deviation	1.97184
Minimum	0.00000e+000	Skewness	1.24500
Maximum	15.00000	Kurtosis	6.16183
Valid observations	1313		

Variable: Annual Rent/Square Foot

Mean	15.34137	Standard deviation	6.42105
Minimum	4.01000	Skewness	1.86323
Maximum	48.00000	Kurtosis	8.94620
Valid observations	1313		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	87	84	81
Percent	6.63	6.40	6.17

	1983	1984	1985	1986	1987
Count	133	176	146	147	165
Percent	10.13	13.40	11.12	11.20	12.57

	1988	1989
Count	177	115
Percent	13.48	8.76

Variable: Location

	1	2
Count	539	774
Percent	41.05	58.95

Variable: Type

	1	2
Count	735	578
Percent	55.98	44.02

Variable: Zip

	98004	98033	98052	98101	98104
Count	644	76	54	205	174
Percent	49.05	5.79	4.11	15.61	13.25

	98121	98188
Count	63	97
Percent	4.80	7.39

Metropolitan Area: SAN FRANCISCO

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	8.06886e+003	Standard deviation	1.53591e+004
Minimum	1.00200e+003	Skewness	6.35311
Maximum	2.11361e+005	Kurtosis	62.68814
Valid observations	1599		

Variable: Length of the Lease

Mean	3.80675	Standard deviation	4.01228
Minimum	0.00000e+000	Skewness	8.16702
Maximum	76.00000	Kurtosis	1.36331e+002
Valid observations	1599		

Variable: Annual Rent/Square Foot

Mean	20.63044	Standard deviation	9.19466
Minimum	0.72000	Skewness	0.43289
Maximum	50.00000	Kurtosis	2.66833
Valid observations	1599		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	217	213	190
Percent	13.57	13.32	11.88

	1983	1984	1985	1986	1987
Count	134	164	111	130	142
Percent	8.38	10.26	6.94	8.13	8.88

	1988	1989
Count	183	90
Percent	11.44	5.63

Variable: Location

	1	2
Count	1381	218
Percent	86.37	13.63

Variable: Type

	1	2
Count	1361	238
Percent	85.12	14.88

Variable: Zip Code

	94010	94102	94104	94105	94111
Count	60	354	221	151	655
Percent	3.75	22.14	13.82	9.44	40.96

	94596	94612
Count	70	88
Percent	4.38	5.50

Metropolitan Area: SACRAMENTO

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	5.66486e+003	Standard deviation	1.04086e+004
Minimum	1.00500e+003	Skewness	5.51563
Maximum	1.33500e+005	Kurtosis	44.25176
Valid observations	1281		

Variable: Length of the Lease

Mean	3.65027	Standard deviation	1.91648
Minimum	0.00000e+000	Skewness	0.96854
Maximum	13.00000	Kurtosis	5.27248
Valid observations	1281		

Variable: Annual Rent/Square Foot

Mean	14.88237	Standard deviation	6.10370
Minimum	1.80000	Skewness	2.05766
Maximum	48.00000	Kurtosis	10.18730
Valid observations	1281		

2. Qualitative Variables: Frequencies

Variable: Date

	980	1981	1982	1983
Count	69	74	95	128
Percent	5.39	5.78	7.42	9.99

	1984	1985	1986	1987	1988
Count	139	193	172	188	126
Percent	10.85	15.07	13.43	14.68	9.84

	1989
Count	95
Percent	7.42

Variable: Location

	1	2
Count	1053	228
Percent	82.20	17.80

Variable: Type

	1	2
Count	163	1118
Percent	12.72	87.28

Variable: Zip Code

	95610	95628	95670	95814	95815
Count	55	75	98	332	201
Percent	4.29	5.85	7.65	25.92	15.69

	95821	95825
Count	52	468
Percent	4.06	36.53

Metropolitan Area: SAN JOSE

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	6.28476e+003	Standard deviation	1.44249e+004
Minimum	1.00100e+003	Skewness	8.14021
Maximum	1.94000e+005	Kurtosis	91.82285
Valid observations	711		

Variable: Length of the Lease

Mean	3.87060	Standard deviation	2.16245
Minimum	0.00000e+000	Skewness	1.20984
Maximum	15.00000	Kurtosis	6.72969
Valid observations	711		

Variable: Annual Rent/Square Foot

Mean	16.46284	Standard deviation	6.08536
Minimum	3.36000	Skewness	0.74832
Maximum	48.00000	Kurtosis	5.54581
Valid observations	711		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982
Count	57	33	42
Percent	8.04	4.64	5.91

	1983	1984	1985	1986	1987
Count	64	58	46	95	124
Percent	9.00	8.16	6.47	13.36	17.44

	1988	1989
Count	143	26
Percent	20.11	3.66

Variable: Location

	1	2
Count	548	163
Percent	77.07	22.93

Variable: Type

	1	2
Count	248	463
Percent	34.88	65.12

Variable: Zip Code

	95008	95014	95035	95110	95112
Count	61	39	63	247	92
Percent	8.58	5.49	8.86	34.74	12.94

	95113	95128
Count	88	121
Percent	12.38	17.02

Metropolitan Area: SAINT LOUIS

1. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	4.51460e+003	Standard deviation	8.19863e+003
Minimum	1.00100e+003	Skewness	7.47318
Maximum	1.04000e+005	Kurtosis	77.92060
Valid observations	312		

Variable: Length of the Lease

Mean	3.98077	Standard deviation	2.13822
Minimum	0.00000e+000	Skewness	1.05966
Maximum	11.00000	Kurtosis	4.88145
Valid observations	312		

Variable: Annual Rent/Square Foot

Mean	14.63837	Standard deviation	4.58019
Minimum	2.28000	Skewness	2.75161
Maximum	48.00000	Kurtosis	18.82354
Valid observations	312		

2. Qualitative Variables: Frequencies

Variable: Date

	1981	1982	1983	1984	1985
Count	5	35	44	50	31
Percent	1.60	11.22	14.10	16.03	9.94

	1986	1987	1988	1989
Count	32	49	47	19
Percent	10.26	15.71	15.06	6.09

Variable: Location

	1
Count	312
Percent	100.00

Variable: Type

	1	2
Count	152	160
Percent	48.72	51.28

Variable: Zip Code

	63101	63105	63141	63146
Count	39	147	94	32
Percent	12.50	47.12	30.13	10.26

Metropolitan Area: TAMPA

2. Numerical Variables: Descriptive Statistics

Variable: Squre Feet

Mean	5.87038e+003	Standard deviation	1.02492e+004
Minimum	1.00400e+003	Skewness	4.38509
Maximum	6.91230e+004	Kurtosis	24.43659
Valid observations	289		

Variable: Length of the Lease

Mean	3.99654	Standard deviation	1.74304
Minimum	0.00000e+000	Skewness	1.25590
Maximum	11.00000	Kurtosis	6.62219
Valid observations	289		

Variable: Annual Rent/Square Foot

Mean	16.14574	Standard deviation	6.44326
Minimum	4.13000	Skewness	1.78928
Maximum	48.00000	Kurtosis	9.15722
Valid observations	289		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1982	1983	1984	1985
Count	1	13	39	36	51
Percent	0.35	4.50	13.49	12.46	17.65

	1986	1987	1988	1989
Count	70	38	35	6
Percent	24.22	13.15	12.11	2.08

Variable: Location

	1
Count	289
Percent	100.00

Variable: Type

	1	2
Count	181	108
Percent	62.63	37.37

Variable: Zip Code

	33602	33607	33609	33618
Count	51	96	111	31
Percent	17.65	33.22	38.41	10.73

Metropolitan Area: WASHINGTON D.C.

2. Numerical Variables: Descriptive Statistics

Variable: Square Feet

Mean	7.05388e+003	Standard deviation	1.46436e+004
Minimum	1.00300e+003	Skewness	7.83239
Maximum	1.89211e+005	Kurtosis	83.52829
Valid observations	1161		

Variable: Length of the Lease

Mean	4.49354	Standard deviation	3.40843
Minimum	0.00000e+000	Skewness	7.37932
Maximum	73.00000	Kurtosis	1.41814e+002
Valid observations	1161		

Variable: Annual Rent/Square Foot

Mean	20.36506	Standard deviation	6.17777
Minimum	4.50000	Skewness	0.73198
Maximum	50.00000	Kurtosis	4.85696
Valid observations	1161		

2. Qualitative Variables: Frequencies

Variable: Date

	1980	1981	1982	1983
Count	45	64	35	116
Percent	3.88	5.51	3.01	9.99

	1984	1985	1986	1987	1988
Count	167	183	176	214	111
Percent	14.38	15.76	15.16	18.43	9.56

	1989
Count	44
Percent	3.79

Variable: Location

	1	2
Count	678	483
Percent	58.40	41.60

Variable: Type

	1	2
Count	1006	155
Percent	86.65	13.35

Variable: Zip Code

	20005	20006	20036	20045	22070
Count	235	124	161	158	102
Percent	20.24	10.68	13.87	13.61	8.79

	22102	22180
Count	226	155
Percent	19.47	13.35

APPENDIX II
ESTIMATES OF HEDONIC RENT EQUATIONS

METROPOLITAN AREA: ATLANTA

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.48575	33.58662	one	2.54091	29.35671
logsqft	0.0101003	1.12854	logsqft	0.0158853	1.50801
logleng	0.0851859	4.95748	logleng	0.10281	4.16146
high	0.13746	6.9427			
d1980	-0.63491	-11.85652	d1980	-0.44948	-2.66156
d1981	-0.33516	-6.84873	d1981	-0.2804	-3.90163
d1982	-0.38353	-8.99627	d1982	-0.36499	-7.33615
d1983	-0.25095	-6.03938	d1983	-0.26734	-5.21127
d1984	-0.12926	-3.24558	d1984	-0.17505	-3.32267
d1985	-0.0882353	-2.3043	d1985	-0.12404	-2.58011
d1986	-0.0141163	-0.37454	d1986	0.0200668	0.44473
d1987	-0.0318072	-0.91306	d1987	-0.00109047	-0.0253622
d1988	-0.0160401	-0.43612	d1988	0.0105147	0.23196
z30305	0.0858799	3.66121	z30305	0.0893832	3.92635
z30328	0.056024	2.22062	z30328	0.0732524	2.35399
z30345	0.000471525	0.0170669	z30345	-0.0855137	-2.00044
z30080	-0.15909	-4.9941	z30080	-0.13342	-1.59851
z30092	0.021217	0.52638			
z30067	-0.0981199	-2.19234			
Number of Obervations		590	Number of Observations		310
R-squared		0.61545	R-squared		0.52601
Corrected R-quared		0.60332	Corrected R-squared		0.50182
Sum of Squard Residuals		19.77363	Sum of Squared Residuals		7.93127
Standard Errr of the Reg		0.18609	Standard Error of the Re		0.16425
Durbin-Watso Statistic		1.84607	Durbin-Watson Statistic		1.7177
Mean of Depedent Variabl		2.63564	Mean of Dependent Variab		2.76079

METROPOLITAN AREA: BOSTON

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.81859	19.52579	one	2.7655	13.84275
logsqft	0.011961	0.77082	logsqft	0.0370737	1.91255
logleng	0.12148	5.27635	logleng	0.0722727	2.56927
high	0.0713274	1.62189			
d1980	-0.47315	-5.22499	d1980	-0.48985	-3.14467
d1981	-0.26489	-3.10549	d1981	-0.28724	-1.79501
d1982	-0.17908	-2.21792	d1982	-0.0799637	-0.50039
d1983	-0.18792	-2.37101	d1983	-0.15506	-1.01448
d1984	-0.10715	-1.38326	d1984	-0.17414	-1.14381
d1985	-0.10541	-1.43882	d1985	-0.11406	-0.75594
d1986	0.00251411	0.032939	d1986	-0.0458802	-0.30282
d1987	0.09583	1.19261	d1987	0.0860791	0.55094
d1988	0.0631788	0.80856	d1988	0.12608	0.81795
z2142	-0.0519789	-1.1347	z2142	-0.0606465	-1.22885
z2158	-0.00706839	-0.12764			
z2108	-0.0399402	-0.93561	z2108	-0.0271161	-0.59134
z1803	-0.18811	-3.26493			
z1801	-0.32142	-5.59594			
z1701	-0.15106	-2.20999			

Number of Obervations	271	Number of Observations	151
R-squared	0.48601	R-squared	0.44492
Corrected R-quared	0.4493	Corrected R-squared	0.39225
Sum of Squard Residuals	10.75961	Sum of Squared Residuals	5.58138
Standard Errr of the Reg	0.20663	Standard Error of the Re	0.20184
Durbin-Watso Statistic	1.86109	Durbin-Watson Statistic	2.07436
Mean of Depedent Variabl	2.94919	Mean of Dependent Variab	3.0277

METROPOLITAN AREA: CHICAGO

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.48127	33.9657	one	2.47011	30.77255
logsqft	0.022044	2.78638	logsqft	0.0411006	4.55004
logleng	0.0698522	5.8972	logleng	0.0633008	4.78241
high	0.14449	6.80476			
d1980	-0.39243	-8.64787	d1980	-0.36432	-4.89132
d1981	-0.40398	-8.90175	d1981	-0.45171	-6.74199
d1982	-0.34013	-8.26146	d1982	-0.25883	-5.09703
d1983	-0.19255	-5.49309	d1983	-0.20373	-4.84825
d1984	-0.11305	-3.2893	d1984	-0.12437	-3.00978
d1985	-0.0625946	-1.82875	d1985	-0.00257912	-0.0629058
d1986	-0.0604028	-1.74288	d1986	-0.0741503	-1.79462
d1987	-0.11167	-3.31321	d1987	-0.10329	-2.60863
d1988	0.0110161	0.30844	d1988	0.0229963	0.54663
z60601	-0.00779235	-0.30042	z60601	-0.00520085	-0.19798
z60606	0.11832	4.22914	z60606	0.10158	3.57946
z60611	0.20728	6.76769	z60611	0.23925	7.45313
z60521	-0.0273525	-0.96433	z60521	-0.0141333	-0.38208
z60195	-0.20777	-7.45162	z60195	-0.235	-7.59663
z60008	-0.24641	-8.36713	z60008	-0.24127	-7.43209

Number of Obervations	1161	Number of Observations	815
R-squared	0.47352	R-squared	0.41051
Corrected R-quared	0.46522	Corrected R-squared	0.39793
Sum of Squard Residuals	65.10717	Sum of Squared Residuals	44.7567
Standard Errr of the Reg	0.23877	Standard Error of the Re	0.23697
Durbin-Watso Statistic	1.66197	Durbin-Watson Statistic	1.77413
Mean of Depedent Variabl	2.6921	Mean of Dependent Variab	2.76881

METROPOLITAN AREA: CINCINNATI

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.45085	17.99763	one	2.70621	16.17143
logsqft	0.0242608	1.6054	logsqft	-0.0278177	-1.54252
logleng	0.0259871	0.99463	logleng	0.052551	1.49282
high	0.1284	3.86095			
d1981	-0.24784	-2.7223	d1981	-0.30571	-2.6082
d1982	-0.41973	-5.02141	d1982	-0.21954	-1.99956
d1983	-0.29143	-3.45283	d1983	-0.0638529	-0.59224
d1984	-0.26154	-3.40879	d1984	-0.11199	-1.18351
d1985	-0.23283	-3.10428	d1985	-0.13003	-1.42164
d1986	-0.20692	-2.79164	d1986	-0.2338	-2.54082
d1987	-0.18049	-2.39853	d1987	-0.16485	-1.79478
d1988	-0.0791464	-0.99167	d1988	-0.10605	-1.06979
z45202	-0.0185719	-0.49463	z45202	0.23464	5.06668
z45246	-0.0652663	-1.67786	z45246	0.26298	3.82914
Number of Obervations		361	Number of Observations		169
R-squared		0.18492	R-squared		0.27566
Corrected R-quared		0.15438	Corrected R-squared		0.21994
Sum of Squard Residuals		22.82485	Sum of Squared Residuals		7.38133
Standard Errr of the Reg		0.25647	Standard Error of the Re		0.21752
Durbin-Watso Statistic		1.66561	Durbin-Watson Statistic		2.12011
Mean of Depedent Variabl		2.5019	Mean of Dependent Variab		2.58599

METROPOLITAN AREA: DALLAS

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	1.92847	25.57709	one	2.27359	27.86842
logsqft	0.028871	3.23162	logsqft	0.00764165	0.78587
logleng	0.0200924	1.25697	logleng	0.0466479	2.4435
high	0.16029	7.64878			
d1980	0.33115	7.02996	d1980	0.11245	1.66952
d1981	0.35757	7.85045	d1981	0.27381	4.89217
d1982	0.4136	8.97728	d1982	0.4393	7.20219
d1983	0.45928	11.72693	d1983	0.45164	10.55326
d1984	0.4793	13.12619	d1984	0.44416	11.77475
d1985	0.52522	14.2962	d1985	0.52758	13.73881
d1986	0.39808	11.4641	d1986	0.42009	12.19295
d1987	0.23515	6.34649	d1987	0.20388	5.5131
d1988	0.11473	3.11864	d1988	0.13694	3.78331
z75240	-0.0437018	-1.59248	z75240	-0.0909037	-2.86175
z75234	-0.10971	-3.7746	z75234	-0.10608	-2.46734
z75201	0.0375709	1.23867	z75201	-0.00757167	-0.23715
z75039	0.10695	3.38768	z75039	0.0394074	1.18406
z75062	-0.0194823	-0.59435	z75062	-0.12583	-2.94246
z75075	-0.00396348	-0.11905	z75075	-0.0637006	-1.84672
Number of Obervations		702	Number of Observations		451
R-squared		0.45647	R-squared		0.55337
Corrected R-quared		0.44214	Corrected R-squared		0.53583
Sum of Squard Residuals		31.63475	Sum of Squared Residuals		15.1477
Standard Errr of the Reg		0.21521	Standard Error of the Re		0.18704
Durbin-Watso Statistic		1.67667	Durbin-Watson Statistic		1.85755
Mean of Depedent Variabl		2.6204	Mean of Dependent Variab		2.66478

METROPOLITAN AREA: DENVER

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	1.7274	.20.47772	one	2.1074	17.89593
logsqft	0.0427424	4.47803	logsqft	0.0109458	0.77298
logleng	0.14791	7.51674	logleng	0.17071	6.4222
high	0.18529	8.45338			
d1980	0.0526137	1.05392	d1980	0.16391	1.74791
d1981	0.21817	4.86039	d1981	0.36822	4.96346
d1982	0.38173	8.76085	d1982	0.4831	5.98545
d1983	0.34061	7.85759	d1983	0.44089	6.50268
d1984	0.30388	7.14333	d1984	0.34205	5.45825
d1985	0.28649	7.03232	d1985	0.37759	6.90942
d1986	0.085326	2.18469	d1986	0.0520528	0.99379
d1987	-0.0125562	-0.32094	d1987	-0.0123826	-0.24271
d1988	-0.0820199	-2.10137	d1988	-0.0511378	-0.94495
z80237	0.0757878	2.12282	z80237	0.10312	2.51762
z80206	0.0671117	1.8482	z80206	0.044579	1.10139
z80222	0.13485	3.46435	z80222	0.13995	3.12265
z80111	0.13525	4.61108	z80111	0.15303	4.13059
z80014	-0.0414579	-1.18919	z80014	-0.0545043	-0.97188
z80112	0.0697201	1.78856			

Number of Obervations	842	Number of Observations	388
R-squared	0.41483	R-squared	0.48847
Corrected R-quared	0.40203	Corrected R-squared	0.46641
Sum of Squard Residuals	48.35646	Sum of Squared Residuals	20.40083
Standard Errr of the Reg	0.2424	Standard Error of the Re	0.2345
Durbin-Watso Statistic	1.77122	Durbin-Watson Statistic	1.84457
Mean of Depedent Variabl	2.55933	Mean of Dependent Variab	2.629

METROPOLITAN AREA: HOUSTON

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	1.82366	24.01113	one	1.98071	23.88696
logsqft	0.0385427	4.87428	logsqft	0.0359334	3.95239
logleng	0.0995888	7.28905	logleng	0.0865622	5.62262
high	0.12425	5.72735			
d1980	0.0408567	1.03346	d1980	0.0675611	1.52053
d1981	0.22947	6.18333	d1981	0.23444	5.68892
d1982	0.38338	9.72924	d1982	0.37412	8.39498
d1983	0.4266	10.20131	d1983	0.39291	7.62316
d1984	0.34018	8.46949	d1984	0.35196	7.76756
d1985	0.26078	6.45327	d1985	0.28492	6.41921
d1986	0.0825412	2.01259	d1986	0.0578288	1.2983
d1987	-0.11525	-2.87304	d1987	-0.10705	-2.38876
d1988	-0.0744907	-1.76653	d1988	-0.0696328	-1.48413
z77027	0.00459579	0.22681	z77027	-0.00213699	-0.0970175
z77057	-0.00648479	-0.26376	z77057	-0.0104919	-0.34782
z77042	-0.0346873	-1.46302	z77042	-0.012729	-0.46168

Number of Obervations	785	Number of Observations	615
R-squared	0.49014	R-squared	0.44689
Corrected R-quared	0.48019	Corrected R-squared	0.43398
Sum of Squard Residuals	31.8925	Sum of Squared Residuals	25.32338
Standard Errr of the Reg	0.20365	Standard Error of the Re	0.20544
Durbin-Watso Statistic	1.92419	Durbin-Watson Statistic	1.8438
Mean of Depedent Variabl	2.54719	Mean of Dependent Variab	2.56055

METROPOLITAN AREA: KANSAS

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.57595	26.37297	one	2.83294	17.52913
logsqft	0.00273097	0.23027	logsqft	-0.0157198	-0.7692
logleng	0.1239	5.2838	logleng	0.13061	2.17814
high	0.0664264	2.97907			
d1980	-0.58389	-9.3097	d1980	-0.60832	-6.41852
d1981	-0.51419	-9.24528	d1981	-0.60761	-6.40363
d1982	-0.36841	-7.09111	d1982	-0.41205	-4.33862
d1983	-0.33801	-7.20026	d1983	-0.38466	-4.09176
d1984	-0.26511	-5.3114	d1984	-0.22562	-2.33067
d1985	-0.1762	-3.25998	d1985	-0.28236	-2.8993
d1986	-0.10379	-1.86449	d1986	-0.0904628	-0.79431
d1987	-0.20141	-3.81726	d1987	-0.20464	-2.18478
d1988	-0.24848	-4.28454	d1988	-0.2859	-2.58147
z66212	-0.0628047	-2.64397	z66212	-0.0999665	-2.37311
z66211	0.0426958	1.72558			

Number of Obervations	279	Number of Observations	86
R-squared	0.48271	R-squared	0.64797
Corrected R-quared	0.45528	Corrected R-squared	0.5901
Sum of Squard Residuals	6.21346	Sum of Squared Residuals	1.55431
Standard Errr of the Reg	0.15341	Standard Error of the Re	0.14592
Durbin-Watso Statistic	1.75231	Durbin-Watson Statistic	2.14411
Mean of Depedent Variabl	2.45623	Mean of Dependent Variab	2.47013

METROPOLITAN AREA: LOS ANGELES

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.68336	52.04802	one	2.71045	50.23869
logsqft	-0.00012393	-0.0209143	logsqft	0.0126983	1.99732
logleng	0.0938052	9.90412	logleng	0.0849501	7.8362
high	0.12297	9.24644			
d1980	-0.36038	-11.37572	d1980	-0.32668	-9.94106
d1981	-0.0803863	-2.62514	d1981	-0.0721263	-2.11969
d1982	-0.0817736	-2.89825	d1982	-0.0801568	-2.59628
d1983	-0.12443	-4.53731	d1983	-0.13397	-4.44619
d1984	-0.0383528	-1.49618	d1984	-0.0129437	-0.45457
d1985	-0.0094638	-0.39176	d1985	-0.0089044	-0.3398
d1986	0.0200974	0.86323	d1986	-0.0140307	-0.56306
d1987	0.0607275	2.63562	d1987	0.0285134	1.15082
d1988	0.0671977	2.8408	d1988	0.0468844	1.82423
z90025	0.29035	14.42296	z90025	0.33345	14.42688
z90017	0.17655	8.33177	z90017	0.18518	8.6735
z91367	0.18413	10.00881	z91367	0.21287	10.38301
z91403	0.0803919	4.4605	z91403	0.0928073	4.94077
z91203	0.11564	5.15027	z91203	0.13809	5.67603

Number of Obrvations	1401	Number of Observations	1047
R-squared	0.40053	R-squared	0.43177
Corrected R-uared	0.39316	Corrected R-squared	0.42295
Sum of Squar Residuals	55.06849	Sum of Squared Residuals	37.04512
Standard Err of the Regr	0.19954	Standard Error of the Re	0.18965
Durbin-WatsoStatistic	1.75266	Durbin-Watson Statistic	1.84134
Mean of Depeent Variable	3.03149	Mean of Dependent Variab	3.0596

METROPOLITAN AREA: MIAMI

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.39782	21.00475	one	2.7042	19.78758
logsqft	0.0479684	3.70735	logsqft	0.0213899	1.27883
logleng	0.1166	6.25065	logleng	0.13636	5.89706
high	0.13724	3.55685			
d1980	-0.31577	-3.4479	d1980	-0.39286	-3.07994
d1981	-0.21312	-3.62851	d1981	-0.22824	-3.36055
d1982	0.0189978	0.35615	d1982	0.16486	2.35604
d1983	-0.00126928	-0.0233899	d1983	0.00873209	0.12969
d1984	0.0710189	1.34733	d1984	0.16587	2.62739
d1985	0.026103	0.43516	d1985	0.051357	0.69312
d1986	0.02624	0.4888	d1986	0.0219178	0.31449
d1987	-0.0218335	-0.44211	d1987	0.0375745	0.64715
d1988	-0.20055	-3.46187	d1988	-0.10649	-1.63449
z33166	-0.23802	-5.36305			
z33134	-0.14223	-3.96291	z33134	-0.16434	-4.3356
z33126	-0.48084	-11.85686	z33126	-0.57067	-12.75299
z33014	-0.33722	-6.41675			
z33016	-0.26304	-4.48718			

Number of Obervations	369	Number of Observations	204
R-squared	0.59496	R-squared	0.66064
Corrected R-quared	0.57535	Corrected R-squared	0.63742
Sum of Squard Residuals	15.63801	Sum of Squared Residuals	7.55902
Standard Errr of the Reg	0.21108	Standard Error of the Re	0.19946
Durbin-Watso Statistic	1.81917	Durbin-Watson Statistic	1.97276
Mean of Depedent Variabl	2.80731	Mean of Dependent Variab	2.94097

METROPOLITAN AREA: MINNEAPOLIS

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.48273	27.82705	one	2.56233	23.60565
logsqft	-0.00926834	-0.92466	logsqft	0.00443407	0.33992
logleng	0.0798022	3.60564	logleng	0.0696469	2.45809
high	0.12268	4.93564			
d1980	-0.21	-3.83015	d1980	-0.28076	-4.10301
d1981	-0.0885792	-1.61904	d1981	-0.27274	-3.28472
d1982	-0.0180223	-0.36165	d1982	-0.0235163	-0.37817
d1983	-0.11561	-2.43716	d1983	-0.16762	-2.91962
d1984	-0.19908	-4.23846	d1984	-0.18884	-3.12874
d1985	-0.0929637	-2.13041	d1985	-0.0388893	-0.71348
d1986	0.10325	2.47414	d1986	0.1484	2.74901
d1987	0.10241	2.44819	d1987	0.0847399	1.61003
d1988	0.0211277	0.48376	d1988	0.0335186	0.60383
z55402	0.0896478	3.20798	z55402	0.0259826	0.82661
z55416	0.0372542	1.09274	z55416	-0.0575477	-1.33493
z55431	0.0561491	1.66341	z55431	-0.0907237	-1.78476
z55344	0.0245052	0.68899	z55344	-0.0406994	-0.71331
z55114	-0.21417	-5.02526			
z55343	0.0284065	0.60591	z55343	-0.0677658	-0.87916
Number of Obervations		624	Number of Observations		415
R-squared		0.30788	R-squared		0.25984
Corrected R-quared		0.28729	Corrected R-squared		0.23009
Sum of Squard Residuals		32.42504	Sum of Squared Residuals		24.07852
Standard Errr of the Reg		0.23151	Standard Error of the Re		0.24597
Durbin-Watso Statistic		1.64328	Durbin-Watson Statistic		1.78569
Mean of Depedent Variabl		2.587	Mean of Dependent Variab		2.65323

METROPOLITAN AREA: NEW YORK

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	3.30472	16.04926	one	3.55085	18.88941
logsqft	-0.0499003	-2.38966	logsqft	-0.0495569	-2.44312
logleng	0.0966852	3.3733	logleng	0.0969709	3.45143
high	0.34493	3.01574			
d1981	-0.28102	-2.99198	d1981	-0.17479	-1.82697
d1982	-0.0368298	-0.40545	d1982	0.0699389	0.74356
d1983	-0.0752415	-0.74472	d1983	0.00917804	0.0891882
d1984	-0.0451987	-0.46627	d1984	0.042397	0.43468
d1985	-0.0418708	-0.44729	d1985	0.0490418	0.51745
d1986	-0.0227895	-0.24691	d1986	0.0679073	0.72743
d1987	-0.064628	-0.64391	d1987	0.0246917	0.24514
d1988	-0.0300749	-0.32235	d1988	0.0563707	0.59845
z10022	0.17678	3.92823	z10022	0.18142	4.11657
z10016	-0.25932	-5.39125	z10016	-0.24891	-5.23328
z10036	-0.2983	-4.90435	z10036	-0.27875	-4.64881

Number of Obervations	276	Number of Observations	269
R-squared	0.37132	R-squared	0.35714
Corrected R-quared	0.3376	Corrected R-squared	0.32437
Sum of Squard Residuals	21.73671	Sum of Squared Residuals	19.92222
Standard Errr of the Reg	0.28859	Standard Error of the Re	0.27951
Durbin-Watso Statistic	1.83825	Durbin-Watson Statistic	1.92927
Mean of Depedent Variabl	3.27291	Mean of Dependent Variab	3.28172

METROPOLITAN AREA: OKLAHOMA

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	1.52467	9.77441	one	0.82474	3.68587
logsqft	0.0641736	3.41819	logsqft	0.15117	5.64862
logleng	-0.0511404	-1.77479	logleng	-0.0590901	-1.55053
high	0.0839411	2.54722			
d1981	0.37842	2.23718	d1981	0.54191	2.40793
d1982	0.58496	7.76574	d1982	0.62384	6.44346
d1983	0.48803	5.25006	d1983	0.51676	3.81072
d1984	0.56134	8.73237	d1984	0.48044	4.43164
d1985	0.43998	7.88103	d1985	0.50527	6.1985
d1986	0.14046	2.5295	d1986	0.30355	4.14325
d1987	0.0215795	0.43789	d1987	0.14022	2.52374
d1988	0.0988822	1.90566	d1988	0.22108	3.28681
z73116	-0.0903845	-2.38393	z73116	-0.00949457	-0.17322
z73108	-0.0974575	-2.22927	z73108	-0.0596322	-0.99085
z73102	0.000946138	0.0215963	z73102	-0.0492392	-0.95604

Number of Obervations	271	Number of Observations	142
R-squared	0.4792	R-squared	0.48476
Corrected R-quared	0.45072	Corrected R-squared	0.43243
Sum of Squard Residuals	13.57002	Sum of Squared Residuals	6.06409
Standard Errr of the Reg	0.23023	Standard Error of the Re	0.21766
Durbin-Watso Statistic	1.70279	Durbin-Watson Statistic	1.71512
Mean of Depedent Variabl	2.17539	Mean of Dependent Variab	2.16578

METROPOLITAN AREA: PHILADELPHIA

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	3.01671	37.94282	one	3.05756	28.02835
logsqft	0.00308615	0.34077	logsqft	-0.0242323	-1.89047
logleng	0.0613992	3.9472	logleng	0.098319	4.78235
high	-0.0759041	-2.48177			
d1980	-0.45718	-6.55026	d1980	-0.31543	-3.43478
d1981	-0.4299	-9.28614	d1981	-0.34901	-5.60589
d1982	-0.16213	-3.23446	d1982	-0.11619	-1.2845
d1983	-0.26982	-6.81447	d1983	-0.1569	-3.0197
d1984	-0.25289	-6.61864	d1984	-0.20824	-4.18112
d1985	-0.20923	-5.8561	d1985	-0.17922	-3.857
d1986	-0.14926	-4.15932	d1986	-0.13593	-3.00669
d1987	-0.0538739	-1.47075	d1987	0.0600791	1.32077
d1988	0.00611595	0.17214	d1988	0.0782628	1.84837
z19103	-0.00635554	-0.25018	z19103	-0.0315911	-1.10786
z19107	-0.32287	-10.03973	z19107	-0.35136	-8.96569
z19106	-0.22914	-5.56339	z19106	-0.22022	-4.67908
z19087	-0.16585	-4.29975			
z19004	-0.0967288	-2.79241	z19004	-0.0906411	-1.91386
z19046	-0.44328	-7.40671			

Number of Obervations	494	Number of Observations	290
R-squared	0.50067	R-squared	0.50335
Corrected R-quared	0.48174	Corrected R-squared	0.47616
Sum of Squard Residuals	13.0012	Sum of Squared Residuals	9.71561
Standard Errr of the Reg	0.16544	Standard Error of the Re	0.1883
Durbin-Watso Statistic	1.96273	Durbin-Watson Statistic	2.05529
Mean of Depedent Variabl	2.81766	Mean of Dependent Variab	2.84426

METROPOLITAN AREA: PHOENIX

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.21981	27.24472	one	2.3905	16.46502
logsqft	0.0310157	3.54977	logsqft	0.0458868	3.2148
logleng	0.15055	10.19444	logleng	0.0723934	2.87178
high	0.1304	5.67956			
d1980	-0.36474	-7.60317	d1980	-0.53932	-5.80399
d1981	-0.23854	-4.92019	d1981	-0.36868	-3.73938
d1982	-0.13499	-2.99376	d1982	-0.22345	-2.36506
d1983	-0.060923	-1.40608	d1983	-0.25509	-2.74967
d1984	-0.0240561	-0.54621	d1984	-0.15133	-1.40179
d1985	0.0211923	0.48141	d1985	-0.0393354	-0.42733
d1986	0.0279112	0.66781	d1986	-0.0770852	-0.87518
d1987	-0.0407421	-0.9998	d1987	-0.16616	-1.90006
d1988	-0.169	-3.8101	d1988	-0.46884	-4.69189
z85016	0.1931	7.91931			
z85202	0.0385022	1.50065	z85202	0.3005	5.8022
z85282	-0.0188606	-0.60587	z85282	0.0539962	0.63076
z85258	0.18813	5.69111			

Number of Obervations	1031	Number of Observations	269
R-squared	0.34187	R-squared	0.46074
Corrected R-quared	0.33149	Corrected R-squared	0.43325
Sum of Squard Residuals	56.86186	Sum of Squared Residuals	13.63212
Standard Errr of the Reg	0.23681	Standard Error of the Re	0.23121
Durbin-Watso Statistic	1.68667	Durbin-Watson Statistic	1.67408
Mean of Depedent Variabl	2.6821	Mean of Dependent Variab	2.66097

METROPOLITAN AREA: PORTLAND

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	1.8002	16.49663	one	2.16912	14.26932
logsqft	0.0577477	4.86292	logsqft	0.0225072	1.31048
logleng	0.0905392	4.78658	logleng	0.1391	5.22781
high	0.15753	5.78136			
d1980	0.0211342	0.33431	d1980	0.16298	1.41378
d1981	0.00800018	0.1357	d1981	0.0551161	0.71215
d1982	0.053668	0.88514	d1982	0.20921	2.50531
d1983	0.0969943	1.85679	d1983	0.22847	3.54633
d1984	0.13256	2.39232	d1984	0.10026	1.51391
d1985	0.061934	1.16796	d1985	0.1595	2.39319
d1986	0.0491226	0.92898	d1986	-0.0211559	-0.31675
d1987	0.0315124	0.60274	d1987	-0.0913368	-1.38469
d1988	0.0258653	0.48575	d1988	0.079215	1.25101
z97223	0.0511099	1.55396	z97223	0.0265634	0.40664
z97204	-0.0607892	-1.71168	z97204	-0.0793739	-1.97906
z97221	0.0629753	1.53265			
z97005	-0.079498	-2.09387			
z97034	0.1034	2.17503			
z97035	0.0205107	0.31917	z97035	-0.0282155	-0.4025

Number of Obervations	682	Number of Observations	251
R-squared	0.18838	R-squared	0.28884
Corrected R-quared	0.16635	Corrected R-squared	0.24665
Sum of Squard Residuals	46.76319	Sum of Squared Residuals	12.24351
Standard Errr of the Reg	0.26558	Standard Error of the Re	0.22777
Durbin-Watso Statistic	1.75859	Durbin-Watson Statistic	1.77378
Mean of Depedent Variabl	2.50073	Mean of Dependent Variab	2.60556

METROPOLITAN AREA: SACRAMENTO

ALL TYPES

Independent Variable	Estimated Coefficient	t-Statistic
one	2.23428	35.39291
logsqft	0.0573413	7.61006
logleng	0.0461358	3.60159
high	0.16203	7.66903
d1980	-0.33001	-9.22687
d1981	-0.26703	-7.56653
d1982	-0.0725439	-2.15531
d1983	-0.15905	-5.12859
d1984	-0.15872	-5.22387
d1985	-0.11591	-4.06788
d1986	-0.0959843	-3.30247
d1987	-0.0876812	-3.0582
d1988	-0.0252033	-0.80663
z95814	-0.0129519	-0.71432
z95815	0.0756472	3.85271
z95821	0.00180337	0.0515137
z95670	-0.14514	-5.58565
z95628	-0.0160605	-0.53048
z95610	-0.13138	-3.76532

Number of Obervations	1121
R-squared	0.26717
Corrected R-quared	0.2552
Sum of Squard Residuals	50.98685
Standard Errr of the Reg	0.2151
Durbin-Watso Statistic	1.81659
Mean of Depedent Variabl	2.64191

ONLY HIGH RISE

Independent Variable	Estimated Coefficient	t-Statistic
one	2.85504	15.08415
logsqft	0.017011	0.8511
logleng	0.055391	1.55392
d1980	-0.75144	-4.7573
d1981	-0.5736	-6.59748
d1982	-0.28708	-3.37496
d1983	-0.28292	-3.24172
d1984	-0.2857	-3.76996
d1985	-0.26911	-3.76787
d1986	-0.27002	-3.81767
d1987	-0.26952	-3.97405
d1988	-0.1088	-1.49162
z95814	-0.0205697	-0.32174
z95815	0.11038	1.47632

Number of Observations	137
R-squared	0.43293
Corrected R-squared	0.373
Sum of Squared Residuals	4.22781
Standard Error of the Re	0.1854
Durbin-Watson Statistic	2.2424
Mean of Dependent Variab	2.81327

METROPOLITAN AREA: SAINT LOUIS

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.74577	23.20602	one	2.88147	14.49921
logsqft	-0.0121616	-0.8555	logsqft	-0.0179038	-0.706
logleng	0.0794333	3.85827	logleng	0.0992985	2.61876
high	0.0418698	1.36221			
d1982	-0.24948	-4.05948	d1982	-0.35588	-3.62491
d1983	-0.15387	-2.57721	d1983	-0.31566	-3.11562
d1984	-0.11109	-1.90704	d1984	-0.18497	-2.06102
d1985	-0.14353	-2.31236	d1985	-0.27284	-2.78753
d1986	-0.0903015	-1.49727	d1986	-0.13534	-1.51583
d1987	-0.1135	-1.99127	d1987	-0.21196	-2.68329
d1988	-0.0541308	-0.94779	d1988	-0.15031	-1.91164
z63141	0.00774241	0.24067	z63141	0.10848	1.39092
z63101	0.0262484	0.70004	z63101	0.0418191	0.89758
z63146	-0.0164368	-0.40058			

Number of Obervations	285	Number of Observations	137
R-squared	0.18066	R-squared	0.19318
Corrected R-quared	0.14135	Corrected R-squared	0.12218
Sum of Squard Residuals	9.14687	Sum of Squared Residuals	6.48246
Standard Errr of the Reg	0.18372	Standard Error of the Re	0.22773
Durbin-Watso Statistic	1.44856	Durbin-Watson Statistic	1.42802
Mean of Depedent Variabl	2.65357	Mean of Dependent Variab	2.7017

METROPOLITAN AREA: SAN DIEGO

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.83106	37.61553	one	2.85223	23.61145
logsqft	-0.0268155	-2.94277	logsqft	-0.00891944	-0.60486
logleng	0.15094	12.91116	logleng	0.13176	6.52996
high	0.12182	6.8889			
d1980	-0.35723	-8.93207	d1980	-0.39281	-6.42366
d1981	-0.25571	-6.26248	d1981	-0.20516	-2.57901
d1982	-0.17419	-4.47011	d1982	-0.13917	-2.30816
d1983	-0.0563961	-1.5931	d1983	-0.19008	-3.68114
d1984	-0.0480397	-1.412	d1984	-0.0669153	-1.29247
d1985	0.0194452	0.55679	d1985	-0.0785472	-1.43439
d1986	0.0340925	0.95728	d1986	-0.0242907	-0.44338
d1987	0.0248446	0.72889	d1987	0.00231212	0.0444627
d1988	0.0158833	0.46823	d1988	0.0184679	0.36459
z92101	-0.0948302	-4.89973	z92101	-0.0446696	-1.98744
z92111	-0.19179	-8.74558			
z92008	-0.1285	-5.68926			
z92037	0.26181	10.51797	z92037	0.28894	4.75586

Number of Obervations	1484	Number of Obrvations	454
R-squared	0.37566	R-squared	0.29608
Corrected R-quared	0.36885	Corrected R-uared	0.27528
Sum of Squard Residuals	98.74573	Sum of Squar Residuals	23.34251
Standard Errr of the Reg	0.25944	Standard Err of the Regr	0.23033
Durbin-Watso Statistic	1.76492	Durbin-WatsoStatistic	2.08851
Mean of Depedent Variabl	2.74562	Mean of Depeent Variable	2.8546

METROPOLITAN AREA: SAN FRANCISCO

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.93698	37.07214	one	3.16501	37.44143
logsqft	-0.0130485	-1.54593	logsqft	-0.0180467	-1.92942
logleng	0.096238	7.40636	logleng	0.10593	7.27407
high	0.23152	9.40841			
d1980	-0.29124	-7.26791	d1980	-0.27623	-5.97332
d1981	-0.00029081	-0.00730028	d1981	0.052337	1.11659
d1982	0.21035	4.96214	d1982	0.28428	5.71009
d1983	0.15259	3.3572	d1983	0.18264	3.62396
d1984	0.18112	4.15081	d1984	0.22846	4.70758
d1985	0.11255	2.56434	d1985	0.10673	2.17547
d1986	-0.0875016	-2.02333	d1986	-0.0559228	-1.15483
d1987	-0.0851102	-2.01717	d1987	-0.0460742	-0.9767
d1988	-0.0298201	-0.75888	d1988	-0.0436922	-0.96045
z94102	-0.35019	-11.8307	z94102	-0.35267	-10.97409
z94104	-0.15624	-6.6274	z94104	-0.14453	-5.97809
z94105	-0.2435	-8.7409	z94105	-0.21637	-7.36956
z94612	-0.36869	-10.29941	z94612	-0.37354	-8.93319
z94596	-0.0841237	-1.96038	z94596	-0.0103749	-0.14076
z94010	-0.39738	-9.31893	z94010	-0.39182	-7.35737

Number of Obervations	1249	Number of Obrvations	1048
R-squared	0.4499	R-squared	0.41458
Corrected R-quared	0.44185	Corrected R-uared	0.40492
Sum of Squard Residuals	98.52973	Sum of Squar Residuals	82.2143
Standard Errr of the Reg	0.28303	Standard Err of the Regr	0.28252
Durbin-Watso Statistic	1.50173	Durbin-WatsoStatistic	1.47244
Mean of Depedent Variabl	3.00839	Mean of Depeent Variable	3.05306

METROPOLITAN AREA: SAN JOSE

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.89181	30.83449	one	2.88309	23.92775
logsqft	-0.0228049	-2.15748	logsqft	-0.0147291	-1.20725
logleng	0.043265	2.54726	logleng	0.0529363	2.43488
high	0.0820749	3.49566			
d1980	-0.25253	-4.17154	d1980	-0.62136	-3.76499
d1981	-0.11458	-1.84964	d1981	-0.0259635	-0.26271
d1982	0.0259456	0.4268	d1982	0.16819	1.87914
d1983	0.0696917	1.21979	d1983	0.1442	1.53334
d1984	0.13446	2.32157	d1984	0.30999	3.33052
d1985	0.19107	3.22575	d1985	0.22712	2.31012
d1986	0.26479	5.03729	d1986	0.38902	4.48535
d1987	0.0114414	0.22351	d1987	-0.0330629	-0.38887
d1988	-0.0191601	-0.3733	d1988	-0.0682203	-0.81252
z95128	-0.0982362	-2.86529			
z95112	-0.10246	-3.23409	z95112	-0.12294	-2.56952
z95113	-0.064417	-2.22405	z95113	-0.0960446	-3.99808
z95035	-0.079889	-2.28014			
z95008	-0.00938263	-0.27638	z95008	0.0828961	1.24111
z95014	0.17397	4.11956			
Number of Obervations		602	Number of Observations		210
R-squared		0.37724	R-squared		0.63622
Corrected R-quared		0.35801	Corrected R-squared		0.61011
Sum of Squard Residuals		26.2757	Sum of Squared Residuals		3.93061
Standard Errr of the Reg		0.2123	Standard Error of the Re		0.14198
Durbin-Watso Statistic		1.79928	Durbin-Watson Statistic		2.24756
Mean of Depedent Variabl		2.80733	Mean of Dependent Variab		2.87147

METROPOLITAN AREA: SEATTLE

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.23171	34.30472	one	2.04798	24.83506
logsqft	0.0255487	3.39178	logsqft	0.070987	6.94875
logleng	0.0904403	6.69966	logleng	0.0662472	3.70112
high	0.12351	8.43323			
d1980	-0.16593	-4.8651	d1980	-0.18871	-4.28599
d1981	-0.10595	-3.05597	d1981	-0.080241	-1.72444
d1982	-0.0329888	-0.96364	d1982	-0.070056	-1.61565
d1983	0.0167545	0.56659	d1983	-0.0133299	-0.37301
d1984	0.039276	1.40235	d1984	0.0154554	0.47528
d1985	0.0113786	0.39134	d1985	0.00630211	0.18711
d1986	0.085305	2.95251	d1986	0.0335923	0.98429
d1987	0.0678407	2.43718	d1987	0.00381162	0.12106
d1988	0.0508301	1.87973	d1988	-0.00487959	-0.1696
z98104	-0.0468643	-1.97574	z98104	-0.0313938	-1.27677
z98188	-0.0251258	-0.8211	z98188	-0.0194173	-0.47013
z98121	-0.0267948	-0.85648	z98121	-0.0343991	-1.01619
z98004	0.10318	5.30081	z98004	0.13416	6.38956
z98033	0.0525652	1.64522	z98033	0.1338	2.45818
z98052	-0.13593	-3.81482			

Number of Obervations	1133	Number of Observations	636
R-squared	0.28892	R-squared	0.28924
Corrected R-quared	0.27743	Corrected R-squared	0.27087
Sum of Squard Residuals	47.94991	Sum of Squared Residuals	24.17315
Standard Errr of the Reg	0.20747	Standard Error of the Re	0.19762
Durbin-Watso Statistic	1.84512	Durbin-Watson Statistic	1.89742
Mean of Depedent Variabl	2.67745	Mean of Dependent Variab	2.73553

METROPOLITAN AREA: TAMPA

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	2.19774	16.64074	one	2.37452	14.92559
logsqft	0.0400166	2.68676	logsqft	0.0590217	3.30216
logleng	0.0843988	2.44233	logleng	0.11112	2.46879
high	0.19458	6.83411			
d1982	-0.23449	-2.38193	d1982	-0.41947	-3.00541
d1983	-0.20658	-2.38206	d1983	-0.37251	-3.22934
d1984	-0.0431383	-0.50768	d1984	-0.17841	-1.60886
d1985	0.0241672	0.28897	d1985	-0.11184	-1.05604
d1986	0.0200354	0.24255	d1986	-0.1473	-1.40986
d1987	0.00567976	0.0670269	d1987	-0.13875	-1.29653
d1988	-0.2527	-2.93844	d1988	-0.28136	-2.60178
z33607	0.0642463	2.25816	z33607	-0.0337768	-0.92978
z33602	-0.0137047	-0.38776	z33602	0.00961834	0.22642
z33618	0.0933487	2.0181			
Number of Obervations		253	Number of Observations		158
R-squared		0.46848	R-squared		0.29834
Corrected R-quared		0.43957	Corrected R-squared		0.24548
Sum of Squard Residuals		8.40781	Sum of Squared Residuals		5.37797
Standard Errr of the Reg		0.18756	Standard Error of the Re		0.19193
Durbin-Watso Statistic		2.01341	Durbin-Watson Statistic		1.92293
Mean of Depedent Variabl		2.72152	Mean of Dependent Variab		2.82136

METROPOLITAN AREA: WASHINGTON, DC

ALL TYPES			ONLY HIGH RISE		
Independent Variable	Estimated Coefficient	t-Statistic	Independent Variable	Estimated Coefficient	t-Statistic
one	3.05893	50.21909	one	3.01397	46.96481
logsqft	0.00399107	0.66246	logsqft	0.00660861	0.93088
logleng	0.0693682	7.91946	logleng	0.0647804	6.53013
high	-0.00351133	-0.13266			
d1980	-0.49131	-12.37906	d1980	-0.48026	-10.69123
d1981	-0.39964	-11.04118	d1981	-0.37459	-9.2157
d1982	-0.39112	-9.40182	d1982	-0.37461	-7.98132
d1983	-0.33522	-9.92384	d1983	-0.30097	-8.18965
d1984	-0.1884	-5.99172	d1984	-0.18282	-5.24984
d1985	-0.0943065	-3.00613	d1985	-0.0511415	-1.48328
d1986	-0.10529	-3.37614	d1986	-0.0539603	-1.57698
d1987	-0.0784353	-2.57012	d1987	-0.0638682	-1.87492
d1988	0.000524416	0.0158726	d1988	0.021832	0.59195
z20045	0.0998619	4.84635	z20045	0.082409	3.97599
z20036	0.1327	6.92836	z20036	0.13529	7.12098
z20006	0.11624	5.55887			
z22102	-0.0936045	-5.30885	z22102	-0.0892894	-5.09193
z22180	-0.14946	-7.19325	z22180	-0.17245	-8.08618
z22070	-0.45445	-13.90275			
Number of Obervations		1041	Number of Obrvations		792
R-squared		0.5723	R-squared		0.50115
Corrected R-quared		0.56477	Corrected R-uared		0.49151
Sum of Squard Residuals		30.55218	Sum of Squar Residuals		22.27473
Standard Errr of the Reg		0.1729	Standard Err of the Regr		0.16942
Durbin-Watso Statistic		1.3093	Durbin-WatsoStatistic		1.25152
Mean of Depedent Variabl		2.98547	Mean of Depeent Variable		3.01475

APPENDIX III.

This appendix lists time series data utilized for the estimation of the alternative rent adjustment models, as well as for the analysis of cross-section differences in normal vacancy rates and office space rents. These include data on vacancy rates, single- and multitenant completions, employment in FIRE and the service sector, as well as total employment for the 19 metropolitan areas included in the sample. The employment data come from the 202 Employment Survey carried out by the U.S. Department of Commerce, while the rest of the data come from Coldwell Banker surveys.

ATLANTA

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1337.0	680.0	23.7	45.8	318.9
1955.2	NA	454.0	2039.0	25.9	47.8	318.9
1956.1	NA	0.0	205.0	26.0	48.2	335.2
1956.2	NA	0.0	68.0	26.7	49.6	335.2
1957.1	NA	27.0	0.0	28.5	52.3	338.0
1957.2	NA	76.0	0.0	29.1	52.6	338.0
1958.1	NA	30.0	118.0	29.2	56.4	329.1
1958.2	NA	24.0	324.0	29.4	56.2	329.1
1959.1	NA	21.0	22.0	28.6	54.7	346.6
1959.2	NA	49.0	18.0	29.1	55.2	346.6
1960.1	4.6	265.0	97.0	29.3	56.8	355.4
1960.2	6.2	248.0	212.0	30.1	57.5	355.4
1961.1	8.6	44.0	108.0	32.4	59.9	357.2
1961.2	8.8	16.0	143.0	32.9	60.5	357.2
1962.1	9.4	18.0	221.0	33.2	64.4	377.2
1962.2	10.0	6.0	331.0	33.2	66.1	377.2
1963.1	8.9	0.0	257.0	34.8	67.1	402.9
1963.2	9.8	0.0	323.0	35.9	71.9	402.9
1964.1	10.3	32.0	379.0	37.5	73.0	425.9
1964.2	9.4	93.0	493.0	38.3	75.0	425.9
1965.1	9.8	78.0	705.0	37.7	77.0	455.7
1965.2	9.2	27.0	288.0	38.9	80.2	455.7
1966.1	9.2	2.0	38.0	41.3	81.8	484.0
1966.2	13.0	1.0	38.0	41.5	83.5	484.0
1967.1	17.9	17.0	256.0	41.5	86.8	505.8
1967.2	15.1	49.0	698.0	42.8	90.2	505.8
1968.1	13.8	170.0	754.0	44.3	93.6	530.5
1968.2	12.2	143.0	1245.0	44.6	94.4	530.5
1969.1	12.0	15.0	1498.0	46.2	99.9	570.2
1969.2	17.1	31.0	1302.0	47.3	99.8	570.2
1970.1	21.0	454.0	847.0	48.9	105.8	576.2
1970.2	14.9	1110.0	665.0	50.6	107.9	576.2
1971.1	15.2	343.0	877.0	52.9	112.6	593.1
1971.2	13.6	180.0	833.0	53.8	114.2	593.1
1972.1	10.7	264.0	638.0	54.8	119.7	631.6
1972.2	8.9	98.0	727.0	55.8	119.9	631.6
1973.1	11.0	11.0	777.0	58.5	127.2	680.4
1973.2	12.1	11.0	1440.0	63.6	134.0	680.4
1974.1	10.7	104.0	2313.0	64.3	137.0	692.6
1974.2	11.0	264.0	3100.0	64.5	140.8	692.6
1975.1	12.0	129.0	2706.0	60.7	132.5	648.4
1975.2	19.8	189.0	1326.0	60.0	138.1	648.4
1976.1	23.0	610.0	700.0	58.5	148.9	678.1
1976.2	27.1	210.0	312.0	59.5	157.3	678.1
1977.1	26.0	3.0	267.0	59.4	153.4	719.3
1977.2	23.0	1.0	266.0	60.5	161.6	719.3
1978.1	20.0	29.0	485.0	61.5	175.1	774.7
1978.2	16.6	15.0	514.0	63.9	185.7	774.7
1979.1	15.6	0.0	278.0	65.8	191.9	821.7
1979.2	12.3	0.0	322.0	68.4	198.1	821.7
1980.1	12.0	435.0	508.0	69.3	202.7	847.5
1980.2	12.0	1299.0	837.0	71.1	209.6	847.5
1981.1	11.0	366.0	626.0	70.9	213.9	873.4
1981.2	10.9	147.0	1129.0	72.2	216.8	873.4
1982.1	14.1	69.0	2211.0	72.5	220.2	885.9
1982.2	15.1	66.0	2741.0	73.3	226.1	885.9
1983.1	14.0	230.0	1398.0	73.9	229.1	910.6
1983.2	10.8	244.0	1316.0	75.2	235.2	910.6
1984.1	11.9	100.0	1632.0	79.6	250.8	972.5
1984.2	12.3	52.0	2775.0	84.9	259.8	1034.7
1985.1	15.4	44.0	4142.0	88.0	270.0	1063.0
1985.2	17.3	62.0	4405.0	90.6	280.4	1092.1
1986.1	18.8	90.0	2662.0	91.7	279.6	1103.4
1986.2	18.5	229.0	2323.0	95.4	306.7	1147.3
1987.1	18.0	946.0	3433.0	96.6	315.7	1165.4
1987.2	17.5	536.0	3064.0	98.9	321.4	1176.9
1988.1	17.5	46.0	1984.0	99.5	328.2	1190.8
1988.2	17.2	46.0	1984.0	99.4	329.8	1185.7

BOSTON

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1768.0	11159.0	71.3	233.4	NA
1955.2	NA	587.0	3724.0	71.6	233.8	NA
1956.1	NA	0.0	0.0	73.0	235.7	NA
1956.2	NA	0.0	0.0	75.1	236.5	NA
1957.1	NA	14.0	16.0	78.6	237.0	NA
1957.2	NA	36.0	44.0	79.2	240.5	NA
1958.1	3.1	11.0	24.0	79.5	241.6	NA
1958.2	3.6	4.0	8.0	78.9	242.8	NA
1959.1	4.5	0.0	0.0	76.2	247.0	1089.1
1959.2	5.4	0.0	0.0	76.5	246.7	1089.1
1960.1	6.0	50.0	141.0	81.0	250.0	1102.9
1960.2	8.3	50.0	401.0	82.0	252.7	1102.9
1961.1	4.7	0.0	36.0	83.5	255.4	1110.1
1961.2	6.8	0.0	14.0	84.9	258.8	1110.1
1962.1	4.5	0.0	14.0	85.3	265.4	1121.8
1962.2	4.6	0.0	18.0	85.7	265.8	1121.8
1963.1	6.2	46.0	28.0	83.4	278.4	1121.2
1963.2	7.4	125.0	52.0	83.4	281.6	1121.2
1964.1	11.0	16.0	38.0	83.7	289.5	1123.8
1964.2	9.2	6.0	99.0	84.7	293.3	1123.8
1965.1	8.3	6.0	453.0	84.7	292.6	1157.3
1965.2	8.4	2.0	1092.0	85.6	299.5	1157.3
1966.1	7.0	0.0	948.0	85.5	298.4	1209.2
1966.2	7.5	0.0	489.0	90.0	313.2	1209.2
1967.1	7.6	11.0	183.0	92.0	321.3	1249.7
1967.2	5.0	29.0	159.0	94.7	326.4	1249.7
1968.1	3.4	12.0	440.0	96.2	326.5	1277.9
1968.2	2.7	7.0	647.0	98.5	327.7	1277.9
1969.1	2.9	3.0	288.0	100.6	327.2	1314.8
1969.2	1.8	9.0	475.0	103.8	327.8	1314.8
1970.1	1.6	74.0	1185.0	106.0	329.9	1313.1
1970.2	2.4	189.0	1986.0	105.4	329.6	1313.1
1971.1	4.2	132.0	1398.0	105.6	332.8	1274.7
1971.2	5.0	44.0	927.0	104.9	334.1	1274.7
1972.1	6.3	0.0	619.0	104.8	336.2	1284.0
1972.2	3.7	0.0	721.0	105.9	335.4	1284.0
1973.1	4.8	16.0	1495.0	106.7	355.7	1320.7
1973.2	5.0	16.0	1659.0	108.1	357.5	1320.7
1974.1	6.0	0.0	1045.0	107.4	363.1	1337.2
1974.2	7.1	0.0	608.0	106.0	368.1	1337.2
1975.1	7.8	5.0	412.0	103.0	363.9	1284.9
1975.2	9.0	14.0	562.0	102.2	366.2	1284.9
1976.1	11.5	142.0	1706.0	101.1	367.5	1304.5
1976.2	12.2	318.0	1420.0	100.7	372.7	1304.5
1977.1	15.1	96.0	461.0	105.1	383.5	1340.4
1977.2	13.6	45.0	212.0	108.8	395.4	1340.4
1978.1	10.1	56.0	228.0	111.3	415.1	1417.6
1978.2	9.0	22.0	238.0	112.1	433.0	1417.6
1979.1	7.0	3.0	257.0	113.5	451.7	1485.0
1979.2	5.5	5.0	474.0	116.4	458.5	1485.0
1980.1	3.1	49.0	608.0	120.2	469.0	1526.8
1980.2	3.3	140.0	1215.0	121.9	475.8	1526.8
1981.1	2.6	193.0	1659.0	123.2	489.0	1550.0
1981.2	3.1	177.0	1995.0	126.0	491.9	1555.0
1982.1	5.2	81.0	1464.0	128.5	497.4	1555.3
1982.2	4.2	77.0	1180.0	129.8	503.5	1555.3
1983.1	6.9	98.0	917.0	130.3	513.3	1570.1
1983.2	7.4	230.0	1448.0	133.6	521.8	1570.1
1984.1	7.4	638.0	2709.0	134.6	535.9	1604.8
1984.2	11.9	785.0	4247.0	136.5	553.7	1671.8
1985.1	13.9	327.0	3525.0	145.4	579.8	1741.7
1985.2	14.2	172.0	2586.0	151.5	592.8	1765.8
1986.1	14.5	208.0	1861.0	155.5	604.8	1792.7
1986.2	13.9	122.0	1824.0	159.9	617.0	1816.9
1987.1	13.3	97.0	2575.0	163.3	628.4	1838.3
1987.2	14.0	58.0	3291.0	167.1	646.4	1861.1
1988.1	13.7	55.0	3033.0	173.4	656.0	1873.0
1988.2	13.7	55.0	3033.0	174.7	666.0	1883.0

CHICAGO

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	650.0	9532.0	137.7	296.9	2012.6
1955.2	NA	1950.0	28597.0	137.5	300.7	2012.6
1956.1	NA	2.0	0.0	141.0	312.9	2087.1
1956.2	NA	0.0	0.0	142.0	318.5	2087.1
1957.1	NA	0.0	111.0	140.9	331.9	2102.4
1957.2	NA	0.0	332.0	142.9	334.5	2102.4
1958.1	NA	53.0	606.0	141.9	333.6	2005.1
1958.2	NA	153.0	253.0	141.2	335.2	2005.1
1959.1	NA	35.0	19.0	142.7	328.0	2049.3
1959.2	NA	25.0	24.0	139.4	328.6	2049.3
1960.1	4.9	48.0	514.0	136.8	330.3	2067.0
1960.2	4.8	55.0	771.0	139.0	332.2	2067.0
1961.1	6.9	39.0	48.0	141.1	328.2	2033.7
1961.2	8.3	39.0	52.0	141.3	332.1	2033.7
1962.1	7.4	74.0	427.0	144.5	339.8	2069.8
1962.2	7.0	26.0	1031.0	144.9	345.1	2069.8
1963.1	7.5	0.0	670.0	146.3	357.6	2076.9
1963.2	7.6	0.0	395.0	147.1	365.8	2076.9
1964.1	7.4	0.0	182.0	146.7	363.5	2121.3
1964.2	6.7	0.0	283.0	146.3	370.5	2121.3
1965.1	6.7	4.0	1051.0	146.8	377.3	2216.4
1965.2	9.8	4.0	1649.0	147.2	386.8	2216.4
1966.1	8.1	0.0	712.0	148.2	394.5	2329.7
1966.2	5.6	0.0	478.0	149.4	404.3	2329.7
1967.1	4.5	0.0	586.0	154.7	431.3	2382.6
1967.2	5.2	0.0	666.0	159.9	441.9	2382.6
1968.1	4.4	72.0	539.0	161.0	442.4	2418.8
1968.2	3.4	72.0	1013.0	164.4	458.6	2418.8
1969.1	2.5	0.0	1742.0	165.0	455.3	2463.7
1969.2	1.6	0.0	3223.0	168.9	466.9	2463.7
1970.1	3.6	364.0	2325.0	169.8	464.3	2418.1
1970.2	4.6	1084.0	2284.0	172.9	466.6	2418.1
1971.1	7.3	306.0	2250.0	173.3	465.0	2373.3
1971.2	9.3	185.0	2725.0	176.9	472.0	2373.3
1972.1	9.0	207.0	3637.0	176.0	470.0	2380.1
1972.2	10.4	94.0	3101.0	179.0	482.3	2380.1
1973.1	13.3	22.0	1847.0	172.3	486.3	2447.6
1973.2	15.0	43.0	1766.0	177.1	504.0	2447.6
1974.1	14.0	427.0	3105.0	182.4	507.4	2487.9
1974.2	14.8	1073.0	3083.0	186.2	522.9	2487.9
1975.1	16.9	554.0	2405.0	182.7	517.1	2356.8
1975.2	16.8	301.0	1089.0	184.2	521.3	2356.8
1976.1	16.6	246.0	510.0	182.7	514.7	2381.4
1976.2	15.1	140.0	358.0	187.6	537.5	2381.4
1977.1	13.9	98.0	649.0	186.5	535.1	2421.8
1977.2	11.4	152.0	1025.0	193.7	551.4	2421.8
1978.1	8.1	700.0	841.0	196.0	553.4	2510.1
1978.2	7.3	275.0	1438.0	202.6	573.5	2510.1
1979.1	6.0	6.0	1841.0	205.4	573.6	2575.3
1979.2	4.1	11.0	3516.0	208.9	595.5	2575.3
1980.1	4.7	1245.0	5060.0	209.3	596.5	2580.3
1980.2	4.9	3370.0	4815.0	221.0	615.3	2580.3
1981.1	5.3	252.0	2683.0	228.1	627.4	2550.6
1981.2	6.6	160.0	2169.0	231.4	636.4	2550.6
1982.1	7.0	1187.0	2870.0	228.4	640.4	2478.3
1982.2	8.6	575.0	3552.0	227.7	643.6	2478.3
1983.1	11.0	51.0	3646.0	225.9	667.0	2436.2
1983.2	13.6	23.0	3822.0	224.9	676.1	2436.2
1984.1	13.2	97.0	3450.0	227.7	686.1	2439.4
1984.2	11.9	155.0	3604.0	235.4	719.6	2573.6
1985.1	13.4	79.0	3520.0	241.4	736.9	2579.0
1985.2	13.7	119.0	4629.0	245.6	747.4	2621.1
1986.1	14.9	279.0	5895.0	249.0	749.5	2613.7
1986.2	17.2	309.0	6430.0	253.1	765.5	2624.2
1987.1	15.6	117.0	6201.0	254.3	771.7	2644.0
1987.2	15.7	126.0	3499.0	258.7	783.0	2664.0
1988.1	15.0	345.0	1753.0	261.8	798.1	2715.6
1988.2	13.5	345.0	1753.0	262.2	810.5	2733.7

CINCINNATI

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1989.0	1605.0	NA	NA	NA
1955.2	NA	2773.0	4814.0	NA	NA	NA
1956.1	NA	502.0	0.0	NA	NA	NA
1956.2	NA	168.0	0.0	NA	NA	NA
1957.1	NA	0.0	0.0	NA	NA	NA
1957.2	NA	0.0	0.0	NA	NA	NA
1958.1	NA	0.0	0.0	NA	NA	344.7
1958.2	NA	0.0	0.0	NA	NA	344.7
1959.1	NA	0.0	170.0	18.0	48.5	355.8
1959.2	NA	0.0	170.0	18.2	48.4	355.8
1960.1	8.8	10.0	0.0	17.6	48.5	356.8
1960.2	9.3	10.0	0.0	21.3	50.7	356.8
1961.1	10.1	0.0	0.0	21.2	51.4	344.2
1961.2	8.2	0.0	0.0	21.3	51.0	344.2
1962.1	8.5	0.0	6.0	21.8	52.3	346.1
1962.2	8.9	0.0	18.0	22.3	52.2	346.1
1963.1	9.6	0.0	24.0	21.5	54.8	345.4
1963.2	12.4	0.0	25.0	21.6	54.6	345.4
1964.1	12.3	0.0	16.0	22.1	54.5	362.7
1964.2	17.8	0.0	10.0	22.5	54.4	362.7
1965.1	14.0	2.0	5.0	23.0	58.8	371.7
1965.2	12.0	2.0	11.0	23.7	58.4	371.7
1966.1	11.3	0.0	113.0	23.3	61.0	392.9
1966.2	10.5	0.0	229.0	23.7	61.7	392.9
1967.1	9.3	0.0	46.0	23.2	66.1	404.6
1967.2	7.9	0.0	37.0	23.7	67.6	404.6
1968.1	8.6	0.0	70.0	23.8	69.6	417.4
1968.2	8.6	0.0	157.0	24.2	71.5	417.4
1969.1	6.9	0.0	366.0	24.4	73.9	431.1
1969.2	6.0	0.0	278.0	25.0	75.7	431.1
1970.1	6.9	91.0	87.0	25.6	77.2	433.0
1970.2	4.0	91.0	43.0	26.1	79.7	433.0
1971.1	2.4	0.0	46.0	25.9	79.7	426.2
1971.2	4.3	0.0	74.0	26.4	81.8	426.2
1972.1	8.7	0.0	115.0	26.1	83.8	435.0
1972.2	14.0	0.0	253.0	26.6	87.8	435.0
1973.1	21.0	0.0	585.0	26.6	90.7	456.8
1973.2	21.0	0.0	236.0	26.9	94.5	456.8
1974.1	21.6	0.0	18.0	26.8	94.9	461.7
1974.2	18.2	0.0	12.0	27.5	97.8	461.7
1975.1	16.1	123.0	117.0	27.6	97.3	448.0
1975.2	13.4	123.0	246.0	28.4	97.7	448.0
1976.1	12.0	0.0	117.0	28.5	99.8	458.0
1976.2	11.9	0.0	61.0	28.9	103.0	458.0
1977.1	7.5	0.0	33.0	29.2	104.3	477.2
1977.2	3.6	0.0	50.0	30.2	109.4	477.2
1978.1	4.4	9.0	129.0	29.9	110.7	502.9
1978.2	2.2	19.0	318.0	31.2	116.9	502.9
1979.1	2.6	2.0	562.0	31.5	117.0	518.7
1979.2	4.8	4.0	460.0	32.3	120.3	518.7
1980.1	6.2	37.0	126.0	32.1	121.1	511.2
1980.2	7.5	86.0	178.0	32.7	125.0	511.2
1981.1	9.6	31.0	851.0	32.2	124.4	504.3
1981.2	13.1	23.0	1097.0	32.4	126.8	504.3
1982.1	11.4	50.0	339.0	31.8	126.8	470.4
1982.2	12.7	18.0	161.0	32.2	127.9	490.4
1983.1	12.4	0.0	109.0	32.0	127.8	487.0
1983.2	10.5	0.0	280.0	32.2	132.5	487.0
1984.1	13.0	239.0	923.0	33.1	135.6	505.4
1984.2	16.3	699.0	1640.0	34.4	141.3	531.6
1985.1	17.8	82.0	755.0	35.1	148.4	540.7
1985.2	19.4	27.0	412.0	35.9	153.1	549.4
1986.1	19.8	0.0	335.0	37.0	158.4	557.1
1986.2	18.4	0.0	327.0	38.5	158.6	567.7
1987.1	14.8	38.0	481.0	39.5	163.7	580.2
1987.2	13.2	38.0	633.0	40.5	170.4	593.6
1988.1	14.0	0.0	653.0	41.7	173.2	604.1
1988.2	15.4	0.0	507.0	42.3	176.6	613.9

DALLAS

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	515.0	1372.0	NA	NA	NA
1955.2	NA	1544.0	4115.0	NA	NA	NA
1956.1	NA	0.0	0.0	NA	NA	NA
1956.2	NA	0.0	0.0	NA	NA	NA
1957.1	NA	0.0	70.0	NA	NA	NA
1957.2	NA	0.0	208.0	NA	NA	NA
1958.1	NA	10.0	163.0	NA	NA	336.5
1958.2	NA	30.0	329.0	NA	NA	336.5
1959.1	NA	109.0	885.0	NA	NA	356.6
1959.2	NA	91.0	564.0	30.2	65.0	356.6
1960.1	9.9	17.0	135.0	31.0	65.9	376.5
1960.2	10.6	11.0	55.0	31.9	66.6	376.5
1961.1	8.9	50.0	78.0	32.7	67.3	397.0
1961.2	11.3	18.0	44.0	34.4	68.8	397.0
1962.1	10.3	0.0	27.0	35.9	70.4	415.8
1962.2	9.9	0.0	27.0	36.7	72.7	415.8
1963.1	11.5	38.0	32.0	39.4	75.7	435.7
1963.2	10.5	112.0	84.0	40.2	77.3	435.7
1964.1	13.7	86.0	243.0	40.7	78.8	451.7
1964.2	14.3	145.0	611.0	41.2	80.7	451.7
1965.1	18.3	219.0	844.0	42.0	84.0	474.8
1965.2	17.3	236.0	698.0	42.3	87.3	474.8
1966.1	15.0	199.0	365.0	43.2	88.3	508.0
1966.2	14.5	67.0	217.0	43.8	92.6	508.0
1967.1	17.3	0.0	342.0	46.1	96.4	542.1
1967.2	15.1	0.0	163.0	46.7	99.7	542.1
1968.1	12.6	0.0	39.0	49.6	104.5	567.9
1968.2	12.1	0.0	59.0	50.0	106.9	567.9
1969.1	8.1	112.0	419.0	51.4	108.0	611.8
1969.2	6.4	332.0	842.0	53.0	110.9	611.8
1970.1	4.2	147.0	244.0	57.8	118.0	613.4
1970.2	5.1	84.0	256.0	58.7	121.5	605.6
1971.1	12.6	76.0	442.0	58.5	119.6	601.2
1971.2	24.2	58.0	983.0	59.6	121.5	611.5
1972.1	28.9	61.0	1372.0	61.2	125.0	627.6
1972.2	23.8	54.0	1864.0	63.0	128.9	644.8
1973.1	24.6	72.0	1527.0	64.8	132.0	669.2
1973.2	18.1	33.0	1089.0	66.3	135.9	683.7
1974.1	15.3	6.0	738.0	68.3	138.8	689.4
1974.2	19.0	11.0	877.0	67.8	138.0	680.1
1975.1	15.3	119.0	2211.0	66.8	138.3	666.6
1975.2	17.5	298.0	1502.0	67.5	142.6	680.2
1976.1	16.0	143.0	473.0	68.0	147.2	698.8
1976.2	15.0	78.0	249.0	70.4	149.1	717.2
1977.1	8.3	60.0	336.0	72.5	151.3	736.6
1977.2	9.8	49.0	540.0	74.7	157.0	757.8
1978.1	6.0	55.0	725.0	78.4	166.2	797.2
1978.2	6.0	95.0	1262.0	80.8	173.8	831.6
1979.1	4.7	114.0	1049.0	83.2	180.2	863.4
1979.2	8.8	235.0	1893.0	86.6	187.1	897.9
1980.1	5.4	319.0	2971.0	89.8	193.2	915.8
1980.2	8.0	527.0	4354.0	92.4	200.2	936.4
1981.1	8.3	627.0	3002.0	94.3	211.8	962.3
1981.2	7.6	400.0	3511.0	95.9	217.3	981.3
1982.1	14.1	164.0	4110.0	98.0	225.3	989.0
1982.2	19.3	164.0	5933.0	101.3	233.4	997.0
1983.1	20.8	292.0	7085.0	105.6	240.8	1014.8
1983.2	23.1	738.0	6855.0	110.5	255.7	1059.9
1984.1	21.4	2094.0	4609.0	117.8	272.1	1126.6
1984.2	20.9	2489.0	4790.0	124.7	287.6	1173.5
1985.1	21.7	962.0	6991.0	128.9	293.0	1192.1
1985.2	23.1	496.0	8060.0	130.9	295.9	1202.8
1986.1	25.4	754.0	8071.0	135.8	309.9	1226.4
1986.2	27.6	252.0	4442.0	137.0	304.9	1203.5
1987.1	27.9	0.0	2678.0	133.7	302.0	1182.1
1987.2	27.7	0.0	1324.0	132.1	312.9	1179.8
1988.1	28.2	0.0	1205.0	130.0	318.7	1184.1
1988.2	27.5	0.0	1205.0	126.1	317.1	1171.4

DENVER

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	237.0	757.0	16.0	34.0	NA
1955.2	NA	274.0	2272.0	16.7	36.8	NA
1956.1	NA	69.0	0.0	17.2	37.3	NA
1956.2	NA	26.0	0.0	18.9	37.3	NA
1957.1	NA	7.0	114.0	19.3	38.0	NA
1957.2	NA	14.0	341.0	19.8	39.0	NA
1958.1	NA	165.0	303.0	19.8	40.0	220.4
1958.2	NA	187.0	221.0	20.2	40.0	220.4
1959.1	NA	17.0	123.0	21.9	39.8	236.4
1959.2	NA	10.0	117.0	21.5	44.9	236.4
1960.1	7.2	27.0	275.0	21.3	46.2	249.8
1960.2	6.5	67.0	206.0	21.4	47.4	249.8
1961.1	7.9	126.0	82.0	24.1	55.9	262.5
1961.2	7.1	225.0	52.0	25.0	59.6	262.5
1962.1	11.1	215.0	83.0	23.3	61.3	269.7
1962.2	9.8	128.0	103.0	26.3	62.8	269.7
1963.1	10.8	79.0	70.0	26.0	64.9	272.9
1963.2	10.4	35.0	133.0	26.8	66.7	272.9
1964.1	13.9	20.0	446.0	26.8	66.0	274.4
1964.2	14.9	25.0	334.0	28.9	68.3	274.4
1965.1	16.5	85.0	78.0	29.1	69.7	278.9
1965.2	14.1	111.0	35.0	29.4	70.1	278.9
1966.1	13.5	39.0	82.0	29.4	70.7	295.5
1966.2	13.9	38.0	28.0	29.8	71.6	295.5
1967.1	12.2	94.0	0.0	30.1	75.4	306.6
1967.2	10.1	96.0	0.0	31.2	82.0	306.6
1968.1	7.1	32.0	40.0	32.1	83.0	324.7
1968.2	5.8	47.0	121.0	33.5	86.7	324.7
1969.1	3.7	179.0	146.0	34.2	88.0	344.0
1969.2	3.1	247.0	224.0	36.0	89.3	344.0
1970.1	2.6	91.0	150.0	36.1	91.6	356.6
1970.2	3.7	62.0	246.0	36.1	94.1	356.6
1971.1	5.0	88.0	349.0	37.0	97.4	375.3
1971.2	5.2	108.0	714.0	37.2	97.5	375.3
1972.1	9.0	100.0	1054.0	38.8	99.2	413.4
1972.2	15.4	115.0	1092.0	39.5	101.7	413.4
1973.1	11.7	112.0	575.0	40.9	104.5	446.9
1973.2	9.0	144.0	565.0	42.7	107.6	446.9
1974.1	7.8	193.0	964.0	42.7	110.3	454.2
1974.2	10.0	170.0	1109.0	43.4	112.7	454.2
1975.1	14.8	101.0	998.0	43.4	114.6	444.2
1975.2	17.0	78.0	510.0	43.7	117.6	444.2
1976.1	19.0	200.0	282.0	44.0	118.8	463.1
1976.2	21.9	148.0	160.0	45.5	121.8	463.1
1977.1	14.9	47.0	148.0	46.5	125.8	475.8
1977.2	15.2	56.0	287.0	49.2	131.9	475.5
1978.1	12.0	169.0	766.0	51.8	137.0	544.7
1978.2	9.0	316.0	1404.0	55.0	143.3	544.7
1979.1	7.0	176.0	686.0	55.9	146.2	580.9
1979.2	4.0	241.0	984.0	58.8	151.8	580.9
1980.1	3.0	345.0	1656.0	58.1	155.4	597.8
1980.2	3.2	571.0	2915.0	59.4	161.5	597.8
1981.1	2.7	731.0	2515.0	60.8	165.7	626.7
1981.2	3.2	499.0	3250.0	62.1	169.5	626.7
1982.1	6.8	272.0	3491.0	63.0	170.7	646.0
1982.2	13.4	143.0	4211.0	64.2	172.6	646.0
1983.1	21.4	146.0	4831.0	66.4	176.5	658.4
1983.2	26.2	140.0	3583.0	67.7	182.0	658.4
1984.1	27.5	200.0	2249.0	68.6	187.3	666.8
1984.2	25.7	181.0	1929.0	68.7	189.3	678.8
1985.1	24.2	152.0	3719.0	67.4	191.7	689.1
1985.2	25.8	81.0	2454.0	69.0	195.3	690.2
1986.1	26.0	53.0	1246.0	70.2	198.5	697.5
1986.2	26.5	40.0	502.0	67.8	193.9	669.1
1987.1	26.9	101.0	369.0	67.8	196.8	673.7
1987.2	27.1	34.0	123.0	66.7	195.7	666.1
1988.1	26.8	0.0	0.0	66.6	196.6	671.9
1988.2	24.4	0.0	0.0	65.9	195.2	664.6

HOUSTON

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	409.0	1195.0	NA	NA	NA
1955.2	NA	1226.0	3585.0	NA	NA	NA
1956.1	NA	85.0	805.0	NA	NA	NA
1956.2	NA	30.0	299.0	NA	NA	NA
1957.1	NA	17.0	149.0	NA	NA	NA
1957.2	NA	13.0	56.0	NA	NA	NA
1958.1	NA	27.0	44.0	NA	NA	NA
1958.2	NA	23.0	15.0	NA	NA	NA
1959.1	NA	7.0	0.0	NA	NA	NA
1959.2	NA	16.0	0.0	NA	NA	NA
1960.1	3.0	116.0	189.0	NA	NA	419.7
1960.2	2.7	242.0	564.0	NA	NA	419.7
1961.1	8.2	47.0	170.0	NA	NA	429.0
1961.2	6.0	84.0	232.0	NA	NA	429.0
1962.1	7.6	532.0	663.0	NA	NA	448.0
1962.2	6.2	735.0	777.0	NA	NA	448.0
1963.1	26.9	186.0	354.0	NA	NA	456.0
1963.2	26.8	69.0	199.0	NA	NA	456.0
1964.1	18.0	21.0	198.0	NA	NA	478.2
1964.2	14.0	38.0	209.0	NA	NA	478.2
1965.1	15.6	281.0	270.0	NA	NA	507.3
1965.2	18.4	625.0	382.0	NA	NA	507.3
1966.1	17.9	285.0	297.0	30.4	79.9	545.5
1966.2	11.9	144.0	404.0	30.5	80.8	545.5
1967.1	11.9	78.0	565.0	31.7	88.1	579.1
1967.2	12.2	112.0	597.0	32.4	90.5	579.1
1968.1	13.0	479.0	400.0	34.1	112.8	614.8
1968.2	8.9	420.0	383.0	34.3	115.8	614.8
1969.1	7.5	85.0	422.0	36.9	124.6	654.5
1969.2	2.5	61.0	642.0	38.5	127.4	654.5
1970.1	4.4	156.0	648.0	40.9	136.6	678.0
1970.2	5.0	300.0	1242.0	43.1	138.1	678.0
1971.1	5.9	359.0	2166.0	44.6	142.1	693.4
1971.2	7.7	282.0	2507.0	47.1	145.6	693.4
1972.1	8.8	123.0	1189.0	48.9	151.0	734.1
1972.2	14.0	157.0	1348.0	52.4	159.3	734.1
1973.1	19.0	623.0	2891.0	55.2	166.6	797.7
1973.2	21.0	435.0	3129.0	56.8	174.7	797.7
1974.1	22.7	89.0	1673.0	56.9	181.7	863.8
1974.2	17.0	44.0	1301.0	58.7	187.1	863.8
1975.1	9.5	62.0	1789.0	59.3	190.0	913.9
1975.2	8.6	134.0	1824.0	60.7	199.7	913.9
1976.1	8.0	252.0	1499.0	62.2	206.4	974.0
1976.2	7.8	617.0	1590.0	65.2	212.6	974.0
1977.1	8.6	1130.0	1700.0	67.6	221.0	1042.9
1977.2	8.8	1149.0	2365.0	70.8	232.4	1042.9
1978.1	5.9	496.0	2736.0	74.3	241.2	1138.5
1978.2	5.9	404.0	3363.0	78.1	248.6	1138.5
1979.1	8.8	664.0	2684.0	81.8	256.2	1228.2
1979.2	5.6	843.0	3483.0	85.0	262.6	1228.2
1980.1	7.0	638.0	4211.0	88.3	273.9	1302.0
1980.2	11.5	822.0	6151.0	90.6	286.1	1302.0
1981.1	6.3	1118.0	5783.0	93.2	298.3	1412.3
1981.2	5.7	1402.0	7765.0	97.4	313.1	1412.3
1982.1	8.9	1485.0	8340.0	100.1	323.7	1435.8
1982.2	11.7	827.0	10598.0	102.0	322.3	1435.8
1983.1	17.9	372.0	12640.0	105.6	308.4	1376.0
1983.2	27.1	321.0	9397.0	106.9	315.4	1376.0
1984.1	28.1	737.0	7114.0	107.7	325.5	1296.5
1984.2	27.7	974.0	3812.0	109.1	335.0	1317.7
1985.1	27.0	663.0	2021.0	110.0	341.5	1304.9
1985.2	27.8	563.0	1046.0	113.6	351.5	1315.5
1986.1	28.8	870.0	1705.0	115.7	354.3	1288.5
1986.2	29.8	358.0	593.0	102.7	339.3	1196.1
1987.1	30.8	84.0	37.0	102.1	343.5	1187.8
1987.2	31.8	28.0	12.0	101.2	359.3	1179.2
1988.1	30.6	0.0	0.0	97.5	364.4	1209.5
1988.2	28.6	0.0	0.0	97.7	373.9	1229.9

KANSAS

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1547.0	1142.0	22.4	47.2	NA
1955.2	NA	516.0	3426.0	22.1	47.3	NA
1956.1	NA	0.0	24.0	22.5	48.1	NA
1956.2	NA	0.0	8.0	22.6	48.0	NA
1957.1	NA	22.0	18.0	22.4	48.4	NA
1957.2	NA	22.0	6.0	23.7	49.1	NA
1958.1	NA	0.0	0.0	25.8	50.8	371.7
1958.2	NA	0.0	0.0	26.4	51.3	371.7
1959.1	NA	0.0	60.0	25.0	55.8	386.1
1959.2	NA	0.0	170.0	26.3	56.6	386.1
1960.1	9.4	4.0	34.0	26.6	56.6	386.9
1960.2	9.7	4.0	21.0	27.2	56.5	386.9
1961.1	8.0	0.0	27.0	28.4	57.6	387.1
1961.2	5.8	0.0	55.0	28.3	59.3	387.1
1962.1	5.8	16.0	166.0	23.1	59.4	410.1
1962.2	11.3	16.0	137.0	28.9	62.6	410.1
1963.1	10.0	0.0	35.0	28.9	62.7	416.5
1963.2	10.4	0.0	21.0	29.6	66.1	416.5
1964.1	11.7	0.0	28.0	29.8	66.6	424.0
1964.2	10.1	0.0	70.0	30.7	72.8	424.0
1965.1	14.1	0.0	431.0	30.4	74.3	438.7
1965.2	14.2	0.0	214.0	31.0	75.9	438.7
1966.1	16.7	0.0	11.0	31.3	76.6	461.8
1966.2	20.0	0.0	8.0	32.3	79.7	461.8
1967.1	21.5	6.0	76.0	32.7	81.8	473.4
1967.2	19.0	19.0	210.0	32.7	85.6	473.4
1968.1	20.0	56.0	321.0	33.2	85.9	487.2
1968.2	17.6	40.0	213.0	33.5	88.0	487.2
1969.1	17.4	6.0	53.0	34.4	87.4	499.0
1969.2	17.4	7.0	67.0	35.4	91.4	499.0
1970.1	15.0	96.0	292.0	35.3	95.1	494.1
1970.2	13.0	39.0	624.0	35.8	96.6	494.1
1971.1	11.0	0.0	397.0	35.7	98.9	489.4
1971.2	9.0	0.0	362.0	36.7	99.3	489.4
1972.1	8.2	0.0	432.0	36.1	98.8	503.9
1972.2	8.2	1.0	326.0	37.3	102.7	503.9
1973.1	7.0	2.0	239.0	38.5	105.1	527.3
1973.2	7.0	2.0	186.0	39.7	111.0	527.3
1974.1	7.0	0.0	208.0	39.8	109.6	529.0
1974.2	10.0	0.0	246.0	40.1	114.7	529.0
1975.1	16.0	56.0	301.0	39.4	113.0	516.8
1975.2	19.0	105.0	295.0	39.5	116.4	516.8
1976.1	20.0	3.0	163.0	39.7	119.6	538.0
1976.2	19.0	1.0	273.0	41.1	125.8	538.0
1977.1	18.0	0.0	876.0	42.1	126.4	562.7
1977.2	17.0	0.0	923.0	43.4	131.7	562.7
1978.1	16.0	71.0	318.0	44.4	131.2	591.6
1978.2	15.0	91.0	167.0	45.9	136.6	591.6
1979.1	13.5	0.0	196.0	46.8	139.6	610.5
1979.2	11.8	0.0	224.0	47.5	143.6	610.5
1980.1	8.8	241.0	239.0	47.0	142.4	594.1
1980.2	10.6	241.0	395.0	48.0	145.3	594.1
1981.1	8.7	0.0	596.0	47.7	145.0	589.6
1981.2	7.7	0.0	636.0	48.2	148.1	589.6
1982.1	7.5	5.0	386.0	47.6	145.1	571.5
1982.2	10.7	14.0	334.0	47.5	144.8	571.5
1983.1	10.2	5.0	391.0	46.9	144.4	561.4
1983.2	11.6	8.0	534.0	48.4	148.7	561.4
1984.1	12.5	14.0	572.0	52.0	151.2	595.9
1984.2	12.4	42.0	798.0	52.6	153.1	605.9
1985.1	13.7	389.0	749.0	51.2	158.5	610.3
1985.2	16.1	544.0	1091.0	52.9	160.4	613.7
1986.1	18.3	50.0	1438.0	53.1	156.6	612.3
1986.2	18.5	62.0	1556.0	57.6	167.0	624.1
1987.1	21.0	971.0	1186.0	57.9	168.1	625.6
1987.2	20.7	435.0	970.0	57.9	166.8	618.5
1988.1	20.5	8.0	997.0	58.4	172.7	630.5
1988.2	20.6	8.0	997.0	57.4	169.9	622.0

LOS ANGELES

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	7101.0	8403.0	97.0	282.6	1692.9
1955.2	NA	4087.0	5791.0	100.8	288.9	1692.9
1956.1	NA	107.0	331.0	103.9	293.4	1801.8
1956.2	NA	36.0	116.0	109.5	301.0	1801.8
1957.1	NA	28.0	78.0	111.2	304.7	1857.5
1957.2	NA	55.0	181.0	113.7	315.1	1857.5
1958.1	NA	250.0	519.0	114.4	311.7	1780.1
1958.2	NA	466.0	615.0	116.4	320.9	1780.1
1959.1	NA	192.0	141.0	111.5	310.2	1879.7
1959.2	5.0	144.0	139.0	115.2	323.9	1879.7
1960.1	6.3	267.0	403.0	119.5	324.0	1906.5
1960.2	9.6	127.0	689.0	125.2	350.4	1906.5
1961.1	8.7	28.0	429.0	128.0	369.6	1908.2
1961.2	9.8	20.0	471.0	130.1	381.1	1908.2
1962.1	11.4	191.0	516.0	132.9	385.7	1987.1
1962.2	11.9	223.0	775.0	136.3	395.3	1987.1
1963.1	11.9	40.0	949.0	140.1	404.0	2040.3
1963.2	11.7	36.0	1291.0	143.1	417.6	2040.3
1964.1	12.0	93.0	1362.0	147.2	423.0	2088.0
1964.2	11.5	232.0	1105.0	142.6	402.3	2088.0
1965.1	12.4	621.0	877.0	145.5	406.1	2136.6
1965.2	11.6	400.0	591.0	147.3	424.7	2136.6
1966.1	10.8	87.0	396.0	150.3	430.4	2254.8
1966.2	10.9	42.0	685.0	146.8	456.1	2254.8
1967.1	10.9	69.0	1877.0	147.5	465.9	2315.3
1967.2	12.1	112.0	2975.0	148.7	484.3	2315.3
1968.1	13.0	141.0	1558.0	150.4	487.5	2392.8
1968.2	10.0	218.0	1310.0	155.0	505.7	2392.8
1969.1	9.9	191.0	1636.0	159.0	520.6	2477.0
1969.2	9.9	264.0	1784.0	163.2	537.6	2477.0
1970.1	10.5	427.0	1378.0	167.7	538.2	2423.3
1970.2	11.5	274.0	2033.0	169.7	541.0	2423.3
1971.1	17.0	122.0	3649.0	170.4	528.7	2348.2
1971.2	23.0	56.0	4044.0	174.0	548.3	2348.2
1972.1	23.0	43.0	2430.0	176.0	561.0	2435.8
1972.2	22.0	59.0	1760.0	181.0	577.1	2435.8
1973.1	21.8	109.0	1994.0	184.3	592.7	2570.8
1973.2	18.0	221.0	1973.0	188.1	620.2	2570.8
1974.1	16.0	227.0	2135.0	186.7	617.5	2598.9
1974.2	20.0	310.0	1964.0	187.8	620.8	2598.9
1975.1	23.5	418.0	2088.0	183.7	617.2	2530.2
1975.2	23.0	211.0	1268.0	186.1	638.0	2530.2
1976.1	19.0	63.0	944.0	186.9	648.2	2612.1
1976.2	13.8	47.0	468.0	171.0	668.9	2612.1
1977.1	11.5	103.0	298.0	194.7	687.9	2732.5
1977.2	9.0	237.0	344.0	202.5	719.3	2732.5
1978.1	5.6	365.0	716.0	208.7	744.9	2924.4
1978.2	4.3	589.0	1172.0	216.6	772.5	2924.4
1979.1	4.0	337.0	724.0	220.8	798.7	3082.1
1979.2	2.8	606.0	1115.0	228.9	820.2	3082.1
1980.1	2.7	1777.0	1641.0	233.0	833.5	3109.1
1980.2	2.4	1662.0	3033.0	237.8	826.8	3109.1
1981.1	2.3	534.0	2815.0	239.6	857.1	3151.2
1981.2	3.0	292.0	4435.0	240.7	958.6	3151.2
1982.1	6.9	567.0	5715.0	238.4	957.6	3078.0
1982.2	12.1	332.0	6518.0	237.2	972.8	3078.0
1983.1	16.3	139.0	5482.0	234.2	876.0	3101.1
1983.2	16.9	119.0	3962.0	239.1	890.9	3101.1
1984.1	16.5	234.0	3171.0	248.4	921.0	3188.9
1984.2	16.6	419.0	3103.0	256.8	965.1	3313.6
1985.1	16.9	417.0	3882.0	259.6	972.9	3327.1
1985.2	17.1	520.0	5163.0	263.6	976.9	3351.9
1986.1	16.6	500.0	6045.0	268.2	1000.0	3371.2
1986.2	17.4	523.0	5184.0	276.9	1002.7	3417.7
1987.1	16.9	592.0	3947.0	282.1	1035.5	3483.3
1987.2	16.8	434.0	2693.0	286.1	1050.6	3526.0
1988.1	15.5	270.0	2536.0	290.8	1072.0	3582.6

MIAMI

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	610.0	371.0	12.9	50.2	216.3
1955.2	NA	429.0	1112.0	14.4	50.1	216.3
1956.1	NA	108.0	207.0	15.2	54.6	238.9
1956.2	NA	39.0	69.0	15.8	56.5	238.9
1957.1	NA	23.0	0.0	16.7	65.8	256.8
1957.2	NA	9.0	0.0	16.9	64.6	256.8
1958.1	NA	5.0	42.0	17.1	65.7	260.6
1958.2	NA	6.0	123.0	17.4	63.6	260.6
1959.1	NA	11.0	76.0	20.3	68.1	269.7
1959.2	NA	25.0	44.0	20.3	65.5	269.7
1960.1	7.2	54.0	22.0	20.9	70.5	276.2
1960.2	5.0	40.0	30.0	20.5	67.6	276.2
1961.1	3.5	9.0	121.0	21.5	72.2	275.6
1961.2	5.8	11.0	122.0	21.6	71.2	275.6
1962.1	7.3	68.0	40.0	23.2	75.6	282.5
1962.2	8.4	101.0	13.0	23.4	76.6	282.5
1963.1	8.4	20.0	0.0	24.5	76.7	289.9
1963.2	5.2	25.0	0.0	24.6	76.5	289.9
1964.1	7.2	115.0	126.0	24.8	77.4	301.0
1964.2	7.1	170.0	375.0	24.6	80.2	301.0
1965.1	12.0	50.0	141.0	26.2	82.8	321.9
1965.2	15.5	50.0	134.0	26.4	84.1	321.9
1966.1	17.0	126.0	259.0	26.7	90.6	340.3
1966.2	20.0	159.0	199.0	26.7	88.6	340.3
1967.1	14.5	110.0	89.0	26.7	92.6	369.2
1967.2	13.0	51.0	72.0	26.6	93.3	369.2
1968.1	12.0	21.0	151.0	29.1	100.2	401.0
1968.2	10.0	25.0	150.0	29.5	108.4	401.0
1969.1	8.3	63.0	61.0	31.5	113.2	434.9
1969.2	4.4	166.0	99.0	31.7	118.6	434.9
1970.1	4.5	413.0	257.0	34.0	121.4	452.4
1970.2	4.2	387.0	564.0	34.7	126.0	452.4
1971.1	3.8	109.0	492.0	35.6	127.3	465.4
1971.2	3.6	92.0	624.0	36.8	134.4	465.4
1972.1	4.0	347.0	584.0	39.1	132.0	507.2
1972.2	5.5	226.0	748.0	39.9	138.7	507.2
1973.1	9.0	34.0	897.0	41.6	137.2	548.0
1973.2	12.0	48.0	949.0	42.2	146.8	548.0
1974.1	16.0	613.0	1007.0	43.4	142.4	548.9
1974.2	20.8	550.0	483.0	42.7	151.7	548.9
1975.1	22.0	49.0	227.0	41.9	138.2	508.3
1975.2	23.0	17.0	94.0	41.1	148.1	508.3
1976.1	20.0	0.0	90.0	41.5	144.8	516.9
1976.2	16.0	0.0	51.0	42.2	158.0	516.9
1977.1	14.0	47.0	49.0	43.0	151.6	536.4
1977.2	12.0	140.0	46.0	43.7	154.4	536.4
1978.1	10.2	145.0	60.0	45.4	161.3	571.4
1978.2	3.8	55.0	60.0	46.2	166.9	571.4
1979.1	2.5	4.0	28.0	46.1	173.0	607.2
1979.2	2.7	6.0	66.0	48.6	174.6	607.2
1980.1	1.5	139.0	341.0	50.5	181.0	643.9
1980.2	1.4	279.0	836.0	53.1	186.5	643.9
1981.1	2.1	28.0	496.0	55.3	187.0	665.2
1981.2	4.2	23.0	582.0	55.8	191.5	665.2
1982.1	5.3	96.0	631.0	55.0	184.5	649.1
1982.2	8.0	165.0	993.0	53.8	188.3	649.1
1983.1	10.0	73.0	1385.0	56.3	192.4	650.6
1983.2	11.6	89.0	1422.0	57.0	192.8	650.6
1984.1	13.6	201.0	713.0	59.5	213.0	678.0
1984.2	15.3	198.0	800.0	60.9	212.8	691.7
1985.1	18.1	86.0	1085.0	62.2	214.9	693.1
1985.2	20.3	70.0	1067.0	63.9	220.2	708.7
1986.1	22.0	195.0	724.0	64.5	221.9	707.9
1986.2	21.2	66.0	934.0	66.1	223.3	708.5
1987.1	23.4	0.0	2218.0	66.7	222.2	710.4
1987.2	23.4	0.0	1378.0	68.2	226.2	726.8
1988.1	24.5	0.0	312.0	68.4	223.8	723.2
1988.2	24.3	0.0	312.0	68.1	229.6	728.4

MINNEAPOLIS

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1493.0	2068.0	34.1	64.8	521.6
1955.2	NA	1970.0	6203.0	34.8	66.0	521.6
1956.1	NA	32.0	0.0	32.4	67.9	542.4
1956.2	NA	12.0	0.0	33.1	68.9	542.4
1957.1	NA	58.0	0.0	33.6	69.5	553.0
1957.2	NA	28.0	0.0	35.2	74.8	553.0
1958.1	NA	5.0	96.0	35.2	75.7	557.2
1958.2	NA	3.0	96.0	34.7	75.5	557.2
1959.1	NA	4.0	0.0	34.8	80.2	576.9
1959.2	NA	9.0	0.0	35.5	81.0	576.9
1960.1	5.1	15.0	121.0	36.3	85.1	592.8
1960.2	6.6	24.0	352.0	36.7	85.9	592.8
1961.1	4.9	12.0	31.0	36.6	85.2	595.2
1961.2	4.5	23.0	50.0	38.6	98.2	595.2
1962.1	3.4	121.0	967.0	39.5	102.4	618.7
1962.2	5.4	79.0	333.0	39.9	105.5	618.7
1963.1	8.9	10.0	0.0	40.8	110.1	628.0
1963.2	9.2	4.0	0.0	40.3	111.0	628.0
1964.1	9.8	0.0	0.0	40.1	112.8	641.0
1964.2	8.8	0.0	0.0	39.8	114.3	641.0
1965.1	7.9	2.0	91.0	40.5	116.6	675.1
1965.2	8.3	2.0	265.0	40.8	119.8	675.1
1966.1	6.8	0.0	35.0	41.1	125.4	720.3
1966.2	7.2	0.0	64.0	42.1	127.7	720.3
1967.1	5.9	3.0	449.0	43.2	133.7	752.5
1967.2	5.4	7.0	872.0	44.8	136.8	752.5
1968.1	4.9	11.0	286.0	46.0	144.3	785.7
1968.2	5.1	26.0	164.0	46.6	144.5	785.7
1969.1	4.8	26.0	186.0	47.3	151.8	826.2
1969.2	7.8	51.0	202.0	48.1	154.2	826.2
1970.1	6.0	100.0	190.0	50.9	163.9	817.2
1970.2	5.8	88.0	337.0	51.5	168.5	817.2
1971.1	5.7	29.0	654.0	51.0	167.1	797.8
1971.2	5.8	31.0	722.0	51.1	167.6	797.8
1972.1	9.7	99.0	397.0	52.1	159.4	818.7
1972.2	12.1	129.0	244.0	53.3	162.6	818.7
1973.1	13.0	38.0	194.0	54.9	166.3	870.5
1973.2	11.8	66.0	289.0	56.4	173.3	870.5
1974.1	11.1	243.0	749.0	56.1	175.4	892.8
1974.2	10.3	516.0	731.0	56.9	180.8	892.8
1975.1	10.0	430.0	313.0	56.8	182.9	870.8
1975.2	10.3	213.0	146.0	56.8	188.8	870.8
1976.1	11.5	91.0	153.0	57.3	189.9	894.6
1976.2	12.0	55.0	82.0	58.4	194.2	894.6
1977.1	8.2	79.0	57.0	62.3	203.9	948.6
1977.2	8.7	134.0	58.0	64.0	210.3	948.6
1978.1	5.8	164.0	74.0	64.6	217.7	1008.4
1978.2	4.8	276.0	166.0	67.2	227.3	1008.4
1979.1	3.1	364.0	234.0	68.4	233.8	1068.9
1979.2	1.2	416.0	618.0	70.2	242.2	1068.9
1980.1	1.4	430.0	1990.0	70.9	245.9	1085.5
1980.2	1.5	169.0	2618.0	72.8	255.3	1085.5
1981.1	2.8	35.0	817.0	74.0	256.1	1085.6
1981.2	3.6	19.0	669.0	75.1	258.2	1085.6
1982.1	8.3	49.0	1498.0	75.0	258.4	1060.5
1982.2	9.8	92.0	1573.0	74.8	262.3	1060.5
1983.1	11.5	134.0	1014.0	76.1	263.4	1059.5
1983.2	13.2	83.0	626.0	78.4	274.3	1059.5
1984.1	12.1	33.0	433.0	80.1	281.6	1008.4
1984.2	12.4	17.0	565.0	81.8	293.6	1061.7
1985.1	14.1	16.0	1752.0	83.6	297.1	1054.0
1985.2	16.8	34.0	2306.0	86.4	300.6	1066.2
1986.1	17.6	129.0	984.0	88.7	307.6	1071.9
1986.2	17.4	233.0	936.0	91.8	308.5	1081.1
1987.1	16.7	138.0	1631.0	92.1	316.5	1094.0
1987.2	20.1	51.0	2027.0	93.6	325.6	1114.8
1988.1	18.9	12.0	1493.0	96.0	328.5	1133.1
1988.2	20.4	12.0	1493.0	96.6	338.3	1141.7

NEW YORK

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	6328.0	29412.0	356.8	609.0	3308.9
1955.2	NA	10730.0	83702.0	357.6	615.0	3308.9
1956.1	NA	975.0	3358.0	366.9	620.2	3379.1
1956.2	NA	328.0	1180.0	365.7	684.3	3379.1
1957.1	1.0	0.0	1239.0	374.9	633.6	3388.1
1957.2	1.0	0.0	1381.0	374.9	639.7	3388.1
1958.1	1.5	283.0	2588.0	379.6	660.8	3295.9
1958.2	1.5	848.0	3070.0	382.9	667.8	3295.9
1959.1	2.0	635.0	1813.0	382.2	623.3	3346.6
1959.2	2.0	732.0	1881.0	374.6	627.9	3346.6
1960.1	2.3	910.0	2942.0	394.2	651.8	3367.2
1960.2	2.5	396.0	3149.0	398.1	662.4	3367.2
1961.1	2.5	421.0	2450.0	403.2	687.7	3350.6
1961.2	2.8	141.0	1780.0	408.6	675.2	3350.6
1962.1	2.8	0.0	1402.0	412.7	690.2	3377.6
1962.2	2.9	0.0	1761.0	411.8	678.4	3377.6
1963.1	4.0	0.0	2994.0	413.4	707.7	3346.1
1963.2	4.6	0.0	3715.0	414.8	715.8	3346.1
1964.1	6.0	201.0	3307.0	407.7	731.1	3378.1
1964.2	5.0	599.0	1586.0	408.0	741.9	3378.1
1965.1	4.0	310.0	633.0	408.6	752.7	3390.0
1965.2	3.5	104.0	336.0	411.6	765.2	3390.0
1966.1	3.5	0.0	1217.0	409.7	779.6	3417.4
1966.2	3.0	0.0	2292.0	414.8	787.1	3417.4
1967.1	3.0	442.0	2066.0	418.8	805.2	3453.2
1967.2	2.6	442.0	2807.0	429.5	813.8	3453.2
1968.1	0.1	0.0	2800.0	436.4	834.1	3501.2
1968.2	0.5	0.0	3771.0	449.9	846.3	3501.2
1969.1	0.3	398.0	3917.0	471.1	859.8	3567.4
1969.2	0.3	398.0	5043.0	475.7	875.6	3567.4
1970.1	0.3	0.0	4803.0	486.5	900.4	3500.6
1970.2	0.6	0.0	6184.0	482.6	905.9	3500.6
1971.1	1.5	0.0	6679.0	477.9	887.4	3356.6
1971.2	3.0	0.0	8300.0	474.5	880.8	3356.6
1972.1	5.3	649.0	10417.0	463.4	861.5	3322.3
1972.2	8.0	649.0	6643.0	462.1	868.7	3322.3
1973.1	10.4	0.0	4301.0	456.1	879.1	3295.1
1973.2	12.0	0.0	1489.0	448.4	878.2	3295.1
1974.1	13.0	0.0	168.0	445.3	878.6	3190.9
1974.2	14.0	0.0	83.0	441.9	873.9	3190.9
1975.1	15.0	0.0	843.0	438.2	867.5	3032.0
1975.2	15.0	0.0	284.0	438.7	861.3	3032.0
1976.1	15.0	0.0	0.0	433.9	863.2	3009.5
1976.2	14.0	0.0	0.0	434.7	867.9	3009.5
1977.1	13.2	0.0	438.0	431.4	877.3	3012.7
1977.2	11.7	0.0	1304.0	434.5	890.3	3012.7
1978.1	10.0	0.0	246.0	433.2	913.6	3065.2
1978.2	6.9	0.0	82.0	440.9	935.7	3065.2
1979.1	5.0	0.0	0.0	444.9	954.6	3122.6
1979.2	3.1	0.0	0.0	454.7	981.2	3122.6
1980.1	1.9	0.0	65.0	462.3	994.4	3156.8
1980.2	1.3	0.0	195.0	476.0	1019.6	3156.8
1981.1	1.8	0.0	794.0	489.5	1042.2	3221.9
1981.2	2.0	0.0	2061.0	501.2	1059.3	3221.9
1982.1	3.2	293.0	1729.0	505.6	1066.1	3216.6
1982.2	3.9	875.0	2654.0	511.9	1077.6	3216.6
1983.1	5.5	858.0	3652.0	513.8	1091.0	3214.4
1983.2	6.0	286.0	3376.0	524.3	1108.2	3214.4
1984.1	6.2	0.0	2178.0	531.5	1135.2	3273.7
1984.2	7.4	0.0	1567.0	534.1	1150.6	3344.6
1985.1	8.4	576.0	1724.0	538.4	1163.6	3335.9
1985.2	8.3	1724.0	1843.0	544.3	1180.3	3361.3
1986.1	9.2	730.0	1756.0	553.1	1199.4	3389.0
1986.2	9.1	731.0	2525.0	567.4	1220.0	3614.2
1987.1	8.7	1396.0	4532.0	574.7	1239.4	3420.7
1987.2	9.7	913.0	3039.0	585.0	1253.6	3458.4
1988.1	10.9	300.0	930.0	585.5	1275.2	3484.7
1988.2	11.9	300.0	930.0	583.5	1274.1	3484.6

OKLAHOMA

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	91.0	818.0	7.1	18.1	108.5
1955.2	NA	101.0	2453.0	7.6	19.0	108.5
1956.1	NA	3.0	0.0	7.7	19.4	110.4
1956.2	NA	2.0	0.0	7.8	19.4	110.4
1957.1	NA	12.0	51.0	7.8	19.6	109.3
1957.2	NA	10.0	147.0	8.0	20.2	109.3
1958.1	NA	3.0	43.0	8.0	20.3	115.9
1958.2	NA	1.0	15.0	8.1	19.9	115.9
1959.1	NA	0.0	0.0	9.0	21.0	123.6
1959.2	NA	0.0	0.0	9.2	20.9	123.6
1960.1	14.0	8.0	23.0	9.2	22.5	128.5
1960.2	13.1	16.0	23.0	9.2	22.6	128.5
1961.1	11.9	4.0	0.0	10.0	23.8	130.8
1961.2	9.8	2.0	0.0	10.0	24.0	130.8
1962.1	10.5	3.0	0.0	10.5	26.0	137.4
1962.2	12.8	2.0	0.0	[illegible].5	26.0	137.4
1963.1	13.2	2.0	0.0	11.4	27.3	142.8
1963.2	14.2	2.0	0.0	11.4	27.6	142.8
1964.1	17.4	4.0	51.0	12.6	29.9	148.8
1964.2	16.9	7.0	140.0	12.6	30.2	148.5
1965.1	16.7	6.0	53.0	12.7	32.8	154.3
1965.2	21.3	4.0	63.0	12.9	32.8	154.3
1966.1	15.3	3.0	213.0	13.1	33.7	159.1
1966.2	15.3	2.0	72.0	13.1	33.9	159.1
1967.1	18.0	2.0	0.0	13.5	34.8	161.6
1967.2	21.6	5.0	0.0	13.7	34.6	161.6
1968.1	19.6	8.0	5.0	13.8	36.3	167.8
1968.2	20.7	20.0	15.0	14.2	37.1	167.8
1969.1	9.0	42.0	88.0	14.4	39.4	180.0
1969.2	1.8	72.0	224.0	14.9	40.0	180.0
1970.1	2.6	63.0	118.0	15.8	41.5	196.6
1970.2	5.7	30.0	158.0	16.0	41.6	196.6
1971.1	9.0	6.0	280.0	16.4	43.3	203.0
1971.2	13.0	15.0	373.0	17.2	43.9	203.0
1972.1	12.1	262.0	249.0	17.0	44.8	215.1
1972.2	10.0	522.0	267.0	17.6	46.1	215.1
1973.1	9.0	72.0	376.0	18.4	47.1	227.3
1973.2	9.5	31.0	376.0	19.2	48.0	227.3
1974.1	14.0	64.0	365.0	19.1	48.7	234.9
1974.2	20.6	34.0	152.0	19.3	50.6	234.9
1975.1	23.9	11.0	52.0	19.1	51.5	230.7
1975.2	15.9	13.0	21.0	19.2	52.7	230.7
1976.1	14.0	68.0	33.0	19.4	54.5	237.8
1976.2	12.1	78.0	11.0	19.8	55.7	237.8
1977.1	12.1	14.0	0.0	20.2	57.7	252.8
1977.2	12.0	17.0	0.0	20.8	60.5	252.8
1978.1	10.3	74.0	39.0	21.4	64.1	278.3
1978.2	8.0	127.0	116.0	22.1	67.4	278.3
1979.1	5.9	63.0	126.0	22.1	70.1	296.4
1979.2	4.0	37.0	253.0	23.0	71.8	296.4
1980.1	2.5	38.0	315.0	23.6	73.9	312.2
1980.2	2.0	28.0	483.0	24.4	74.7	312.2
1981.1	1.5	24.0	326.0	25.0	75.4	331.6
1981.2	2.8	42.0	600.0	25.4	79.0	331.6
1982.1	7.2	118.0	1807.0	25.8	83.9	350.5
1982.2	9.3	87.0	1288.0	26.9	86.5	350.5
1983.1	10.8	22.0	278.0	26.2	83.9	359.9
1983.2	16.8	14.0	102.0	26.6	85.1	359.9
1984.1	21.0	45.0	808.0	26.5	85.7	336.3
1984.2	22.3	42.0	483.0	26.9	85.[illegible]	338.9
1985.1	22.4	13.0	103.0	26.2	87.4	311.5
1985.2	22.1	17.0	52.0	26.3	88.5	309.[illegible]
1986.1	24.3	107.0	194.0	25.7	86.4	316.0
1986.2	22.9	45.0	66.0	25.0	88.5	307.7
1987.1	24.7	2.0	0.0	25.1	87.7	305.2
1987.2	27.3	0.0	0.0	24.6	88.9	304.5
1988.1	27.7	0.0	63.0	24.1	87.5	303.1
1988.2	28.9	0.0	63.0	24.0	92.5	305.8

PHILADELPHIA

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1637.0	8678.0	NA	NA	1295.4
1955.2	NA	569.0	7952.0	NA	NA	1295.4
1956.1	NA	0.0	394.0	NA	NA	1308.0
1956.2	NA	0.0	135.0	NA	NA	1308.0
1957.1	NA	79.0	107.0	NA	NA	1312.9
1957.2	NA	79.0	48.0	NA	NA	1312.9
1958.1	NA	0.0	33.0	80.8	197.5	1268.2
1958.2	NA	0.0	43.0	80.8	198.8	1268.2
1959.1	NA	0.0	83.0	78.8	194.6	1290.7
1959.2	NA	0.0	175.0	78.7	201.5	1290.7
1960.1	11.3	258.0	346.0	81.0	207.4	1304.8
1960.2	9.5	258.0	117.0	82.6	212.2	1304.8
1961.1	8.0	0.0	0.0	83.7	219.3	1297.7
1961.2	7.3	0.0	0.0	83.4	223.6	1297.7
1962.1	6.7	11.0	25.0	85.0	224.3	1312.6
1962.2	6.6	24.0	76.0	85.1	230.1	1312.6
1963.1	8.9	6.0	318.0	85.5	234.5	1305.4
1963.2	8.9	3.0	215.0	86.2	242.2	1305.4
1964.1	10.9	1.0	21.0	86.9	240.5	1318.6
1964.2	10.3	4.0	24.0	86.9	243.7	1318.6
1965.1	11.2	332.0	214.0	88.4	242.2	1368.2
1965.2	11.0	393.0	506.0	88.7	244.4	1368.2
1966.1	9.1	4.0	243.0	91.2	256.5	1423.4
1966.2	9.1	3.0	193.0	91.7	261.8	1423.4
1967.1	5.8	60.0	166.0	91.4	276.4	1458.6
1967.2	5.0	163.0	285.0	94.3	281.6	1458.6
1968.1	5.3	97.0	590.0	96.8	285.7	1496.2
1968.2	4.5	64.0	850.0	99.9	289.4	1496.2
1969.1	3.3	30.0	591.0	100.4	308.1	1528.4
1969.2	3.0	63.0	362.0	103.0	309.9	1528.4
1970.1	2.7	399.0	239.0	106.1	324.5	1509.9
1970.2	6.4	479.0	270.0	107.0	328.0	1509.9
1971.1	6.9	86.0	404.0	107.1	327.1	1476.1
1971.2	6.9	48.0	817.0	109.1	338.1	1476.1
1972.1	7.9	133.0	1317.0	109.2	340.0	1507.2
1972.2	7.9	113.0	1314.0	111.7	345.2	1507.2
1973.1	7.6	36.0	615.0	111.8	351.7	1534.7
1973.2	8.6	60.0	608.0	113.1	354.6	1534.7
1974.1	10.8	318.0	886.0	112.9	354.4	1521.8
1974.2	13.4	402.0	1627.0	113.8	354.8	1521.8
1975.1	13.8	107.0	3084.0	111.5	360.7	1462.4
1975.2	15.8	47.0	1636.0	111.6	371.6	1462.4
1976.1	16.0	50.0	443.0	111.6	382.3	1485.2
1976.2	13.4	44.0	189.0	112.4	388.1	1485.2
1977.1	10.6	60.0	72.0	116.1	393.8	1512.2
1977.2	11.5	64.0	61.0	119.1	403.8	1512.2
1978.1	10.1	80.0	174.0	121.7	406.9	1562.1
1978.2	9.0	29.0	252.0	124.9	422.3	1562.1
1979.1	8.7	3.0	93.0	126.6	430.7	1599.8
1979.2	2.9	2.0	191.0	127.8	441.4	1599.8
1980.1	3.3	16.0	667.0	127.9	448.4	1598.3
1980.2	5.0	40.0	1620.0	130.4	457.3	1598.3
1981.1	7.6	22.0	1593.0	131.3	465.1	1609.7
1981.2	8.9	43.0	1516.0	132.1	472.2	1609.7
1982.1	8.4	118.0	1114.0	130.2	481.0	1584.1
1982.2	9.2	155.0	958.0	130.7	487.9	1584.1
1983.1	9.8	51.0	1019.0	130.9	499.0	1577.5
1983.2	9.6	61.0	1276.0	132.4	508.5	1577.5
1984.1	10.3	175.0	1434.0	137.1	519.7	[illegible]
1984.2	11.5	106.0	1038.0	140.5	541.6	[illegible]
1985.1	11.2	58.0	1743.0	144.7	548.5	[illegible]
1985.2	14.1	34.0	2060.0	148.1	564.4	[illegible]
1986.1	14.6	30.0	2281.0	149.4	569.9	[illegible]
1986.2	14.4	47.0	2297.0	159.3	583.8	[illegible]
1987.1	12.8	109.0	2115.0	161.9	599.3	[illegible]
1987.2	14.1	171.0	1741.0	163.6	613.3	[illegible]
1988.1	14.8	100.0	1545.0	164.1	628.5	[illegible]
1988.2	15.5	100.0	1545.0	164.9	639.1	[illegible]

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	305.0	163.0	5.7	13.8	92.0
1955.2	NA	914.0	490.0	5.9	13.2	72.0
1956.1	NA	13.0	31.0	6.2	14.9	102.0
1956.2	NA	5.0	11.0	6.8	15.5	102.0
1957.1	NA	23.0	0.0	7.1	17.3	114.8
1957.2	NA	41.0	0.0	7.4	17.8	114.8
1958.1	NA	20.0	0.0	7.6	19.6	121.9
1958.2	NA	40.0	0.0	8.0	19.4	121.9
1959.1	NA	162.0	96.0	9.0	21.0	138.2
1959.2	NA	186.0	96.0	10.0	21.6	138.2
1960.1	20.5	55.0	0.0	10.4	24.0	151.3
1960.2	18.0	24.0	0.0	11.8	25.4	151.3
1961.1	16.7	20.0	183.0	11.9	27.8	158.1
1961.2	16.0	20.0	541.0	12.2	28.8	158.1
1962.1	16.8	35.0	128.0	12.8	31.0	165.9
1962.2	20.3	37.0	52.0	13.9	31.8	165.9
1963.1	10.0	28.0	20.0	14.0	33.4	175.0
1963.2	7.3	18.0	39.0	14.4	34.1	175.0
1964.1	2.6	14.0	253.0	14.8	36.1	184.4
1964.2	2.5	16.0	635.0	15.2	36.6	184.4
1965.1	7.1	25.0	580.0	15.7	39.2	190.3
1965.2	11.0	34.0	211.0	16.2	39.3	190.3
1966.1	14.4	31.0	22.0	16.4	41.3	208.4
1966.2	16.0	26.0	8.0	16.8	40.5	208.4
1967.1	15.5	16.0	0.0	17.0	41.9	213.4
1967.2	11.0	23.0	0.0	17.3	41.9	213.4
1968.1	10.0	60.0	0.0	17.9	44.8	230.5
1968.2	9.5	51.0	0.0	18.5	45.2	230.5
1969.1	4.0	14.0	0.0	19.7	48.8	255.8
1969.2	5.1	15.0	0.0	21.1	50.3	255.8
1970.1	9.5	32.0	20.0	22.9	53.9	270.2
1970.2	9.8	85.0	82.0	23.6	54.9	270.2
1971.1	6.3	329.0	272.0	24.2	57.9	283.9
1971.2	11.8	258.0	292.0	25.7	59.3	283.9
1972.1	10.0	40.0	56.0	27.0	64.1	317.8
1972.2	9.9	31.0	71.0	28.7	66.8	317.8
1973.1	6.2	138.0	299.0	30.5	73.3	359.3
1973.2	6.6	210.0	621.0	31.9	75.8	359.3
1974.1	7.1	92.0	326.0	32.3	79.2	370.0
1974.2	9.1	77.0	394.0	32.8	78.2	370.0
1975.1	10.5	94.0	735.0	32.3	79.9	349.0
1975.2	14.1	148.0	618.0	33.2	81.8	349.0
1976.1	17.0	274.0	366.0	33.2	85.5	365.5
1976.2	20.3	172.0	143.0	33.5	87.3	365.5
1977.1	20.0	60.0	59.0	34.7	93.5	402.3
1977.2	20.4	30.0	28.0	36.5	96.7	402.3
1978.1	12.4	39.0	26.0	37.9	105.1	459.9
1978.2	11.5	52.0	64.0	39.3	109.0	459.9
1979.1	6.1	59.0	326.0	42.3	120.2	516.8
1979.2	8.0	106.0	771.0	44.8	124.2	516.8
1980.1	6.0	161.0	397.0	45.2	130.3	537.8
1980.2	6.0	161.0	476.0	46.0	132.3	537.8
1981.1	7.9	72.0	571.0	47.4	138.0	558.4
1981.2	7.9	93.0	1014.0	48.8	140.3	558.4
1982.1	8.4	261.0	1563.0	48.9	144.3	556.5
1982.2	10.4	283.0	1520.0	48.8	144.3	556.5
1983.1	14.1	117.0	816.0	49.0	148.0	568.9
1983.2	20.0	77.0	684.0	50.5	159.2	568.9
1984.1	19.5	83.0	789.0	56.0	182.8	660.6
1984.2	20.2	139.0	1374.0	59.3	189.6	700.9
1985.1	23.5	257.0	2051.0	63.1	199.6	730.3
1985.2	25.5	321.0	2995.0	67.1	204.4	746.3
1986.1	28.1	260.0	3074.0	71.0	214.1	770.7
1986.2	26.5	70.0	1673.0	72.9	219.8	778.3
1987.1	24.7	7.0	794.0	73.2	224.4	781.1
1987.2	21.7	2.0	505.0	75.4	234.7	798.6
1988.1	23.1	7.0	914.0	75.1	240.2	800.7
1988.2	22.7	7.0	914.0	73.6	243.5	806.6

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	352.0	876.0	12.9	31.4	208.9
1955.2	NA	1057.0	2628.0	12.4	32.8	208.9
1956.1	NA	41.0	72.0	12.4	33.4	216.2
1956.2	NA	14.0	24.0	13.3	35.1	216.2
1957.1	NA	5.0	0.0	13.5	34.2	211.0
1957.2	NA	5.0	0.0	13.3	35.5	211.0
1958.1	NA	24.0	45.0	13.3	34.7	204.1
1958.2	NA	36.0	131.0	13.3	36.0	204.1
1959.1	NA	8.0	46.0	13.7	33.6	214.7
1959.2	NA	15.0	37.0	14.1	35.3	214.7
1960.1	6.6	98.0	84.0	14.3	35.3	220.6
1960.2	7.7	151.0	29.0	15.2	38.6	220.6
1961.1	8.1	37.0	0.0	15.2	39.0	218.0
1961.2	7.8	21.0	0.0	15.6	40.2	218.0
1962.1	7.6	35.0	104.0	15.6	40.3	225.6
1962.2	7.8	38.C	104.0	16.6	41.6	225.6
1963.1	7.0	38.0	0.0	16.9	42.1	232.8
1963.2	6.3	33.0	0.0	17.2	43.7	232.8
1964.1	10.0	23.0	31.0	17.3	44.6	241.9
1964.2	10.5	31.0	94.0	17.5	46.6	241.9
1965.1	10.6	63.0	215.0	17.9	47.3	256.2
1965.2	8.1	60.0	116.0	19.4	51.4	256.2
1966.1	6.4	23.0	22.0	19.5	53.4	275.0
1966.2	7.5	25.0	10.0	20.4	53.1	275.0
1967.1	7.4	53.0	14.0	21.1	54.3	281.8
1967.2	5.3	83.0	38.0	21.9	56.4	281.8
1968.1	4.1	88.0	204.0	22.1	59.2	297.5
1968.2	4.3	37.0	356.0	23.1	61.2	297.5
1969.1	7.6	8.0	90.0	23.4	64.4	314.9
1969.2	5.7	7.0	86.0	24.4	66.5	314.9
1970.1	9.3	34.0	185.0	24.7	68.3	310.8
1970.2	10.0	83.0	322.0	25.1	68.8	310.8
1971.1	11.0	70.0	235.0	25.3	70.6	314.4
1971.2	11.1	89.0	357.0	25.8	72.2	314.4
1972.1	10.0	97.0	649.0	26.3	73.4	331.5
1972.2	6.8	90.0	563.0	29.2	76.1	331.5
1973.1	9.0	73.0	276.0	31.1	77.7	351.4
1973.2	10.4	63.0	149.0	31.9	79.6	351.4
1974.1	12.3	81.0	108.0	31.7	81.6	362.2
1974.2	10.4	62.0	140.0	32.4	83.2	362.2
1975.1	10.4	44.0	314.0	32.2	84.1	355.8
1975.2	10.2	36.0	481.0	32.7	86.5	355.8
1976.1	10.0	38.0	340.0	33.2	88.7	372.1
1976.2	8.9	62.0	188.0	34.8	90.8	372.1
1977.1	8.6	111.0	106.0	36.5	93.7	376.8
1977.2	7.4	159.0	90.0	39.0	96.6	376.8
1978.1	5.9	113.0	128.0	40.6	99.7	430.5
1978.2	5.3	90.0	247.0	42.4	103.1	430.5
1979.1	4.6	99.0	332.0	43.8	104.8	456.0
1979.2	3.8	70.0	622.0	46.3	107.7	456.0
1980.1	2.6	49.0	739.0	46.0	110.1	457.5
1980.2	3.2	52.0	795.0	46.5	110.0	457.5
1981.1	6.3	108.0	643.0	46.1	110.9	448.3
1981.2	8.0	80.0	464.0	46.0	110.3	448.3
1982.1	9.0	22.0	363.0	45.1	107.1	426.7
1982.2	10.8	33.0	423.0	44.9	104.5	426.7
1983.1	14.2	284.0	728.0	43.4	111.3	415.7
1983.2	16.4	176.0	775.0	44.4	112.2	415.7
1984.1	17.9	14.0	509.0	44.4	113.5	424.9
1984.2	18.4	6.0	381.0	44.7	116.9	441.0
1985.1	19.0	20.0	444.0	45.8	118.0	440.9
1985.2	20.2	23.0	386.0	46.4	121.8	447.9
1986.1	20.5	16.0	345.0	46.4	123.4	447.8
1986.2	19.3	10.0	324.0	47.2	128.7	451.5
1987.1	18.7	6.0	345.0	48.6	134.5	465.1
1987.2	19.0	7.0	371.0	47.2	137.9	482.2
1988.1	19.1	14.0	344.0	48.0	138.8	489.7
1988.2	18.3	14.0	344.0	49.2	140.1	495.6

SACRAMENTO

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	57.0	293.0	8.2	9.0	12.1
1955.2	NA	170.0	878.0	8.2	9.0	12.1
1956.1	NA	1.0	50.0	8.2	9.0	12.1
1956.2	NA	0.0	17.0	8.2	9.0	12.1
1957.1	NA	0.0	0.0	8.2	9.0	12.1
1957.2	NA	0.0	0.0	8.2	9.0	12.1
1958.1	NA	0.0	4.0	8.2	9.0	12.1
1958.2	NA	0.0	10.0	8.2	9.0	12.1
1959.1	NA	1.0	4.0	8.2	9.0	12.1
1959.2	NA	3.0	9.0	8.2	9.0	12.1
1960.1	NA	64.0	44.0	8.2	9.0	12.1
1960.2	NA	125.0	102.0	8.2	9.0	12.1
1961.1	NA	14.0	64.0	8.2	9.0	12.1
1961.2	NA	5.0	51.0	8.2	9.0	12.1
1962.1	NA	5.0	39.0	8.2	9.0	12.1
1962.2	NA	8.0	53.0	8.2	9.0	12.1
1963.1	NA	20.0	114.0	8.2	9.0	12.1
1963.2	NA	55.0	111.0	8.2	9.0	12.1
1964.1	NA	233.0	46.0	8.2	9.0	12.1
1964.2	NA	178.0	42.0	8.2	9.0	12.1
1965.1	NA	31.0	91.0	8.2	9.0	12.1
1965.2	NA	12.0	104.0	8.2	9.0	12.1
1966.1	NA	9.0	84.0	8.2	9.0	12.1
1966.2	NA	9.0	33.0	8.2	9.0	12.1
1967.1	NA	15.0	6.0	9.7	36.3	156.2
1967.2	NA	20.0	8.0	10.1	36.7	164.7
1968.1	NA	14.0	57.0	10.3	37.6	158.5
1968.2	NA	21.0	152.0	10.6	38.6	164.9
1969.1	NA	27.0	75.0	10.9	39.3	159.0
1969.2	NA	62.0	182.0	10.5	41.0	167.3
1970.1	NA	100.0	570.0	9.5	41.7	162.0
1970.2	NA	190.0	367.0	9.8	42.2	169.3
1971.1	NA	220.0	63.0	11.1	42.7	164.6
1971.2	NA	155.0	47.0	12.1	44.1	175.6
1972.1	NA	93.0	235.0	12.5	45.8	176.2
1972.2	NA	48.0	269.0	13.2	46.9	186.3
1973.1	NA	43.0	82.0	13.3	49.0	184.9
1973.2	NA	36.0	63.0	13.9	50.5	195.6
1974.1	NA	43.0	96.0	14.1	51.9	190.5
1974.2	NA	52.0	204.0	14.6	54.0	201.6
1975.1	NA	58.0	425.0	14.5	55.8	193.7
1975.2	NA	61.0	455.0	15.2	57.7	208.4
1976.1	NA	48.0	161.0	15.6	59.7	207.2
1976.2	NA	55.0	184.0	16.5	60.7	220.2
1977.1	NA	70.0	456.0	17.2	61.9	219.8
1977.2	NA	84.0	685.0	18.4	65.0	238.3
1978.1	NA	77.0	444.0	19.4	68.9	243.8
1978.2	NA	74.0	367.0	20.9	70.4	262.8
1979.1	NA	43.0	373.0	21.8	73.4	263.3
1979.2	NA	109.0	402.0	23.1	75.7	279.9
1980.1	7.0	818.0	376.0	23.3	76.8	268.6
1980.2	8.0	835.0	565.0	23.8	79.7	278.3
1981.1	11.0	102.0	890.0	23.9	81.6	274.2
1981.2	14.0	50.0	932.0	24.8	83.5	284.8
1982.1	17.0	126.0	485.0	24.3	83.9	273.3
1982.2	18.0	181.0	547.0	24.5	83.9	281.5
1983.1	20.5	181.0	822.0	24.8	85.7	278.9
1983.2	23.2	137.0	1496.0	25.8	88.5	299.3
1984.1	26.5	82.0	1786.0	26.5	93.7	309.3
1984.2	23.4	91.0	1919.0	28.7	96.9	328.0
1985.1	26.3	128.0	1301.0	28.9	100.7	336.8
1985.2	26.1	262.0	863.0	29.4	104.8	342.7
1986.1	25.2	538.0	854.0	30.5	105.8	347.8
1986.2	21.4	390.0	804.0	31.8	110.9	357.3
1987.1	19.8	137.0	989.0	32.7	113.1	375.7
1987.2	17.6	64.0	932.0	33.4	118.1	384.2
1988.1	16.9	71.0	736.0	34.3	123.5	404.0
1988.2	15.5	71.0	736.0	34.8	126.8	405.8

SAN DIEGO

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	20.0	276.0	7.2	24.8	144.0
1955.2	NA	61.0	287.0	7.7	25.1	144.0
1956.1	NA	0.0	12.0	8.1	25.3	161.9
1956.2	NA	0.0	6.0	10.2	28.0	161.9
1957.1	NA	0.0	0.0	10.2	27.3	181.3
1957.2	NA	0.0	0.0	10.3	28.1	181.3
1958.1	NA	0.0	17.0	10.5	27.3	185.0
1958.2	NA	0.0	47.0	10.6	28.4	185.0
1959.1	NA	0.0	11.0	10.2	33.3	205.2
1959.2	NA	0.0	29.0	10.6	35.1	205.2
1960.1	2.1	64.0	507.0	11.6	38.3	202.9
1960.2	1.5	64.0	520.0	11.7	39.6	202.9
1961.1	3.4	0.0	31.0	11.5	42.3	204.5
1961.2	3.5	0.0	11.0	11.5	43.3	204.5
1962.1	4.9	0.0	14.0	11.5	43.2	198.9
1962.2	5.6	0.0	36.0	11.6	45.6	198.9
1963.1	15.0	0.0	231.0	11.9	46.3	196.4
1963.2	23.1	0.0	397.0	12.0	47.6	196.4
1964.1	17.7	0.0	119.0	12.6	48.2	198.7
1964.2	16.1	0.0	44.0	12.9	49.2	198.7
1965.1	12.0	3.0	14.0	13.3	49.2	203.1
1965.2	12.4	3.0	16.0	14.4	50.1	203.1
1966.1	11.3	0.0	80.0	14.4	50.9	218.6
1966.2	11.0	0.0	187.0	13.8	55.0	218.6
1967.1	16.5	6.0	72.0	13.5	56.8	233.1
1967.2	9.3	17.0	50.0	14.2	63.8	233.1
1968.1	3.6	31.0	23.0	14.8	64.2	253.3
1968.2	3.8	34.0	39.0	15.6	65.8	253.3
1969.1	8.0	14.0	180.0	16.5	67.8	278.2
1969.2	12.6	14.0	299.0	17.4	74.2	278.2
1970.1	9.3	15.0	60.0	17.9	76.1	289.5
1970.2	9.0	43.0	125.0	18.8	81.2	289.5
1971.1	14.6	1020.0	929.0	19.5	81.1	297.6
1971.2	13.2	1757.0	1840.0	20.9	82.0	297.6
1972.1	6.0	142.0	601.0	22.6	82.8	314.3
1972.2	5.1	47.0	297.0	23.7	86.8	314.3
1973.1	8.4	2.0	282.0	24.7	89.6	339.9
1973.2	6.9	1.0	253.0	25.3	94.9	339.9
1974.1	6.9	32.0	306.0	25.8	95.4	350.3
1974.2	8.2	86.0	413.0	25.4	99.3	350.3
1975.1	10.0	46.0	660.0	24.9	96.9	348.8
1975.2	16.1	16.0	325.0	25.8	99.9	348.8
1976.1	20.0	0.0	77.0	26.5	101.6	368.5
1976.2	19.8	0.0	54.0	28.2	106.1	368.5
1977.1	18.0	17.0	155.0	29.7	109.9	404.8
1977.2	16.0	47.0	307.0	31.3	119.6	404.8
1978.1	13.9	19.0	248.0	33.0	127.6	457.0
1978.2	10.6	29.0	378.0	35.0	134.5	457.0
1979.1	10.3	50.0	460.0	37.1	139.7	497.1
1979.2	6.4	109.0	654.0	39.0	145.9	497.1
1980.1	4.5	162.0	588.0	39.4	147.2	507.6
1980.2	3.8	167.0	703.0	39.7	149.7	507.6
1981.1	3.0	81.0	610.0	41.1	153.4	523.1
1981.2	2.8	88.0	991.0	42.1	158.6	523.1
1982.1	11.5	198.0	1889.0	42.7	159.3	521.8
1982.2	17.0	192.0	1741.0	42.9	162.7	521.8
1983.1	23.2	87.0	726.0	45.6	151.8	522.7
1983.2	21.4	72.0	634.0	47.0	165.7	522.7
1984.1	18.7	101.0	1137.0	49.2	178.1	570.8
1934.2	16.7	172.0	1631.0	50.6	189.0	613.3
1985.1	18.9	232.0	1367.0	52.7	196.3	631.5
1985.2	23.0	274.0	1507.0	53.9	202.5	643.0
1986.1	23.1	196.0	1726.0	54.5	206.2	650.5
1986.2	23.6	186.0	1639.0	58.5	215.0	678.5
1987.1	22.4	290.0	1447.0	59.5	222.1	693.5
1987.2	23.0	162.0	1148.0	61.1	229.3	710.7
1988.1	22.1	54.0	1042.0	61.7	236.3	733.1
1988.2	21.2	54.0	1042.0	62.8	240.9	743.6

SAN FRANCISCO

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	2529.0	3418.0	55.2	115.8	701.4
1955.2	NA	7265.0	10255.0	56.7	118.1	701.4
1956.1	NA	270.0	0.0	58.0	119.2	731.8
1956.2	NA	91.0	0.0	66.2	125.9	731.8
1957.1	NA	12.0	125.0	65.9	126.4	745.1
1957.2	NA	6.0	374.0	65.7	129.1	745.1
1958.1	NA	22.0	627.0	64.9	127.7	728.4
1958.2	NA	26.0	210.0	66.3	129.2	728.4
1959.1	NA	8.0	0.0	63.8	132.9	753.8
1959.2	NA	18.0	0.0	65.2	135.5	753.8
1960.1	9.6	108.0	110.0	66.4	136.8	765.6
1960.2	12.0	215.0	319.0	68.8	145.6	765.6
1961.1	8.7	84.0	42.0	72.6	152.2	767.0
1961.2	7.8	42.0	33.0	73.9	155.5	767.0
1962.1	8.4	40.0	95.0	75.2	159.5	789.2
1962.2	8.2	27.0	157.0	76.8	163.3	789.2
1963.1	7.9	18.0	84.0	78.8	168.5	805.9
1963.2	7.1	35.0	136.0	79.7	166.0	805.9
1964.1	7.0	83.0	226.0	81.8	168.1	827.5
1964.2	6.6	190.0	481.0	83.7	172.8	827.5
1965.1	8.9	267.0	737.0	81.8	173.7	849.6
1965.2	8.6	163.0	625.0	81.7	182.4	849.6
1966.1	8.8	38.0	240.0	82.4	188.1	880.3
1966.2	11.0	58.0	267.0	81.1	191.3	880.3
1967.1	10.6	343.0	749.0	81.1	191.8	900.3
1967.2	11.8	679.0	951.0	84.4	204.4	900.3
1968.1	11.4	832.0	364.0	86.8	208.0	934.6
1968.2	9.1	161.0	461.0	89.7	213.9	934.6
1969.1	7.3	225.0	1221.0	91.8	217.9	971.2
1969.2	8.9	264.0	1516.0	94.5	229.6	971.2
1970.1	10.0	320.0	716.0	95.9	232.0	968.8
1970.2	9.9	220.0	563.0	96.7	238.1	968.8
1971.1	13.2	112.0	693.0	95.6	238.8	948.2
1971.2	12.8	114.0	992.0	97.4	234.5	948.2
1972.1	11.6	194.0	1096.0	99.2	235.0	964.1
1972.2	12.7	365.0	1592.0	101.6	240.3	964.1
1973.1	11.6	674.0	2014.0	104.6	250.9	1010.6
1973.2	10.4	271.0	1647.0	106.5	259.4	1010.6
1974.1	8.8	23.0	1128.0	108.3	260.6	1032.6
1974.2	8.8	22.0	670.0	109.5	264.0	1032.6
1975.1	9.4	417.0	529.0	109.3	266.9	1028.0
1975.2	8.3	402.0	674.0	112.1	274.1	1028.0
1976.1	9.9	39.0	1630.0	114.0	279.8	1058.0
1976.2	11.6	21.0	1299.0	117.5	289.2	1058.0
1977.1	11.9	77.0	432.0	120.4	290.6	1096.6
1977.2	9.8	132.0	327.0	123.6	302.7	1096.6
1978.1	5.8	56.0	671.0	128.9	312.8	1164.2
1978.2	4.6	136.0	968.0	134.8	322.8	1164.2
1979.1	3.2	869.0	601.0	137.2	331.8	1217.9
1979.2	2.9	1348.0	915.0	141.3	346.3	1217.9
1980.1	2.5	352.0	1584.0	144.1	351.1	1253.0
1980.2	2.5	133.0	2417.0	147.3	361.4	1253.0
1981.1	1.1	70.0	1690.0	148.1	368.1	1273.6
1981.2	1.1	46.0	1988.0	152.2	375.3	1273.6
1982.1	3.7	56.0	2491.0	153.0	378.9	1260.8
1982.2	7.3	144.0	3054.0	152.8	379.1	1260.8
1983.1	9.4	680.0	2590.0	151.8	382.3	1253.9
1983.2	10.9	1086.0	2959.0	152.5	393.9	1253.9
1984.1	13.7	356.0	3468.0	153.6	416.4	1328.1
1984.2	15.0	247.0	3775.0	155.4	424.6	1336.8
1985.1	15.6	250.0	3174.0	157.6	434.0	1367.4
1985.2	17.8	568.0	3405.0	157.8	444.1	1391.8
1986.1	19.4	3242.0	4884.0	160.0	453.4	1418.0
1986.2	20.8	1591.0	3808.0	165.3	452.0	1416.9
1987.1	20.2	100.0	2131.0	167.4	461.1	1440.7
1987.2	19.2	54.0	1289.0	167.1	469.5	1450.9
1988.1	18.6	586.0	1418.0	169.5	479.1	1477.5
1988.2	17.7	586.0	1418.0	169.9	487.3	1486.1

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	30.0	209.0	NA	NA	NA
1955.2	NA	89.0	627.0	NA	NA	NA
1956.1	NA	12.0	0.0	NA	NA	NA
1956.2	NA	4.0	0.0	NA	NA	NA
1957.1	NA	0.0	0.0	NA	NA	NA
1957.2	NA	0.0	0.0	NA	NA	NA
1958.1	NA	0.0	20.0	5.3	22.2	125.8
1958.2	NA	1.0	20.0	5.7	24.0	137.1
1959.1	NA	11.0	0.0	5.8	26.8	147.1
1959.2	NA	31.0	0.0	6.1	29.0	157.7
1960.1	NA	41.0	8.0	6.6	30.7	164.8
1960.2	NA	15.0	24.0	6.9	32.4	170.3
1961.1	NA	0.0	11.0	7.1	34.4	176.6
1961.2	NA	0.0	21.0	7.4	37.3	184.5
1962.1	NA	8.0	55.0	7.7	39.0	193.0
1962.2	NA	20.0	62.0	8.2	41.4	203.8
1963.1	NA	14.0	19.0	8.6	45.4	209.9
1963.2	NA	7.0	23.0	9.0	48.0	219.3
1964.1	NA	2.0	60.0	9.6	49.5	221.6
1964.2	NA	2.0	113.0	10.0	52.0	222.4
1965.1	NA	4.0	105.0	10.1	54.7	229.8
1965.2	NA	8.0	76.0	10.4	56.9	239.0
1966.1	NA	16.0	41.0	10.4	59.7	256.1
1966.2	NA	20.0	49.0	10.4	61.9	268.5
1967.1	NA	7.0	104.0	10.8	64.0	276.9
1967.2	NA	10.0	164.0	11.1	68.6	290.8
1968.1	NA	29.0	131.0	11.5	67.7	297.4
1968.2	NA	36.0	107.0	12.1	70.2	306.6
1969.1	NA	13.0	70.0	12.7	73.4	316.8
1969.2	NA	13.0	110.0	13.2	76.9	324.4
1970.1	NA	29.0	213.0	13.7	77.8	323.4
1970.2	NA	34.0	394.0	13.7	76.8	313.8
1971.1	NA	19.0	318.0	14.2	77.2	315.7
1971.2	NA	18.0	398.0	15.3	79.9	326.2
1972.1	NA	29.0	476.0	16.1	86.6	339.4
1972.2	NA	30.0	488.0	17.1	90.3	383.7
1973.1	NA	23.0	360.0	18.0	94.6	376.6
1973.2	NA	18.0	251.0	13.2	97.3	388.8
1974.1	NA	14.0	222.0	18.9	99.3	406.1
1974.2	NA	21.0	232.0	19.1	99.3	401.8
1975.1	NA	39.0	347.0	19.2	100.4	391.3
1975.2	NA	59.0	317.0	19.8	105.8	409.9
1976.1	NA	39.0	190.0	20.6	110.1	421.9
1976.2	NA	43.0	188.0	21.5	114.6	437.4
1977.1	NA	53.0	271.0	22.2	119.2	453.8
1977.2	NA	67.0	384.0	22.9	126.8	474.5
1978.1	NA	51.0	370.0	24.1	132.1	500.7
1978.2	NA	81.0	404.0	25.2	136.6	525.4
1979.1	NA	105.0	297.0	26.5	142.9	553.3
1979.2	NA	208.0	487.0	27.6	148.5	581.3
1980.1	NA	349.0	917.0	28.3	154.1	597.2
1980.2	NA	280.0	1318.0	29.3	156.2	605.3
1981.1	NA	119.0	969.0	29.8	159.9	609.5
1981.2	NA	82.0	695.0	30.0	161.9	617.0
1982.1	NA	177.0	532.0	29.9	161.0	617.9
1982.2	NA	110.0	594.0	29.5	164.9	625.4
1983.1	13.4	37.0	844.0	30.4	172.0	636.5
1983.2	14.8	36.0	1234.0	31.5	181.7	667.3
1984.1	12.0	86.0	1092.0	31.8	180.9	679.6
1984.2	15.7	191.0	1389.0	32.6	180.7	711.4
1985.1	16.3	262.0	1826.0	32.7	184.3	714.0
1985.2	24.5	285.0	1560.0	33.2	184.0	710.8
1986.1	25.4	194.0	1099.0	34.2	186.9	712.4
1986.2	26.4	134.0	709.0	34.5	189.6	691.2
1987.1	24.8	173.0	736.0	34.7	193.6	692.8
1987.2	24.9	80.0	607.0	34.8	196.9	698.0
1988.1	19.9	25.0	611.0	34.6	204.2	713.8
1988.2	16.8	25.0	611.0	34.8	205.1	714.9

SEATTLE

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	178.0	1689.0	17.1	35.8	261.4
1955.2	NA	534.0	4888.0	18.2	36.4	261.4
1956.1	NA	11.0	39.0	19.0	37.0	273.6
1956.2	NA	4.0	13.0	18.8	38.4	273.6
1957.1	NA	3.0	0.0	18.5	38.3	296.0
1957.2	NA	5.0	0.0	18.8	39.2	296.0
1958.1	NA	46.0	3.0	18.5	39.6	296.2
1958.2	NA	39.0	8.0	18.8	40.7	296.2
1959.1	NA	3.0	97.0	19.8	39.7	332.8
1959.2	NA	3.0	262.0	20.4	40.8	332.8
1960.1	7.0	29.0	149.0	21.5	44.6	326.6
1960.2	7.6	51.0	128.0	22.4	48.6	326.6
1961.1	8.2	13.0	198.0	22.1	47.7	333.3
1961.2	8.0	7.0	67.0	22.8	49.6	333.3
1962.1	7.3	6.0	0.0	23.4	53.7	365.8
1962.2	7.9	9.0	0.0	25.2	56.9	365.8
1963.1	7.4	17.0	12.0	25.9	54.0	352.7
1963.2	8.6	20.0	35.0	25.2	55.0	352.7
1964.1	9.2	7.0	180.0	25.1	55.1	342.3
1964.2	9.2	10.0	180.0	25.1	56.1	342.3
1965.1	10.0	28.0	30.0	25.7	56.9	361.6
1965.2	10.6	51.0	17.0	26.1	58.7	361.6
1966.1	10.4	34.0	30.0	26.8	60.6	423.2
1966.2	9.1	29.0	61.0	28.9	65.8	423.2
1967.1	7.8	35.0	77.0	29.3	68.9	458.8
1967.2	7.1	21.0	157.0	31.6	73.0	458.8
1968.1	6.3	8.0	160.0	32.7	76.0	487.3
1968.2	7.3	13.0	316.0	34.0	79.2	487.3
1969.1	5.6	33.0	506.0	34.8	81.9	490.6
1969.2	8.3	95.0	626.0	35.8	83.7	490.6
1970.1	9.1	568.0	440.0	35.0	82.6	441.8
1970.2	9.5	408.0	291.0	34.4	81.1	441.8
1971.1	9.6	43.0	238.0	33.7	81.8	410.4
1971.2	9.6	22.0	240.0	34.1	82.9	410.4
1972.1	9.4	90.0	306.0	35.2	85.0	418.9
1972.2	10.6	102.0	437.0	36.3	88.9	418.9
1973.1	11.2	53.0	462.0	36.9	91.9	417.9
1973.2	10.6	31.0	538.0	37.9	94.8	417.9
1974.1	10.7	20.0	555.0	38.1	97.1	454.8
1974.2	10.6	41.0	455.0	39.2	101.3	454.8
1975.1	8.7	145.0	407.0	38.9	103.1	463.5
1975.2	8.4	266.0	259.0	40.2	105.2	463.5
1976.1	10.0	165.0	173.0	40.0	108.9	481.8
1976.2	8.2	72.0	187.0	41.6	112.3	481.8
1977.1	8.2	24.0	238.0	43.3	117.7	520.9
1977.2	8.2	25.0	397.0	46.4	123.6	520.9
1978.1	6.7	136.0	505.0	49.0	131.0	585.0
1978.2	5.1	126.0	646.0	51.1	136.0	585.0
1979.1	2.9	18.0	402.0	52.9	142.0	644.7
1979.2	2.1	24.0	639.0	55.6	147.3	644.7
1980.1	2.1	156.0	1157.0	56.1	152.5	663.0
1980.2	6.6	332.0	1923.0	58.0	154.9	663.0
1981.1	9.4	131.0	1719.0	57.5	157.9	664.8
1981.2	8.3	132.0	1386.0	58.3	159.4	664.8
1982.1	9.0	201.0	951.0	58.1	155.1	650.0
1982.2	12.3	290.0	1041.0	56.7	156.4	650.0
1983.1	15.9	408.0	1955.0	57.3	161.3	639.4
1983.2	17.4	149.0	1762.0	58.8	166.7	639.4
1984.1	18.1	9.0	354.0	60.3	180.2	681.9
1984.2	16.5	9.0	761.0	61.5	184.0	706.8
1985.1	15.5	156.0	1248.0	62.8	191.1	719.9
1985.2	17.5	435.0	1693.0	64.4	197.1	742.3
1986.1	17.2	351.0	1811.0	65.6	199.8	755.0
1986.2	17.5	243.0	1811.0	67.1	204.9	770.7
1987.1	15.8	166.0	603.0	67.6	210.1	784.0
1987.2	15.1	110.0	666.0	67.6	218.9	805.9
1988.1	13.7	184.0	1840.0	67.8	229.7	835.3
1988.2	16.7	184.0	1840.0	69.0	234.5	853.8

SAINT LOUIS

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	627.0	1019.0	35.8	86.8	NA
1955.2	NA	1882.0	3056.0	36.0	90.2	NA
1956.1	NA	70.0	27.0	35.9	91.0	NA
1956.2	NA	25.0	10.0	37.6	89.6	NA
1957.1	NA	33.0	42.0	37.9	90.6	NA
1957.2	NA	16.0	15.0	37.4	91.5	NA
1958.1	NA	10.0	0.0	38.1	93.9	682.3
1958.2	NA	5.0	0.0	38.7	94.6	682.3
1959.1	NA	4.0	10.0	37.4	96.1	697.2
1959.2	NA	10.0	29.0	37.7	94.4	697.2
1960.1	11.4	402.0	28.0	38.3	97.3	702.2
1960.2	12.7	614.0	47.0	38.7	98.9	702.2
1961.1	13.4	24.0	57.0	39.6	103.6	682.7
1961.2	13.9	10.0	58.0	39.7	104.5	682.7
1962.1	13.9	50.0	31.0	40.3	104.2	686.9
1962.2	13.4	48.0	49.0	40.4	105.4	686.9
1963.1	15.2	22.0	105.0	40.6	112.2	715.4
1963.2	13.1	10.0	193.0	41.3	115.1	715.4
1964.1	14.3	4.0	204.0	42.5	121.7	737.1
1964.2	17.4	10.0	101.0	42.3	124.9	737.1
1965.1	15.1	99.0	35.0	42.5	133.1	765.3
1965.2	15.1	251.0	24.0	42.6	136.8	765.3
1966.1	15.1	76.0	56.0	44.1	142.0	802.5
1966.2	14.0	118.0	85.0	44.5	146.1	802.5
1967.1	13.0	456.0	50.0	45.8	148.9	813.9
1967.2	12.1	437.0	93.0	47.1	150.9	813.9
1968.1	12.1	108.0	192.0	47.9	150.6	823.8
1968.2	12.1	70.0	393.0	48.8	154.6	823.8
1969.1	16.0	107.0	358.0	48.2	160.7	842.1
1969.2	20.6	248.0	412.0	48.8	163.1	842.1
1970.1	15.4	442.0	403.0	49.7	166.8	823.7
1970.2	12.0	1122.0	372.0	50.3	168.4	823.7
1971.1	10.7	3630.0	310.0	49.5	167.3	809.9
1971.2	12.0	1452.0	345.0	50.6	169.0	809.9
1972.1	13.0	87.0	556.0	49.8	166.5	809.4
1972.2	14.0	33.0	409.0	50.4	167.3	809.4
1973.1	14.6	107.0	188.0	50.6	169.9	835.4
1973.2	12.7	137.0	160.0	52.0	174.3	835.4
1974.1	13.7	61.0	292.0	51.7	175.2	841.2
1974.2	15.7	138.0	400.0	52.4	180.9	841.2
1975.1	13.6	954.0	252.0	51.7	180.7	816.2
1975.2	16.0	918.0	410.0	52.9	187.0	816.2
1976.1	18.0	138.0	1329.0	52.6	188.4	838.2
1976.2	19.4	46.0	627.0	54.0	193.8	838.2
1977.1	17.0	0.0	74.0	54.8	195.5	868.3
1977.2	14.0	2.0	35.0	56.9	202.7	868.3
1978.1	11.1	298.0	120.0	58.0	204.8	908.3
1978.2	9.6	883.0	215.0	59.9	212.9	908.3
1979.1	9.6	374.0	153.0	59.9	216.1	937.1
1977.2	8.8	171.0	242.0	61.0	219.5	937.1
1980.1	7.0	69.0	351.0	60.4	225.3	913.1
1980.2	5.1	72.0	542.0	61.3	229.3	913.1
1981.1	5.1	277.0	376.0	60.5	229.6	915.7
1981.2	4.6	321.0	605.0	61.0	234.1	915.7
1982.1	7.0	133.0	1117.0	60.1	231.9	892.3
1982.2	9.0	57.0	1346.0	60.1	235.7	892.3
1983.1	7.3	30.0	845.0	61.5	234.6	887.3
1983.2	11.2	40.0	585.0	61.6	240.3	887.3
1984.1	12.3	97.0	618.0	62.7	244.1	912.8
1984.2	12.6	256.0	528.0	64.0	245.6	942.2
1985.1	10.7	706.0	414.0	65.2	252.4	943.1
1985.2	10.1	583.0	625.0	67.3	258.8	953.0
1986.1	13.4	168.0	1311.0	68.9	260.6	962.9
1986.2	17.3	72.0	1397.0	72.7	274.3	969.5
1987.1	16.4	97.0	741.0	73.6	278.6	979.5
1987.2	16.2	43.0	439.0	73.9	285.1	983.0
1988.1	15.1	16.0	439.0	74.2	289.4	996.6
1988.2	16.1	16.0	439.0	73.0	290.0	995.2

TAMPA

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	65.0	140.0	7.6	22.7	140.5
1955.2	NA	196.0	419.0	8.3	22.0	140.5
1956.1	NA	4.0	0.0	8.8	25.3	153.1
1956.2	NA	2.0	0.0	9.7	26.3	153.1
1957.1	NA	10.0	5.0	9.9	30.2	168.8
1957.2	NA	5.0	12.0	10.3	29.2	168.8
1958.1	NA	0.0	11.0	10.6	32.1	176.6
1958.2	NA	0.0	4.0	10.9	30.0	176.6
1959.1	NA	4.0	0.0	11.5	32.9	190.4
1959.2	NA	10.0	0.0	12.6	33.4	190.4
1960.1	NA	5.0	14.0	13.3	35.8	195.2
1960.2	4.9	13.0	42.0	13.4	34.0	195.2
1961.1	NA	121.0	86.0	14.5	37.1	192.7
1961.2	NA	234.0	124.0	15.5	38.0	192.7
1962.1	NA	59.0	87.0	15.9	40.5	199.5
1962.2	NA	23.0	30.0	15.8	39.0	199.5
1963.1	NA	17.0	0.0	15.9	43.9	205.8
1963.2	50.2	7.0	0.0	16.1	43.2	205.8
1964.1	NA	6.0	3.0	16.0	44.6	215.3
1964.2	27.6	4.0	7.0	16.2	45.1	215.3
1965.1	27.3	7.0	69.0	17.1	49.1	224.5
1965.2	NA	3.0	29.0	17.3	48.4	224.5
1966.1	NA	0.0	0.0	17.4	52.4	237.3
1966.2	NA	0.0	0.0	18.1	51.4	237.3
1967.1	NA	0.0	85.0	18.3	55.7	248.1
1967.2	NA	0.0	204.0	18.1	54.0	248.1
1968.1	NA	125.0	6.0	18.9	60.7	266.6
1968.2	NA	125.0	4.0	19.2	61.1	266.6
1969.1	NA	0.0	41.0	19.7	66.2	285.0
1969.2	NA	0.0	97.0	20.0	65.3	285.0
1970.1	NA	70.0	38.0	21.9	72.5	301.2
1970.2	6.0	203.0	53.0	22.3	70.3	301.2
1971.1	2.5	56.0	92.0	22.8	76.6	318.3
1971.2	0.2	21.0	187.0	23.9	74.6	318.3
1972.1	10.7	10.0	216.0	26.4	83.1	361.5
1972.2	8.5	6.0	258.0	28.0	83.8	361.5
1973.1	3.1	9.0	137.0	31.0	90.8	408.4
1973.2	7.1	18.0	261.0	33.3	91.8	408.4
1974.1	10.3	27.0	823.0	32.3	98.0	412.1
1974.2	9.7	62.0	1208.0	31.9	96.1	412.1
1975.1	12.6	87.0	582.0	32.4	98.5	389.7
1975.2	14.6	134.0	303.0	32.8	97.3	389.7
1976.1	17.0	87.0	299.0	33.2	102.0	394.7
1976.2	20.0	135.0	163.0	33.8	101.6	394.7
1977.1	22.9	351.0	135.0	34.7	108.7	415.8
1977.2	21.9	199.0	94.0	35.6	111.3	415.8
1978.1	18.0	38.0	96.0	36.8	119.6	453.4
1978.2	15.0	29.0	120.0	37.7	124.6	453.4
1979.1	12.0	111.0	133.0	39.2	134.5	490.8
1979.2	9.0	242.0	231.0	40.9	135.5	490.8
1980.1	9.0	289.0	230.0	42.2	143.3	520.4
1980.2	10.0	152.0	489.0	43.4	144.2	520.4
1981.1	13.0	41.0	1024.0	44.9	152.6	552.8
1981.2	17.0	41.0	1209.0	45.5	150.6	552.8
1982.1	18.9	160.0	586.0	46.4	161.4	560.8
1982.2	16.4	287.0	419.0	46.4	163.6	560.8
1983.1	18.6	205.0	439.0	48.7	170.0	575.0
1983.2	16.5	91.0	676.0	50.0	170.5	575.0
1984.1	14.1	34.0	891.0	52.0	184.4	602.1
1984.2	17.5	23.0	1594.0	55.2	186.5	620.8
1985.1	21.4	92.0	2105.0	57.0	193.5	641.5
1985.2	26.3	32.0	1915.0	58.9	198.8	650.7
1986.1	25.6	0.0	1278.0	60.0	198.0	665.1
1986.2	22.8	0.0	782.0	62.8	210.4	675.2
1987.1	19.7	41.0	718.0	64.6	214.6	684.8
1987.2	21.0	41.0	711.0	66.0	221.4	700.8
1988.1	21.6	0.0	1023.0	66.4	221.9	709.3
1988.2	23.5	0.0	1023.0	67.0	228.4	719.7

WASHINGTON DC

DATE	VACANCY RATE (%)	SINGLE TENANT COMPLETIONS	MULTI TENANT COMPLETIONS	EMPLOYM. IN FIRE	EMPLOYM. IN SERVICES	TOTAL EMPLOYMENT
		In Thousands				
1955.1	NA	1314.0	3116.0	29.5	160.7	416.1
1955.2	NA	624.0	5366.0	34.1	162.6	416.1
1956.1	NA	58.0	357.0	34.7	163.6	429.6
1956.2	NA	21.0	119.0	34.9	164.4	429.6
1957.1	NA	46.0	0.0	34.3	174.8	436.9
1957.2	NA	23.0	0.0	33.5	177.1	436.9
1958.1	2.0	4.0	126.0	33.0	179.4	447.9
1958.2	3.0	11.0	377.0	33.1	181.4	447.9
1959.1	5.0	238.0	772.0	33.8	181.1	483.0
1959.2	8.0	595.0	1001.0	35.7	190.5	483.0
1960.1	6.0	75.0	401.0	36.0	192.2	501.0
1960.2	3.5	122.0	454.0	39.7	199.5	501.0
1961.1	2.3	1006.0	1168.0	40.2	201.4	515.5
1961.2	1.4	1400.0	1105.0	40.7	209.5	515.5
1962.1	0.8	249.0	342.0	40.7	212.7	547.0
1962.2	0.8	140.0	424.0	43.3	218.1	547.0
1963.1	0.8	311.0	1292.0	43.9	219.1	575.0
1963.2	1.0	362.0	2225.0	44.4	220.7	575.0
1964.1	3.2	290.0	1294.0	47.6	226.3	605.8
1964.2	4.6	237.0	1207.0	48.5	228.3	605.8
1965.1	8.0	189.0	1639.0	51.7	236.8	644.6
1965.2	6.7	258.0	1418.0	53.8	244.9	644.6
1966.1	3.2	362.0	912.0	57.4	253.8	684.9
1966.2	2.9	629.0	958.0	60.2	256.8	684.9
1967.1	1.6	756.0	1404.0	60.2	261.8	704.5
1967.2	2.0	740.0	1963.0	61.9	270.3	704.5
1968.1	1.1	512.0	1814.0	62.4	274.4	740.2
1968.2	1.5	437.0	1911.0	64.5	281.0	740.2
1969.1	1.6	478.0	1687.0	64.7	288.0	773.0
1969.2	0.9	613.0	2046.0	67.1	293.2	773.0
1970.1	1.0	903.0	2616.0	69.9	295.9	801.8
1970.2	2.4	673.0	2881.0	71.5	297.0	801.8
1971.1	4.0	359.0	2520.0	72.0	300.1	821.0
1971.2	6.0	238.0	2007.0	75.6	297.2	821.0
1972.1	7.9	300.0	1897.0	75.7	299.9	863.3
1972.2	4.7	368.0	1567.0	78.7	298.6	863.3
1973.1	4.0	470.0	1819.0	80.1	303.5	910.2
1973.2	2.3	436.0	1256.0	82.9	313.5	910.2
1974.1	2.0	236.0	726.0	83.2	318.0	921.2
1974.2	1.8	337.0	883.0	83.6	327.7	921.2
1975.1	5.0	1093.0	2193.0	80.4	326.7	908.3
1975.2	8.6	809.0	2362.0	81.2	333.8	908.3
1976.1	7.0	200.0	1127.0	81.3	339.6	923.9
1976.2	5.3	110.0	741.0	83.1	343.9	923.9
1977.1	4.0	194.0	829.0	85.0	355.9	962.6
1977.2	3.0	308.0	1060.0	87.6	366.6	962.6
1978.1	2.5	311.0	1178.0	87.6	384.3	1029.0
1978.2	2.0	513.0	1899.0	90.8	407.2	1029.0
1979.1	1.5	661.0	2083.0	91.9	425.3	1124.5
1979.2	1.6	800.0	3169.0	94.8	436.8	1124.5
1980.1	2.5	623.0	3671.0	94.5	451.4	1137.0
1980.2	1.0	588.0	3982.0	96.4	467.8	1137.0
1981.1	2.2	612.0	3037.0	96.0	477.0	1167.3
1981.2	2.8	689.0	3044.0	96.2	488.7	1167.3
1982.1	3.5	717.0	3558.0	95.2	496.0	1168.4
1982.2	8.0	816.0	4153.0	96.5	503.4	1168.4
1983.1	12.2	804.0	4006.0	98.7	515.5	1194.2
1983.2	10.1	879.0	4295.0	100.3	525.1	1194.2
1984.1	10.3	862.0	3930.0	103.7	538.3	1245.8
1984.2	11.2	967.0	4936.0	107.0	560.9	1318.2
1985.1	12.3	1073.0	5700.0	107.7	577.1	1335.0
1985.2	13.8	1046.0	7480.0	112.1	604.1	1406.2
1986.1	14.4	834.0	7734.0	117.7	621.6	1438.0
1986.2	14.8	902.0	7690.0	119.2	633.5	1469.5
1987.1	16.2	1614.0	7122.0	122.6	642.3	1493.2
1987.2	15.1	868.0	5908.0	125.1	664.4	1525.4
1988.1	13.5	216.0	5291.0	128.6	685.3	1570.4
1988.2	12.4	216.0	5291.0	129.0	697.4	1586.0

APPENDIX IV.

CONSTRUCTION COSTS

The Appendix presents construction costs per square foot for office space for 19 metropoitan areas. These figures have been obtained from the 1989 edition of Means Square Foot Costs and refer to an 11-20 story building. These costs have been estimated using as model a 15 story building with 10 feet story height and 140,000 square feet floor area. Means Square Foot Costs is published annually by R.S Means Company Inc.

YEAR	ATLANTA	BOSTON	CHICAGO	CINCINNATI	DALLAS
1980.1	49.46	54.63	44.18	54.29	49.24
1981.1	53.39	57.86	47.87	59.27	53.72
1982.1	56.70	65.62	50.80	63.59	60.15
1983.1	62.82	71.71	55.84	67.99	66.23
1984.1	62.78	75.13	57.34	70.23	67.87
1985.1	64.40	79.17	57.91	70.96	66.04
1986.1	65.94	81.14	59.19	71.54	67.15
1987.1	67.44	83.05	61.10	73.43	67.99
1988.1	69.21	86.13	63.06	75.36	69.98

YEAR	DENVER	HOUSTON	KANSAS	LOS ANGELES	MIAMI
1980.1	52.94	52.26	52.83	60.43	50.70
1981.1	57.65	57.28	56.76	65.62	54.49
1982.1	63.88	63.40	62.71	71.86	58.94
1983.1	69.99	70.18	68.08	77.61	65.41
1984.1	73.18	71.00	69.42	80.29	67.81
1985.1	70.50	70.03	69.87	81.87	70.26
1986.1	72.25	70.65	71.40	84.26	71.68
1987.1	73.80	71.47	73.00	85.56	69.90
1988.1	75.36	72.29	75.36	88.44	73.06

YEAR	MINNEAPOLIS	NEW YORK	OKLAHOMA	PHILADELPHIA	PHOENIX
1980.1	52.30	57.60	46.81	52.37	54.59
1981.1	56.75	62.41	51.54	56.55	59.14
1982.1	61.36	68.29	56.61	61.51	61.99
1983.1	66.42	75.47	61.90	66.34	66.50
1984.1	70.91	79.48	63.62	70.42	68.05
1985.1	71.72	82.73	65.00	73.27	66.99
1986.1	73.18	87.05	67.55	75.71	67.68
1987.1	75.02	89.53	68.72	77.39	68.32
1988.1	76.90	92.28	70.75	79.98	70.75

YEAR	PORTLAND	SAN DIEGO	SAN FRANCISCO	WASHINGTON DC
1980.1	57.84	57.89	64.61	52.19
1981.1	63.00	63.36	70.72	56.85
1982.1	70.65	71.30	79.57	60.78
1983.1	75.43	76.81	85.72	66.55
1984.1	75.47	78.23	87.31	69.28
1985.1	76.21	80.16	89.46	68.97
1986.1	77.53	82.39	91.95	70.74
1987.1	77.68	84.24	94.02	71.86
1988.1	79.98	86.13	96.13	73.82