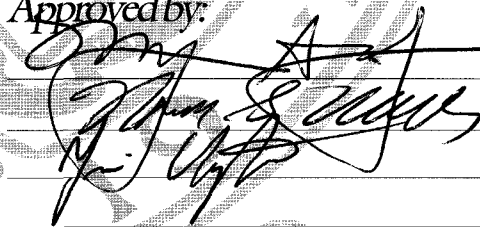


# UNIVERSITY OF CINCINNATI

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I, Sergey Markosyan,  
hereby submit this as part of the requirements for the degree of:  
Master of Community Planning  
in School of Planning, College of DAAP  
It is entitled The Impact of September 11,  
2001 on Office Development and Design

Approved by:



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®



THE IMPACT OF SEPTEMBER 11, 2001 ON OFFICE DEVELOPMENT AND  
DESIGN

A thesis submitted to the

Division of Research and Advanced Studies  
of the University of Cincinnati

in partial fulfillment of the  
requirements for the degree of

MASTER OF COMMUNITY PLANNING

in the School of Planning  
of the College of Design, Architecture, Art, and Planning

2003

by

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UMI Number: EP26353

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## **ABSTRACT**

The research examines the possible impacts of terrorist actions of September 11, 2002 on Class A office properties in the United States. The study analyzes whether tenants and owners of the office space changed or will change their location preferences and adopted or will adopt design and security modifications in their buildings.

Changes in vacancy rates, rental rates, quarterly absorption, and year-to-date absorption in 44 major office markets between the third quarter of the year 2002 and the third quarter of the year 2001 are analyzed. Little statistical evidence of tenants' flight away from larger cities to smaller cities, from downtowns to suburbs, and from very tall trophy buildings to other Class A CBD buildings were found. A web survey of members of The Building Managers and Owners Association confirmed these results. Moreover, the survey indicated that significant design and security changes were or will be implemented in the future as a result of terrorist action of September 11th.

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## INTRODUCTION

Among the industries which were impacted most by the terrorist actions of September 11, 2001 (9/11), real estate industry should be noted in particular. At the same time, commercial real estate was probably more influenced than any other segment of the real estate industry. On that day almost 34.5 million square feet of office space were destroyed or damaged in downtown New York (TenantWise 2003). The lion's share of this space (27.8 million square feet) was represented by Class A office space. Destroyed and damaged space was only the direct result, which could be estimated rather accurately. However, it is more difficult to evaluate the indirect impact that can be expressed by the increase of vacancy rates, occupancy costs, security costs, insurance costs, costs on design changes and relocation, the decrease of rental rates and occupancy. A number of analysts and consultants have tried to estimate the indirect impact and predict how 9/11 events would influence the future of the real estate industry. It seems that the majority of real estate services firms that conducted either a survey or another type of research to evaluate the impacts of 9/11 terrorist attacks on issues relevant to the real estate industry, including development, design, security, location strategy, and etc. The first analysis and predictions were made on the first week after the tragic event had happened. After more than year and a half this topic is still hotly debated among real estate experts, architectural, and planning professionals and on the Internet. The reason for the flurry of these debates is the long-lasting effect of a wide range of impacts. Tenants of the office building cannot move away instantly from their location, especially if the amount of leased space is significant. Rental rates do not increase nor decrease in one month with

the same rate as crude oil prices. Property owners cannot apply design changes in their buildings in a short period of time because it requires huge investments and reduces profitability of properties. Even after almost two years after the terrorist attacks, there are a number of changes which are planned by real estate departments of companies. For example, according to a survey by Jones Lang LaSalle, one of the world's largest real estate services firms, released in September 2002, only 21% of companies implemented their changes as of June 2002 (p. 2). At the same time 48% of respondents indicated that it would take 6 and more months to implement changes in the strategy (Jones Lang LaSalle 2002, 2).

Most of the issues related to real estate, city planning, and architecture discussed in the aftermath of September 11th can be divided into two broad groups: location and security.

Many firms have already reevaluated their location strategies and many are still in the process of doing this. September 11th raised a number of questions about the location of office properties for tenants. The following are the most frequently discussed questions and problems addressed by real estate services firms and their clients:

1. Whether to stay in a high-rise trophy building or to move in a low-rise one?

Terrorists targeted the World Trade Center towers, which were among the tallest buildings in the world. Based on this fact, some analysts predict that a number of tenants will try to avoid trophy buildings in the future (Levy and Powers 2002, 75).

2. Whether to stay in a central business district location, or to move to a suburb?

WTC towers were located in the downtown of New York, a high density area

with a large number of office space and people. That was one of the reasons why WTC had been a target of the terrorist attack. As a result, some analysts anticipated that some tenants would prefer to move away from the downtowns to suburban low concentrated areas (Lynn 2002).

3. Whether to stay in a large city or to relocate to a smaller city? For example, according to John Heffron, the partner and national director of construction services for Ernst & Young Real Estate Advisory Services, some companies would consider relocation of “part of some headquarters operations to a less visible location” (Lyne 2001)

A positive answer to any of these questions could radically change companies' strategies and policies, costs and revenues. Moreover, if tenants answer to any of these questions positively, a number of property owners, developers, city planners, economic development planners, and local government representatives can accordingly modify their strategies and tactics, plans and projects. These alterations could, in turn, dramatically change the urban pattern of the American cities, increase property values in some locations, decrease in others, and influence property and other taxes. To be ready for these changes, real estate professionals and urban planners must be able to predict them. For this purpose, different parameters of real estate activity should be analyzed. Change in vacancy and rental rates and change in absorption are the basic ones. These data can be easily collected and examined using modern statistical techniques and approaches. Another way to predict changes is to perform surveys among tenants and real estate and planning analysts. The surveys could reveal how tenants' behavior influenced by recent events and what they plan to do in the future.

The fear of terrorism threat, caused by the events of 9/11, has stimulated many companies to reexamine their security policies and procedures. The importance of these issues is confirmed by the survey "Top Security Threats and Management Issues Facing Corporate America," which was conducted by Pinkerton Consulting & Investigations and released in winter 2002. According to this survey, terrorism leapt from the number 17 concern in the year 2001 to the number-three security concern of American business in the year 2002 (National Real Estate Investor 2002). There are a number of security changes that have been already adopted or are being currently adopted. Building and landscaping design, access restriction, revision and development of evacuation and disaster plans are among the most frequently discussed changes in real estate, planning, and architectural publications. These changes can significantly impact development, occupancy and insurance costs, and property attractiveness to tenants. In turn, property owners and developers would have to adjust their strategies and plans. Again as with modifications of companies' location strategies, changes to security policies and procedures can alter the urban pattern of the American cities, property values, and taxes. Therefore, it is timely to examine security and design changes and the other characteristics of real estate activities mentioned before.

Hence, the goal of this research is to analyze how terrorist attack of September 11th has influenced office development and design in the United States. As conceptualizing office development and design is quite broad and include a lot of issues, this study will focus on particular aspects, which are listed in the research objectives.

The terrorist actions of September 11th were not the first case of such an event in the world. Periodically, terrorists have attacked and continue to attack various cities in

various parts of the world. London, Jerusalem, and Tel Aviv have been suffering terrorism for a long time. Familiarity with the impact of terrorist activities on the development and urban forms of these cities can be very important in the analysis of how 9/11 events might have influenced development in the American cities. Therefore, the objectives of the research include the following:

- Review of literature on terrorist prevention methods, approaches, and technique;
- Brief historical overview of the impact of terrorism on Israeli cities and London;
- Evaluation of the impact of terrorist actions on tenants' preferences regarding the existing and future office buildings' location;
- Analysis of the impact of 9/11 on tenants' preferences regarding building type, size, and height and how property owners and developers might address such changes;
- Examination of what security, and design improvements were implemented by property owners, developers, and tenants as a result of September 11th.

The following hypotheses will be tested in order to accomplish these objectives:

1. As a result of terrorist actions of September 11th, tenants of office buildings moved or are more likely to move to smaller cities in the future in face of terrorist threats.
2. As a consequence of terrorist attacks of September 11th and fears of terrorism, tenants of office properties moved or are more likely to move away from downtown on the next move and to avoid more concentrated urban areas.
3. Tenants prefer to avoid very tall and trophy office buildings since the events of September 11th.

4. Concerns of terrorism influenced or will influence design and security changes in office buildings.

The first three hypotheses evaluate changes in location strategies of tenants of office buildings. The last one examines alterations in design and security policies and procedures, which were or will be adopted by property owners and developers.

## CHAPTER 1

### LITERATURE AND RESEARCH REVIEW

Before September 11, 2002, little research was conducted on how development of cities and particularly office space buildings in American cities were impacted by the threat of terrorist actions. The reason was that American cities rarely faced such problems. Cities' residents had little experience related to terrorist actions and, therefore, were rarely concerned about terrorism. However, other fears in conjunction with the urban environment existed, and very often, fear was one reason for urban evolution, the improvement of cities' environment, and dramatic changes in urban patterns. Therefore, to understand the impact of terrorism on the office development, one should analyzed how people's fears impacted urban development and, particularly, development of office buildings; what means were used to protect office workers in their workplaces; and how fear could influence office design. To analyze all these issues, we need to find out what fears and threats impacted cities development in the past.

#### *1.1 Crime and Terrorism Prevention in the American Cities – Different Approaches*

Various fears, related to urban environment, have existed and exist now along with the fear of terrorism. A widely discussed fear in the planning literature is crime. Crime existed in cities since long ago and it has become one of the major problems of cities' residents. For example, more than 50 percent of ten thousand people interviewed in 1967 reported that crime made them change their lifestyle radically: they stopped

walking at night and moved their homes to neighborhoods which they perceived to be safe (Newman 1973, xii). People invented many different methods for preventing crime in cities. One such method was offered in architecture in order to find the places in the buildings, in which people were exposed to the danger of crime, and improving their architecture made them less dangerous. Oscar Newman was among the leading experts on this issue. His works on crime prevention by means of design, including *Architectural Design for Crime Prevention*, *Defensible Space: Crime Prevention through Urban Design*, *Design Guidelines for Creating Defensible Space*, were created in 1970s. Although these works are primarily about crime prevention in residential areas, some of his findings may be applied for this research, because the author analyzed communities of both low-rise and high rise residential buildings and very often high-rise buildings are used for both residential and office purposes. Therefore, Newman's works may help to identify the methods of preventing terrorist actions in this kind of buildings. For example, the author summarizes that "public areas of building interiors (stairs, corridors, lobbies, and elevators) were, in general, more feared in high-rise than in low-rise buildings" (Newman 1973, xv). Therefore, in preventing terrorist action, much attention should be paid to these public areas of building interiors, as these areas are the possible places of terrorists' penetration into buildings.

In *Defensible Space: Crime Prevention through Urban Design*, Newman demonstrated that building height directly correlated with people' fear of crime. However, he proved that the total effect of crime was not as strong as it was expected (Newman 1972). These results are consistent with Edward L. Glaeser and Jesse M. Shapiro' (2001, 5) paper called *Cities and Warfare: The Impact of Terrorism on Urban*

*Forms.* According to these authors, the height of buildings did not influence the number of terrorist actions in these buildings. At the same time, Newman, in his work *Architectural Design for Crime Prevention*, stated that “as building height increases, so too does crime” (1973, 113). He analyzed statistical data about the number of incidents of crime, building height, and project size and summarized that “the apparent effect of height on crime is quite evident” (Newman 1973, 114). According to the analysis, there is an increase in crime rate with the increase of building height. Moreover, crime rate increases with the increase of project size (the number of units), especially when the size of project more than 1000 units (Newman 1973, 114)

The reasons for the increase of crime rate, according to Newman (1973, 113), were:

- a larger number of apartment units;
- a larger number of people who used the single lobby, entry, and elevators, which resulted in anonymity;
- more interior space, hidden from view.

The fear of crime accelerated the development of gated communities in the United States. Gated communities are residential areas and small neighborhoods with restricted access. The purpose of gated communities is to offer security to its residents. This phenomenon appeared and developed mostly in the 1980s. At that time many people believed that usual neighborhoods and communities do not possess the primary features, security and protection. People felt themselves unsafe in the common residential space. Therefore, they moved to the gated and walled communities. While security is the primary goal and motivation for living in the gated communities, there are other

incentives behind the creation of such communities. Edward J. Blakely and Mary Gail Snyder (1997), in their work *Fortress America*, introduced three types of gated communities: lifestyle communities, prestige (elite) communities, and security zone communities (p. 44). According to the authors' specification, lifestyle communities provide security and separation for leisure services, activities, and amenities within gated communities; prestige communities attract people who are looking for "a stable neighborhood of similar people where property values will be protected"; and security zone communities are communities "where the fear of crime and outsiders is the foremost motivation" (Blakely and Snyder 1997, 44). The analysis of development of gated communities may give some clues of possible trends in development of suburb office parks, which can be considered as examples of office gated communities. However, this connection is not strong, because the difference between reasons for developing residential gated communities and office parks is significant.

Contrary to "Fortress America" strategy, John Friedmann (2002) proposes the strategy of "Open City" in his article *City of Fear or Open City?* The Friedmann's idea is that Americans should not lock themselves "into the prison of our own fears." Instead, he proposes four major steps: reducing the urban footprint, drafting charters of local citizenship, meeting basic human needs, and working toward new forms of city-regional governments. These steps, in Friedmann's opinion, can help create "Open City" atmospheres in the American cities. These steps can help make the American cities more sustainable, human, and people-friendly. For example, the first step – reducing the urban footprint - implies "reducing the use of all forms of energy, especially fossil fuels; cutting back on water consumption; relying more on locally grown food and less on

imports from other regions; and making steady progress in recycling solid and liquid wastes” (Friedmann 2002, 238). According to the author, this step will show to poor Islamic countries, which are the sources of terrorism, that American society is ready to share the world’s resources on the equitable basis. Therefore, the American society will show the rest of the world its willingness to transform itself and become more open. In the Friedmann’s opinion, these steps can dramatically change the attitude of most Islamic countries toward America, and, therefore, diminish the threat of terrorism.

The literature on office space construction and development published before 9/11 does not mention the threat of terrorist actions. However, according to John Robert White (1993), life safety and security issues have a major impact on building design (p. 250). There are several ways of improving security of office facilities. Reception stations with video equipment and personnel for monitoring activity in office buildings 24 hours a day are one of the forms of security provisions. Electronic equipment with card entry, personal identification systems, and elevator controls are other possible forms (White 1993, 252). Special attention is usually paid to control access to parking areas. Controlling access to underground garages and parking space adjacent to office buildings can be even more critical in the face of terrorist threat, because terrorists can use cars with explosives to commit terrorist actions. Life safety systems usually include sprinkler systems, fire doors, fire alarms, and smoke alarms.

Among the most recent researchers on crime prevention and physical security are Lawrence J. Fennelly and Timothy D. Crowe. In 1997, under the overall edition of Fenelly the second edition of *Handbook of Loss Reduction and Crime Prevention* was published. The second edition is titled *Effective Physical Security* and contains works of

various experts in this field. This book is divided into three major parts: Design, Equipment, and Operations. In each section the author describes crime prevention methods in buildings by using different approaches. Much attention in this book is paid to the means of crime prevention in office buildings. Many of them can be applied now by the owners of the office properties for preventing not only crime but also terrorist actions. Moreover, in face of terrorism threat, many recommendations of Fennelly seem making even more sense than they could do before the terrorist actions of 9/11. For example, one of the chapters in the book is devoted to bomb and physical security planning. The most of procedures described in this chapter were never applied by property owners before 9/11 events and are being adapted now.

The first part of the book, Design, focuses on how high-quality design of a building can help to improve security. First, it contains a set of recommendations for initial survey of a building security, which must be performed on a stage of a facility designing and construction. According to Fennelly (1997), the initial survey should be performed by the owner together with architects who design the building (p. 3). Fennelly provides several checklists. Each of them covers a particular aspect of building security, which should be checked on the design phase of the building construction. Interior space, exterior access, windows and glass, locks and their installation, doors, alarm systems, storage rooms must be the points of the essential interest of a building owner (Fennelly 1997, 5-9). Second, Fennelly describes the process of the fundamental security surveys, which are characterized as “critical on-site examination and analysis... to ascertain the present security status, to identify deficiencies or excesses, to determine the protection needed and to make recommendations to improve the overall security” (Fennelly 1997,

13). The recommendations, on the basis of a security survey, are grouped as maximum, medium, and minimum, expressing the level of protection that will be employed. The author also provides a list of exterior and interior physical characteristics of a building that should be checked periodically as one of a security measures. Third, the author illustrates the different physical security approaches, which depend on the level of physical security. According to Gigliotti and Jason, there are five levels of physical security – from minimum to maximum (Fennelly 1997, 89). Each level has its own criteria and purposes. This method can be used by the owners of modern office facilities. Depending on a location of a building and its interior and exterior characteristics, the risk of terrorist action can be higher or lower. According to the level of the risk, corresponding level of physical security can be adopted. For example, if a building is located in the area with a high concentration of people and is a high-rise trophy property, it is considered at somewhat greater risk as a result of 9/11 (Levy and Powers 2002, 75). Hence, its level of security must be higher than if the building is located in the periphery and is a low rise one. However, in this case, a thorough examination, which will consider all the factors influencing a risk of terrorist action, should be made. A separate chapter in *Handbook of Loss Reduction and Crime Prevention* deals with the concept of crime prevention through environmental design (CPTED) and authored by Timothy D. Crowe. In 2002 Crowe published his own book and showed how the CPTED concept works. Crowe's book as well as the concept is described later in this chapter.

The second part of the book is devoted to the equipment that is used to prevent crime: physical barriers, such as doors, walls, fences, topography, locks, safe, accessories, alarms, and electronic surveillance. The author provides technical

specifications and examples of the necessary and most effective equipment for preventing crime. Many of his recommendations can also be used for prevention of terrorist activities, which can be performed with usage of explosives.

In the last part of the book, the author explains different procedures for protection of facilities. According to Wyllie, special attention should be paid to the preparation of security personnel (Fennelly 1997, 250). Proper training of security guards can help avoid many problems associated with crime and correspondingly terrorist actions. The awareness of guards about how to deal with bomb threats is necessary for high-quality security personnel. The author describes different scenarios, when personnel responsible for building security must react accordingly in various situations. First, the personnel should control the interior and exterior spaces as much as possible, so the likelihood of penetration of terrorists with explosives is minimized. Parking facilities should be restricted (Fennelly 1997, 268). In case of bomb detection, security guards are responsible for organized evacuation of all the people from the building. Besides, the process of evacuation should take as little time as possible. The events of 9/11 showed that evacuation plans are especially important in case of terrorist actions and can reduce losses significantly.

*Crime Prevention through Environmental Design* by Timothy D. Crowe describes the same named concept, which applies different applications of architectural design and space management concepts for the purposes of reduction of the fear of crime and the incidence of crime (Crowe 2000, 1). The main idea is that quality of life can be improved through producing behavioral effects that reduce fear and incidence of crime by manipulation the physical environment (Crowe 2000, 34-35). In this context,

environment is represented by people and physical and social features which surround people; design is concluded in physical, law, and management enforcements.

Crime Prevention through Environmental Design (CPTED) concept includes three major strategies: natural access control, natural surveillance, and territorial reinforcement. The main goal of access control is to disallow access to a target by creating perception of risk in criminals. Natural surveillance discusses how to keep trespassers under observation. Crowe lists three strategies for access control and surveillance: organized (guards for the former and police patrol for the latter), mechanical (locks for the former and lighting for the latter), and natural (spatial definition for the former, windows for the latter). Territorial reinforcement means using physical design for creating of a sense of territoriality (Crowe 2000, 36-37).

The author provides a number of examples of using CPTED strategies and applications for different purposes. As this study focuses on office space, I make a brief review of the strategies and application related to commercial environments and office buildings for terrorism prevention.

CPTED for commercial areas can be applied through a complex of approaches, which include access control, surveillance through physical design, mechanical surveillance systems, design and construction, owner/management actions, social interaction, private security services, police services, community awareness, and territorial identity (Crowe 2000, 128). The following examples show how to apply the above-mentioned approaches in practice:

- access control, which prevent unauthorized access to buildings, garages, and other restricted areas. This type of control can be applied by proper design of entrances

and lobbies. For example, main entrance and way to elevators should be controlled so that people cannot go directly to elevators without registering. Therefore, security/receptionist station should be located so that both main entrance and elevators are visible from the station (Crowe 2000, 143);

- surveillance through physical design, which make it possible to detect offenders of the office environment. It can be applied through appropriate site planning efforts. For example, campus plan should emphasize openness of the place so that intruders perceived risk of surveillance (Crowe 2000, 148);
- mechanical surveillance devices, which serve to detect and signal attempts of illegal penetration into building (Crowe 200, 127).

The main principle is to use all the approaches as an interrelated and interconnected system. The system should be carefully planned and implemented. The process of CPTED planning is similar to the pragmatic rational planning model, described by the most textbooks on planning theory. It includes data collection and existing conditions survey, data analysis, goals formulation, alternatives generation, solutions development, solutions evaluation and translation of solutions into policies, plans, and guidelines (Crowe 2000, 204).

Despite the main purpose of the concept described by Crowe in his book is to prevent crime, it can be applied to protection of office building from terrorist actions. However, it should be updated by introducing the approaches for bomb detection and chemical and biological weapon prevention.

### ***1.2 The Impact of Terrorism on Cities. The International Context***

To better understand how terrorism can influence the development of American cities, research on the international experience could be useful. Edward L. Glaeser and Jesse M. Shapiro have evaluated the link between terrorism and urbanization in Jerusalem and London which are the cities with the highest number of terrorist actions in the world. In their paper *Cities and Warfare: The Impact of Terrorism on Urban Forms* (2001) the authors found out that there was no correlation between the number of terrorist actions and city population size of a city. They analyzed the population data in Jerusalem, Tel Aviv, and London throughout several decades and concluded that the link between terrorism and urbanization was “small, statistically weak and casually dubious” (Glaeser and Shapiro 2001, 24). Examining the impact of terrorist actions on the Israel cities, the authors found that Jerusalem experienced larger growth of population than Tel Aviv, despite the fact that most terrorist actions in Israel took place in Jerusalem, and Jerusalem has been considered less safe (Glaeser and Shapiro 2001, 17). According to the authors, Jerusalem’s average annual growth of population over the period of fifty years was 4.2 percent compared to 2.6 percent in Tel Aviv. They linked this fact to the increased political role of Jerusalem, physical beauty of the city, a strong tourist economy, and significance in historical context, all of which, in the author’s opinion, outweigh danger of terrorism (Glaeser and Shapiro 2001, 18). The authors also found little evidence on the impact of terrorism on urban landscape in Israel. Tel Aviv has two high-rise 500 feet tall buildings, which performs good and several similar projects in line as of December 2001. Jerusalem does not have such types of buildings but the reason is

not the fear of terrorist actions, but strong opposition of local communities, which struggle for preserving city's character (Glaeser and Shapiro 2001, 18).

The analysis of the impact of terrorist actions on London indicated that, "permanent residential population does not seem to react to terrorism, temporary population – i.e. tourism – appears to be much more responsive" (Glaeser and Shapiro 2001, 19). The authors cited the work *An Econometric Analysis of the Impact of Terrorism on Tourism* by W. Enders, T. Sandler, and G. F. Parise, in which the authors analyzed the impact of terrorism on European cities from 1974 to 1988. Enders, Sandler, and Parise suggested that terrorism made cities unpleasant places for vacation (Glaeser and Shapiro 2001, 19). Therefore, terrorist actions can mostly influence not office buildings, but hotels, resorts, and other entertainment facilities.

At the end of their work, Glaeser and Shapiro predicted, that the overall impact of September 11th on the American cities would be small.

### ***1.3 Post-9/11 Publications***

Despite some researchers and analysts, such as Glaeser and Shapiro, predict insignificant impact, in a number of sources, published after September 11th, the impact of terrorism on the real estate development is considered to be significant. For example, according to the article of Jack Lyne (2002), many real estate firms will face higher tenant occupancy costs by increasing building security. As a result, Lyne anticipated that the profitability of much real estate property would decline. This, in turn, can cause the developers of future development project to look for locations with less development costs and to move to the areas with low cost of land and construction costs (Lyne 2002).

Anthony Downs, in his article *Despite Events of Sept.11, Industry Will Prove Resilient*, stated that September 11th events reduced demand for all types of space and caused vacancies to rise and rents to fall for office space. He also pointed out that big businesses do not want to concentrate their personnel at a single high-rise building. On the contrary, they prefer to disperse their employees around the region (Downs 2001).

The process of employees and facilities dispersion concluded in spreading facilities and/or operations across wide geographic area with the purpose of keeping business operating in case of destruction one or more companies' facilities. The other possible option is decentralization, which is mostly the same as dispersion. The only difference is that decentralization usually means moving facilities out of the cities into suburban areas, whereas dispersion is primarily moving facilities into the other parts of a city or into other cities. September 11th revealed companies' vulnerability when all the operations were concentrated in one place – World Trade Center (PricewaterhouseCoopers and Lend Lease Real Estate Investments 2002, 12).

The process of decentralization and dispersion of facilities is complicated. There are several possible scenarios to decentralize and disperse facilities. Scenarios include operations dispersion or decentralization, headquarters facilities dispersion or decentralization, establishing of back-up facilities, decentralization of data centers and main equipment rooms. Any of these scenarios inevitably leads to a greater use of telecommunication (videoconferencing, teleconferencing, and Internet-based technologies) (Lyne 2001).

The initial reaction of real estate industry on the 9/11 events is reflected in the article by Jack Lyne *Real Estate Strategy, Post-09/11/01: In Part, a Whole New*

*Ballgame*, which was released on September 24, 2001 - less than two weeks after the terrorist actions. Facilities decentralization and dispersion is the core of this article. Lyne expects that dispersion of corporate facilities will grow but mostly for famous and biggest American cities, like New York, Chicago, and Atlanta (Lyne 2001).

According to the report of PricewaterhouseCoopers and Lend Lease Real Estate Investments, *Emerging Trends in Real Estate: 2003*, released in fall 2002, "most large companies have reevaluated where functions should be located, moving pieces of businesses in and out of cities to ensure that backup facilities and computer systems are secure." (PricewaterhouseCoopers and Lend Lease Real Estate Investments 2002, 12).

The fact that the famous towers of the World Trade Center were chosen as a target for terrorist attack caused some researchers to speculate about correlation of office buildings' fame and the decrease of their attractiveness to tenants after September 11th. Miller et al. (2003) analyzed changes in vacancy rates and sublease rates in thirty seven highest office buildings all across the United States in the research about the impact of 9/11 on trophy and tall office properties. Miller et al. performed regression analysis running two sets of regressions. The dependent variable in the first set was the percentage change in vacancy rates between the second quarter of 2001 and the fourth quarter of 2001.

The dependent variable in the second set was the percentage change in sublease rates between the second quarter of 2001 and the fourth quarter of 2001. The heights of the buildings, the location of the buildings, and whether or not the buildings are "famous" (the authors use this term only for the buildings, which are known not only in the United States, but also abroad, for example, Sears Tower in Chicago or Empire State Building in

New York) were independent “dummy” variables. The results of the analysis indicated that only “famous” buildings and buildings located in New York were impacted by 9/11 terrorist actions. However, the impact, i.e. increase in vacancy rates was not very significant (Miller et al. 2003). The similar conclusion was made by Levy and Powers in their article *Office Checkpoints* (2002). They quoted Peter Block, director of Cushman & Wakefield, which is one of the largest developers and property owners in the U.S., and James Thomas, chairman of Thomas Properties Group. According to Block, despite existing viewpoints that landmark buildings have greater risk, only small percentage of the clients of Cushman & Wakefield does not consider these buildings for leasing and occupancy of the landmark buildings owned by Cushman & Wakefield (among them are Bank of America Plaza in Dallas and Key Tower in Seattle) was not decreased significantly after 9/11 (Levy and Powers 2002, 75). At the same time, Thomas pointed out that his company “continued to look at landmark building projects”, but “wouldn’t buy an existing building if it was too prominent” (Levy and Powers 2002, 75).

Significant attention in the publications evaluating impact of September 11th is paid to design and security issues. There are a number of different design approaches which can be enhanced in the office buildings. Equipment systems development, improvement of building materials, which can resist terrorist attacks, urban landscaping, which can deter vehicles and create barriers are among them (Levy and Powers 2002, 76-77).

Among discussed security measures, access restriction dominates over the other ones. The largest development companies changed their approach in developing new multi-story and multi-tenant facilities as a result of 9/11. For example, according to

Charles M. Wagner, senior property manager of Hines, “the events of 9/11 caused the company to immediately review the security protocol, the company had initially developed for the building, which was in the early stage of construction in Chicago by September 11”(Levy and Powers 2002, 76-77). Wagner pointed out that “the building was originally intended to be a public multi-tenant facility.” However, the terrorist attack made them change their access policy and implement closed-access protocol. Now all the visitors to the upper floors must proceed through a state-of-art screening process (Levy and Powers 2002, 76-77).

Additional security procedures are mostly welcomed by tenants of office properties. However, according to Levy and Powers (2002) one year after September 11th, many tenants are becoming less tolerant to improving security measures and implementing design changes, which result in increase of occupancy costs. Levy and Powers states that according to recent surveys of real estate professionals, among the prime drivers of tenants, related to selecting office buildings are occupancy costs, location, and amenities (2002, 75). At the same time security measures were not mentioned as prime drivers of tenants. If right after September 11th many tenants were ready to pay for security improvements, now they understand that implementing design changes and providing new security procedures will inevitably add additional costs, which ultimately will be passed onto them. Moreover, additional security measures create inconveniences, such as delays of companies’ personnel and clients (Levy and Powers 2002, 75). Not only tenants, but also some real estate professionals, such as Paul Beitler, Chicago real estate executive, contend that “many of the security measures implemented in high-rise office buildings nationwide in the wake of the Sept. 11 terrorist attacks on the

World Trade Center are ineffective, costly and onerous” (Valley 2002). Beitler doubted the ability of the improved security measures to really prevent terrorist attacks. These doubts are supported by the fact that after the terrorist action of 1993, \$150 million had been invested to improve security at the WTC buildings, but this did not help on September 11th (Valley 2002).

However, most experts consider upgrading of security systems and procedures to be very important for preventing future terrorist attacks against office properties. Mark Pickett in his article *Building Security Does Matter* stated that security measures had to be implemented long ago (2002). He contended that terrorist action does not necessary mean an air strike. Attack with usage of chemical or biological weapons or explosive usually implies penetration of terrorists inside the building. In this case, building control systems, revision of air-intake and ventilation systems, and evacuation procedures can prevent terrorist attack or at least reduce dangerous consequences (Pickett 2002).

#### ***1.4 Post-9/11 Surveys and Studies***

Since September 11, 2001 much research, evaluated the impact of 9/11. The largest real estate consulting companies administered these research projects and surveys. In their studies, the companies assessed the implications of the terrorist attacks as well as discussed predictions made by firms and their clients regarding future trends of real estate industry.

In February 2002, Ernst & Young conducted a survey *Trends in Global Real Estate Survey: The Latest in Technology, Security and Corporate Real Estate Strategy*. The purpose of this survey was to determine reaction of real estate professionals on the

tragic events of 9/11 and find out how companies adjusted their strategies and policies in the face of terrorism threat. This survey was released in March, 2002 and, in some sense, is the reflection of the first reaction of the real estate industry on the 9/11 terrorist attack.

The results of this survey revealed three significant points:

1. Companies increased their interest in improving security measures. According to the survey, 65% of firms acknowledge high or some degree of corporate interest in improving physical security of corporate facilities. Moreover, a large share of companies has already started to implement new security policies. Forty seven percent of the respondents changed (significantly or somewhat) physical access to corporate facilities and properties, 12% was spending significant funds on preventive measures, and 29% of the firms were evaluating the necessary expenditures.
2. High-rise office buildings, but not high concentrated central business districts, were considered to have greater risk of future terrorist attacks. Thirty one percent of the companies planned to avoid leasing space in high-rise buildings, but at the same time 85% of the firms were not going to alter concentrations of their employees.
3. The events of 9/11 only slightly influenced the investment strategies of real estate companies. Only 18% of firms slightly modified their investment strategies. Moreover, 65% planned to increase their investments in real estate and only 15% planned to decrease their investments.

In September, 2002, one year after 9/11 terrorist actions, Jones Lang LaSalle released a report *The Impact of September 11 on Corporate Real Estate*. The report was

based on the survey, which was conducted in June 2002 among the corporate real estate executives from more than 50 of Jones Lang LaSalle' largest corporate clients. The purpose of this survey was to determine the impact of 9/11 on corporate real estate strategies. According to the report, "September 11 attack had a significant and widespread impact on corporate real estate. U.S. headquartered companies responded quickly and decisively to the events of September 11" (Jones Lang LaSalle 2002, 1). The survey divided corporate real estate strategies into four groups: location strategy, building management issues, security measures and occupancy costs issues. September 11th has caused many companies to alter their location strategies. Despite the majority of them (54%) did not make any changes almost half of them had made or planned to make some alterations as of June, 2002 (Jones Lang LaSalle 2002, 6). The most of issues regarding companies' location policies included: 1) dispersion of more operations by geography (28% of companies, which reported changes, 2) consolidations of operations into fewer locations (24%), 3) reduction of operations in trophy locations (20%). Only 4% of respondents considered reduction of operations in high-rise buildings and 4% - reductions of operations in CBDs. In comparison to Ernst & Young research, high-rises are not regarded by real estate executives as "risky" location or, even if regarded as "risky", high rise facilities provide much more benefits to tenants. Proximity to large concentration of financial, legal, governmental institutions, clients, hotels, restaurants, access to a labor force and transportation facilities overweight the fear of terrorist threat. However, most company would prefer to avoid trophy locations and landmark buildings, which, in their opinion, are the major targets of terrorists.

The most crucial result of the analysis of the building management concerns caused by 9/11 is that entrance security was mentioned as one of the three most importance issues by 91% of respondents (51% mentioned entrance security as number-one concern). The other major concerns cited by respondents were building management preparedness (number-one concern - 31%) and evacuation plans (number-one concern – 14%). Moreover, evacuation plans was declared among the top three building management concerns by 84% of respondents (Jones Lang LaSalle 2002, 4).

Among the provisions for since 9/11 made by the companies, development of or major revision to disaster plans was reported by 34% of respondents as the most significant activity. The other ones included establishing and maintaining back-up facilities, increasing back-up of power and data and separation of data centers from CBD locations (Jones Lang LaSalle 2002, 2).

## CHAPTER 2

### METHODOLOGY OF THE RESEARCH

The research method encompasses both quantitative and qualitative techniques. A particular method had been used for collecting data and examining each of the study's hypotheses.

#### *2.1 Data Collection for Testing Hypotheses # 1 and # 2*

For the analysis of the hypotheses on changing of tenants' preferences who favor smaller cities and suburban areas, 44 United States real estate market areas were examined (figure 1). The analysis was based on the data, which are available on the web site of Colliers International, one of the largest U.S. real estate services firms. The data set used for the analysis consists of the following information:

1. Inventory (in square feet) – the total amount of the occupied and vacant office space in a particular market on the last day of the analyzed quarter.
2. Absorption since the beginning of the current quarter (in square feet) – the net change in the amount of occupied office space in a particular market, which have occurred since the first day of the analyzed quarter (quarterly absorption).
3. Absorption since the beginning of the current year (in square feet) - the net change in the amount of occupied office space in a particular market, which have occurred since the first day of the current year (year-to-date (YTD) absorption).
4. Vacancy rate (in percent) – percentage of the stock of the office space in a particular market, which is not currently occupied.

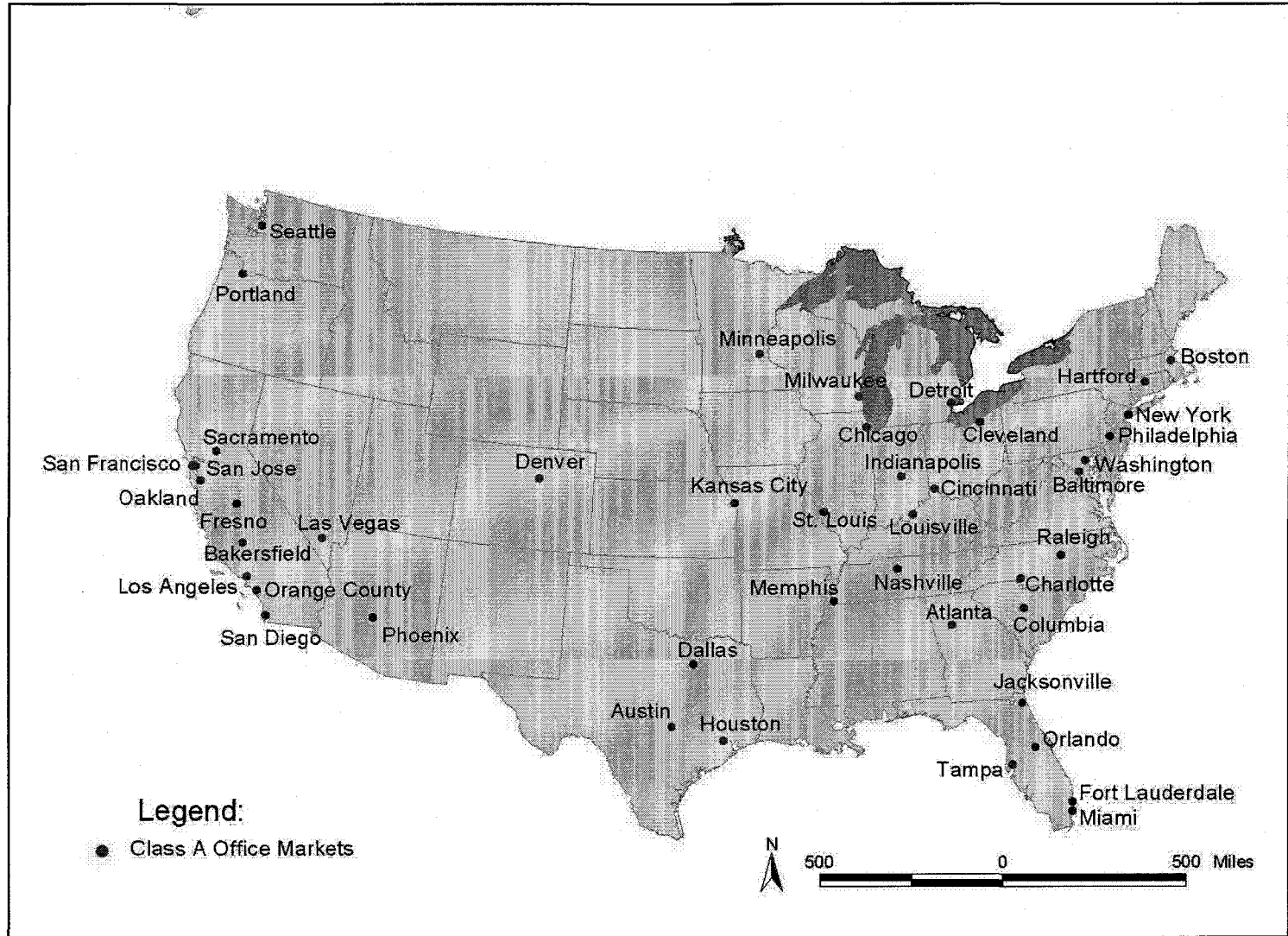


Figure 1. Analyzed Class A Office Markets

5. Average annual quoted rent (in dollars per square foot).

The data set was collected for Class A office properties located both in the central business district (CBD or downtown) locations and in the suburbs for which the market areas were examined. The data set included the above-mentioned data for two periods: the third quarter of the year 2001 and the third quarter of the year 2002. Since the period of interest occurred in the end of the third quarter of the year 2001, this quarter is used as a base period. Comparing changes of analyzed parameters for one year since September 11th, the hypotheses of the study on changes of tenants' location preferences as a result of September 11th were tested.

The analyzed data do not represent the total U.S. office space stock. Some large markets, such as Pittsburgh, PA, West Palm Beach, FL, Honolulu, HI and some other, were not included in this study, because of data unavailability. Therefore, office space stock mentioned in this study as a U.S. total stock does not necessarily represent the total amount of Class A office space in the United States. Nevertheless, as almost all the major metropolitan areas are included in the sample, all the calculated parameters will be considered as U.S. total stock characteristics.

As mentioned before, the initial data were collected for both CBDs and suburbs. Therefore, most of the market areas are represented by two sets of data: CBD Class A Office Space market and Suburb Class A Office Space market. However, some large office market areas, such as New York and Washington D.C., include more than two markets. In these cases, CBD or suburb markets are divided into several smaller sub-markets. For, example, Washington D.C. suburban office market consists of two sub-

markets: Washington D.C./North Virginia and Washington D.C./Suburban Maryland. At the same time, New York downtown office market includes three sub-markets: New York Downtown, New York Midtown, and New York Midtown South. On the other hand, some markets can contain either downtown or suburban office market. For example, Orange County is a purely suburban market, whereas San Francisco is an entirely downtown office market. All the collected data are summarized in the tables 1-2.

## *2.2 Methodology for Testing Hypotheses # 2*

To analyze the impact of September 11th on office development (to corroborate or reject the hypothesis about change of tenants' location preferences in favor of suburbs as places with less concentration of people and office space) four regression tests were performed. The independent variable was the same for each of the four regression test. It was a dummy variable based on whether the variable was for a downtown market area or for a suburban market area. The value "1" was assigned to the downtown office markets and the value "0" was assigned to the suburban office markets.

The dependent variables were different in each test and were represented by the following parameters for every downtown and suburban office market:

- change in vacancy rates between the third quarter of the year 2002 and the third quarter of the year 2001;
- percentage change in average annual quoted rents between the third quarter of the year 2002 and the third quarter of the year 2001;
- percentage change in the quarterly absorption between the third quarter of the year 2002 and the third quarter of the year 2001;

Table 1  
Downtown Class A Office Markets Original Data

##	Market	Total Inventory		Absorption		Absorption YTD		Vacancy Rate		Average Annual Rent	
		3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (%)	3Q 2002 (%)	3Q 2001 (\$PSF)	3Q 2002 (\$PSF)
1	Atlanta, GA	21,327,000	23,866,000	-140,000	185,000	643,000	391,000	11.0	17.5	24	21.3
2	Austin, TX	3,647,000	4,333,000	-96,000	-293,000	-416,000	-123,000	13.9	27.5	32.4	25.3
3	Bakersfield, CA	579,000	627,000	-25,000	12,000	6,000	63,000	17.1	5.8	16.2	17.4
4	Baltimore, MD	7,629,000	7,738,000	-31,000	-261,000	87,000	-318,000	11.1	17.8	24.7	20.8
5	Boston, MA	30,792,000	32,236,000	-415,000	-349,000	-1,081,000	-623,000	8.0	15.8	60.8	46.7
6	Charlotte, NC	8,687,000	9,641,000	-135,000	856,000	-41,000	500,000	6.1	5.0	25.3	24.5
7	Chicago, IL	54,305,000	53,471,000	606,000	-109,000	-172,000	-556,000	13.2	14.1	39	31
8	Cincinnati, OH	7,393,000	7,483,000	70,000	-28,000	-38,000	-109,000	4.2	7.9	21.3	21.2
9	Cleveland, OH	9,346,000	9,346,000	-21,000	13,000	43,000	-100,000	9.0	13.3	21.3	21
10	Columbia, SC	2,680,000	1,934,000	30,000	-59,000	10,000	-59,000	7.1	10.9	19	18
11	Dallas, TX	20,565,000	20,565,000	-254,000	-178,000	-424,000	-360,000	16.9	18.2	25	19.5
12	Denver, CO	13,916,000	15,546,000	-94,000	-171,000	-494,000	-255,000	12.5	16.4	27.1	22.2
13	Detroit, MI	8,066,000	8,610,000	26,000	33,000	197,000	-4,000	8.6	16.3	28	25
14	Fresno, CA	244,000	251,000	0	6,000	3,000	8,000	1.2	0.0	15.6	18
15	Ft. Lauderdale, FL	3,179,000	3,813,000	-46,000	135,000	-60,000	133,000	12.5	24.1	25.6	26.6
16	Hartford, CT	6,565,000	6,554,000	34,000	-208,000	148,000	-254,000	9.8	13.9	24	24.6
17	Houston, TX	24,743,000	26,481,000	-370,000	-412,000	-267,000	-696,000	7.3	15.1	23.3	26.2
18	Indianapolis, IN	5,893,000	5,899,000	-137,000	-4,000	-52,000	17,000	14.4	16.2	21.3	19.8
19	Jacksonville, FL	5,087,000	5,087,000	5,000	-201,000	14,000	-317,000	5.8	12.3	18.9	19.5
20	Kansas City MO-KS	5,606,000	5,805,000	-43,000	108,000	-278,000	-9,000	10.2	14.8	21.8	20.9
21	Las Vegas, NV	332,000	435,000	0	7,000	1,000	22,000	8.0	17.3	28	27.4
22	Los Angeles, CA	23,441,000	23,441,000	127,000	-179,000	469,000	-275,000	17.5	17.5	25.4	24.7
23	Louisville, KY	3,327,000	3,472,000	-19,000	-9,000	0	-5,000	5.1	8.9	19.8	20.2
24	Memphis, TN	2,173,000	2,145,000	2,000	81,000	70,000	-19,000	14.0	16.5	18	16.6
25	Miami, FL	3,645,000	3,644,000	-31,000	-89,000	-19,000	-145,000	9.0	13.8	29	28.7
26	Milwaukee, WI	4,830,000	5,670,000	10,000	299,000	-10,000	502,000	11.1	10.7	23	23
27	Minneapolis, MN	11,526,000	13,171,000	626,000	-426,000	359,000	-1,514,000	7.9	24.0	29	25.5
28	Nashville, TN	2,869,000	2,869,000	-118,000	2,000	-148,000	15,000	17.0	15.9	18.5	18.5

##	Market	Total Inventory		Absorption		Absorption YTD		Vacancy Rate		Average Annual Rent	
		3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (%)	3Q 2002 (%)	3Q 2001 (\$PSF)	3Q 2002 (\$PSF)
29	New York, NY - Downtown	55,945,000	55,945,000	-13,358,000	151,000	-15,512,000	-2,632,000	7.5	14.3	42.6	38.3
30	New York, NY - Midtown	141,224,000	145,455,000	-1,969,000	445,000	-4,566,000	1,322,000	7.7	8.5	62.4	57.4
31	New York, NY - Midtown South	14,054,000	14,054,000	-146,000	19,000	-539,000	-271,000	5.6	7.2	45.7	35.5
32	Oakland - East Bay, CA	6,301,000	6,829,000	4,000	20,000	-104,000	-87,000	5.4	13.6	37.6	31.3
33	San Francisco, CA	44,656,000	47,059,000	-891,000	75,000	-2,878,000	-336,000	10.3	15.2	45	32.3
34	Orlando, FL	3,149,000	3,213,000	-131,000	-40,000	2,000	-111,000	18.0	38.4	21.2	24.2
35	Philadelphia, PA	29,994,000	30,537,000	424,000	-58,000	107,000	-538,000	11.2	14.4	23.7	23.1
36	Phoenix, AZ	8,227,000	8,637,000	510,000	-5,000	-203,000	-13,000	12.8	15.9	22.4	21
37	Portland, OR	9,279,000	9,770,000	-109,000	-2,000	-463,000	-172,000	9.0	12.8	27	22
38	Raleigh, NC	1,927,000	1,935,000	7,000	-5,000	-43,000	0	7.4	7.5	18	18
39	Sacramento, CA	4,282,000	4,551,000	-68,000	-19,000	4,000	-162,000	3.9	10.4	25.8	21.6
40	San Diego, CA	4,823,000	6,747,000	14,000	14,000	126,000	-124,000	4.2	9.4	30.6	27.3
41	San Jose/Silicon Valley, CA	2,049,000	2,391,000	-74,000	42,000	-88,000	-94,000	4.3	14.3	63.2	30.9
42	Seattle, WA	24,717,000	25,437,000	559,000	67,000	-45,000	26,000	10.8	13.0	31.3	28.1
43	St. Louis, MO	6,998,000	7,260,000	-81,000	17,000	-127,000	-40,000	12.2	14.4	20	18.8
44	Tampa, FL	5,261,000	5,261,000	-24,000	2,000	12,000	42,000	13.9	36.8	19.1	19.5
45	Washington, DC	31,886,000	35,542,000	700,000	480,000	1,870,000	1,844,000	4.0	6.6	49	46
	U.S. Total	687,164,000	714,756,000	-15,072,000	-36,000	-23,897,000	-5,436,000	9.5	13.3	39.8	35

Source: Colliers International

Table 2  
Suburban Class A Office Markets Original Data

##	Market	Total Inventory		Absorption		Absorption YTD		Vacancy Rate		Average Annual Rent	
		3Q 2001 (\$F)	3Q 2002 (\$F)	3Q 2001 (\$F)	3Q 2002 (\$F)	3Q 2001 (\$F)	3Q 2002 (\$F)	3Q 2001 (%)	3Q 2002 (%)	3Q 2001 (\$PSF)	3Q 2002 (\$PSF)
1	Atlanta, GA	63,042,000	66,641,000	96,000	-660,000	1,493,000	-977,000	14.9	20.9	24.00	21.00
2	Austin, TX	12,104,000	15,585,000	513,000	342,000	14,000	-229,000	19.8	31.6	26.80	21.80
3	Bakersfield, CA	2,000,000	2,000,000	19,000	15,000	114,000	119,000	22.4	16.5	19.20	18.60
4	Baltimore, MD	11,390,000	12,087,000	66,000	132,000	273,000	198,000	11.0	15.7	23.40	19.00
5	Boston, MA	48,500,000	54,262,000	-233,000	-364,000	-1,978,000	-1,015,000	17.2	29.4	36.00	27.00
6	Charlotte, NC	15,093,000	15,819,000	26,000	32,000	185,000	-325,000	12.7	18.3	21.80	20.20
7	Chicago, IL	68,336,000	72,228,000	-612,000	-115,000	-1,004,000	-1,512,000	17.5	21.3	29.00	25.00
8	Cincinnati, OH	9,247,000	10,266,000	149,000	67,000	88,000	133,000	16.6	20.7	19.30	19.70
9	Cleveland, OH	5,625,000	6,226,000	82,000	198,000	211,000	487,000	16.2	14.0	22.00	21.60
10	Columbia, SC	1,835,000	726,000	35,000	32,000	-105,000	0	21.5	14.5	18.30	17.00
11	Dallas, TX	73,920,000	83,295,000	-334,000	-1,122,000	281,000	-1,962,000	15.3	19.5	25.00	21.50
12	Denver, CO	26,504,000	30,394,000	-502,000	-826,000	-420,000	399,000	19.3	23.9	21.80	19.50
13	Detroit, MI	26,547,000	30,635,000	-212,000	-414,000	-177,000	-907,000	10.8	16.1	27.60	25.00
14	Fresno, CA	2,059,000	2,335,000	16,000	29,000	221,000	155,000	11.5	12.6	19.20	16.20
15	Ft.Lauderdale, FL	7,490,000	9,185,000	144,000	176,000	672,000	26,000	21.5	23.7	24.60	25.40
16	Hartford, CT	7,342,000	7,670,000	8,000	-30,000	-235,000	-362,000	12.6	19.6	20.70	20.40
17	Houston, TX	53,885,000	55,445,000	676,000	-450,000	1,328,000	-749,000	13.6	16.3	20.50	20.90
18	Indianapolis, IN	7,614,000	7,708,000	107,000	-103,000	230,000	-168,000	18.5	23.7	21.30	19.00
19	Jacksonville, FL	7,096,000	6,682,000	-344,000	-182,000	-130,000	32,000	10.6	12.8	17.90	18.80
20	Kansas City MO-KS	9,981,000	10,547,000	60,000	-607,000	100,000	-654,000	15.3	23.1	22.00	21.70
21	Las Vegas, NV	2,275,000	2,478,000	62,000	-5,000	112,000	75,000	6.9	12.5	26.20	26.00
22	Los Angeles, CA	78,892,000	82,638,000	-359,000	-84,000	-1,051,000	-657,000	13.5	18.3	30.10	28.80
23	Louisville, KY	3,367,000	4,275,000	166,000	-15,000	0	173,000	11.7	19.7	18.10	17.60
24	Memphis, TN	7,103,000	8,379,000	74,000	130,000	45,000	442,000	15.3	14.5	19.50	18.90
25	Miami, FL	12,771,000	14,050,000	-87,000	314,000	-168,000	360,000	19.7	18.7	28.00	28.50
26	Milwaukee, WI	8,025,000	7,123,000	0	0	-100,000	0	9.2	27.4	21.00	21.00
27	Minneapolis, MN	8,307,000	9,330,000	751,000	-427,000	1,007,000	-1,584,000	14.1	28.9	27.10	24.50
28	Nashville, TN	10,358,000	11,194,000	-197,000	148,000	-139,000	85,000	17.8	16.8	18.50	18.50

##	Market	Total Inventory		Absorption		Absorption YTD		Vacancy Rate		Average Annual Rent	
		3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (SF)	3Q 2002 (SF)	3Q 2001 (%)	3Q 2002 (%)	3Q 2001 (\$PSF)	3Q 2002 (\$PSF)
29	New Jersey - Central	55,100,000	57,661,000	383,000	-1,562,000	2,133,000	-2,699,000	11.4	19.1	24.50	23.80
30	New Jersey - Northern	88,240,000	91,200,000	245,000	-46,000	3,745,000	-572,000	7.9	14.8	30.00	25.00
31	New York, NY/ Fairfield County, CT	31,170,000	31,170,000	50,000	-180,000	-1,747,000	-827,000	12.4	17.9	30.60	31.80
32	New York, NY - Westchester County, NY	24,614,000	24,614,000	-397,000	-249,000	-1,156,000	267,000	13.5	16.1	26.30	26.60
33	Oakland - East Bay, CA	24,602,000	25,531,000	277,000	350,000	108,000	462,000	9.5	12.8	35.70	29.20
34	Orange County, CA	27,221,000	28,508,000	-289,000	85,000	-199,000	36,000	18.5	22.7	31.30	29.80
35	Orlando, FL	14,955,000	12,831,000	95,000	133,000	100,000	163,000	14.2	37.1	17.00	21.30
36	Philadelphia, PA	41,215,000	33,540,000	1,689,000	570,000	218,000	527,000	13.9	16.8	24.30	23.00
37	Phoenix, AZ	19,947,000	22,900,000	477,000	367,000	1,082,000	643,000	20.5	24.1	24.40	23.20
38	Portland, OR	10,134,000	10,213,000	200,000	-231,000	266,000	-398,000	18.1	22.8	24.00	21.00
39	Raleigh, NC	17,463,000	18,737,000	-61,000	-13,000	2,000	6,000	23.8	25.3	18.50	18.50
40	Sacramento, CA	6,129,000	8,534,000	-302,000	88,000	-243,000	-101,000	11.5	17.5	19.80	21.00
41	San Diego, CA	17,218,000	18,078,000	93,000	-199,000	161,000	-443,000	15.7	17.9	30.70	22.50
42	San Jose/Silicon Valley, CA	16,811,000	21,297,000	244,000	133,000	-1,226,000	840,000	11.8	14.1	49.00	29.70
43	Seattle, WA	29,218,000	31,449,000	-764,000	115,000	253,000	-300,000	14.4	18.9	23.70	23.20
44	St.Louis, MO	20,761,000	22,647,000	-204,000	384,000	334,000	717,000	11.2	13.6	24.50	24.50
45	Tampa, FL	17,153,000	17,720,000	202,000	-35,000	505,000	5,000	12.0	24.3	20.60	21.50
46	Washington, DC/North Virginia	61,223,000	67,920,000	791,000	249,000	1,984,000	1,491,000	11.9	19.3	32.00	29.00
47	Washington, DC/Suburban MD	19,073,000	22,148,000	235,000	233,000	236,000	1,060,000	10.0	14.8	33.00	29.00
	U.S.Total	1,132,955,000	1,205,901,000	3,134,000	-3,597,000	7,423,000	-7,540,000	14.0	19.6	26.90	24.40

Source: Colliers International

- percentage change in the year-to-date absorption between the third quarter of the year 2002 and the third quarter of the year 2001.

Before running regressions, the above mentioned parameters using the data from the tables 1-2 were calculated.

To calculate change in vacancy rates between the third quarter of the year 2002 and the third quarter of the year 2001, the following formula was used:

$$(2.1) \quad \Delta V_{di/si} = V_{di/si}^{3Q2002} - V_{di/si}^{3Q2001}$$

where,  $\Delta V_{di/si}$  - change in vacancy rates between the third quarter of the year 2002 and the third quarter of the year 2001 for a downtown/suburban office market  $i$ ,

$V_{di/si}^{3Q2002}$  - vacancy rate for downtown/suburban office market  $i$  in the third quarter of the year 2002,

$V_{di/si}^{3Q2001}$  - vacancy rate for downtown/suburban office market  $i$  in the third quarter of the year 2001.

Percentage change in average annual quoted rents between the third quarter of the year 2002 and the third quarter of the year 2001 was calculated using the formula below:

$$(2.2) \quad \Delta \% R_{di/si} = \frac{R_{di/si}^{3Q2002} - R_{di/si}^{3Q2001}}{R_{di/si}^{3Q2001}}$$

where,  $\Delta \% R_{di/si}$  - percentage change in average annual quoted rents between the third quarter of the year 2002 and the third quarter of the year 2001 for a downtown/suburban office market  $i$ ,

$R_{di/si}^{3Q2002}$  - average annual quoted rent for a downtown/suburban office market  $i$  in the third quarter of the year 2002,

$R_{di/si}^{3Q2001}$  - average annual quoted rent for a downtown/suburban office market  $i$  in the third quarter of the year 2001.

Percentage change in the quarterly absorption between the third quarter of the year 2002 and the third quarter of the year 2001 was calculated using the following formula:

$$(2.3) \quad \Delta\%Abs_{di/si} = \frac{Abs_{di/si}^{3Q2002}}{I_{di/si}^{3Q2002}} - \frac{Abs_{di/si}^{3Q2001}}{I_{di/si}^{3Q2001}}$$

where,  $\Delta\%Abs_{di/si}$  - percentage change in the quarterly absorption between the third quarter of the year 2002 and the third quarter of the year 2001 for a downtown/suburban office market  $i$ ,

$Abs_{di/si}^{3Q2002}$  - quarterly absorption for a downtown/suburban office market  $i$  in the third quarter of the year 2002,

$Abs_{di/si}^{3Q2001}$  - quarterly absorption for a downtown/suburban office market  $i$  in the third quarter of the year 2001,

$I_{di/si}^{3Q2002}$  - inventory for a downtown/suburban office market  $i$  in the third quarter of the year 2002,

$I_{di/si}^{3Q2001}$  - inventory for a downtown/suburban office market  $i$  in the third quarter of the year 2001.

Percentage change in the year-to-date absorption between the third quarter of the year 2002 and the third quarter of the year 2001 was calculated using the same formula as the formula 2.3 above. The only difference is that instead of the quarterly absorption

parameters, year-to-date absorption parameters for the third quarter of the year 2002 and the third quarter of the year 2001 were used.

The results of calculations of all the parameters which are subsequently used for the regression tests are provided in the tables 9 and 10 in the chapter 3.

### ***2.3 Methodology for Testing Hypotheses # 1***

To test the hypothesis about change of tenants' location preferences in favor of smaller cities, four regressions tests were performed. The independent variable used in these regression tests was a numerical variable based on the total inventory of each metro area expressed in million square feet. The metro areas with the larger amount of office space were considered in these tests as larger cities. The dependent variables were different for each test and were the same as in the previous regression analysis:

- change in vacancy rates between the third quarter of the year 2002 and the third quarter of the year 2001;
- percentage change in average annual quoted rents between the third quarter of the year 2002 and the third quarter of the year 2001;
- percentage change in the quarterly absorption between the third quarter of the year 2002 and the third quarter of the year 2001;
- percentage change in the year-to-date absorption between the third quarter of the year 2002 and the third quarter of the year 2001.

The only difference is that in this case the above-mentioned parameters represented the total Class A office stock in each metro area. The data collected for the research through Colliers International web-site contained data for downtown and

suburban office markets separately. Therefore, to obtain empirical data for regressions evaluating the hypothesis about change of tenants' location preferences in favor of smaller cities, downtown and suburban office space for each particular space market were combined into single total metro area office space markets. For example, all the Washington D.C. suburban sub-markets and the downtown market were combined into a single Washington D.C. Class A office space market. Total inventory for each market (metro) area was calculated using the following formula:

$$(2.4) \quad I_{ii}^j = \sum I_{di}^j + \sum I_{si}^j$$

where,  $I_{ii}^j$  - inventory for a total metro area  $i$  in the third quarter of the year  $j$ ,

$\sum I_{di}^j$  - the sum of the inventory of all the downtown office space markets and sub-markets in the particular metro area  $i$  in the third quarter of the year  $j$ ,

$\sum I_{si}^j$  - the sum of the inventory of all the suburban office space markets and sub-markets in the particular metro area  $i$  in the third quarter of the year  $j$ .

Total absorption since the beginning of the analyzed quarter, and total absorption since the beginning of the analyzed year were calculated using the same formulas as the formula 2.4, but instead of inventory parameters, quarterly absorption parameters and year-to-date absorption parameters were used.

Vacancy rates for the total metro-area markets were calculated as weighted average vacancy rates using the formula given below:

$$(2.5) \quad V_{ii}^j = \frac{\sum (V_{di}^j \times I_{di}^j) + \sum (V_{si}^j \times I_{si}^j)}{\sum I_{di}^j + \sum I_{si}^j}$$

where,  $V_{ii}^j$  - overall vacancy rate for the Class A office space in a metro area  $i$  in the third quarter of the year  $j$ ,

$V_{di}^j$  - vacancy rate for a downtown market or sub-market  $i$  in the third quarter of the year  $j$ ,

$V_{si}^j$  - vacancy rate for a suburban market or sub-market  $i$  in the third quarter of the year  $j$ ,

$I_{di}^j$  - downtown market or a sub-market  $i$  office inventory in the third quarter of the year  $j$ ,

$I_{si}^j$  - downtown market or sub-market  $i$  office inventory in the third quarter of the year  $j$ .

Average rents for the total metro area markets were calculated as weighted average rents using the following formula:

$$(2.6) \quad R_{ii}^j = \frac{\sum (R_{di}^j \times I_{di}^j) + \sum (R_{si}^j \times I_{si}^j)}{\sum I_{di}^j + \sum I_{si}^j}$$

where,  $R_{ii}^j$  - overall rent for the Class A office space in a metro area  $i$  in the third quarter of the year  $j$ ,

$R_{di}^j$  - average annual quoted rent for a downtown market or sub-market  $i$  in the third quarter of the year  $j$ ,

$R_{si}^j$  - average annual quoted rent for a suburban market or sub-market  $i$  in the third quarter of the year  $j$ .

To calculate the overall vacancy rate for the total U.S. Class A office stock, the following formula was used:

$$(2.7) \quad V_{us}^j = \frac{\sum_{i=1}^n (V_{ii}^j \times I_{ii}^j)}{\sum_{i=1}^n I_{ii}^j}$$

where,  $V_{us}^j$  - overall vacancy rate for the total U.S. Class A office space in the third quarter of the year  $j$ ,

$I_{ii}^j$  - inventory of the total Class A office stock for a metro area  $i$  in the third quarter of the year  $j$ ,

$V_{ii}^j$  - overall vacancy rate for the Class A office space in a metro area  $i$  in the third quarter of the year  $j$ ,

$n$  - the number of analyzed metro areas.

Average rent for the total for the total U.S. Class A office stock was calculated as weighted average rent using the following formula:

$$(2.8) \quad R_{us}^j = \frac{\sum_{i=1}^n (R_{ii}^j \times I_{ii}^j)}{\sum_{i=1}^n I_{ii}^j}$$

where, where,  $R_{us}^j$  - average rent for the total U.S. Class A office space stock in the third quarter of the year  $j$ ,

$R_{ii}^j$  - overall rent for the Class A office space in the particular metro area  $i$  in the third quarter of the year  $j$ .

The results of calculations all the parameters which were subsequently used for the regressions tested the hypothesis about changing of tenants in favor of smaller cities are provided in the table 8 in the chapter 3.

To better understand the results of regressions, eight scatter charts are created. Each regression corresponds to two charts. The charts show correlation between independent (“X”) and dependent (“Y”) variables. Four charts showed all the metro area office markets and other four charts showed all the metro area office markets excluding New York office market. New York office market was excluded because the total amount of its office stock significantly exceeded the amount of office stock of the other markets.

#### ***2.4 Data Collection and Methodology for Testing Hypothesis # 3***

Examination of the hypothesis about tenants’ flight away from high-rise trophy buildings was based on the data provided by the CoStar Group, real estate consulting company, and the Real Estate Center of the University of Cincinnati. All the data used in this analysis included two data sets.

The first data set consisted of the information on the thirty-seven trophy properties located in the ten cities (see table 3).

The information for each building contained data on total square feet, the number of floors, total vacant space per quarter, total sublease space per quarter, and annual rent per square foot on available space per quarter. For the purposes of the study, I used the above-mentioned data for the third quarter of the year 2001 and the third quarter of the year 2002. The data are provided in the table 4.

The second data set included the same variables for the CBD Class A office properties in the same ten market areas which contain analyzed trophy buildings. The data are shown in the table 5.

Table 3. Trophy Properties Included in the Analysis

<b>1. New York</b> 1 Chase Manhattan Plz 1745 Broadway American International Building Carnegie Hall Tower Chrysler Building CitySpire Empire State Building GE Bldg The Trump Building Trump Tower Met Life Bldg Metropolitan Tower	<b>3. Charlotte</b> Bank of America Corporate Center	
	<b>4. Seattle</b> Bank of America Tower Key Tower	
	<b>5. Dallas</b> Bank One Center Fountain Place Bank of America Plaza	
	<b>6. Boston</b> John Hancock Tower	
	<b>7. Los Angeles</b> Library Tower AON Center	
	<b>8. Atlanta</b> SunTrust Plaza	
	<b>9. Pittsburgh</b> U.S. Steel Tower	
	<b>10. Houston</b> Wells Fargo Plaza Williams Tower Chase Tower	
	<b>2. Chicago</b> 311 S Wacker Drive 900 N Michigan Ave AON Center Olympia Center Onterie Center West Tower Sears Tower Water Tower Place John Hancock Center AT&T Corporate Center 1 Lake Point Tower Renaissance Plaza Two Prudential Plaza	

Table 4  
Trophy Buildings Original Data

Building	Market	year_qtr	Bld RBA, SF	Vacant Relet, SF	Vacant Sublet, SF	Total Vacant, SF	Vacant %	Net Abs Relet, SF	Net Abs Sublet, SF	Rents, \$
1 Chase Manhattan Plz	New York	2002 3q	2,239,000	0	34,450	34,450	1.5%	0	0	\$0.00
		2001 3q	2,239,000	0	0	0	0.0%	0	0	\$0.00
1745 Broadway	New York	2002 3q	698,000	0	0	0	0.0%	38,475	0	\$0.00
		2001 3q	698,000	0	0	0	0.0%	0	0	\$0.00
American International Building	New York	2002 3q	774,419	0	0	0	0.0%	0	0	\$0.00
		2001 3q	774,419	0	0	0	0.0%	0	0	\$0.00
Carnegie Hall Tower	New York	2002 3q	547,000	49,005	30,886	79,891	14.6%	(13,640)	(6,440)	\$73.90
		2001 3q	547,000	33,435	16,541	49,976	9.1%	28,195	(16,541)	\$69.60
Chrysler Building	New York	2002 3q	1,194,037	76,327	37,664	113,991	9.5%	(21,082)	(6,735)	\$77.00
		2001 3q	1,194,037	52,393	55,427	107,820	9.0%	(25,887)	(41,762)	\$70.00
CitySpire	New York	2002 3q	330,000	31,523	70,122	101,645	30.8%	0	(1,881)	\$52.30
		2001 3q	330,000	30,142	10,695	40,837	12.4%	12,666	(7,005)	\$58.15
Empire State Building	New York	2002 3q	2,248,370	125,130	163,368	288,498	12.8%	(13,213)	(1,072)	\$48.61
		2001 3q	2,248,370	90,811	115,231	206,042	9.2%	(6,105)	(84,151)	\$53.46
GE Bldg	New York	2002 3q	2,893,580	29,540	10,149	39,689	1.4%	0	1,470	\$65.03
		2001 3q	2,893,580	77,425	0	77,425	2.7%	(10,643)	0	\$74.97
The Trump Building	New York	2002 3q	1,300,000	146,480	103,465	249,945	19.2%	(8,154)	(87,211)	\$57.03
		2001 3q	1,300,000	95,930	7,379	103,309	7.9%	0	(7,379)	\$57.03
Trump Tower	New York	2002 3q	280,000	62,142	0	62,142	22.2%	0	0	\$77.21
		2001 3q	280,000	40,334	0	40,334	14.4%	(18,893)	0	\$97.21
Met Life Bldg	New York	2002 3q	2,841,536	2,659	51,331	53,990	1.9%	0	(24,621)	\$0.00
		2001 3q	2,841,536	0	5,057	5,057	0.2%	0	0	\$103.00
Metropolitan Tower	New York	2002 3q	225,000	6,292	0	6,292	2.8%	0	0	\$67.21
		2001 3q	225,000	0	0	0	0.0%	0	0	\$70.21
311 S Wacker Drive	Chicago	2002 3q	1,281,000	230,977	30,690	261,667	20.4%	(20,153)	(5,066)	\$41.19
		2001 3q	1,281,000	136,313	2,238	138,551	10.8%	(69,716)	6,659	\$37.05
900 N Michigan Ave	Chicago	2002 3q	544,000	1,111	12,231	13,342	2.5%	0	(6,742)	\$28.10
		2001 3q	544,000	0	4,239	4,239	0.8%	6,351	0	\$28.50
Aon Center - Chicago	Chicago	2002 3q	2,529,269	182,148	126,144	308,292	12.2%	(3,613)	0	\$34.05
		2001 3q	2,529,269	167,477	7,000	174,477	6.9%	529,214	0	\$33.19
Olympia Center	Chicago	2002 3q	335,190	88,581	18,698	107,279	32.0%	0	0	\$32.31
		2001 3q	335,190	82,845	0	82,845	24.7%	(16,660)	0	\$31.70
Onterie Center West Tower	Chicago	2002 3q	184,414	111,977	0	111,977	60.7%	0	0	\$32.00
		2001 3q	184,414	0	0	0	0.0%	0	0	\$0.00
Sears Tower	Chicago	2002 3q	3,446,323	201,027	320,091	521,118	15.1%	0	(35,527)	\$0.00
		2001 3q	3,446,323	130,569	31,749	162,318	4.7%	668	12,678	\$31.53

Building	Market	year_qtr	Bld RBA, SF	Vacant Relet, SF	Vacant Sublet, SF	Total Vacant, SF	Vacant %	Net Abs Relet, SF	Net Abs Sublet, SF	Rents, \$
Water Tower Place	Chicago	2002 3q	100,000	0	720	720	0.7%	0	0	\$0.00
		2001 3q	100,000	0	720	720	0.7%	0	1,811	\$0.00
John Hancock Center	Chicago	2002 3q	819,118	64,120	29,483	93,603	11.4%	0	2,877	\$29.64
		2001 3q	819,118	35,902	0	35,902	4.4%	12,732	6,330	\$35.72
AT&T Corporate Center 1	Chicago	2002 3q	1,572,454	25,564	60,857	86,421	5.5%	10,702	(54,560)	\$42.19
		2001 3q	1,572,454	75,235	29,718	104,953	6.7%	(13,916)	13,240	\$44.91
Lake Point Tower Renaissance Plaza	Chicago	2002 3q	32,600	32,600	0	32,600	100.0%	(15,000)	0	\$32.51
		2001 3q	32,600	15,800	0	15,800	48.5%	13,200	0	\$33.36
Two Prudential Plaza	Chicago	2002 3q	941,000	72,370	29,269	101,639	10.8%	(14,437)	(8,829)	\$37.19
		2001 3q	941,000	64,742	20,440	85,182	9.1%	0	30,727	\$31.70
Bank of America Corporate Center	Charlotte	2002 3q	1,117,000	0	32,968	32,968	3.0%	0	(32,968)	\$0.00
		2001 3q	1,117,000	0	0	0	0.0%	0	0	\$0.00
Bank of America Tower	Seattle	2002 3q	1,537,932	236,649	163,022	399,671	26.0%	(26,626)	(6,756)	\$31.61
		2001 3q	1,537,932	194,271	127,583	321,854	20.9%	(71,074)	(19,002)	\$39.38
Key Tower	Seattle	2002 3q	1,055,547	9,193	12,476	21,669	2.1%	(2,703)	0	\$31.00
		2001 3q	1,055,547	71,223	0	71,223	6.7%	69,935	0	\$38.28
Bank One Center	Dallas	2002 3q	1,530,957	234,550	56,241	290,791	19.0%	(13,316)	(8,438)	\$24.27
		2001 3q	1,530,957	227,663	0	227,663	14.9%	(60,829)	0	\$24.16
Fountain Place	Dallas	2002 3q	1,200,266	13,606	15,000	28,606	2.4%	21,128	13,266	\$24.56
		2001 3q	1,200,266	42,634	35,500	78,134	6.5%	0	0	\$19.60
Bank of America Plaza	Dallas	2002 3q	1,865,168	75,250	35,534	110,784	5.9%	0	0	\$24.33
		2001 3q	1,865,168	75,250	5,000	80,250	4.3%	0	0	\$0.00
John Hancock Tower	Boston	2002 3q	1,589,533	223,449	0	223,449	14.1%	(14,131)	0	\$0.00
		2001 3q	1,589,533	223,652	0	223,652	14.1%	57,956	0	\$0.00
Library Tower	Los Angeles	2002 3q	1,432,553	99,380	70,408	169,788	11.9%	0	19,657	\$30.49
		2001 3q	1,432,553	85,974	79,027	165,001	11.5%	37,011	(10,578)	\$26.51
Aon Center - LA	Los Angeles	2002 3q	1,028,852	197,864	18,352	216,216	21.0%	7,693	2,579	\$19.98
		2001 3q	1,028,852	309,526	46,588	356,114	34.6%	(50,504)	0	\$19.90
SunTrust Plaza	Atlanta	2002 3q	1,249,022	65,923	3,619	69,542	5.6%	(21,494)	0	\$30.55
		2001 3q	1,249,022	30,113	4,949	35,062	2.8%	(4,512)	(4,949)	\$27.31
U.S. Steel Tower	Pittsburgh	2002 3q	2,336,272	252,112	99,095	351,207	15.0%	(108,536)	(1,695)	\$25.50
		2001 3q	2,336,272	146,851	97,400	244,251	10.5%	4,184	5,997	\$26.00
Wells Fargo Plaza	Houston	2002 3q	1,721,242	93,226	86,226	179,452	10.4%	(1,494)	(86,226)	\$26.00
		2001 3q	1,721,242	79,507	49,513	129,020	7.5%	(1,940)	5,831	\$26.22
Williams Tower	Houston	2002 3q	1,545,011	79,566	0	79,566	5.1%	9,722	0	\$25.85
		2001 3q	1,545,011	73,115	0	73,115	4.7%	(8,550)	0	\$27.89
Chase Tower	Houston	2002 3q	1,683,893	60,317	15,572	75,889	4.5%	4,124	0	\$30.17
		2001 3q	1,683,893	58,471	15,076	73,547	4.4%	(55,158)	(9,114)	\$30.17

Source: CoStar Group

To examine the hypothesis I analyzed the performance of trophy buildings and CBD Class A office properties, excluding trophy buildings, after September 11th, 2001. The analysis was based on the percentage change in vacancy rates. I did not examine the information on the change in rental rates, because it was not available in sufficient details for every trophy building. I did not analyze the information on change in absorption, because the amount of office space in the trophy buildings, on the contrary to the amount of space in the CBD market areas, remained the same for the analyzed period. Moreover, it is illogical, because if tenants move from a high-rise trophy building into a low-rise building in the same CBD market area, absorption for a trophy building will change, but it will not change for a CBD market area.

To analyze the performance of trophy buildings versus CBD Class A office properties a regression test was performed. The two independent variables used in the regression were dummy variables. The first one was based on whether the variable represents the whole market area or for the trophy properties in that area. The value "1" was assigned to the trophy properties and the value "0" is assigned to market areas. The second dummy variable was based on the location of office properties. The value "1" was assigned to New York and Chicago and the value "0" was assigned to the other cities. New York and Chicago were used as a dummy variable because these market areas contain the high number of high-rise trophy properties and, theoretically, these cities must have been impacted most.

A dependent variable in the regression was represented by a percentage change in average vacancy rates for Class A properties in each of the CBD market area and for the trophy properties in each market area. Before running a regression, the average vacancy

rates for Class A properties for each of the CBD market area without trophy properties were calculated. Data on the trophy buildings were excluded from the CBD data, so the trophy properties vacancies did not influence the markets' vacancies. Vacancy rates for trophy buildings are also calculated for each market area. Therefore, the regression contains two parameters of percentage change in average vacancy rates for each market area: for the whole area, excluding trophy properties, and for the trophy properties only.

To calculate the vacancy rates for trophy properties, the following formula was used:

$$(2.9) \quad Vm_{tpi}^j = \frac{\sum Vac_{tpm}^j}{\sum I_{tpm}^j}$$

where,  $Vm_{tpi}^j$  - the average vacancy rate for all the trophy properties in a market area  $i$  in the third quarter of the year  $j$ ,

$Vac_{tpm}^j$  - vacant space for a trophy property  $m$  in the third quarter of the year  $j$ ,

$I_{tpm}^j$  - total rentable space for a trophy property  $m$  in the third quarter of the year  $j$ .

Vacant space and vacancy rates for CBD markets presented in the table 4 include trophy properties; therefore, new vacancy rates, which exclude data on trophy buildings, were calculated. New vacancy rates for Class A CBD office markets were calculated using the formula below:

$$(2.10) \quad Vm_{di}^j = \frac{Vac_{di}^j - \sum Vac_{tpm}^j}{I_{di}^j - \sum I_{tpm}^j}$$

where,  $Vm_{di}^j$  - the average vacancy rate for a market area  $i$ , excluding trophy properties, in the third quarter of the year  $j$ ,

$Vac_{di}^j$  - vacant space for a market area  $i$ , including trophy properties, in the third quarter of the year  $j$ ,

$I_{di}^j$  - total rentable space (inventory) for a market area  $i$ , including trophy properties, in the third quarter of the year  $j$ .

Changes in vacancy rates for trophy properties as well as for the CBD market areas were calculated as a difference between the vacancy rate in the third quarter of 2002 and the vacancy rate in the third quarter of 2001.

The results of calculations are shown in the tables 12 and 13 in the Chapter 3.

### ***2.5 Methodology for Testing all the Hypotheses by Conducting a Web Survey***

The goal of three sets of regression analyses, described above, was to examine how tenants' preferences have changed since 9/11. However, the time elapsed since the events of 9/11 is too short to estimate possible consequence. Some tenants' have not determined yet whether to change their strategies or not, some plan to modify them in the near future. At the same time, the other tenants could move to other locations as a result of post-tragedy panic and now are planning to return to their previous location. Therefore, regression analysis of the market data for the period between the third quarter of 2001 and the third quarter of the year 2002 demonstrates primarily short-term effect and cannot reveal the long-term effect of 9/11. Moreover, a recession experiencing by the U.S. economy could significantly influence real estate office market during the analyzed period of time. For example, if vacancy rates in the trophy properties declined as a result

of September 11th and vacancy rates in the other Class A properties declined as a result of recession at the same rate, the regression analysis would not reveal any impact of 9/11 on the trophy properties.

To determine, whether there was a change in the preferences of tenants that can cause long term effect or it were only a short-term consequences of post-tragedy panic and most of the tenants of high-rise properties would prefer to stay in their previous locations, an on-line survey among the five hundred members of BOMA, the Building Owners and Managers Association, was implemented. The survey was performed during the period March 6<sup>th</sup> - 15<sup>th</sup> of 2003 in cooperation with Norm Miller, the Director of the Real Estate Center of the University of Cincinnati.

Since September 11, 2001 several relevant studies were performed. However, none of them, known to us, surveyed the broad range of real estate professionals and consultants. For example, Jones Lang LaSalle, a real estate services firm, which performed a survey on the impact of September 11th, focused only on corporate real estate. The company surveyed leading corporate real estate executives on corporate behavior in the wake of September 11th. The survey was broad-based including all categories of real estate professionals, such as developers, property managers and brokers.

For the purposes of the survey, including survey creation, responses collection and results analysis we used *SurveyMonkey* on-line survey software. The survey was managed from the web-site [www.surveymonkey.com](http://www.surveymonkey.com).

The participants of the survey were chosen arbitrary from the BOMA Directory 2000. The participants were chosen so that almost all the largest cities across the United

States had been represented in the survey. Representation of the cities in the survey is shown in the table 6.

Table 6. Representation of the Cities and the States in the Survey

State	City	State	City	State	City
AZ	Phoenix	IL	Chicago	OH	Cincinnati
CA	Los Angeles	IN	Indianapolis	OH	Cleveland
CA	Sacramento	KY	Louisville	OH	Columbus
CA	San Diego	MA	Boston	OR	Portland
CA	San Francisco	MD	Baltimore	PA	Philadelphia
CA	San Jose	MI	Detroit	PA	Pittsburgh
CO	Denver	MN	Minneapolis	TX	Austin
DC	Washington	MO	St. Louis	TX	Dallas
FL	Miami	NC	Charlotte	TX	Houston
FL	Tampa	NC	Raleigh	VA	Arlington
GA	Atlanta	NY	New York	WA	Seattle

An e-mail with an invitation to voluntarily take part in the survey was sent to each of participants. Each e-mail contained a link to the web-page with the survey. If participants wished to provide questions to the authors of the survey or comments with permission to be quoted, they were able to send a separate email to provided e-mail address.

The survey included the following question and five statements:

- Who you are?
- Since 9/11 you will avoid very tall and trophy buildings for your future space needs.

- If you work with tenants, your tenants prefer to avoid very tall and trophy buildings since 9/11.
- You or your tenants are more likely to move away from downtown on the next move and to avoid more concentrated urban areas?
- You or your tenants are more likely to move to smaller cities in the future in face of terrorist threats.
- Concerns of terrorism influenced or will influence design changes in your buildings.

The purpose of the question 1 was to identify real estate specialization of the survey participants.

Question 1 was “one answer choice” question with nine provided choices: “owner”, “investor”, “consultant”, “leasing agent”, “lender”, “property manager”, “CRE” (corporate real estate), “developer”, and “other” with an additional blank field which allowed a respondent to enter a different answer than the choices we had provided.

Five other questions were represented by five statements with five answer choices: “strongly agree”, “agree”, “not sure”, “disagree”, and “strongly disagree”. Each of the answers reflected the strength of agreement or disagreement of the survey participants with each provided statement.

As it was mentioned, five hundred e-mails to the members of the BOMA were sent. However, during the next day after starting a survey, approximately one hundred of e-mail returned as undelivered. There were two reasons why the e-mails were undelivered. First, some e-mail addresses were entered incorrectly. Second, some BOMA members changed their e-mail addresses or left their jobs, where they had the e-mail

addresses registered at the BOMA. Therefore, approximately 400 e-mails were delivered. Sixty responses were sent back. It implies response rate of about 15%. Figure 2 displays profile of the respondents.

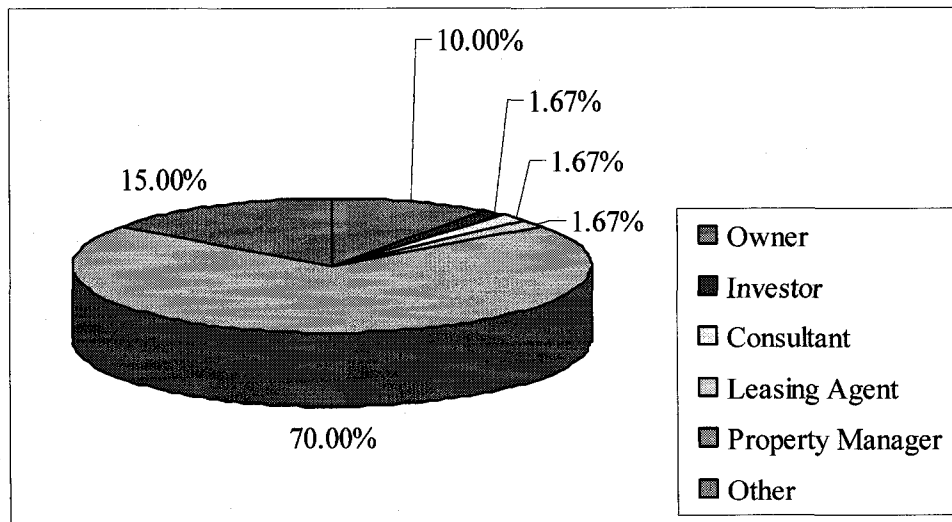


Figure 2. Respondents' Profile

After finishing the survey, the results were downloaded from the *SurveyMonkey* web site and exported to Microsoft Excel file. For survey evaluation and analysis Microsoft Excel software was used. For each question, a bar-chart represented of a percentage of the respondents chosen correspondent answers was created.

## CHAPTER 3

### FINDINGS

This chapter describes results and findings of the study after conducting all the calculation, regression tests, web survey and analysis of real estate, planning, and architectural publications. Some results and findings may be presented not in the same order as the methods and techniques of the research described in the Chapter 2. The reason is that the methodology of the study demonstrates the actual order of the process of data collection and analysis. On the other hand, the results and the findings obtaining in the process of the research are arranged in the most convenient way for their discussion and presentation.

For the analysis of the hypothesis about change of tenants' preferences in favor of smaller cities, four regression tests were performed and eight scatter charts were created. The variables for the regression set and for the charts are based on the parameters which are calculated according to the methodology described in the section 2.3 of the Chapter 2 and which are shown in the table 7. The results from the regressions are presented in the table 8. The scatter charts are shown on the figures 3-10

In the regression tested change in vacancy rates, positive coefficient associated with Total Inventory variable was expected. In the regressions tested percentage change in rents, percentage change in absorption, and percentage change in absorption YTD negative coefficients were expected. The expectations were based on the hypothesis that tenants would move away from larger cities to smaller cities and, therefore, vacancy rates in the larger cities, which in our tests are the cities with the larger amount of Class A

office, were supposed to increase significantly compared to small cities, where vacancy rates were expected to decline or to slightly increase. At the same time, possible tenants' flight away from the larger cities could have been followed by less significant, if any, decrease in rental rates, quarterly absorption, and year-to-date absorption in smaller cities compared to larger cities. The null hypothesis for each regression test is that the coefficients associated with the independent variables would be zero.

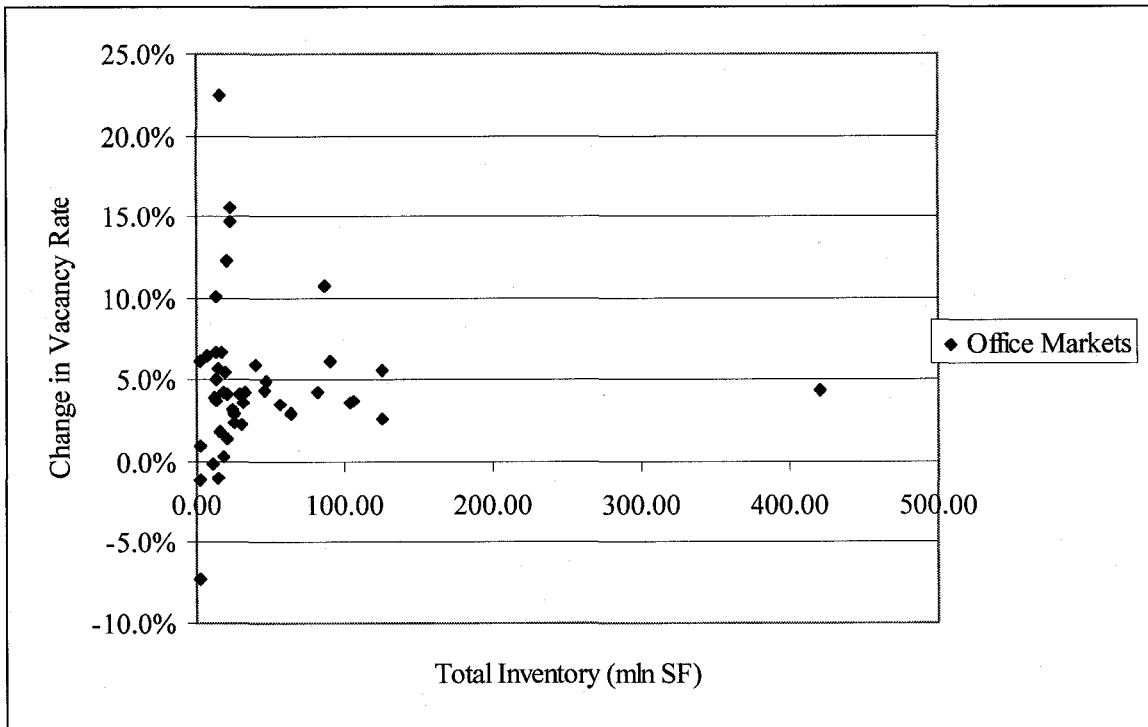


Table 7  
Metro Area Class A Office Markets Calculated Data

##	MARKET	Total Inventory		Absorption		Absorption YTD		Vac. Rate Change (%)	Annual Rent Change (%)
		3Q 2002 (SF)	Change (%)	Change (SF)	Change (%)	Change (SF)	Change (%)		
1	Atlanta, GA	90,507,000	7.3%	-431,000	-0.47%	-2,722,000	-3.18%	6.1	-12.2%
2	Austin, TX	19,918,000	26.5%	-368,000	-2.40%	50,000	0.78%	12.3	-19.7%
3	Bakersfield, CA	2,627,000	1.9%	33,000	1.26%	62,000	2.28%	-7.3	-1.1%
4	Baltimore, MD	19,825,000	4.2%	-164,000	-0.83%	-480,000	-2.50%	5.5	-17.6%
5	Boston, MA	86,498,000	9.1%	-65,000	-0.01%	1,421,000	1.96%	10.7	-24.7%
6	Charlotte, NC	25,460,000	7.1%	997,000	3.95%	31,000	0.08%	3.0	-5.4%
7	Chicago, IL	125,699,000	2.5%	-218,000	-0.17%	-892,000	-0.69%	2.6	-17.6%
8	Cincinnati, OH	17,749,000	6.7%	-180,000	-1.10%	-26,000	-0.17%	4.2	0.7%
9	Cleveland, OH	15,572,000	4.0%	150,000	0.95%	133,000	0.79%	1.9	-1.5%
10	Columbia, SC	2,660,000	-41.1%	-92,000	-2.45%	36,000	-0.11%	-1.1	-5.3%
11	Dallas, TX	103,860,000	9.9%	-712,000	-0.63%	-2,179,000	-2.08%	3.6	-15.6%
12	Denver, CO	45,940,000	13.7%	-401,000	-0.70%	1,058,000	2.57%	4.4	-13.6%
13	Detroit, MI	39,245,000	13.4%	-195,000	-0.43%	-931,000	-2.38%	5.9	-9.7%
14	Fresno, CA	2,586,000	12.3%	19,000	0.66%	-61,000	-3.42%	1.0	-13.0%
15	Fl.Lauderdale, FL	12,998,000	21.8%	213,000	1.47%	-453,000	-4.51%	5.0	3.4%
16	Hartford, CT	14,224,000	2.3%	-280,000	-1.98%	-529,000	-3.71%	5.7	0.3%
17	Houston, TX	81,926,000	4.2%	-1,168,000	-1.44%	-2,506,000	-3.11%	4.3	5.8%
18	Indianapolis, IN	13,607,000	0.7%	-77,000	-0.56%	-329,000	-2.43%	3.7	-9.2%
19	Jacksonville, FL	11,769,000	-3.4%	-44,000	-0.47%	-169,000	-1.47%	4.0	4.3%
20	Kansas City MO-KS	16,352,000	4.9%	-516,000	-3.16%	-485,000	-2.91%	6.7	-2.3%
21	Las Vegas, NV	2,913,000	11.7%	-60,000	-2.31%	-16,000	-1.00%	6.2	-0.8%
22	Los Angeles, CA	106,079,000	3.7%	-31,000	-0.02%	-350,000	-0.31%	3.7	-3.9%
23	Louisville, KY	7,747,000	15.7%	-171,000	-2.51%	168,000	2.17%	6.4	-0.9%
24	Memphis, TN	10,524,000	13.5%	135,000	1.19%	308,000	2.78%	-0.1	-3.7%
25	Miami, FL	17,694,000	7.8%	343,000	1.99%	402,000	2.35%	0.4	1.1%
26	Milwaukee, WI	12,793,000	-0.5%	289,000	2.26%	612,000	4.78%	10.1	0.6%
27	Minneapolis, MN	22,501,000	13.5%	-2,230,000	-10.73%	-4,464,000	-20.66%	15.5	-11.1%

##	MARKET	Total Inventory		Absorption		Absorption YTD		Vac. Rate Change (%)	Annual Rent Change (%)
		3Q 2002 (SF)	Change (%)	Change (SF)	Change (%)	Change (SF)	Change (%)		
28	Nashville, TN	14,063,000	6.3%	465,000	3.45%	387,000	2.88%	-1.0	0.0%
29	New York - New Jersey	420,099,000	2.4%	13,770,000	3.36%	12,230,000	3.01%	4.3	-8.7%
30	Oakland - East Bay, CA	32,360,000	4.7%	89,000	0.23%	371,000	1.15%	4.3	-17.9%
31	San Francisco, CA	47,059,000	5.4%	966,000	2.15%	2,542,000	5.73%	4.9	-28.2%
32	Orange County, CA	28,508,000	4.7%	374,000	1.36%	235,000	0.86%	4.2	-4.8%
33	Orlando, FL	16,044,000	-11.4%	129,000	0.78%	-50,000	-0.24%	22.5	23.4%
34	Philadelphia, PA	64,077,000	-10.0%	-1,601,000	-2.17%	-336,000	-0.47%	2.9	-4.2%
35	Phoenix, AZ	31,537,000	11.9%	-625,000	-2.36%	-249,000	-1.12%	3.6	-5.1%
36	Portland, OR	19,983,000	2.9%	-324,000	-1.63%	-373,000	-1.84%	4.2	-15.5%
37	Raleigh, NC	20,672,000	6.6%	36,000	0.19%	47,000	0.24%	1.5	0.0%
38	Sacramento, CA	13,085,000	25.7%	439,000	4.08%	-24,000	0.29%	6.7	-4.8%
39	San Diego, CA	24,825,000	12.6%	-292,000	-1.23%	-854,000	-3.59%	2.4	-22.4%
40	San Jose/Silicon Valley, CA	23,688,000	25.6%	5,000	-0.16%	2,060,000	10.12%	3.1	-41.0%
41	Seattle, WA	56,886,000	5.5%	387,000	0.70%	-482,000	-0.87%	3.5	-6.6%
42	St. Louis, MO	29,907,000	7.7%	686,000	2.37%	470,000	1.52%	2.3	-1.1%
43	Tampa, FL	22,981,000	2.5%	-211,000	-0.94%	-470,000	-2.10%	14.7	3.9%
44	Washington, DC/North Virginia/Suburban MD	125,610,000	12.0%	-764,000	-0.77%	305,000	-0.15%	5.6	-8.6%
	U.S.Total	1,920,657,000	5.5%	8,305,000	0.47%	3,498,000	0.23%	4.9	-11.0%

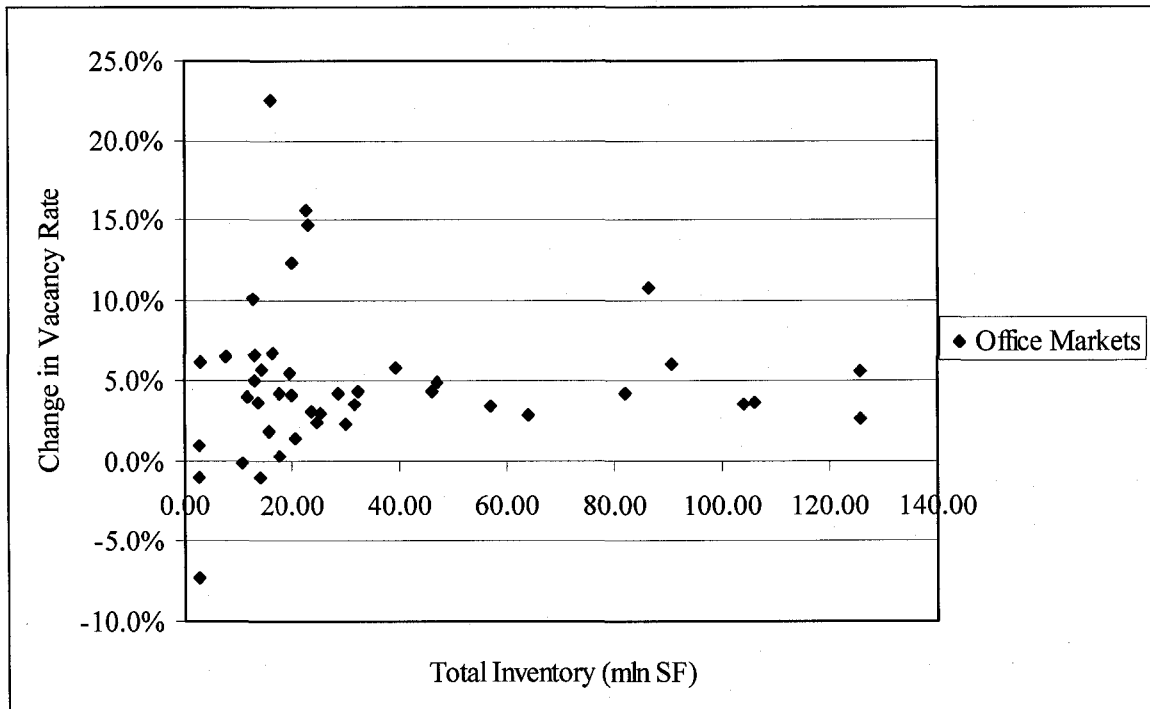


Figure 4. Scatter Chart Showing Correlation between Total Inventory and Change in Vacancy Rates (excluding New York).

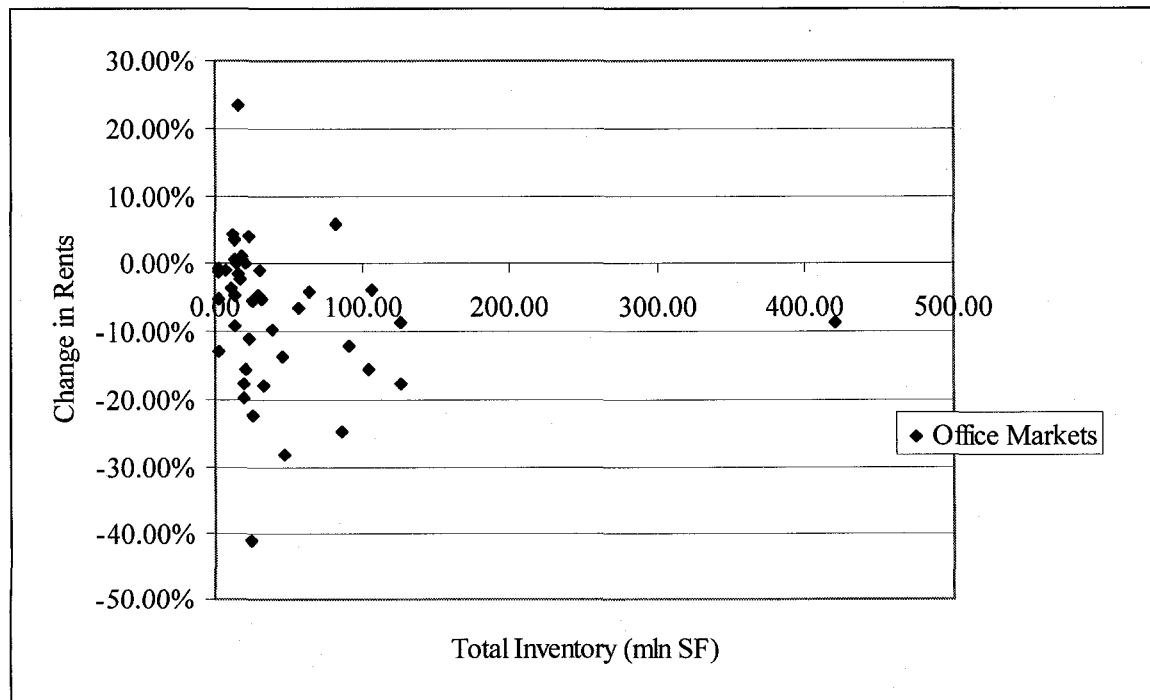


Figure 5. Scatter Chart Showing Correlation between Total Inventory and Change in Rents.

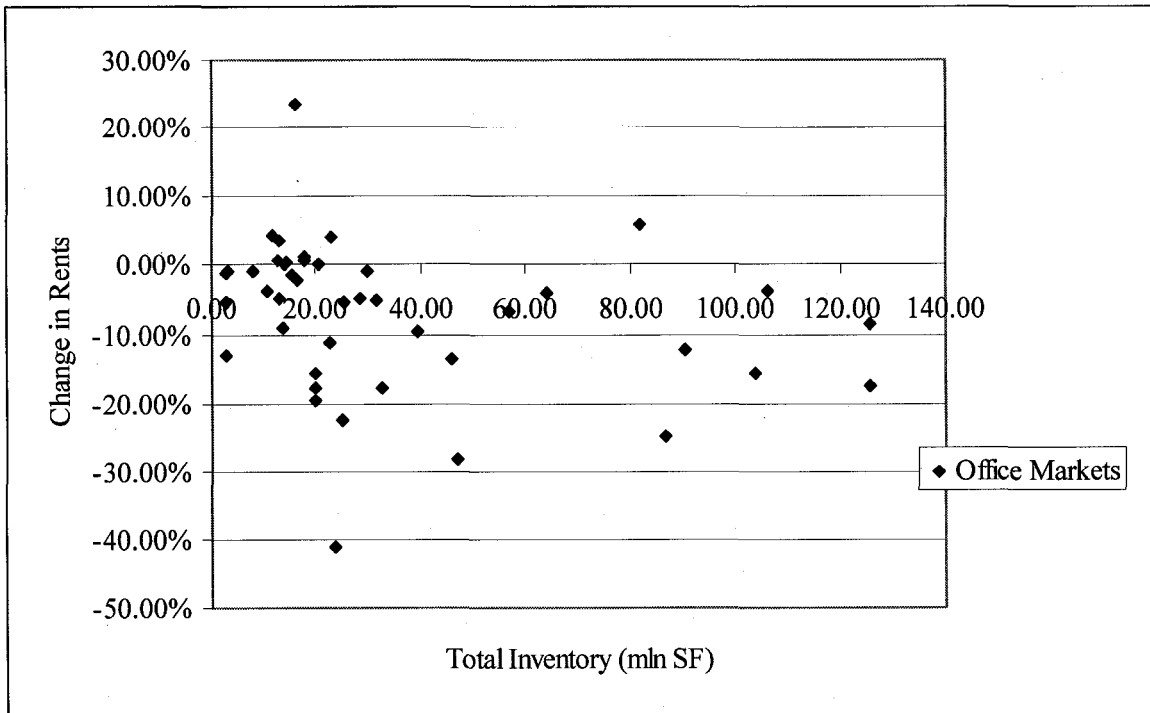


Figure 6. Scatter Chart Showing Correlation between Total Inventory and Change in Rents (excluding New York).

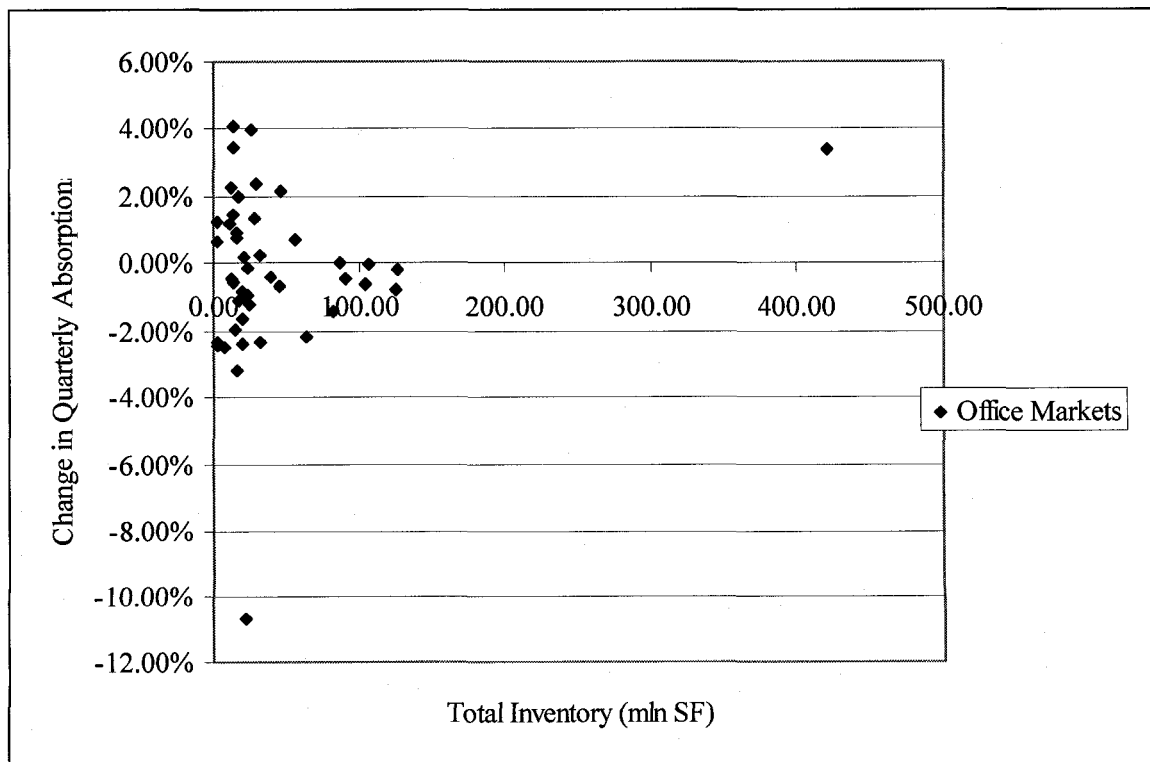


Figure 7. Scatter Chart Showing Correlation between Total Inventory and Change in Quarterly Absorption.

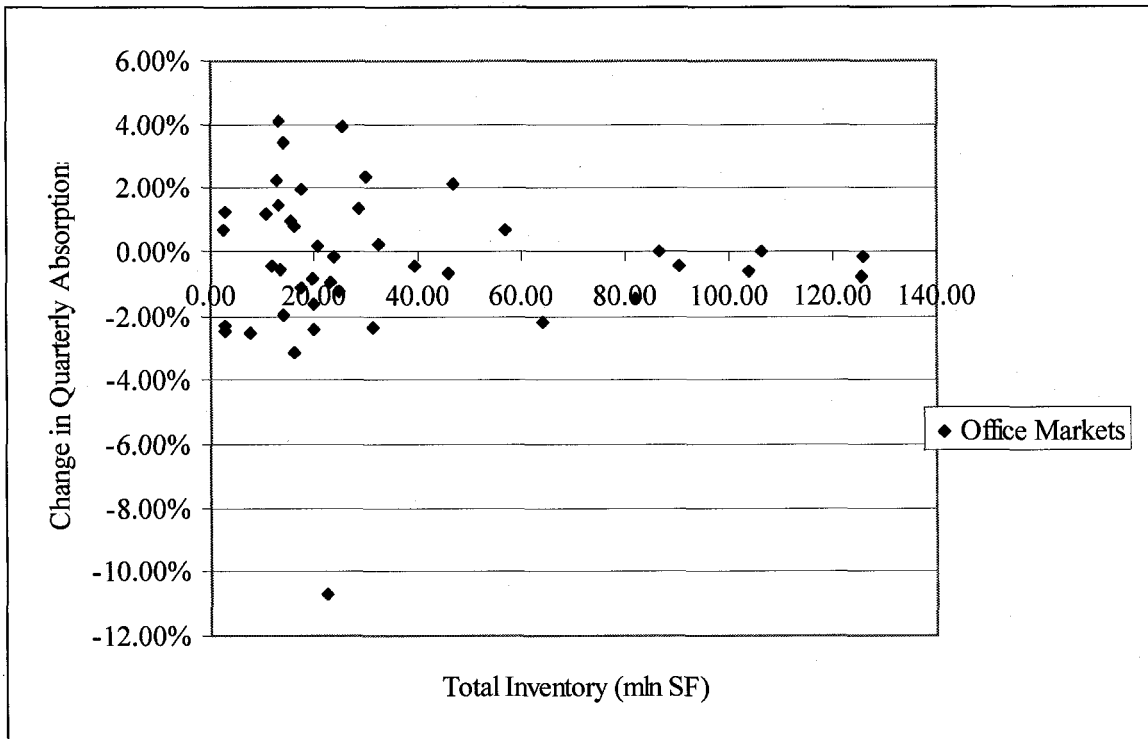


Figure 8. Scatter Chart Showing Correlation between Total Inventory and Change in Quarterly Absorption (excluding New York).

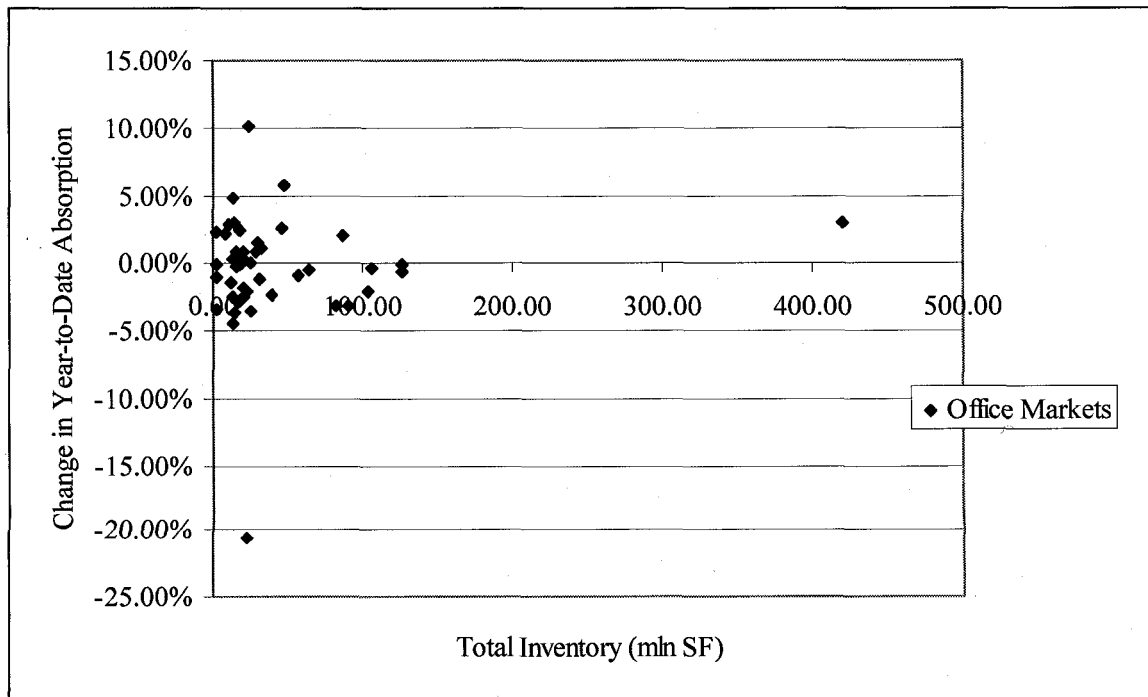


Figure 9. Scatter Chart Showing Correlation between Total Inventory and Change in Year-to-Date Absorption.

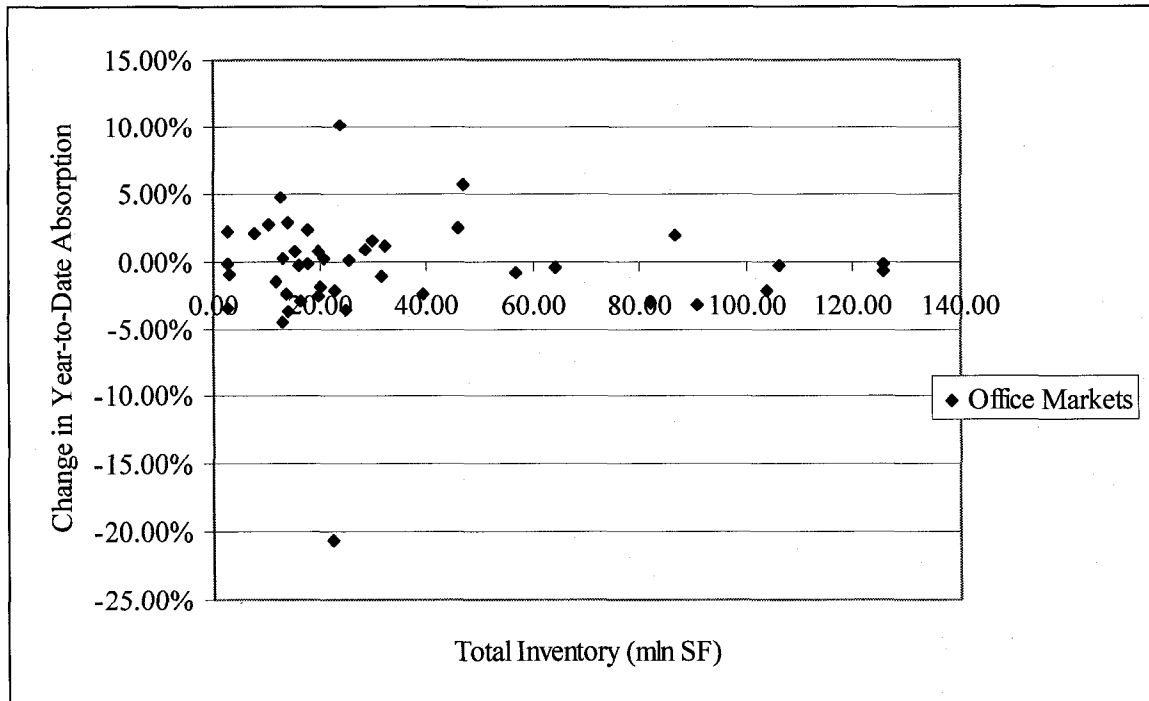


Figure 10. Scatter Chart Showing Correlation between Total Inventory and Change in Year-to-Date Absorption (excluding New York)

Table 8. Results of the Regression Tests of the Hypothesis about Change of Tenants' Preferences in Favor of Smaller Cities

	Coefficients	Standard Error	P-value	Coefficients	Standard Error	P-value
	Change in Vacancy Rates			Percentage Change in Rents		
Intercept	0.0486	0.0088	2E-06	-0.0609	0.01942	0.0031
Total Inventory	2E-06	0.0001	0.9854	-0.0002	0.00024	0.3314
F	0.0003			0.96574		
Significance F	0.9854			0.33137		
R Square	8E-06			0.14992		
	Percentage Change in Absorption			Percentage Change in Absorption YTD		
Intercept	-0.005	0.0044	0.26598	-0.007	0.0076	0.3671
Total Inventory	6.5E-05	6E-05	0.24498	6.2E-05	1E-04	0.5223
F	1.39038			0.41639		
Significance F	0.24498			0.52225		
R Square	0.03204			0.00982		

In the regression tested change in vacancy rates positive coefficient associated with Total Inventory variable were expected. In the regressions tested percentage change

in rents, percentage change in absorption, and percentage change in absorption YTD negative coefficients were expected. The expectations were based on the hypothesis that tenants would move away from larger cities to smaller cities and, therefore, vacancy rates in the larger cities, which in our tests are the cities with the larger amount of Class A office, were supposed to increase significantly compared to small cities, where vacancy rates were expected to decline or to slightly increase. At the same time, possible tenants' flight away from the larger cities could have been followed by less significant, if any, decrease in rental rates, quarterly absorption, and year-to-date absorption in smaller cities compared to larger cities. The null hypothesis for each regression test is that the coefficients associated with the independent variables would be zero.

The regression analysis which focuses on the change in vacancy rate as a dependent variable shows that the Total Inventory variable is completely insignificant. The P-value is close to 1.00 implying that the amount of office space in the U.S. cities did not influence change in vacancy rates for the period between the third quarter of the year 2001 and the third quarter of the year 2002. Visual analysis of the figures 3 and 4 demonstrates that there is no correlation between the variables. The overall F-statistic and R Square, which is far even from 1%, also make summarize that no significant relationship exists.

The overall parameters of the regression analysis of the relationship between the amount of office space in the cities and percentage change in rental rates are much better than in the previous test. The results for Total Inventory variable are stronger and the dependence of percentage change in rents for the analyzed period is higher then in the case with change of vacancy rates. However, it is also far from significant. The P-value is

only 0.33. The overall model is significant at the same level as the independent variable, but it is not enough to confirm the hypothesis. The figures 5 and 6 also show no correlation between the variables.

The results of the third regression, which evaluates the relationship between the total inventory of the office space in the markets and the percentage change of the quarterly space absorption in the markets, shows that, as in the cases with previous models, there is no significant statistical evidence of the presence of the relationships between the independent and dependent variables. Even though P-value is approximately equal to 0.24, which is higher than in the previous tests, it is not enough for the independent variable to be significant. The figures 7 and 8 don't indicate that correlation between the variable exists. Moreover, the coefficient for Total Inventory, on the contrary to the expectation, is positive, which gives an opportunity to reject the assumption that larger cities experienced more significant decrease or less significant increase in quarterly absorption than smaller cities did.

The last test in the set of regressions and the scatter charts, examining the hypothesis about change of tenants' preferences in favor of smaller cities, shows approximately the same results as the previous model and charts. First, the statistical evidence of relationship between the percentage change in the year-to-date absorptions of the office space and the amount of office stock at the markets is insignificant. Second, there is no correlation between variables. Third, the coefficient of independent variable is positive which is opposite to the expectations.

Therefore, empirical results do not indicate any significant results for relative increase in vacancy rates and decrease in rental rates, quarterly absorption, and year-to-

date absorption of office space located in the larger cities. These results are the indicator of the absence of the overall tendency of tenants' exodus to smaller cities.

The analysis of the hypothesis about change of tenants' preferences in favor of reducing operations in central business district locations also included four regression tests, which were performed with the same dependent variables as in the previous analysis. However, the independent variable in these models is a dummy variable, which is based on whether the office space is located in a CBD or in a suburb. The variables for this regression set are based on the parameters which are calculated according to the methodology described in the section 2.2 of the Chapter 2 and which are shown in the tables 9-10. The results from the regressions are shown in the table 11.

In the regression set that analyzes impact of 9/11 on the CBD office space, I anticipated obtaining positive signs associated with the coefficients when running regression tested change in vacancy rates and negative signs associated with the coefficients when running regressions examined percentage change in rental rates, in quarterly absorption, and in year-to-date absorption. The expectations were based on the prediction that as a result of terrorist actions of 9/11, companies, renting office space in CBDs, would change their location strategy, start reducing their activities in downtown locations, as places with higher concentration of people and office buildings, and move to suburbs, which are considered to be places with significantly lower concentration. The theory is that terrorists usually prefer to perform their actions in areas with high concentration of people, i.e. in downtown office buildings. Companies' getaway from CBDs to suburbs was supposed to result in increase of vacancy rates and decrease of rental rates, quarterly absorption, and YTD absorption in CBDs compared to suburbs.

Table 9  
Downtown Class A Office Markets Calculated Data

##	MARKET	Total Inventory		Absorption		Absorption YTD		Vac. Rate Change (%)	Annual Rent Change (%)
		3Q 2002 (SF)	Change (%)	Change (SF)	Change (%)	Change (SF)	Change (%)		
1	Atlanta, GA	23,866,000	11.9%	325,000	1.43%	-252,000	-1.38%	6.5	-11.3%
2	Austin, TX	4,333,000	18.8%	-197,000	-4.13%	293,000	8.57%	13.6	-21.9%
3	Bakersfield, CA	627,000	8.3%	37,000	6.23%	57,000	9.01%	-11.3	7.4%
4	Baltimore, MD	7,738,000	1.4%	-230,000	-2.97%	-405,000	-5.25%	6.7	-15.8%
5	Boston, MA	32,236,000	4.7%	66,000	0.27%	458,000	1.58%	7.8	-23.2%
6	Charlotte, NC	9,641,000	11.0%	991,000	10.43%	541,000	5.66%	-1.1	-3.2%
7	Chicago, IL	53,471,000	-1.5%	-715,000	-1.32%	-384,000	-0.72%	0.9	-20.5%
8	Cincinnati, OH	7,483,000	1.2%	-98,000	-1.32%	-71,000	-0.94%	3.7	-0.5%
9	Cleveland, OH	9,346,000	0.0%	34,000	0.36%	-143,000	-1.53%	4.3	-1.4%
10	Columbia, SC	1,934,000	-27.8%	-89,000	-4.17%	-69,000	-3.42%	3.8	-5.3%
11	Dallas, TX	20,565,000	0.0%	76,000	0.37%	64,000	0.31%	1.3	-22.0%
12	Denver, CO	15,546,000	11.7%	-77,000	-0.42%	239,000	1.91%	3.9	-18.1%
13	Detroit, MI	8,610,000	6.7%	7,000	0.06%	-201,000	-2.49%	7.7	-10.7%
14	Fresno, CA	251,000	2.9%	6,000	2.39%	5,000	1.96%	-1.2	15.4%
15	Ft. Lauderdale, FL	3,813,000	19.9%	181,000	4.99%	193,000	5.38%	11.6	3.9%
16	Hartford, CT	6,554,000	-0.2%	-242,000	-3.69%	-402,000	-6.13%	4.1	2.5%
17	Houston, TX	26,481,000	7.0%	-42,000	-0.06%	-429,000	-1.55%	7.8	12.4%
18	Indianapolis, IN	5,899,000	0.1%	133,000	2.26%	69,000	1.17%	1.8	-7.0%
19	Jacksonville, FL	5,087,000	0.0%	-206,000	-4.05%	-331,000	-6.51%	6.5	3.2%
20	Kansas City MO-KS	5,805,000	3.5%	151,000	2.63%	269,000	4.80%	4.6	-4.1%
21	Las Vegas, NV	435,000	31.0%	7,000	1.61%	21,000	4.76%	9.3	-2.1%
22	Los Angeles, CA	23,441,000	0.0%	-306,000	-1.31%	-744,000	-3.17%	0.0	-2.8%
23	Louisville, KY	3,472,000	4.4%	10,000	0.31%	-5,000	-0.14%	3.8	2.0%
24	Memphis, TN	2,145,000	-1.3%	79,000	3.68%	-89,000	-4.11%	2.5	-7.8%
25	Miami, FL	3,644,000	0.0%	-58,000	-1.59%	-126,000	-3.46%	4.8	-1.0%
26	Milwaukee, WI	5,670,000	17.4%	289,000	5.07%	512,000	9.06%	-0.4	0.0%
27	Minneapolis, MN	13,171,000	14.3%	-1,052,000	-8.67%	-1,873,000	-14.61%	16.1	-12.1%

##	MARKET	Total Inventory		Absorption		Absorption YTD		Vac. Rate Change (%)	Annual Rent Change (%)
		3Q 2002 (SF)	Change (%)	Change (SF)	Change (%)	Change (SF)	Change (%)		
28	Nashville, TN	2,869,000	0.0%	120,000	4.18%	163,000	5.68%	-1.1	0.0%
29	New York, NY - Downtown	55,945,000	0.0%	13,509,000	24.15%	12,880,000	23.02%	6.8	-10.1%
30	New York, NY - Midtown	145,455,000	3.0%	2,414,000	1.70%	5,888,000	4.14%	0.8	-8.0%
31	New York, NY - Midtown South	14,054,000	0.0%	165,000	1.17%	268,000	1.91%	1.6	-22.3%
32	Oakland - East Bay, CA	6,829,000	8.4%	16,000	0.23%	17,000	0.38%	8.2	-16.8%
33	San Francisco, CA	47,059,000	5.4%	966,000	2.15%	2,542,000	5.73%	4.9	-28.2%
34	Orlando, FL	3,213,000	2.0%	91,000	2.92%	-113,000	-3.52%	20.4	14.2%
35	Philadelphia, PA	30,537,000	1.8%	-482,000	-1.60%	-645,000	-2.12%	3.2	-2.5%
36	Phoenix, AZ	8,637,000	5.0%	-515,000	-6.26%	190,000	2.32%	3.1	-6.2%
37	Portland, OR	9,770,000	5.3%	107,000	1.15%	291,000	3.23%	3.8	-18.5%
38	Raleigh, NC	1,935,000	0.4%	-12,000	-0.62%	43,000	2.23%	0.1	0.0%
39	Sacramento, CA	4,551,000	6.3%	49,000	1.17%	-166,000	-3.65%	6.5	-16.3%
40	San Diego, CA	6,747,000	39.9%	0	-0.08%	-250,000	-4.45%	5.2	-10.8%
41	San Jose/Silicon Valley, CA	2,391,000	16.7%	116,000	5.37%	-6,000	0.36%	10.0	-51.1%
42	Seattle, WA	25,437,000	2.9%	-492,000	-2.00%	71,000	0.28%	2.2	-10.2%
43	St. Louis, MO	7,260,000	3.7%	98,000	1.39%	87,000	1.26%	2.2	-6.0%
44	Tampa, FL	5,261,000	0.0%	26,000	0.49%	30,000	0.57%	22.9	2.1%
45	Washington, DC	35,542,000	11.5%	-220,000	-0.84%	-26,000	-0.68%	2.6	-6.1%
	U.S. Total	714,756,000	4.0%	15,036,000	2.19%	18,461,000	2.72%	3.8	-12.1%

Table 10  
Suburban Class A Office Markets Calculated Data

##	MARKET	Total Inventory		Absorption		Absorption YTD		Vac. Rate Change (%)	Annual Rent Change (%)
		3Q 2002 (SF)	Change (%)	Change (SF)	Change (%)	Change (SF)	Change (%)		
1	Atlanta, GA	66,641,000	5.7%	-756,000	-1.14%	-2,470,000	-3.83%	6.0	-12.50%
2	Austin, TX	15,585,000	28.8%	-171,000	-2.04%	-243,000	-1.59%	11.8	-18.66%
3	Bakersfield, CA	2,000,000	0.0%	-4,000	-0.20%	5,000	0.25%	-5.9	-3.12%
4	Baltimore, MD	12,087,000	6.1%	66,000	0.51%	-75,000	-0.76%	4.7	-18.80%
5	Boston, MA	54,262,000	11.9%	-131,000	-0.19%	963,000	2.21%	12.2	-25.00%
6	Charlotte, NC	15,819,000	4.8%	6,000	0.03%	-510,000	-3.28%	5.6	-7.34%
7	Chicago, IL	72,228,000	5.7%	497,000	0.74%	-508,000	-0.62%	3.8	-13.79%
8	Cincinnati, OH	10,266,000	11.0%	-82,000	-0.96%	45,000	0.34%	4.1	2.07%
9	Cleveland, OH	6,226,000	10.7%	116,000	1.72%	276,000	4.07%	-2.2	-1.82%
10	Columbia, SC	726,000	-60.4%	-3,000	2.50%	105,000	5.72%	-7.0	-7.10%
11	Dallas, TX	83,295,000	12.7%	-788,000	-0.90%	-2,243,000	-2.74%	4.2	-14.00%
12	Denver, CO	30,394,000	14.7%	-324,000	-0.82%	819,000	2.90%	4.6	-10.55%
13	Detroit, MI	30,635,000	15.4%	-202,000	-0.55%	-730,000	-2.29%	5.3	-9.42%
14	Fresno, CA	2,335,000	13.4%	13,000	0.46%	-66,000	-4.10%	1.1	-15.63%
15	Ft.Lauderdale, FL	9,185,000	22.6%	32,000	-0.01%	-646,000	-8.69%	2.2	3.25%
16	Hartford, CT	7,670,000	4.5%	-38,000	-0.50%	-127,000	-1.52%	7.0	-1.45%
17	Houston, TX	55,445,000	2.9%	-1,126,000	-2.07%	-2,077,000	-3.82%	2.7	1.95%
18	Indianapolis, IN	7,708,000	1.2%	-210,000	-2.74%	-398,000	-5.20%	5.2	-10.80%
19	Jacksonville, FL	6,682,000	-5.8%	162,000	2.12%	162,000	2.31%	2.2	5.03%
20	Kansas City MO-KS	10,547,000	5.7%	-667,000	-6.36%	-754,000	-7.20%	7.8	-1.36%
21	Las Vegas, NV	2,478,000	8.9%	-67,000	-2.93%	-37,000	-1.90%	5.6	-0.76%
22	Los Angeles, CA	82,638,000	4.7%	275,000	0.35%	394,000	0.54%	4.8	-4.32%
23	Louisville, KY	4,275,000	27.0%	-181,000	-5.28%	173,000	4.05%	8.0	-2.76%
24	Memphis, TN	8,379,000	18.0%	56,000	0.51%	397,000	4.64%	-0.8	-3.08%
25	Miami, FL	14,050,000	10.0%	401,000	2.92%	528,000	3.88%	-1.0	1.79%
26	Milwaukee, WI	7,123,000	-11.2%	0	0.00%	100,000	1.25%	18.2	0.00%
27	Minneapolis, MN	9,330,000	12.3%	-1,178,000	-13.62%	-2,591,000	-29.10%	14.8	-9.59%

##	MARKET	Total Inventory		Absorption		Absorption YTD		Vac. Rate Change (%)	Annual Rent Change (%)
		3Q 2002 (SF)	Change (%)	Change (SF)	Change (%)	Change (SF)	Change (%)		
28	Nashville, TN	11,194,000	8.1%	345,000	3.22%	224,000	2.10%	-1.0	0.00%
29	New Jersey - Central	57,661,000	4.6%	-1,945,000	-3.40%	-4,832,000	-8.55%	7.7	-2.86%
30	New Jersey - Northern	91,200,000	3.4%	-291,000	-0.33%	-4,317,000	-4.87%	6.9	-16.67%
31	New York, NY/ Fairfield County	31,170,000	0.0%	-230,000	-0.74%	920,000	2.95%	5.5	3.92%
32	New York, NY - Westchester Co	24,614,000	0.0%	148,000	0.60%	1,423,000	5.78%	2.6	1.14%
33	Oakland - East Bay, CA	25,531,000	3.8%	73,000	0.24%	354,000	1.37%	3.3	-18.21%
34	Orange County, CA	28,508,000	4.7%	374,000	1.36%	235,000	0.86%	4.2	-4.79%
35	Orlando, FL	12,831,000	-14.2%	38,000	0.40%	63,000	0.60%	22.9	25.29%
36	Philadelphia, PA	33,540,000	-18.6%	-1,119,000	-2.40%	309,000	1.04%	2.9	-5.35%
37	Phoenix, AZ	22,900,000	14.8%	-110,000	-0.79%	-439,000	-2.62%	3.6	-4.92%
38	Portland, OR	10,213,000	0.8%	-431,000	-4.24%	-664,000	-6.52%	4.7	-12.50%
39	Raleigh, NC	18,737,000	7.3%	48,000	0.28%	4,000	0.02%	1.5	0.00%
40	Sacramento, CA	8,534,000	39.2%	390,000	5.96%	142,000	2.78%	6.0	6.06%
41	San Diego, CA	18,078,000	5.0%	-292,000	-1.64%	-604,000	-3.39%	2.2	-26.71%
42	San Jose/Silicon Valley, CA	21,297,000	26.7%	-111,000	-0.83%	2,066,000	11.24%	2.3	-39.39%
43	Seattle, WA	31,449,000	7.6%	879,000	2.98%	-553,000	-1.82%	4.5	-2.11%
44	St.Louis, MO	22,647,000	9.1%	588,000	2.68%	383,000	1.56%	2.4	0.00%
45	Tampa, FL	17,720,000	3.3%	-237,000	-1.38%	-500,000	-2.92%	12.3	4.37%
46	Washington, DC/North Virginia	67,920,000	10.9%	-542,000	-0.93%	-493,000	-1.05%	7.4	-9.38%
47	Washington, DC/Suburban MD	22,148,000	16.1%	-2,000	-0.18%	824,000	3.55%	4.8	-12.12%
	U.S.Total	1,205,901,000	6.4%	-6,731,000	-0.57%	-14,963,000	-1.28%	5.5	-9.29%

The null hypothesis for each regression in this regression set is, similar to previous set, that the associated coefficients would be zero.

Table 11. Results of the Regression Tests of the Hypothesis about Change of Tenants' Preferences in Favor of Suburbs

	Coefficients	Standard Error	P-value	Coefficients	Standard Error	P-value
	Change in Vacancy Rates			Percentage Change in Rents		
Intercept	0.0493	0.0081	2E-08	-0.0621	0.0165	0.000286
Downtowns	0.00015	0.0115	0.9899	-0.0136	0.0235	0.56411
F	0.00016			0.33511		
Significance F	0.98988			0.56411		
R Square	1.8E-06			0.00371		
	Percentage Change in Absorption			Percentage Change in Absorption YTD		
Intercept	-0.0059	0.0058	0.3187	-0.009	0.0083	0.2824
Downtowns	0.01543	0.0084	0.0681	0.0169	0.0119	0.1598
F	3.40849			2.0094		
Significance F	0.06815			0.1598		
R Square	0.03649			0.0218		

The first regression in this set, which examines dependence of change in vacancy rates on location in high concentrated urban areas, does not indicate strong statistical evidence of such link. Despite, the sign of the variable is the same as expected; its P-value is close to 1.00 which is an evidence of the model insignificance. Therefore, I can summarize that downtowns did not suffer from relatively higher increase in vacancy rates.

In the second regression, the Downtown variable is also not close to be significant. The P-value of the variable is equal to 0.56. The R Square is less than 1%. Therefore, as in the case with change in vacancy rates, relationship between the dependent and independent variables can be rejected. The regression indicates that

downtown properties did not experience relatively larger decrease in rental rates for the period from the third quarter of the year 2001 to the third quarter of the year 2002.

The third regression, which testes relationship between percentage change of quarterly absorption of the office space and downtown location shows that Downtown variable, as well as the overall model, is significant at the 10% level. However, the variable is positive which is opposite of the expected sign. Moreover, R Square is only slightly more then 4%. This model indicates that, on the contrary to the hypothesis of the study, central business district locations outperformed suburban locations in terms of quarterly absorption.

The fourth model in this set of regressions is not also in line with the expectations of this study and is almost a duplicate of the third model. Despite the model is almost significant at the 15% level, the sign of the Downtown variable is negative, which is different from the predicted one. This test demonstrates that suburban locations experienced more decrease in the year-to-date absorption between the third quarter of 2001 and the third quarter of 2002.

Therefore, statistical analysis of the hypothesis about tenants' flight away from downtowns revealed no statistical evidence of the relative increase in vacancy rates and in relative decrease in rental rates of the Class A office properties in downtown locations compared to suburbs. At the same time, empirical data suggests that downtown office properties did better than suburban ones regarding quarterly and year-to-date absorption of office space in the analyzed period. Thus, the results of the regression analysis did not confirm the hypothesis of this study about abandonment of the central business district locations by office tenants as a result of terrorist actions of September 11, 2001.

Table 12  
Trophy Buildings and Markets Calculated Data

Building	Market	Total Vacancy 3Q 2002, SF	Total Market Vacancy 3Q 2002, SF	Total Vacancy 3Q 2001, SF	Total Market Vacancy 3Q 2001, SF	Bld RBA	TOTAL Market RBA, SF	Total Market Vacancy 3Q 2002, %	Total Market Vacancy 3Q 2002, %	Change in Vacancy Rate, %
1 Chase Manhattan Plz	New York	34,450		0		2,239,000				
1745 Broadway	New York	0		0		698,000				
American International Building	New York	0		0		774,419				
Carnegie Hall Tower	New York	79,891		49,976		547,000				
Chrysler Building	New York	113,991		107,820		1,194,037				
CitySpire	New York	101,645		40,837		330,000				
Empire State Building	New York	288,498		206,042		2,248,370				
GE Bldg	New York	39,689		77,425		2,893,580				
The Trump Building	New York	249,945		103,309		1,300,000				
Trump Tower	New York	62,142		40,334		280,000				
Met Life Bldg	New York	53,990		5,057		2,841,536				
Metropolitan Tower	New York	6,292	1,030,533	0	630,800	225,000	15,570,942	6.62%	4.05%	2.57%
311 S Wacker Drive	Chicago	261,667		138,551		1,281,000				
900 N Michigan Ave	Chicago	13,342		4,239		544,000				
Aon Center - Chicago	Chicago	308,292		174,477		2,529,269				
Olympia Center	Chicago	107,279		82,845		335,190				
Onterie Center West Tower	Chicago	111,977		0		184,414				
Sears Tower	Chicago	521,118		162,318		3,446,323				
Water Tower Place	Chicago	720		720		100,000				
John Hancock Center	Chicago	93,603		35,902		819,118				

Building	Market	Total Vacancy 3Q 2002, SF	Total Market Vacancy 3Q 2002, SF	Total Vacancy 3Q 2001, SF	Total Market Vacancy 3Q 2001, SF	Bld RBA	TOTAL Market RBA, SF	Total Market Vacancy 3Q 2002, %	Total Market Vacancy 3Q 2002, %	Change in Vacancy Rate, %
AT&T Corporate Center I	Chicago	86,421		104,953		1,572,454				
Lake Point Tower Renaissance Plaza	Chicago	32,600		15,800		32,600				
Two Prudential Plaza	<b>Chicago</b>	101,639	<b>1,638,658</b>	85,182	<b>804,987</b>	941,000	<b>11,785,368</b>	<b>13.90%</b>	<b>6.83%</b>	<b>7.07%</b>
Bank of America Corporate Center	<b>Charlotte</b>	32,968	<b>32,968</b>	0	<b>0</b>	1,117,000	<b>1,117,000</b>	<b>2.95%</b>	<b>0.00%</b>	<b>2.95%</b>
Bank of America Tower	Seattle	399,671		321,854		1,537,932				
Key Tower	<b>Seattle</b>	21,669	<b>421,340</b>	71,223	<b>393,077</b>	1,055,547	<b>2,593,479</b>	<b>16.25%</b>	<b>15.16%</b>	<b>1.09%</b>
Bank One Center	Dallas	290,791		227,663		1,530,957				
Fountain Place	Dallas	28,606		78,134		1,200,266				
Bank of America Plaza	<b>Dallas</b>	110,784	<b>430,181</b>	80,250	<b>386,047</b>	1,865,168	<b>4,596,391</b>	<b>9.36%</b>	<b>8.40%</b>	<b>0.96%</b>
John Hancock Tower	<b>Boston</b>	223,449	<b>223,449</b>	223,652	<b>223,652</b>	1,589,533	<b>1,589,533</b>	<b>14.06%</b>	<b>14.07%</b>	<b>-0.01%</b>
Library Tower	Los Angeles	169,788		165,001		1,432,553				
Aon Center - LA	<b>Los Angeles</b>	216,216	<b>386,004</b>	356,114	<b>521,115</b>	1,028,852	<b>2,461,405</b>	<b>15.68%</b>	<b>21.17%</b>	<b>-5.49%</b>
SunTrust Plaza	<b>Atlanta</b>	69,542	<b>69,542</b>	35,062	<b>35,062</b>	1,249,022	<b>1,249,022</b>	<b>5.57%</b>	<b>2.81%</b>	<b>2.76%</b>
U.S. Steel Tower	<b>Pittsburgh</b>	351,207	<b>351,207</b>	244,251	<b>244,251</b>	2,336,272	<b>2,336,272</b>	<b>15.03%</b>	<b>10.45%</b>	<b>4.58%</b>
Wells Fargo Plaza	Houston	179,452		129,020		1,721,242				
Williams Tower	Houston	79,566		73,115		1,545,011				
Chase Tower	<b>Houston</b>	75,889	<b>334,907</b>	73,547	<b>275,682</b>	1,683,893	<b>4,950,146</b>	<b>6.77%</b>	<b>5.57%</b>	<b>1.20%</b>

Note: Data shown in Bold are for the all the trophy buildings in the market

Source: CoStar Group

Table 13  
Downtown Class A Office Markets which Contain Trophy Buildings (Calculated Data)

Market	Quarter	Data Including Trophy Buildings							Data Excluding Trophy Buildings				
		Existing Inventory		Vacancy				Net Absorption	Quoted Rates	RBA SF	Total Vacancy SF	Vacancy %	Change in Vacancy
		# Buildings	Total RBA	Direct SF	Sublet SF	Total SF	Vacancy %						
Atlanta	2002 3q	24	14,412,022	1,496,399	521,850	2,018,249	14.0%	(1,779)	\$ 22.72	13,163,000	1,948,707	14.80%	1.61%
	2001 3q	23	14,054,240	1,347,175	377,199	1,724,374	12.3%	(205,514)	\$ 20.28	12,805,218	1,689,312	13.19%	
Boston	2002 3q	150	45,906,157	3,652,916	1,399,797	5,052,713	11.0%	(255,041)	\$ 41.75	44,316,624	4,829,264	10.90%	2.59%
	2001 3q	147	45,242,456	3,288,617	559,621	3,848,238	8.5%	13,731	\$ 55.78	43,652,923	3,624,586	8.30%	
Charlotte	2002 3q	32	15,207,720	909,820	306,255	1,216,075	8.0%	(59,683)	\$ 20.68	14,090,720	1,183,107	8.40%	2.97%
	2001 3q	30	14,218,072	564,248	147,016	711,264	5.0%	15,293	\$ 18.06	13,101,072	711,264	5.43%	
Chicago	2002 3q	71	55,676,870	5,506,662	2,366,463	7,873,125	14.1%	291,222	\$ 33.47	43,891,502	6,234,467	14.20%	1.15%
	2001 3q	69	54,744,315	5,201,627	1,211,693	6,413,320	11.7%	111,641	\$ 34.02	42,958,947	5,608,333	13.06%	
Dallas	2002 3q	30	25,179,243	3,380,300	802,869	4,183,169	16.6%	(6,292)	\$ 20.31	20,582,852	3,752,988	18.23%	1.86%
	2001 3q	29	25,012,243	3,243,883	485,322	3,729,205	14.9%	(198,667)	\$ 19.37	20,415,852	3,343,158	16.38%	
Houston	2002 3q	26	26,480,776	3,064,915	746,201	3,811,116	14.4%	73,981	\$ 26.04	21,530,630	3,476,209	16.15%	9.15%
	2001 3q	24	24,743,265	1,251,262	408,507	1,659,769	6.7%	(398,966)	\$ 25.50	19,793,119	1,384,087	6.99%	
Los Angeles	2002 3q	75	35,184,485	5,842,376	935,052	6,777,428	19.3%	(51,755)	\$ 23.02	32,723,080	6,391,424	19.53%	1.43%
	2001 3q	75	35,184,485	5,432,434	1,013,181	6,445,615	18.3%	(12,173)	\$ 21.17	32,723,080	5,924,500	18.10%	
New York	2002 3q	455	276,276,265	17,455,527	9,637,027	27,092,554	9.8%	(1,849,627)	\$ 52.43	260,705,323	26,062,021	10.00%	2.87%
	2001 3q	454	284,441,595	13,373,336	6,417,564	19,790,900	7.0%	(13,107,387)	\$ 59.89	268,870,653	19,160,100	7.13%	
Pittsburgh	2002 3q	27	15,205,299	1,317,834	365,891	1,683,725	11.1%	(172,821)	\$ 23.36	12,869,027	1,332,518	10.35%	2.31%
	2001 3q	26	15,005,299	1,026,834	236,076	1,262,910	8.4%	(2,015)	\$ 22.74	12,669,027	1,018,659	8.04%	
Seattle	2002 3q	80	26,083,014	2,340,202	1,458,415	3,798,617	14.6%	(193,936)	\$ 27.14	23,489,535	3,377,277	14.38%	3.51%
	2001 3q	78	25,769,967	1,702,051	1,210,193	2,912,244	11.3%	(189,675)	\$ 34.11	23,176,488	2,519,167	10.87%	

Source: CoStar Group

The last part of the regression analysis examined the impact of September 11th on the tall and trophy properties. The variables for this regression were calculated according to the section 2.4 of the Chapter 2 and are shown in the tables 12-13. The dependent variable in this regression test is change in vacancy rates for Class A office properties and for tall and trophy buildings in the ten cities. The two independent variables are the dummy variables. The first one indicates if the properties are tall and trophy and the second one indicates if properties are located in New York or Chicago. The results of the regression are shown in the table 14.

In this regression significant and positive-signs coefficients associated with independent variables were expected. According to the expectations, trophy properties as well as all the Class A office properties located in New York and Chicago experienced significant relative increase in vacancy rates between the third quarter of 2001 and the third quarter of 2002. The null hypothesis is that the coefficients associated with the independent variables would be zero.

Table 14. Results of the Regression Test of the Hypothesis about Change of Tenants' Preferences Regarding High-Rise and Trophy Buildings

	Coefficients	Standard Error	P-value
	Change in Vacancy Rates		
Intercept	0.02681	0.00958	0.01233
Trophy Properties	-0.01178	0.01277	0.36928
New York and Chicago	0.01323	0.01596	0.41854
F	0.76901		
Significance F	0.47894		
R Square	0.08297		

The regression test demonstrated that none of the variables is close to significant. P-value for Trophy Properties is approximately equal to 0.36. P-value for New York and Chicago is about 0.42. Moreover, Trophy Properties variable, on the contrary to the

expectations, has negative sign. Overall F-statistic is also insignificant. P-value for the model is approximately equal to 0.48 and R Square is less than 10%, which are the indicators of the absence of significant statistical evidence of the predicted relationship.

Therefore, this regression analysis suggests that the tall and trophy properties did not undergo relative increase in vacancy rates compared to the other Class A office properties. This result can be confirmed even by visual analysis of the data in the tables 12 and 13. In the seven of the ten analyzed cities trophy properties outperformed the other Class A office properties, i.e. change in vacancy rates of the trophy buildings was relatively lower than of the other Class A office buildings.

The regression analysis also revealed that both New York and Chicago CBD Class A office markets, which have the largest amount of tall and trophy properties in the United States, did not experience significant increase in vacancy rates compared to the other CBD Class A office markets, which also have some number of tall and trophy buildings. Visual analysis of the data in the tables 12-13 shows that Chicago trophy properties were the most impacted. They faced the most significant vacancy rates increase, which is slightly more than 7%. At the same time, the average vacancy rate in the other Chicago CBD Class A office properties increased on only 1.15%, which is the least growth among the ten analyzed markets.

Los Angeles trophy buildings are the least impacted trophy properties. Average vacancy rate for them demonstrated more than 5% decrease for the period between the third quarter of 2001 and the third quarter of 2002.

Therefore, the three set of regressions described above demonstrates that fears of terrorism did not make tenants to avoid tall and trophy buildings, dense urban areas, and

large cities. In some aspects, office space located in the places, which seemed to be most impacted by the terrorist attacks of 9/11, even outperformed office space located in the “safe” areas. However, as it was already mentioned, this analysis covers the period of only one year after September 11th, and exposes only short-term consequences.

To anticipate the long-term effect, a web survey was conducted. Five hundred members of the Building Owners Managers Association were asked six questions related to the hypotheses of the study.

The goal of the survey was to determine not only the future preferences of tenants but also the preferences of real estate professionals who owns and operates real estate properties. Keeping this in mind, the following statement was made:

- *Since 9/11 you will avoid very tall and trophy buildings for your future space needs.*

The answers are shown on the figure 11.

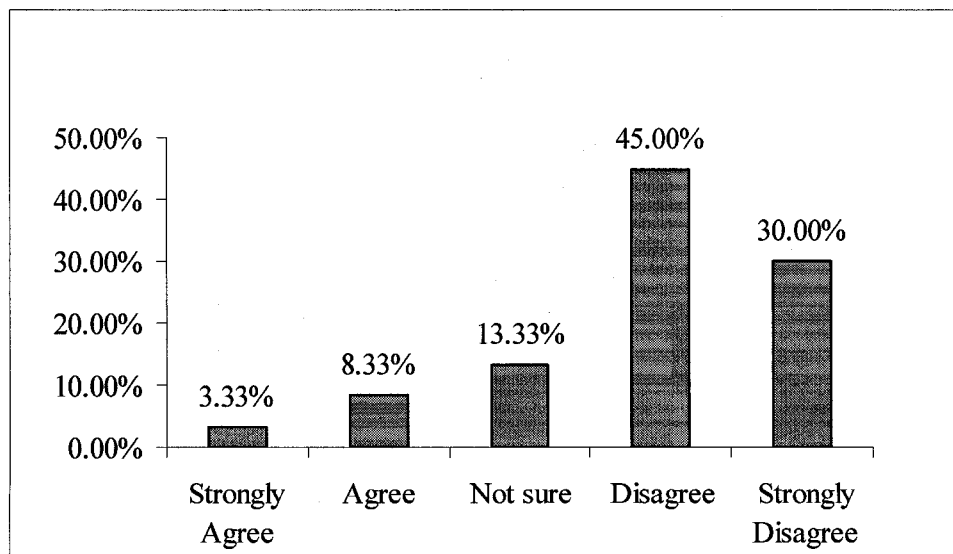


Figure 11. Percentage distribution of respondents according to their agreement or disagreement with the statement: *Since 9/11 you will avoid very tall and trophy buildings for your future space needs.*

The figure above indicates that only a few real estate professionals, as of March 2003, plan to avoid tall and trophy buildings for their space needs. Slightly more than 12% of the respondents agreed or strongly agreed that they would not use trophy high-rises in the future. About 13% of respondents neither agree nor disagree with the above statement. Despite the assertion that “the collapse of two of the world’s tallest office buildings is making some companies think twice about leasing space in a high profile building” (Ernst & Young 2002, 7), real estate industry does not seem to think about fleeing from tall and trophy properties as a result of 9/11 terrorist actions. 75% of respondents declined that they would change their strategy in this regard.

However, considering the fact that tenants’ preferences can differ significantly from the preferences of property owners, the other statement was made:

- *If you work with tenants, your tenants prefer to avoid very tall and trophy buildings since 9/11 (figure 12).*

The figure 12 indicates that real estate professionals predict that the behavior of their tenants will be different from their own. First, the number of positive responses almost doubled from about 12% to almost 24% compared to the first statement. Second, the number of respondents stating that they disagree or strongly disagree that their tenants would ignore tall and trophy properties in the future declined on almost 30% compared to the first statement. Third, almost one in three respondents neither agreed nor disagreed with the above-mentioned statement. This fact indicates that eighteen months after the terrorist actions a number of tenants does not clarify what strategy they should follow in determining type of the building for their business location.

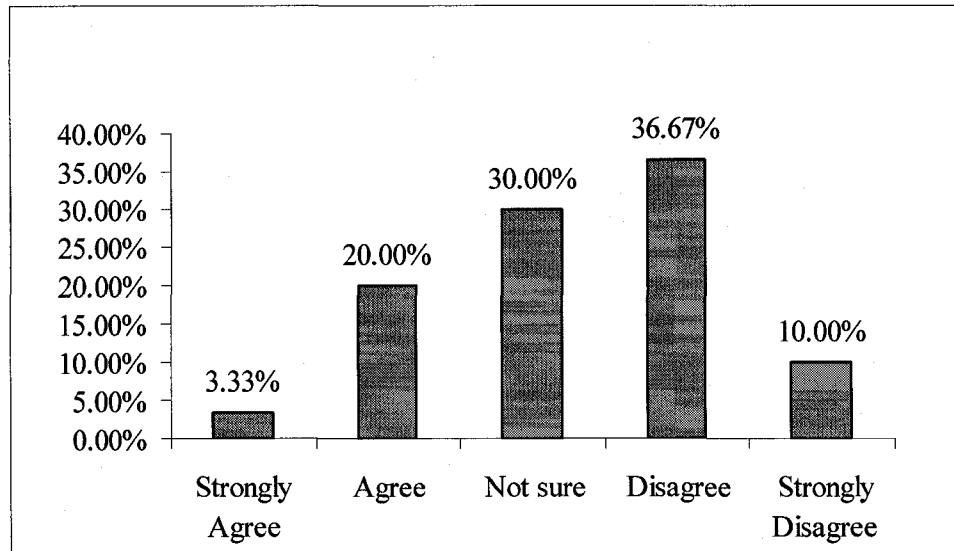


Figure 12. Percentage distribution of the respondents according to their agreement or disagreement with the statement: *If you work with tenants, your tenants prefer to avoid very tall and trophy buildings since 9/11.*

On the other hand, the other statement, “*You or your tenants are more likely to move away from downtown on the next move and to avoid more concentrated urban areas*” (figure 13) reveals that abandonment of the central business districts won’t likely to occur. Neither of the respondents was strongly agree with this statement. Only 13.33% reported that they or their tenants plan to move away from downtown locations in the future. At the same time almost three in four respondents would prefer to stay in a central business district showing that centrally located facilities continue to magnetize tenants by their advantages: convenient access to clients, major business, financial, and institutional services, proximity to large and skilled workforce, to major public transportation and engineering infrastructures. CBDs are usually located on the cross-section of all major transportation arteries and in the area with high concentration of hotels and restaurants. All these factors create the necessary business environment, which very often is not available on the periphery. Moreover, it seems that on the contrast to very tall and trophy

buildings, high concentrated urban areas are not associated by tenants with the terrorist threat. This statement also indicates that only a small number of real estate firms and their tenants did not decide what area would be more preferable for them. Only 13.33% of the respondents are not sure about the place of the future location (in terms of downtown vs. suburb) for them or their tenants.

The responses of the survey participants were even more unanimous when they reported their opinions on the statement “*You or your tenants are more likely to move to smaller cities in the future in face of terrorist threats*” (figure 14). Ninety-three percent of the respondents stated that neither they nor their clients would leave large cities for the sake of moving to smaller cities.

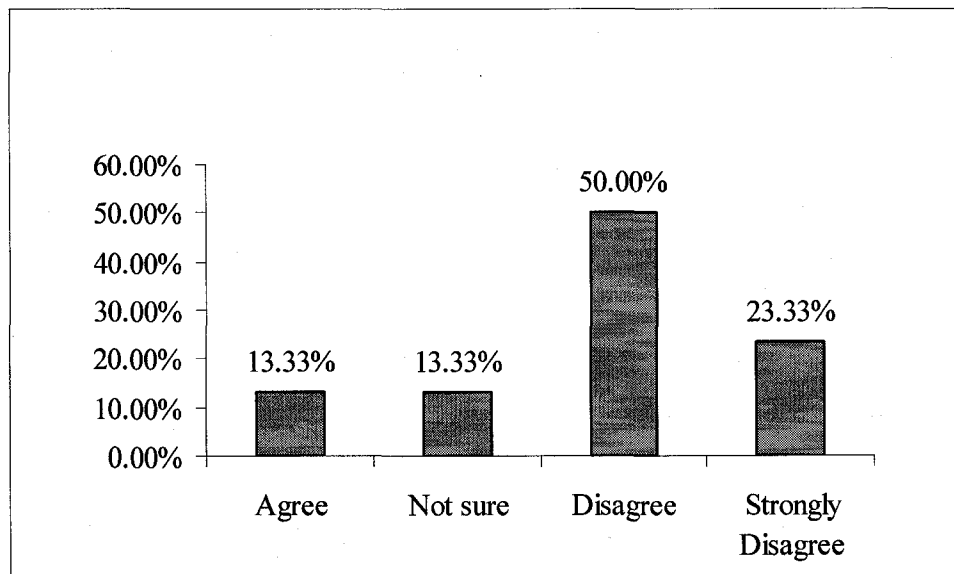


Figure 13. Percentage distribution of the respondents according to their agreement or disagreement with the statement: “*You or your tenants are more likely to move away from downtown on the next move and to avoid more concentrated urban areas*”.

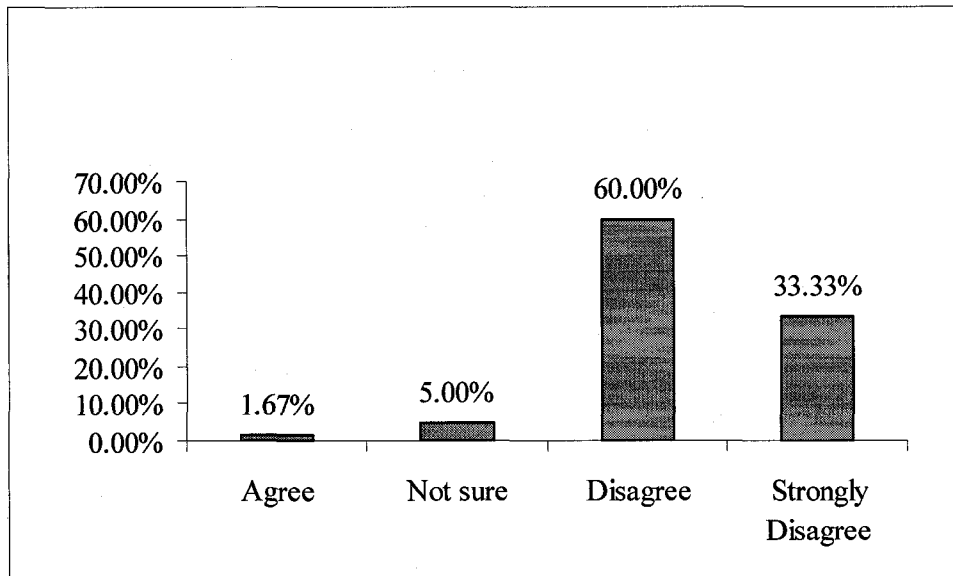


Figure 14. Percentage distribution of the respondents according to their agreement or disagreement with the statement: “You or your tenants are more likely to move to smaller cities in the future in face of terrorist threats”.

It is clear that the advantages of downtowns compared to suburbs are becoming even more appreciable when comparing large cities and small cities. Moreover, three primary centralizing forces – economies of scale, economies of agglomeration, and positive location externalities – are still more powerful than decentralizing forces. Congestion, pollution, crime, high intraurban transportation costs, high rents and urban land costs did not make most of the companies to move to smaller cities (Geltner and Miller 2001, 47-48). It seems that neither did terrorist threat. It is obvious, that some companies will change their location preferences as a result of September 11th and will prefer low-rise buildings, low concentrated areas, and small cities. However, tall buildings, downtowns and large cities “have never been an advantage to every tenant in the past nor should we expect them to be in the future” (Miller et al. 2003, 11).

Many factors have been changing building design over time: energy preservation, development of construction materials and building technologies, health and

environmental concerns, cultural development and etc. Crime prevention concerns are among these factors. Since 1970s, when Oscar Newman wrote books on crime prevention through architectural and urban design, this factor was considered each time when people created different types of facilities. The events of February 26, 1993, when terrorists attacked the World Trade Center for the first time, made researchers speculate about the means of bombing prevention. Several books on building security issues published in the late of 1990s included chapters and sections on management of bomb incidents and bomb prevention approaches. However, practitioners did not pay much attention to these issues. The events of 9/11 seemed to change this. After 9/11, design changes, along with improvement of security measures, development of disaster and evacuation plans, are discussed by real estate analytics as the major means for preventing possible terrorist attacks or for reducing their impact in the future. A number of articles, presentations, and discussions on this matter appeared in real estate, planning, and architectural journals. However, again it is not clear whether design changes will be implemented in practice for a long-run and whether real estate practitioners consider design as an appropriate mean of terrorism prevention. The assessment of the statement "*Concerns of terrorism influenced or will influence design changes in your building*" (figure 15), which was made in the survey, reveals that real estate industry pays substantial attention to this issue now and is going to pay in the future. Sixty-five percent of the survey participants indicated that events of 9/11 stimulated or will stimulate design changes. However, 20% of respondents declined any design changes in their properties as a result of 9/11. Perhaps the main reason for that is the fact that implementation of any design changes results in growth of occupancy costs and, correspondingly, in increase of rents. Moreover, the most of design

changes are not observable, like other security costs, like for example metal, bomb, and weapons detectors in public entrances. As a result, many tenants are not ready to pay more for invisible improvements.

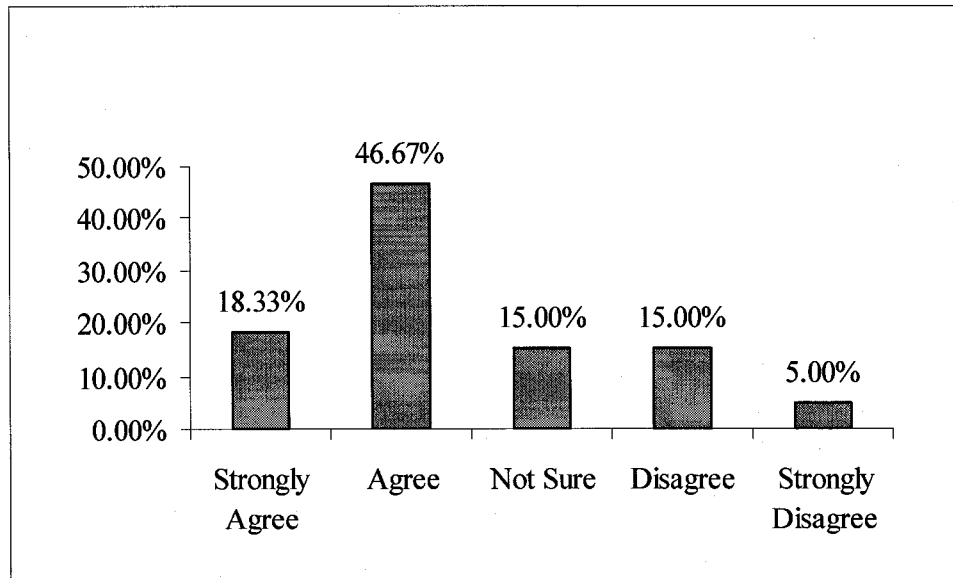


Figure 15. Percentage distribution of the respondents according to their agreement or disagreement with the statement: *“Concerns of terrorism influenced or will influence design changes in your buildings.”*

Even though the results of the web survey points out that concerns of terrorism influenced design changes in the office buildings, I do not expect the improvements to be applied very soon. There are two reasons for that.

First, these alterations require huge capital spending by developers and property owners. As a result, the property owners would have to increase rents to have their properties profitable. However, at present, when economic recession seized the real estate industry, any increase in rents will not attract prospective tenants and will repel current tenants. Moreover, it usually takes some period of time to implement new design and architectural changes in office buildings.

Second, most of the new design and architectural approaches, one of the purposes of which is preventing terrorist threat, can be realized only in new-constructed office facilities. Considering the fact, that it passed only 1.5 year since the time when the tragedy happen, we can not expect to see new office buildings too soon.

The possible ways of improvement design features are discussed by many experts of the field and can include the following ones. First, design changes can be applied both in interior and exterior design. Special attention should be paid to the public spaces, such as lobby. Lobby should be designed in a flexible manner so that alterations, such as adding new security equipment – metal detectors or new turnstiles, can be adopted quickly and without creation of additional inconveniences for tenants and visitors (Maas 2001). Urban landscaping approaches are other way to prevent or reduce terrorist threat and improve security. Levy and Thomas (2002) states that park benches, planters, light poles and other elements of the urban landscape reinforced with steel can be placed in the surroundings in such way that they will create natural barriers for truck bombs (p.76).

Second, special attention should be paid to design of underground parking garages. Architects and designers can design them so that a bomb blast is directed out of the building rather than into it (Mass 2001).

Third, support structures, fireproofing, and design of emergency stairwells are the other issues which can be improved significantly, according to the experts. The fact that vertical support members did not sustain the blast made construction engineers “to learn more about how loads are distributed when large portions of a building are removed” (Gips 2002). The same can be said about sprinkler systems, which was ineffective in preventing spread of fire initiated by the air jets’ fuel. Thickness of fireproofing materials

was not adequate to the scale of the accident and therefore, should be also reviewed and updated according to the new expectations and requirements (Gips 2002). Inefficient design of stairwells resulted in simultaneous cut-off of the escape routes for the WTC tenants from the higher floors. The other drawback of the stairwells was their narrowness, which created congestion during the evacuation. New requirements to stairwells should be adopted and applied by designers, architects, and developers of new office buildings.

## CONCLUSION

A majority of real estate analysts in the aftermath of September 11th suggested that terrorist actions of September 11th would have a significant impact on office real estate. However, the given research reveals that the impact was not such significant as it had been predicted. The events of 9/11 did not make tenants of office buildings change their location preferences.

In the process of the research, four hypotheses were tested. Three of them, which evaluated changes in location strategies, were rejected. Three sets of regression analysis indicated the following:

1. As a result of September 11th, tenants as well as owners of office properties in the United States did not move to smaller cities in face of terrorist threat.
2. As a consequence of terrorist attacks of September 11th and fears of terrorism, tenants of office properties did not move away from downtown and did not avoid more concentrated urban areas.
3. The majority of tenants did not prefer to avoid very tall and trophy office buildings since the events of September 11th.

The regressions revealed that, on the contrary to the hypotheses of the study, downtown Class A office properties often outperformed suburban properties, and very tall and trophy buildings in the majority of cities did better than the other Class A office buildings for the period between the third quarter of 2001 and the third quarter of 2002.

The web survey of the members of the Building Owners and Managers Association showed the same results regarding tenants' preferences and pointed out that preferences would likely be the same in the future.

The results of the research are consistent with the results of the surveys implemented by Ernst & Young and by Jones Land LaSalle and described in the Literature and Research Review Chapter. For example, according to the Ernst & Young, in February 2002, 31 % of the companies planned to avoid leasing space in high profile buildings. Five months later, the survey by Jones Lang LaSalle showed that 20% of firms considered reduction of operations in trophy buildings and only 4% - reduction of operations in high-rise buildings. The web-survey of BOMA members used in the given research was implemented in March 2003 and demonstrated that 12% of owners of office properties prefer to avoid very tall and trophy buildings for their future space needs in the future. At the same time, 23% of office space owners indicated that their tenants will avoid very tall and trophy properties. A similar observation can be made by comparing changes of tenants' preferences regarding moving away from central business district locations. Ernst & Young survey showed that 15% of firms would probably move away from city centers. Jones Lang LaSalle survey indicated that this number declined to 4%. According to the results of the survey performed for the given research, 13% of companies will consider moving away from downtowns. Therefore, the outcomes of the present study coincide with the surveys of the two mentioned surveys. The slight variance among the responses can be attributed to different ways of statement of the questions and to the time of the surveys implementation.

Unlike the hypotheses about changes in location preferences of tenants, the hypothesis about significant changes in design and security policies and procedures as a consequence of 9/11 was confirmed by the research. The results of survey revealed that most of property owners adopted or plan to adopt design modifications, which can help prevent terrorist actions or reduce the consequences of future terrorist attacks. A number of publications in architectural, real estate, and planning journals displayed that security measures had been improved in the majority of office buildings. The surveys by Jones Lang LaSalle and Ernst & Young showed the similar results. For example, according to Ernst & Young, 65% of firms considered improving physical security of corporate facilities. Jones Lang LaSalle research also confirmed that security measures and building design issues “are being considered far more seriously than in the past” (Jones Lang LaSalle 2002, 4). However, a peak of new security policies’ implementations fell on the aftermath of 9/11. The further were the events, the less concerned about improved security were tenants. Moreover, some property owners contended that new security procedures are ineffective, adding, at the same time, substantial costs.

Therefore, the study did not reveal any significant findings in favor of future change of urban pattern of the American cities as a result September 11th. As demand for suburban office properties, for properties in smaller cities, and for low-rise buildings has not increased, developers are not likely to avoid implementation of future projects in high concentrated urban areas. Also, development of high-rise office properties will not likely be ignored by developers. However, these conclusions highly depend on the future activities of terrorists. If terrorist actions happen in the future and target the same types of office buildings as in the previous attack, the situation on the market can change

dramatically. Nevertheless, as of today, it is clear that the main targets of terrorists are places with high concentration of people and with inadequate security. Security improvements made office buildings less likely targets. On the other hand, offices are not the only places with high concentration of people. This fact should be considered by developers of all the types of real estate.

This study evaluates mostly short-term consequences of the terrorist actions of September 11th. One of the objectives of this study is to examine what design changes were implemented by property owners and developers in the aftermath of 9/11 events. At present, the list of possible design modifications can be divided into three large groups: interior and exterior design, parking garages, and support structures and fireproofing.

Interior and exterior design changes include improved redesigning of entrances, improving emergency access, new urban landscaping approaches, and special elevators for firefighters. Parking facilities can be redesigned or relocated so that it won't be possible for terrorists to damage or destroy an office building using underground or adjacent parking garages. Support structures and fireproofing improvements include upgrading building and interior materials to make them more fire-resistant and upgrading sprinkler systems.

However, it is not clear whether the process of adoption of new design improvements will take place in the future and, if it will, what design improvements will prevail. Therefore, the future studies should analyze how effective design changes will be. For example, cost-benefit analysis of design improvements in office building can be performed. While performing such research, a researcher should consider the fact that

design changes can be implemented for prevention and reduction of consequences of not only terrorist attacks but also other crimes.

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Table 5  
Downtown Class A Office Markets which Contain Trophy Buildings (Original Data)

Market	Quarter	Exisitng Inventory		Vacancy				Net Absorption	Quoted Rates
		# Buildings	Total RBA	Direct SF	Sublet SF	Total SF	Vacancy %		
Atalanta	2002 3q	24	14,412,022	1,496,399	521,850	2,018,249	14.0%	(1,779)	\$ 22.72
	2001 3q	23	14,054,240	1,347,175	377,199	1,724,374	12.3%	(205,514)	\$ 20.28
Boston	2002 3q	150	45,906,157	3,652,916	1,399,797	5,052,713	11.0%	(255,041)	\$ 41.75
	2001 3q	147	45,242,456	3,288,617	559,621	3,848,238	8.5%	13,731	\$ 55.78
Charlotte	2002 3q	32	15,207,720	909,820	306,255	1,216,075	8.0%	(59,683)	\$ 20.68
	2001 3q	30	14,218,072	564,248	147,016	711,264	5.0%	15,293	\$ 18.06
Chicago	2002 3q	71	55,676,870	5,506,662	2,366,463	7,873,125	14.1%	291,222	\$ 33.47
	2001 3q	69	54,744,315	5,201,627	1,211,693	6,413,320	11.7%	111,641	\$ 34.02
Dallas	2002 3q	30	25,179,243	3,380,300	802,869	4,183,169	16.6%	(6,292)	\$ 20.31
	2001 3q	29	25,012,243	3,243,883	485,322	3,729,205	14.9%	(198,667)	\$ 19.37
Houston	2002 3q	26	26,480,776	3,064,915	746,201	3,811,116	14.4%	73,981	\$ 26.04
	2001 3q	24	24,743,265	1,251,262	408,507	1,659,769	6.7%	(398,966)	\$ 25.50
Los Angeles	2002 3q	75	35,184,485	5,842,376	935,052	6,777,428	19.3%	(51,755)	\$ 23.02
	2001 3q	75	35,184,485	5,432,434	1,013,181	6,445,615	18.3%	(12,173)	\$ 21.17
New York	2002 3q	455	276,276,265	17,455,527	9,637,027	27,092,554	9.8%	(1,849,627)	\$ 52.43
	2001 3q	454	284,441,595	13,373,336	6,417,564	19,790,900	7.0%	(13,107,387)	\$ 59.89
Pittsburgh	2002 3q	27	15,205,299	1,317,834	365,891	1,683,725	11.1%	(172,821)	\$ 23.36
	2001 3q	26	15,005,299	1,026,834	236,076	1,262,910	8.4%	(2,015)	\$ 22.74
Seattle	2002 3q	80	26,083,014	2,340,202	1,458,415	3,798,617	14.6%	(193,936)	\$ 27.14
	2001 3q	78	25,769,967	1,702,051	1,210,193	2,912,244	11.3%	(189,675)	\$ 34.11

Source: CoStar Group