Price Premiums and Mixed-Use Development

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By
Dominic F. Minadeo, D.A., Economics
Director of Research
Colliers Turley Martin Tucker
Nashville, TN

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NAIOP, the Commercial Real Estate Development Association, is the leading organization for developers, owners and related professionals in office, industrial and mixed-use real estate. NAIOP comprises over 15,000 members in North America. NAIOP advances responsible commercial real estate development and advocates for effective public policy. For more information, visit www.naiop.org visit www.naiop.org.

About the NAIOP Research Foundation

The NAIOP Research Foundation was established in 2000 as a 501(c)(3) organization to support the work of individuals and organizations engaged in real estate development, investment and operations. The foundation's core purpose is to provide these individuals and organizations with the highest level of research information on how real properties—especially office, industrial and mixed-use properties—impact and benefit communities throughout North America. The initial funding for the Research Foundation was underwritten by NAIOP and its founding governors with an endowment fund established to fund future research. For more information, visit www.naioprf.org.

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Requests for funding should be submitted to research@naiop.org. For additional information, please contact Sheila Vertino, NAIOP Research Foundation, 2201 Cooperative Way, Herndon, VA, 20171, at (703) 904-7100, ext. 121, or vertino@naiop.org.

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Hedonic Price Model and Mixed-Use Development

Abstract and Summary of Results
To determine whether mixed-use is now a viable option for most real estate developers, this study employs a hedonic pricing model to extract the rent premium associated with commercial buildings in mixed-use developments. The results should help commercial real estate brokers through more accurate pricing of an emerging niche. Results show that office space in a mixed-use development can command a statistically significant, positive premium in select markets. Rent premiums per square foot were found for Nashville ($1.79), Dallas ($1.99) and Charlotte ($1.82). Philadelphia had a negative rent premium of $1.96 per square foot, while results for Seattle, Indianapolis, Minneapolis and Phoenix were not statistically significant. Mixed-use is still an emerging market niche with strong potential as our culture continues to evolve from sprawl-oriented to smarter development.

Background
During previous decades, Americans abandoned urban living in favor of the suburban dream: a big house, a well-manicured yard and a gas-guzzling SUV for that long commute to work in the city. However, recent shifts in energy prices and social tastes have created a migration back to "Main Street America" and simpler times. Meanwhile, soaring land prices near urban centers have forced investors to require greater returns per square foot. The result has been an increased interest in mixed-use development, which focuses on high-intensity land use through close integration of residential, retail and office space. Although mixed-use is not a new fad, having already existed in various forms for over a decade, it is now penetrating commercial real estate markets across the country. Consequently, mixed-use is now a viable option for many real estate developers.

Purpose of Research
As employees of the commercial real estate industry and residents of our respective communities, we all have a stake in smarter development. However, without major research and analysis of the subject, it might be difficult to persuade potential investors or residents to consider such developments. Although most people recognize the benefits created by living or working in a mixed-use development, monetary incentives have the greatest persuasive effect on members of our capitalistic society. Consequently, this research seeks to uncover whether buildings in a mixed-use development garner higher rents and if that price premium is adequate to overcome higher construction costs and zoning hurdles often associated with mixed-use developments.

Proposed Research Process
To determine whether membership in a mixed-use development has a significant impact on office rents, Colliers Turley Martin Tucker employed a spatially related hedonic pricing approach. Ultimately, the analysis used a cross-sectional data set comprising eight markets in the Southeast, Southwest, Midwest and Northeast in a multi-step estimation process to uncover accurate and useful estimates. The data, while imperfect because they do not reflect all observable characteristics for each building or include every individual building, provide a good representation of the market. Furthermore, through use of proxy variables[1] designed to represent

[1] Proxy variables result from the application of logic to observable variables, making them more statistically useful. For example, personal income may be correlated with the person's age, but

the unobserved characteristics, statistical bias caused by such characteristics will be isolated and minimized.

Hypothesis or Possible Outcomes of the Research
Although mixed-use, by definition and current practice, will create a higher value per square foot of raw land because it incorporates high-intensity land use, this research seeks to uncover the effect of a mixed-use development on rents for the final product. A simplified hypothesis to test would be whether office or retail space in a mixed-use development garners higher rents per square foot than a comparable product in a single-use development.

Work Products/Deliverables
Using a hedonic price model, individual rent premiums charged by members of mixed-use developments will be estimated to show the differing attitudes and values associated with a building's general characteristics and location.

Impact of the Results on NAIOP Members
With the aforementioned deliverable, NAIOP members will be better able to gauge a building's relative competitiveness and more accurately estimate fair market rents. Furthermore, this research could assist brokers in moving mixed-use related products more efficiently by minimizing losses that could be caused by inadequate pricing or unnecessary vacancies (the result of overpricing).

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age is discrete, and using it in its usual context may underutilize its explanatory value to the model. Furthering this example, one could use variables based off preselected cutoff points that represent different life stages (i.e., 0-10 years old, 11-20, 21-30, etc.), whereby each person is the member of only one age group and no age group has less than one member. Employing this method could better utilize the explanatory value of age when estimating a person's income than using just age alone.

Introduction

The idea of a mixed-use development is not a new concept at all, just one from the past that has been recycled and improved upon. Many factors have converged to spur the revitalization of this development theory over the past decade. The factor now providing the most incentive for these developments is the spike in energy prices that has occurred over the past several years. The more recent *super* spike in energy has provided an economic incentive for people to change their lifestyles and habits to accommodate our future environment. Unfortunately, it takes a situation like this to open people's eyes to changes that need to be made, especially when it affects their bottom line. Although the rush into mixed-use had already begun, the escalation in energy prices is the catalyst that is going to move this design style onto the big stage, supporting sustainable development. This monumental shift in the thoughts and minds of individuals is going to create a strong underpinning favoring this type of design theory. People are naturally going to begin reversing the trend of urban sprawl, as it is not going to be possible to maintain the lifestyle they had become accustomed to and enjoyed so much over the past few decades in the face of rising transportation costs.

As a result, the idea of being able to work, live and play within a relatively close proximity is going to be the preferred way of life. We know people will move into these types of facilities to reduce commuting costs and save time, but the real question is how large a premium individuals and employers are willing to pay for this convenience.

In this paper, we are going to test to quantitatively determine if a price premium is paid for office space in mixed-use developments. For the purposes of our study, we will quantify this by using the difference in asking rates for office properties associated with such developments to try to determine the amount of the premium, if one exists, associated with mixed- versus single-use developments. Our study focuses on eight cities in different regions of the U.S: Charlotte, Dallas, Indianapolis, Minneapolis, Nashville, Phoenix, Philadelphia and Seattle. We focused on cities that have been more stable through the housing bubble's collapse and credit crunch for the most accurate representation of the market possible.

Economy

Economic conditions now are considerably more adverse than even a year ago. Ongoing struggles in the credit market have created an environment in which lending is tight and leverage has been reduced dramatically, making it more difficult for real estate investors to obtain the returns to which they had grown accustomed. The de-leveraging in the real estate market causes lower capitalization rates, lower loan-to-value ratios, lower gross rent and income multipliers, in addition to increased operating-expense ratios, preventing many new projects from making it off the drawing board. This creates a more difficult real estate investment environment, as developments cannot provide the proper return based on their prospective risk, leading investors to shy away from riskier and more costly ventures as a result.

This situation presents a double-edged sword for mixed-use. On one hand, the growth of new mixed-use developments will slow. Since it is a more costly method of developing, mixed-use will see the biggest funding cuts, and lending standards will become even stricter. On the other hand, this development style provides diversification of real estate assets, creating a buffer for investors, and, if designed properly, can provide lower long-term costs and higher revenues. The relative strength of the current office market, compared with major weakness in housing and retail, provides an example of how a diversified base of assets working together with multiple cash flows is better than standalone assets. This presents an opportunity to think long-term and outside the box in preparing proposals for such developments instead of focusing only on the short-term mayhem reported in the daily news. In such distressed markets, the greatest opportunities arise.

City Demographics

The following table displays a general view of demographics for cities represented in the study as a backdrop for better understanding these cities and the underlying trends inherent in their geographic location at the time of our data collection.

MSA (as of October '08)	Charlotte	Dallas	Indianapolis	Minneapolis	Nashville	Phoenix	Philadelphia	Seattle
Growth Rate**	11.2%	3.7%	0.50%	-2.6%	1.2%	14.5%	-4.6%	3.4%
Unemployment Rate*	7.20%	5.50%	5.20%	5.80%	5.50%	5.40%	7.30%	3.90%
Labor Force*	029	3,176,635	912,383	219,131	321,397	858,692	631,330	370,466
Employment*	799,916	3,003,206	864,710	206,469	303,701	812,267	584,933	356,071
Unemployment*	62,113	173,429	47,673	12,662	17,696	46,425	46,397	14,395

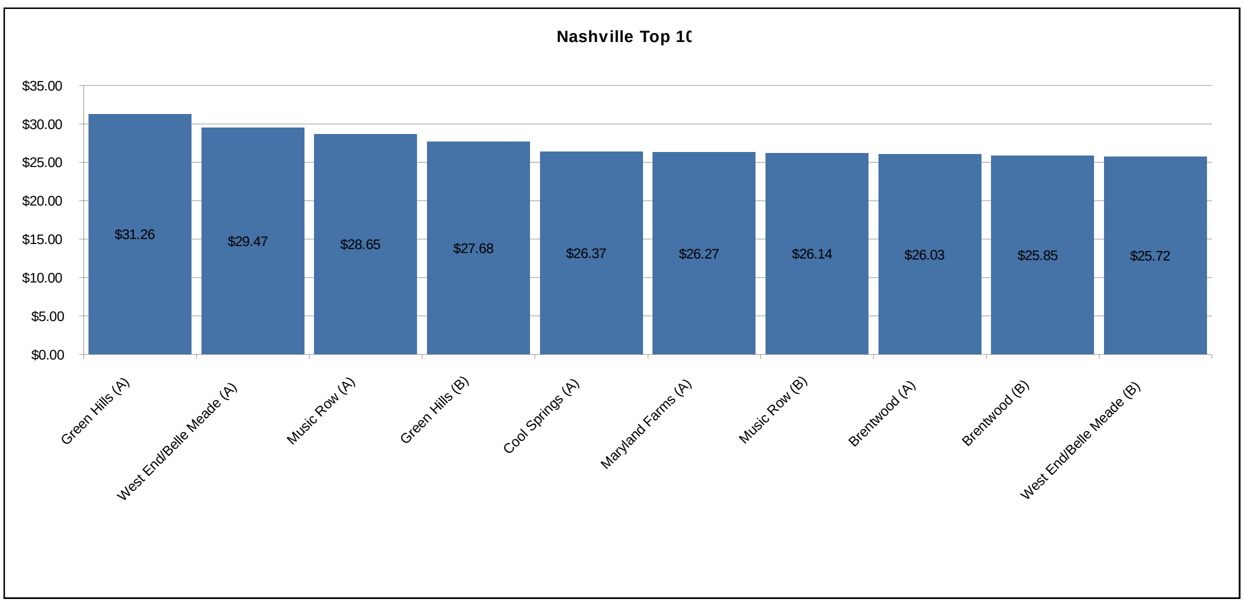
http://data.bls.gov/
* Not Seasonally Adjusted
** April 1, 2000-July 1, 2006, http://quickfacts.census.gov/

Cities

Nashville

Nashville has sustained major growth during the past several years with a big push toward sustainable and mixed-use developments. This city has strong economic underpinnings with a diverse economy supporting many different industries. Traditionally a distribution hub, it has become a major home to the healthcare and auto manufacturing industries. There is no effective means of public transportation except the bus system, so the metropolitan area is segmented into distinct suburbs surrounding the central business district. Given this pattern, mixed-use developments have been located predominantly in the suburbs. The lack of public transportation on a large scale coincides with the distribution of these developments. Several examples of mixed-use developments have been implemented throughout the years, and many more are in the pipeline. Most projects in the central business district have been mixed-use and refurbished industrial buildings characterized by denser development, such as Cummins Station, with campus-style developments reserved for the suburbs. Several new projects either under construction or recently completed fully demonstrate the mixed-use strategy is taking hold in this city. Two examples are Icon and Terrazzo, multi-use integrated structures at the heart of the revitalization efforts in the Gulch area.

Nashville Submarket/Price Premium Graph

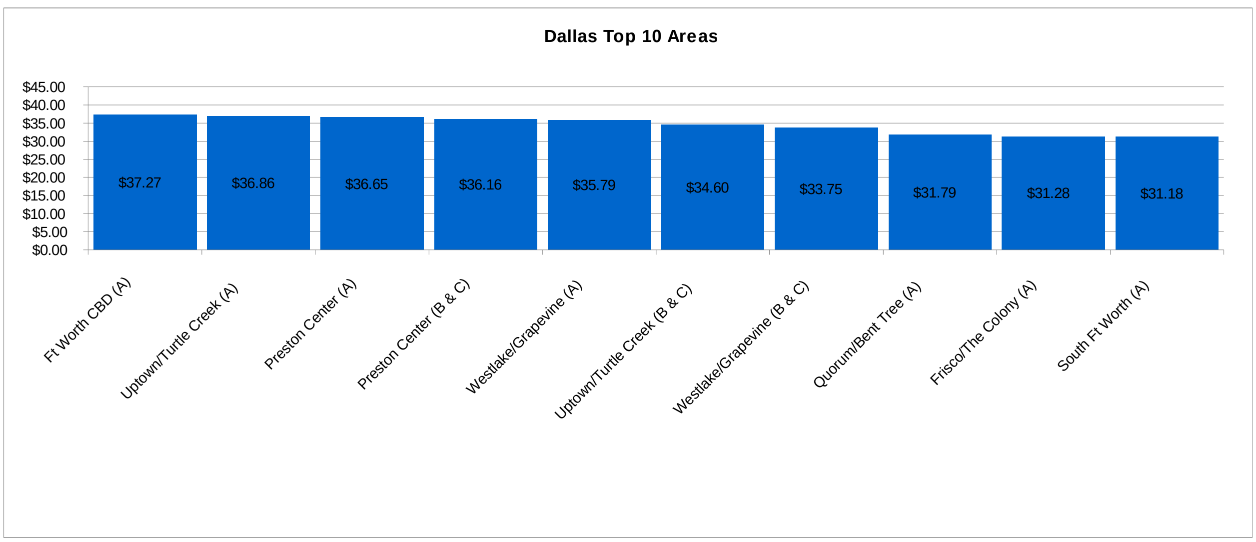


For the Nashville Top 10, the 10 locations with the highest computed rental rates are depicted. For the Nashville Top 10, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, Built or Renovated After 1965 (negative value), Built or Renovated After 1993, Built or Renovated After 2004, RBA Above 50,000 SF, RBA Above 125,000 SF, and RBA Above 300,000 SF. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $1.79. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Dallas

This massive metropolitan area consists of two large cities (Dallas and Ft. Worth) separated by just a short drive down I-30. Its highly educated population is fed by a large number of postsecondary institutions in close proximity that support the technology, financial and business services industries in the area (1). In the 1980s, Dallas made a big push to promote public transportation to effectively ease the traffic problems inherent in such a large metropolitan area, resulting in the expanded DART (Dallas Area Rapid Transit) system. Dallas is ahead of many other cities in this respect. The DART system provides the city with many opportunities to develop transit-oriented mixed-use communities that tie into the infrastructure already in place. A prime example is the Brick Row development, which incorporates an adjoining DART station, creating an integrated complex. Mixed-use has gained strong support in this area with massive developments such as Craig's Ranch, a 2,500-acre master-planned community under construction in McKinney, Texas. This is one of the largest mixed developments under construction in the United States (2), anchored by a remarkable TPC (Tournament Players Club) golf course – following the old adage that everything is bigger in Texas.

Dallas Submarket/Price Premium Graph

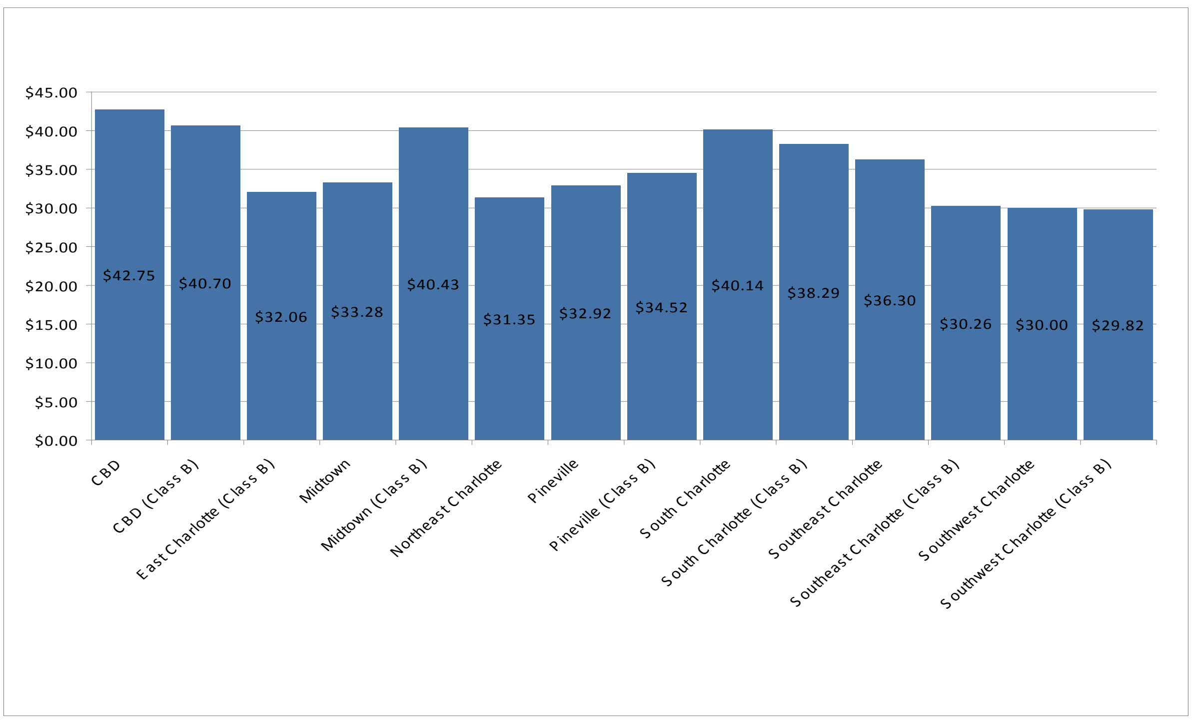


For the Dallas Top 10, the 10 locations with the highest computed rental rates are depicted. Statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, Lease Type Triple Net (negative value), Renovated (negative value), Built or Renovated After 1975, Built or Renovated After 1994, Built or Renovated After 2003, Rentable Building Area Above 75,000 SF, Bank Branch On-Site, Concierge Service, Conference Center, Adjacency to a Mall and Street Level Retail. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $1.99. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Charlotte

This has been a high-growth area during the past decade due to the major influx of businesses relocating to take advantage of the business-friendly atmosphere. The area's two major industries, banking and distribution, have spurred much of the growth. Charlotte houses eight headquarters of large Fortune 500 companies, one of the highest such concentrations in the country. With its heavy reliance on the banking industry, Charlotte's economy should experience a dramatic impact from the massive problems in that sector, but the area's strong economic base should enable it to adapt quickly. The well-educated population that accompanies the many exclusive universities located in surrounding areas supports this economy. Accompanying the large population increases is a strong desire to develop higher-density mixed-use in surrounding suburbs as destination developments. Charlotte has also recently finished the new, highly successful Lynx light rail system, which will make transportation-oriented developments a very viable option going forward (3). Charlotte has many new projects underway, with many near completion. The transportation-oriented Rhyne Station currently under development will become a highlight of the Lynx system in the near future. Wachovia First Street Cultural Campus will be a premier destination, incorporating retail/office/residential into a beautiful complex consisting of many venues and museums. This amazing example of mixed-use is scheduled for completion in 2010. With the support of the local economy and dedication to the mixed-use philosophy, Charlotte will be one of the premier mixed-use cities in the immediate future, providing for a very productive business and personal environment.

Charlotte Submarket/Price Premium Graph

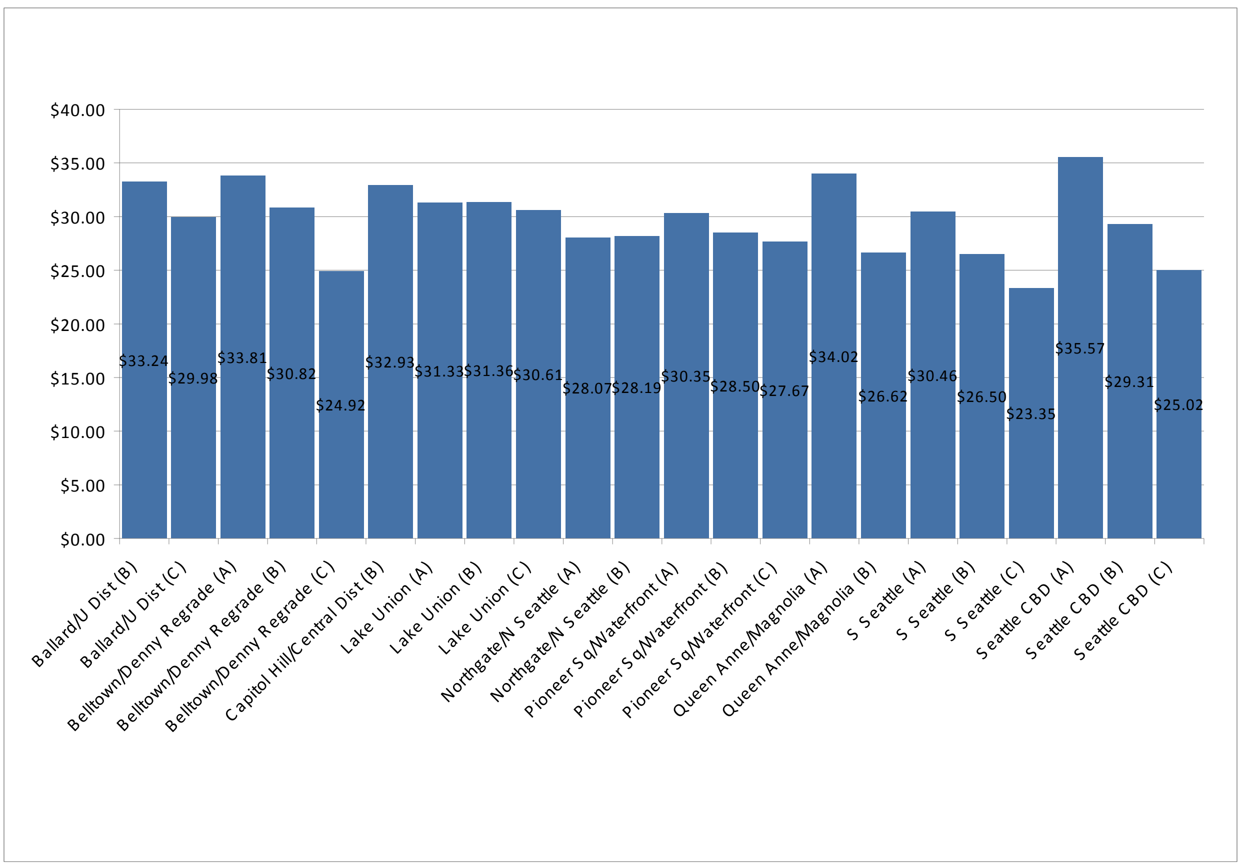


For the Charlotte Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Base Rent, RBA Above 100,000 SF (a negative value), Built or Renovated After 1976, Built or Renovated After 1985, Built or Renovated After 2004, Renovated, LEED and At Least 2 Floors. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $1.82. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Seattle

Seattle is very much in tune with the green and sustainability movements, with its dedication to adhere to the 2030 Challenge and become carbon neutral in many of the city's developments (4). Its economy is diverse across industries with technology, transportation and aerospace industries accounting for the largest portion of business in the city. Seattle is welcoming the arrival of its new light rail system, set for mid-2009, which will connect many different areas of the city to the central business district, complementing the existing monorail system (5). High property values, limited space and traffic congestion create demand for destination developments such as Pike Place Market, which with its utilization of dense development and unique architectural design is representative of the successful mixed-use style this area has enjoyed. An excellent development to be completed in early 2009 is the 2201 Westlake property, consisting of two towers and anchoring the revitalization efforts of the South Lake Union district. Seattle's close proximity to the ocean and mountains creates a picturesque topography and an amazing opportunity to incorporate these natural features into unique mixed-use developments.

Seattle Submarket/Price Premium Graph

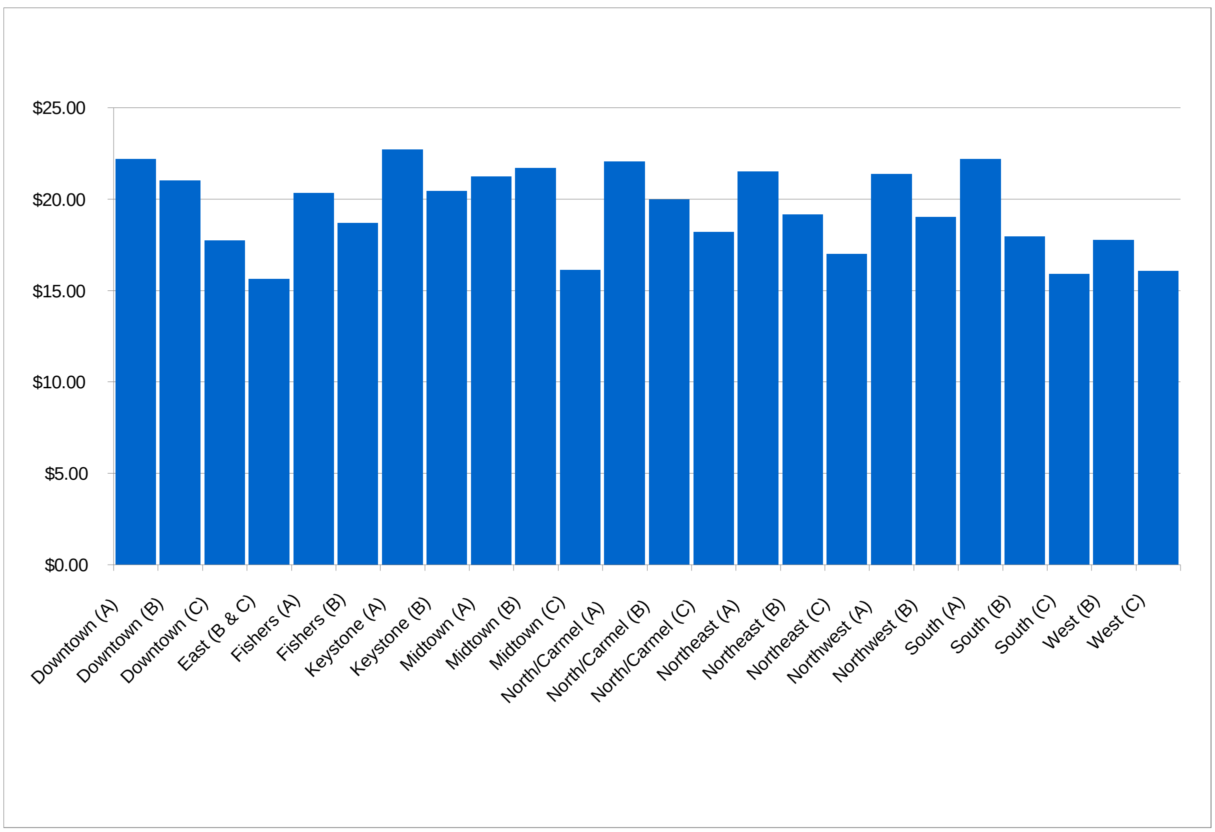


For the Seattle Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Base Rent, Built or Renovated After 1995 (negative value), Built or Renovated After 2003, RBA Above 50,000 SF, At Least 16 Floors, and Lease Type: Full Service Gross. The Mixed-Use premium (Member of a Mixed-Use Development, a negative value) for this submarket was computed as a standard factor of negative $1.93. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Indianapolis

Indianapolis has a strong economic background in manufacturing and industry. During the past 20 years, it has also developed a broader economic base, especially when it comes to research, tourism, insurance and distribution. This area has achieved great success in creating destination sites near its popular sporting events and venues, not to mention the brand-new football stadium – a masterpiece of architectural engineering. The city realized a renaissance in its diversification of industries and integration of old structures with modern developments of contemporary design. Indianapolis is one of the few cities in this study not only promoting mixed-use developments with office space, but also beginning to integrate industrial structures into the design as well, creating a strong mix of uses and providing citizens the opportunity to centralize communities. The local government has been successful in attracting several such projects to be completed in the near future and proposals for many more. The city welcomes future developments that can attract business to the area and further the diversification of its economy. A prime example, taking it a step further than many other mixed-use designs, is Ameriplex-Indianapolis. This project integrates industrial/office, residential and retail structures in one development, earning certification as "Indiana's first wildlife-friendly development" by the Indiana Wildlife Federation (6). Indianapolis has many new projects in the pipeline that incorporate mixed-use design theory, not just creating communities but destinations such as the River Place and Anson developments currently under construction.

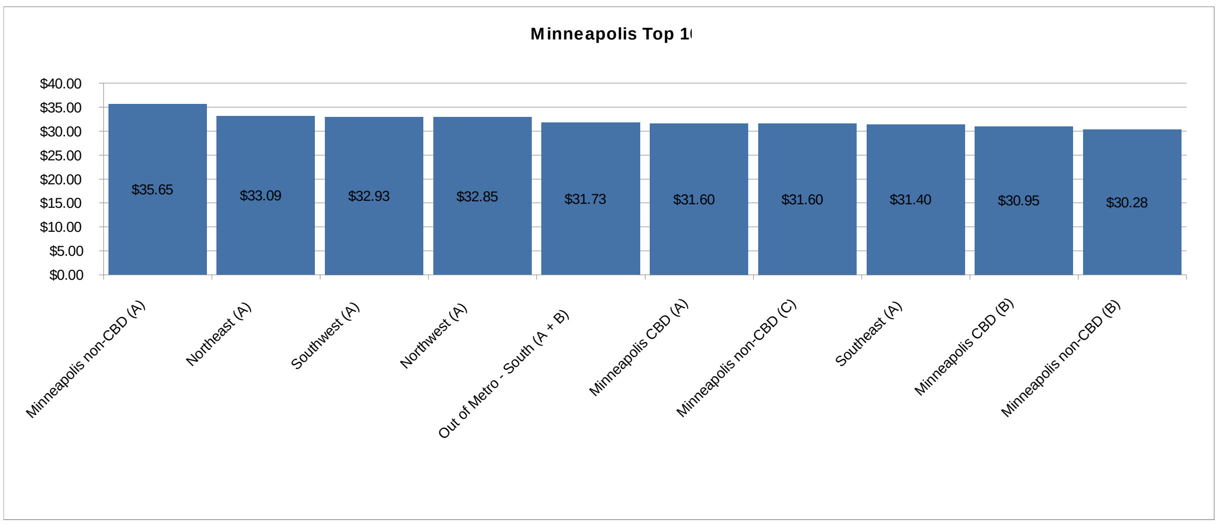
Indianapolis Submarket/Price Premium Graph



For the Indianapolis Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, At Least One Floor Available, Renovated, Built or Renovated After 1990, Built or Renovated After 2005, and RBA Above 150,000 SF. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $ .69. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Minneapolis
Minneapolis and its neighboring city St. Paul form what is commonly known as the Twin Cities, which have been very proactive in their efforts to provide incentives for mixed-use. A combination of public and private support makes the Twin Cities an attractive environment for such developments. Minneapolis and Philadelphia are the only cities in our study to have received the Empowerment Zone (EZ) designation (http://www.hud.gov/news/releasedocs/rcinitiative.cfm). HUD (U.S. Department of Housing and Urban Development) designates such zones to promote the creation of sustainable communities and focus on "the elimination of barriers to economic empowerment and wealth creation for EZ residents and businesses, including safety and educational barriers" (http://www.ci.minneapolis.mn.us/ez/). Mixed-use developments are a perfect fit for the zones, which encourage high-density, sustainable communities for all income classes. Minneapolis has a solid public transit infrastructure, highlighted by its Hiawatha Light Rail line, connecting many popular areas in and around the city and providing an efficient means of transportation across the area (7). Minneapolis has had success in the past with mixed-use developments such as Centennial Lakes. With the knowledge it has gained from such projects and the familiarity between private investors and government, it is likely many new mixed-use developments will arise in the near future.

Minneapolis Submarket/Price Premium Graph

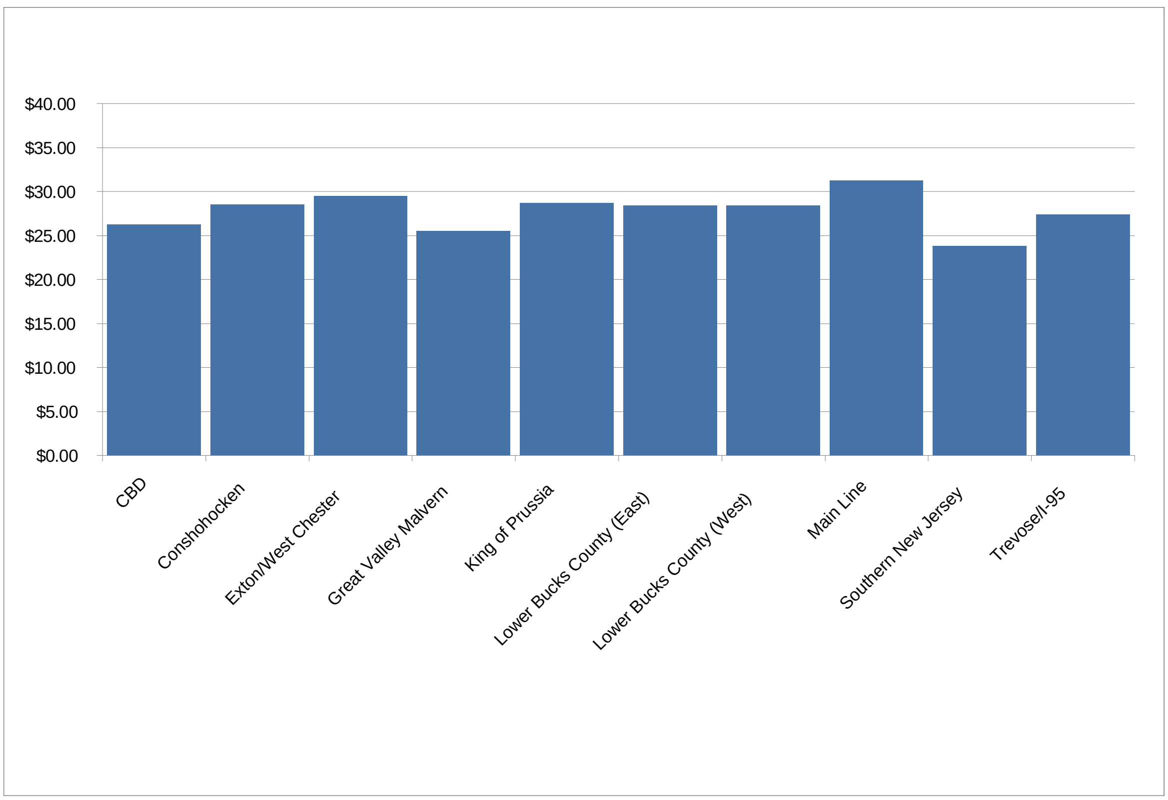


For the Minneapolis Top 10, the 10 locations with the highest computed rental rates are depicted. For the Minneapolis Top 10, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-use Factors. The Non-Mixed-use Factors include Base Rent, Built or Renovated After 1992, Built or Renovated After 2004, RBA Above 200,000 SF, RBA Above 700,000 SF, and Lease Type Full Service Gross. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $2.39. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Philadelphia

Philadelphia is rich in history, not to mention industry. Historically, the city once was a distribution and manufacturing hub for the Northeast, but today it supports a diverse economic base with a focus on technology, insurance, telecommunications and medical supply industries. Philadelphia has succeeded in its approach to promoting business through the Keystone Opportunity zones spread throughout the city, exempting businesses therein from state and local taxes until 2013 (8). These zones provide substantial additional economic incentives that provide an excellent opportunity for subsidizing many costs in developing communities and providing quicker return on investments. Philadelphia has an excellent transit system, run by the Southeastern Pennsylvania Transportation Agency (9). SEPTA is proactive in moving toward more efficient systems with the introduction of hybrid buses and its new Comet trains. Pennsylvania has also been proactive in promoting transit-oriented development by establishing the Transit Oriented Investment Districts (TRID) Act, funded by the Pennsylvania Department of Community and Economic Development (DCED), which provides economic incentives and funding for such projects. Philadelphia has received funding from this legislation for two developments located near the 46th Street and Temple University stations. The public transportation, opportunity zones and government support provide a strong backbone for the success of mixed-use and willingness to adopt such projects and apply a strategy for smarter, sustainable growth.

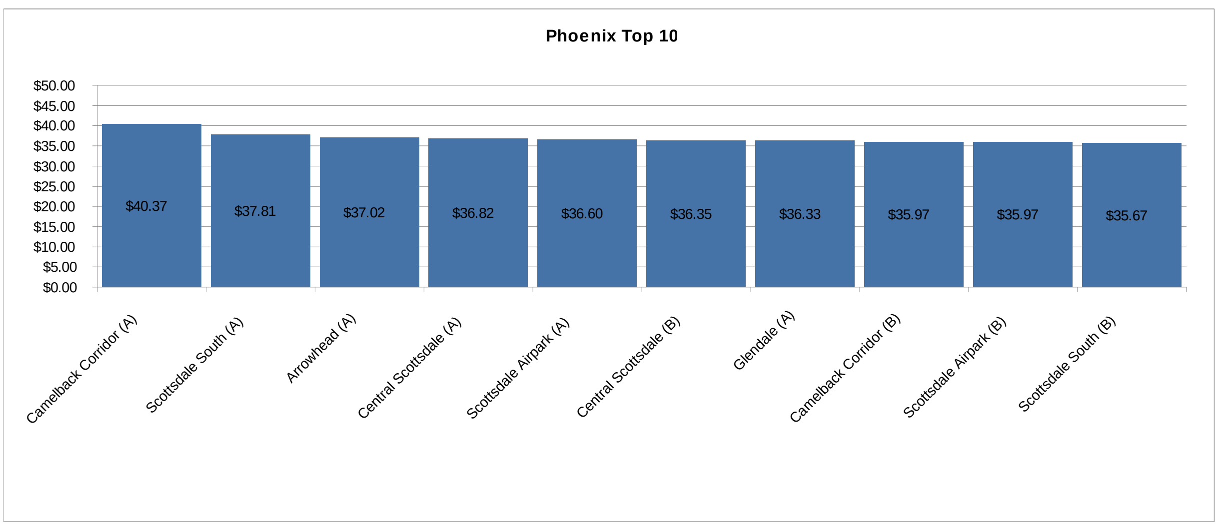
Philadelphia Submarket/Price Premium Graph



For the Philadelphia Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Base Rent, Renovated (negative value), Lease Type: Plus Utilities (negative value), Not Class A Building (negative value), Built or Renovated After 1975, Built or Renovated After 2003, RBA Above 200,000 SF, At Least 3 Floors and TWP Zoning. The Mixed-Use premium (Member of a Mixed-Use Development, a negative value) for this submarket was computed as a standard factor of negative $1.96. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Phoenix
Phoenix is known for its beautiful weather and picturesque landscapes. Tourism is its biggest industry, followed closely by manufacturing. With the incredible population growth Phoenix has sustained during the past decade, it has developed solid technology and business services industries, strengthening its economic diversity. Phoenix opened its new light rail in December 2008, connecting several cities in the surrounding area by an efficient and easy means of transportation (10). This should enable the beginning of transit-oriented mixed-use developments along these lines in the next few years as the rail system becomes established. Phoenix has embraced mixed-use and projects that support sustainable and green communities. An excellent example is CityNorth, currently under development in the Sonora Desert on the outskirts of Phoenix, with some stages opening at the end of 2008. This development will provide an eclectic mix suited to accommodate the 300 days of sunshine Phoenix residents enjoy, enabling active lifestyles in this area throughout the year and paving the way for more resort-style mixed-use projects with all the amenities of home. Surrounded by natural beauty, the city has some restrictions to development that must be addressed in planning and implementing development concerning water usage and large temperature swings not inherent in other markets. Phoenix has worked around these issues and created many mixed-use developments that really incorporate conservation strategies required due to the arid climate and scarcity of natural resources with respect to the population. This has fast-tracked many design theories related to smart growth and mixed-use here, making Phoenix a leader in sustainable development.

Phoenix Submarket/Price Premium Graph



For the Phoenix Top 10, the 10 locations with the highest computed rental rates are depicted. For the Phoenix Top 10, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, Least Type: Triple Net (negative value), Renovated (negative value), Built or Renovated After 1978, Built or Renovated After 1996, Built or Renovated After 2006, RBA Above 175,000 SF, RBA Above 450,000 SF, At Least 8 Floors and Medical (SPC). The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $ .02. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Economic Drivers of Mixed-Use Developments

Credits and Subsidies
A major part of financing for mixed-use comes from subsidies created by state and local governments to assist and promote in the development of such communities. On the federal level, several types of credits are offered. The New Markets Tax Credit offered by the U.S. Treasury has been one of the most popular with developers across the nation, especially for mixed-use. Relatively new in the industry, it allows developers to obtain assistance by investing in Community Development Entities (CDEs). The incentive is to promote development of lower-income housing by offering future tax credits to investors. HUD also offers several types of grants, which have been the most popular means for investors and developers to subsidize a portion of their projects. Problems associated with their use are the mandate that the development include space for lower-income housing as well as other restrictions on the amount and types of space. This can result in higher development costs associated with adjusting designs to fit the criteria that may nullify any gains from the credit.

Another issue with subsidies is that the majority are focused on housing and not the retail and commercial aspects of the development. Local, state and city governments can play a big part in the promotion of such developments through tax incentives, special zoning districts and funding assistance. They can offer incentives that will fill the gaps in federal funding and be more effective since they understand the local environment and can provide insight into their market. They can also promote retail and commercial aspects to complement the housing assistance offered on the federal level. This is apparent in the attitude certain cities have taken toward such development. For example, St. Paul's Sales Tax Revitalization Program (STAR) allows for assistance in "capital projects to further residential, cultural, commercial and economic developments" (11) funded through the proceeds generated from sales tax.

Private funding networks and nonprofits also provide loans and grants for certain types of developments that achieve specific goals set forth by their respective organizations. A prime example is the Funder's Network for Smart Growth and Livable Communities, which provides grants to developers who build sustainable/green communities. The many options for grants and special loans available in the development of mixed-use provide good coverage of development costs associated with such communities, which tend to be higher than for single-use projects. In creating and building our model, it was difficult to obtain an accurate set of data on a scale as large as this paper encompasses to interpret the impact these grants and loans ultimately have on such developments without undergoing major research specifically on this individual topic.

Financing
The financing of mixed-use projects has traditionally been a complicated combination of types of financing for the different aspects of development, making it difficult to obtain proper funding. This can be a result of several factors that affect a development's income stream. Many lenders are wary of lending to developments with too much of their income stream weighted in commercial and retail areas versus residential, since they feel comfortable with one or the other. This provides a hurdle in project development, making it time consuming and expensive to obtain financing, although many new boutique firms now assist in the process.

Another means of financing mixed-use developments has been the use of tax increment financing (TIF) bonds. These debt instruments assist in the financing of up-front development costs by using future taxes paid by the development to fund parts of the project, helping to create infrastructure and improvements. This is a great tool municipalities can use to assist private developers in financing mixed-use without providing subsidies. Because it is based on future taxes, it is hard to value the ultimate cost relative to the up-front gain; this can only be confirmed years down the road.

Property Management

One of the biggest headaches mixed-use development managers encounter is overseeing all aspects of a development including the intricacies involved in managing retail versus commercial and residential space. Incorporating such different styles of management without incurring higher costs is a challenge. Problems arise from different leasing terms and standards associated with commercial and residential spaces. Residential developments tend to have shorter-term leases than the commercial sector. It is difficult for property managers to effectively manage the property and fill space while negotiating such different arrangements. Problems also arise regarding allocation of expenses for shared services such as trash and maintenance. This is why property management is essential to the success of mixed-use development.

Property Mix

Property mix, one of the major decisions in the development of a mixed-use project, begins with the focus and intended rollout. Many mixed-use developments begin with the retail portion as stage one. This allows for an income stream that will help to finance additional phases of the development. Certain guidelines must be met in order to obtain various grants and assistance. Funding programs can dictate the amount of space that can be used for specific purposes (i.e., commercial) and establish limits on size in the development or restrictions on the percentage of revenue obtained from each aspect. The mix varies from site to site, and it is hard to quantify how a tenant mix impacts the success of these developments unless a single source of assistance covers all aspects. Tracking the different incentives developers receive is difficult.

Tenant Mix

Tenant mix is an important aspect of mixed-use communities in providing services and easing logistical issues. A tenant must be able to access essential services without having to go off-site. Tenant mix can be difficult to maintain since the commercial aspect of a development experiences a higher turnover rate than the residential part. The matching of services is important: developers must focus on trying to fulfill the needs of the market they are serving while obtaining a proper return for investors. This limits the types of businesses that will work in the flow of the community, making it harder to obtain tenants that fit.

Traffic/Parking

The traffic patterns resulting from mixed-use affect its success by inhibiting fluid movement throughout a development. It is important in the initial design to conduct traffic pattern studies and account for daily fluctuations and impact on existing traffic patterns. With so many different uses in one development, it is essential to maintain the flow of business and provide proper parking and access for residents and customers. Subterranean parking, inherently more expensive than other methods, has solved much of the problem in smaller developments but may be unnecessary in larger ones.

Transportation

There has been a big push toward developing near public transportation stations to provide a means of connecting developments to the public infrastructure. These projects have been termed transit-oriented developments (TODs), a subtype under the mixed-use umbrella. Many benefits can be realized from developing near transit hubs. This has been effective in cities that have put a major emphasis on public transportation, such as Dallas with its DART system. With this system in place, Dallas is beginning to develop in once unused and unwanted areas, creating high-density developments with easy access across the large metropolitan area. This could eliminate two or more hours of battling traffic per day, depending on the distance between work and home. The gain in productivity and ease of transportation should provide a major incentive to live in this environment, but such benefits are not easily quantifiable except in reduction of personal commuting costs.

Zoning

Zoning is one of the first considerations before any mixed-use project can get off the ground. Since mixed-use accommodates several different types of structures, the zoning has to be specific. Such developments normally require special zoning to incorporate the different uses. This can be a major hurdle in development if local government is not on-board with the project. Many cities have designated special economic zones or districts for mixed-use to encourage higher-density, sustainable developments in these specific areas. These districts expedite the process for these developments, as the zoning is already in place and developments do not have to go through the ordinance board to obtain zoning for a standalone project. This has been done on the federal level with the development of Empowerment Zones (EZ) offered through HUD in selected cities across the United States to encourage these developments in strategic areas.

Methodology

The data for this study were obtained through branches of the commercial real estate firm Colliers International, including Colliers Turley Martin Tucker and Colliers Pinkard. Colliers worked with the research directors/associates in eight cities to obtain the data requested by NAIOP. The requirements set forth for this paper specify buildings that house a minimum of 20,000 square feet of office space, encompassed in the structure of a mixed-use development, either integrated or free-standing, including retail, residential and office. The type of office structure represents either freestanding or integrated structures in moderate-size developments containing high-density residential development. The data obtained through Colliers were then geocoded through Yahoo to provide a more accurate depiction of relationships, rather than using zip codes as a proxy. The data was then designed and formatted in a manner that enabled Colliers to input the data into our econometric model.

The Model

The remainder of this paper contains the results of a hedonic price model, in which office rents were dissected into price premiums determined by quantifiable building characteristics. The selected methodology was expanded to include spatial econometric theory because site location will undoubtedly affect the rent for each office building. If the model is adequately specified and statistically significant, this will extract the implicit price premium associated with various building characteristics, including one that estimates value from incorporation into a mixed-use development. Should the price premium associated with office space in a mixed-use development prove positive and statistically significant, this will serve as proof beyond anecdotal evidence that office space in a mixed-use development derives higher rents than single-use office developments. To maintain a broad audience, this paper uses explanations that would be easily understood by commercial real estate professionals who do not use statistics on a day-to-day basis but have at least a limited background on the subject. For those interested in academic articles providing an exhaustive explanation of the statistics used, the appendix lists relevant articles that employ similar methodologies in estimating hedonic price models for office rents. These articles are recommended due to their well-organized explanations of statistical assumptions and estimation methodologies when analyzing commercial real estate data.

Hedonic Price Analysis

Under the assumption that market prices are affected by various qualitative and quantitative characteristics, a hedonic price analysis attempts to dissect observed market values into implicit price premiums. For example, if you buy a walnut-fudge sundae, how much of the cost is for the walnuts? That is easy when you can look up the price of the walnuts on a menu, but without itemized pricing you must find another method. Say you had receipts for every possible sundae combination; in this case, you would simply subtract the price of a fudge sundae from that of a walnut-fudge sundae, leaving you with the price paid for the walnut upgrade. Expanding on that idea, a hedonic price analysis relies on a sample of observed values from an array of potential combinations built from a finite number of characteristics. Although the characteristics of office spaces are numerous and sometimes statistically unobservable, there are still observable factors that can be easily quantified.

Spatial Econometrics

Since the first axiom of real estate is location, spatial econometric theory will play a key role in this analysis. As the name suggests, spatial econometrics is an extension of statistics in which analysis of economic-related variables incorporates locational data. By applying algorithms to spatial data, such as map coordinates and distances, one can estimate what effect, if any, physical location has on market prices. When applied in a hedonic price model, locational characteristics become observable price premiums. For this analysis, two types of spatial data were used in constructing two sets of spatial variables. Although the results from each variable set are interpreted differently, both proved vital in this analysis. Both sets will be explained in greater detail during explanation of the model specification process.

Data Set and Variable Methodology

To estimate a hedonic pricing model of office rents, we acquired data sets representing a broad sample of available office space, compiled by research contacts in each of the eight markets from various public and proprietary data sources deemed reliable but not guaranteed. Colliers believes the data are accurate, but a number of issues must be addressed. Since features of an office building do not change over time but rents and availability do, the data were limited to observations taken during the second and third quarter of 2008, most from the third quarter. These data sets were acquired and time accurate at the first running of the analyses. Under the assumption that asking rates on office space remain somewhat static from quarter to quarter, this limited time span should minimize the effect of cyclical transitions such as the current downturn. Second, the data are assumed to reflect a sample from each market, not the entire population. However tangible real estate may be, acquiring data on some office buildings was not possible. Listing information is sometimes outdated, unusable or unavailable, in which case those observations were excluded from the survey under the assumption that this would limit sample selection bias. However, the possibility of sample selection bias was not excluded in explanation of suspect results. The third and final data issue was missing information within individual observations. When information for office space in a building was available but one or more fields lacked a value, the missing value was filled with a null value, the observation was dropped, or the variable was not estimated in that particular market's model. For a breakdown of actions taken for each variable and data set, please see the appendix.

Model Specification

Since this hedonic price analysis is being performed on office rents, which are heavily influenced by location and functionality, the base model was composed of four variable groups: systemic, idiosyncratic, mixed-use and neighborhood effects. The first three groups comprised dummy variables based on a binary decision: whether the building met the variable's requirements. Consequently, the estimates from these variables can be used in an additive fashion to estimate the rent for a specific office space.[2] Of these groups, systemic variables

[2] The difference between actual and estimated rent using this method contains inflated variance because the fourth variable group's effect cannot be estimated as simply.

represent the market-segmenting effects of building class and submarket membership, idiosyncratic variables were created from a building's age and quantifiable design characteristics and mixed-use variables are used to extract the price premium associated with being part of a mixed-use development. In the fourth variable group, neighborhood effects, we attempted to remove the interactions between clustered buildings within a submarket. Combining all groups resulted in the following formula.

Formula 1.

$$R = S + I + M + \varepsilon(W)$$

Where

- R = Asking rate per square foot
- S = Systemic variable group
- I = Idiosyncratic variable group
- M = Mixed-use variable group
- $\varepsilon(W)$ = Residual value as a function of the spatial weights matrix W

Systemic Variables

Constituting the first group of spatial variables, systemic variables were created under the assumption that submarket and class segmented the market for office space. Although one could argue the existence of additional levels within this hierarchical structure, these additional layers can become arbitrary, so simplicity was embraced: no building could be a member of more than one submarket or class. Therefore, treating this group of variables as submarket/class specific intercept terms, the result was a level from which the other price premiums were either added or subtracted.

Idiosyncratic Variables

Idiosyncratic variables, or building-specific characteristics, were designed to uncover the market- segmenting effects of a building's size and functional obsolescence. By testing a range of age and size variables created from selected thresholds, the near-optimum breakpoints were found for each market. The resulting estimates represent price premiums applied when a building meets or exceeds one or more of these thresholds. One could argue that these estimates are not constant across each market because they could vary by submarket. However, limited observations eroded the significance of such models.

Mixed-Use Variables

The main point of this analysis was to determine if office space within a mixed-use development derives a higher rent than comparable space in a single-use development. Having already estimated the effect of most systemic and idiosyncratic effects on office rents, we constructed an additional binary variable that was true when a building met our definition of mixed-use to allow for extraction of this implicit price premium. In most cases, our definition included office space within projects advertised as mixed-use. Developments not advertised as mixed-use but exhibiting design and functionality similar to mixed-use developments were also included. Ultimately, if this variable is significant in the final model, the estimate will represent the price premium associated with office rents in a mixed-use development. Should this estimate be positive and significant, this will serve as statistical evidence that office spaces in mixed-use developments demand a higher rent per square foot than comparable products.

Neighborhood Effects

Besides submarkets, such as those used in the systemic variables, another level of spatial interaction takes the form of neighborhood effects. This second group of spatial variables estimated the effect office spaces have on each other when clustered within a submarket. Since these clusters may, for one reason or another, have a common premium not shared by other buildings within that submarket/class, estimating this effect would help alleviate some omitted variable bias. However, defining these clusters imposes a level of difficulty in that there are a number of ways office spaces may cluster. In some cases, these clusters may be isolated groupings within a submarket, while others may be part of a master-planned development containing multiple buildings. But these clusters were not always easily discerned from adjacent buildings. Various methods for defining these clusters were tested. Use of a distance formula allowed reasonable grouping of buildings with similar statistically unobservable characteristics. Therefore, under the assumption that buildings within a certain distance of each other formed a basic cluster within a submarket, a spatial weights matrix was created. Keeping the explanation simple, a spatial-weights matrix is a statistical tool used to estimate the effect of neighboring observations on each other. When two buildings were within a certain distance of each other, they were considered neighbors; thus, they shared a common, unobserved price premium. Using maximum likelihood estimation, attributed to Luke Anselin, a spatial-errors model was employed. If the estimate was positive and significant,[3] neighboring buildings had a positive correlation between residual values (the remainder left over after all other estimates have been extracted from rent). Consequently, this effect can be positive or negative.

[3] Statistical tests were used to detect spatial effects caused by geographic distance and submarket membership in each market's data. See appendix for results.

Conclusion

Analysis Results Presentation
Viable results were extracted from seven of the eight markets analyzed. For these markets, the models exhibited varying degrees of statistical significance with viable explanations for variance in the data. Age, size, submarket, class and a host of other determinants were significant in each market. However, variables for extracting the mixed-use price premium yielded mixed results. Of the four markets in which mixed-use variables were significant, Charlotte, Dallas and Nashville proved positive and Philadelphia negative. The remaining four markets produced an insignificant estimate of the mixed-use price premium, often due to a lack of observations containing mixed-use features.

Nashville—Mixed-Use Price Premium: Positive and Significant
Leading off with the strongest results in terms of significance and inferences, Nashville produced a significant, positive mixed-use price premium. The segmenting effects of size were determined to be at rentable building areas of 50,000/125,000/300,000 square feet, with the premium demanded increasing at each increment. All buildings built after 1965 had a negative price premium that wasn't offset unless the building was constructed after 1993, which suggests buildings constructed during the range of 1966 to 1992 were not as desirable as ones built before or after. In all submarkets but one, the premium for Class A space was above that of Class B, which was above that of Class C. The lone standout, the area along Hillsboro Road, yielded limited observations, suggesting sample bias or unobserved heterogeneity. The spatial errors model was only slightly stronger than an OLS regression (Ordinary Least Squares, i.e., simple statistical analysis) with the coefficient of autocorrelation within the residual of buildings within a quarter-mile at 0.117 (implying weak, positive correlation). The premium for mixed-use office space was $1.79 per square foot with significance at the 95 percent level of confidence. From these results, one could estimate that office space in a mixed-use development demands a premium of 5-10 percent above comparable office space in a single-use project. Furthermore, the model proved accurate within a range of 2 percent in predicting the rent of out-of-sample, mixed-use office space; in-sample, mixed-use office rents were also predicted within a range of 2 percent of the actual asking rate. From these results, one concludes that office space within a mixed-use development in Nashville commands a higher rent per square foot than comparable space in a single-use project.

Dallas—Mixed-Use Price Premium: Positive and Significant
The model for Dallas also proved significant with a range of significant inferences. The segmenting effects of size were determined to be at rentable building areas of 75,000 square feet or above, with larger spaces commanding a higher rent. Buildings built after 1975/1994/2003 commanded higher rents than those built before the respective cut-off. If a building had been renovated, the year of construction was adjusted to the year of renovation; however, these renovated buildings faced a negative premium of $2.71 per square foot. Office spaces associated with a triple-net lease demanded $3.58 less per square foot than other lease types (predominantly full service or modified gross). In all submarkets, the premium for Class A space was above that of Class B, which was above that of Class C. Given the wide range of feature information available, buildings with a bank branch, concierge service, conference center, close proximity to a regional mall, or street-level retail all commanded higher rents than

comparable office space lacking the feature. The spatial errors model was only slightly stronger than an OLS regression with the coefficient of autocorrelation within the residual of buildings within three quarters of a mile at 0.198 (implying semi-weak, positive correlation). Having accounted for all other variables, the premium for mixed-use office space was $1.99 per square foot with significance at the 98.8 percent level of confidence. In-sample/out-of-sample predictions were not as strong as for Nashville due to outliers that caused predicted rents to be over or under estimated by 10 to 50 percent. From these results, one could reasonably conclude there is a positive price premium associated with mixed-use development; however, an improved model may more accurately estimate this premium.

Charlotte—Mixed-Use Price Premium: Positive and Significant

Although limited in observations compared to Dallas and Nashville, this model also proved significant with a range of significant inferences. The segmenting effects of size were identified at rentable building areas at or above 100,000 square feet or buildings with two or more floors, with taller spaces commanding a higher rent but larger spaces facing a smaller, negative premium. Buildings built after 1976/1985/2004 commanded higher rents than those built before the respective cut-off. If a building had been renovated, the year of construction was adjusted to the year of renovation. It is noteworthy that these renovated buildings gained a positive premium of $2.92 per square foot. The premium difference between Class A and B space was irregular compared to other markets, suggesting the classifications were determined differently in this market. Space with any LEED certification level commanded an additional $5.13 per square foot. The spatial errors model was only stronger than an OLS regression with the coefficient of autocorrelation within the residual of buildings within a quarter of a mile at -0.273 (implying semi-strong, negative correlation). Having accounted for all other variables, the premium for mixed-use office space was $1.82 per square foot with significance at the 90.3 percent level of confidence. In-sample/out-of-sample predictions were not as strong as for Nashville due to outliers that caused predicted rents to be over or under estimated by 10 to 50 percent. From these results, one could reasonably conclude that a positive price premium is associated with mixed-use development; however, an improved model may more accurately estimate this premium.

Philadelphia—Mixed-Use Price Premium: Negative and Significant

In the last of the four markets with a significant mixed-use price premium, Philadelphia yielded limited observations, allowing the possibility that this variable was biased by sample selection. Consequently, these results were not as strong as for Nashville, Dallas, or Charlotte. The segmenting effects of size were determined to be at rentable building areas at or above 200,000 square feet or buildings with three or more floors, with larger/taller spaces commanding a higher rent. Buildings built after 1975/2003 commanded higher rents than those built before the respective cut-off. If a building had been renovated, the year of construction was adjusted to the year of renovation; however, these renovated buildings faced a negative premium of $1.01 per square foot. The negative and significant price premium associated with buildings that are not Class A implies that Class A space demands a higher rent than both classes B and C. If a building was in a zone classified as TWP, the rents were estimated to be $2.63 higher per square foot. The spatial error model was more significant than the OLS regression with the coefficient of autocorrelation within the residual of buildings within three-tenths of a mile at -0.358 (implying semi-strong, negative correlation). As already mentioned, the results from this market are suspect due to limited observations, raising concerns of sample-selection bias. Therefore, for this market, one cannot conclude that office space in a mixed-use development commands lower rents than comparable office space, despite contradicting, statistically significant results.

Phoenix—Mixed-Use Price Premium: Positive and Not Significant
In Phoenix, the model proved significant with various inferences but not for membership in a mixed-use development. The segmenting effects of size were determined to be at rentable building areas at or above 175,000/450,000 square feet or buildings with eight or more floors, with larger/taller spaces commanding a higher rent. Buildings built after 1978/1996/2006 commanded higher rents than those built before the respective cut-off. If a building had been renovated, the year of construction was adjusted to the year of renovation; however, these renovated buildings faced a negative premium of $2.24 per square foot. Office spaces associated with a triple-net lease demanded $4.36 less per square foot than other lease types (predominantly full service or modified gross). If a building contained medical office space, it commanded $2.76 more per square foot. In all submarkets, the premium for Class A space was above that of Class B, which was above that of Class C. The spatial errors model was only slightly stronger than an OLS regression with the coefficient of autocorrelation within the residual of buildings within 35 one-hundredths of a mile at -0.032 (implying very weak correlation). As mentioned, the premium associated with membership in a mixed-use development was highly insignificant despite an acceptable range of observations. Therefore, for this market, one concludes that office space in a mixed-use development does not command a rent significantly different from comparable office space in a single-use development.

Indianapolis—Mixed-Use Price Premium: Positive and Not Significant
Similar to Phoenix, the Indianapolis model proved significant with various inferences but not for membership in a mixed-use development. The segmenting effects of size were determined to be at rentable building areas of 150,000 square feet or more, with larger spaces commanding a higher rent. Buildings built after 1990/2005 commanded higher rents than those built before the respective cut-off. If a building had been renovated, the year of construction was adjusted to the year of renovation; however, these renovated buildings faced a negative premium of $1.03 per square foot. If there was at least one floor available, the building also commanded rent of $0.68 less per square foot than comparable office space. In all but one submarket, the premium for Class A space was above that of Class B, which was above that of Class C; the one exception was midtown, where Class A and B space had similar rents with B higher than A. The spatial errors model was only slightly stronger than an OLS regression with the coefficient of autocorrelation within the residual of buildings within a half-mile at 0.359 (implying semi-strong, positive correlation). Although the premium for office space in a mixed-use development was not significant, it was slightly positive. However, for this market, one concludes that office space in a mixed-use development does not command a rent significantly different from comparable office space in a single-use development.

Minneapolis—Mixed-Use Price Premium: Positive and Not Significant
The model for Minneapolis proved significant with various inferences but not for membership in a mixed-use development. The segmenting effects of size were determined to be at rentable building areas at or above 200,000/700,000 square feet, with larger spaces commanding a higher rent. Buildings built after 1992/2004 commanded higher rents than those built before the

respective cut-off. Office spaces associated with a full service gross lease demanded $4.82 more per square foot than other lease types (predominantly triple net). In all submarkets, the premium for Class A space was above that of Class B, which was above that of Class C. The spatial errors model was only slightly stronger than an OLS regression with the coefficient of autocorrelation within the residual of buildings within a quarter-mile at 0.140 (implying weak, positive correlation). Although the premium for office space in a mixed-use development was not significant, it was strongly positive. However, for this market, one concludes that office space in a mixed-use development does not command a rent significantly different from comparable office space in a single-use development.

Seattle—Mixed-Use Price Premium: Negative and Not Significant

The model for Seattle proved significant with various inferences but not for membership in a mixed-use development. The segmenting effects of size were determined to be at rentable building areas at or above 50,000 square feet or buildings with 16 or more floors, with larger/taller spaces commanding a higher rent. Buildings built after 2003 commanded higher rents, while buildings built before 1993 commanded a higher rent than those built between 1993 and 2003. Office spaces associated with a full-service gross lease demanded $2.67 more per square foot than other lease types. In all but two submarkets, the premium for Class A space was above that of Class B, which was above that of Class C. The exceptions were Lake Union and Northgate/North Seattle, where Class A and Class B space had similar rents with B higher, in some instances, than A. Two explanations for the rent dichotomy are similarity in property types with subtle differences separating property amenities and a preferred location for the B designated properties versus the quality differentiation of the Class A facilities. The spatial errors model was only slightly stronger than an OLS regression with the coefficient of autocorrelation within the residual of buildings within a half-mile at -0.293 (implying semi-strong, negative correlation). Although the premium for office space in a mixed-use development was not significant, it was strongly negative. Consequently, for this market, one concludes that office space in a mixed-use development does not command a rent significantly different from comparable office space in a single-use development.

Conclusion—Mixed-use Is a Matter of Perception

As seen in the results, office space in a mixed-use development can command a statistically significant, positive premium in select markets. But in others, the difference proved statistically insignificant. From these results, one concludes that mixed-use is still an emerging market niche with strong potential as our culture continues to evolve from sprawl-oriented to smarter development. Although the pressure from increased energy costs has subsided temporarily, mixed-use still offers the same added utility it always has. With depleting amounts of developable land in viable locations, mixing uses to increase investor returns and user satisfaction will become more predominant. Although the term mixed-use has become a popular marketing method with many developers proclaiming “live, work, play,” the simple fact is that distance to amenities has, and always will, influence consumer behavior.

Appendix

Variable Creation, Rationale, Assumptions and Ex-Ante Discussion
To perform the hedonic price model, binary dummy variables were created from building-specific information. Below is a description of how each variable was constructed:

- **Mixed-use**. If a building was a member of a mixed-use development or determined to fit the mixed-use description based on adjacency to retail and residential space, it was assigned this variable. As presented in the paper's hypothesis, this variable is expected to be positive, reflecting the added value of a mixed-use development.
- **Construction Date**. Under the assumption that buildings built at different times possess different operating costs, features and aesthetics, this variable was used to divide buildings into groups based on discrete points in time. Overlapping of groups was allowed (i.e., a building constructed in 2007 would have true values for *Built after* 1995 and *Built after 2000*), which means one must add the coefficient for each of these variables if a building was built after both thresholds. These variables were expected to be positive since more recently constructed buildings represented an improvement over the previous generation. If a building was renovated, the year of renovation replaced the original construction date, since a renovation would potentially improve operating costs, features and aesthetics. However, because renovations are not a substitute for a new building, a dummy variable was introduced for renovated buildings.
- **Rentable Building Area (RBA).** Various cut-offs were employed to segment data into size groupings under the assumption that larger buildings appealed to a different group of tenants or offered an economy of scale not present in smaller buildings. Overlapping of groups was allowed (i.e., a building of one million square feet is both *RBA over 100,000* and *RBA over 500,000*), so it was necessary to add the coefficients for both variables if a building's RBA was above both thresholds. These variables were expected to be positive since larger spaces can offer tenants a wider range of amenities, including food services, security and larger contiguous spaces. See Charts 1-8 for graphic representation of RBA distribution.
- **At Least "X" Floors.** If the building was at least "X" number of floors or taller, the building was considered a member of this group. In some markets, this variable was more appropriate to use in conjunction with RBA variables.
- **At Least One Floor Available.** If the available space in a building was greater than its average square footage per floor, the building was considered to have at least one floor available. This variable could be either positive or negative depending on the market. In some markets, elevated vacancy rates would make it negative, while in other markets with a low vacancy rate, it would represent a desirable contiguous space.
- **Lease Type.** These variables represented three types of leases, full-service gross, triple net and all others in between. Since this variable ultimately affected the tenants' cost of ownership, a full-service gross (FSG) lease would be positive, representing cost savings to the tenant. Conversely, a triple net would be negative, representing additional cost to the tenant. In most cases, a variable representing FSG lease was used, and all others were assumed to be a lesser lease type.

- **Rent.** As the dependent variable estimated in this analysis, rent was not converted into a binary dummy variable. When a range of asking rates was offered, the high end was used.
- **Submarket/Class**. This variable group was used to create an intercept term for each submarket and the classes within each of the submarkets, representing the average base rent for a submarket/class when all other variables were simultaneously estimated.
- **Features.** Since some data contained feature information, binary dummies were created from the available information. If a building had a select feature, the associated variable represented the cost/value to the tenant. In most cases, these variables were expected to be positive, due to added utility or cost savings, but they could be negative if the feature was correlated with less desirable buildings.
- **Geographic Information**. All buildings were geocoded to produce their GPS coordinates, which were then used in a distance formula to create a contiguity matrix. If a building was within a selected range of another building, the two were considered neighbors. No building was considered a neighbor to itself. When used in the model in which spatially autocorrelated error terms were assumed, the coefficient would be positive since buildings within close proximity affect each other.

Data Set Modification

Given the varying sources of data, some sets were more complete than others. Consequently, some models yielded a wider scope than others. Below are some modifications that were made:

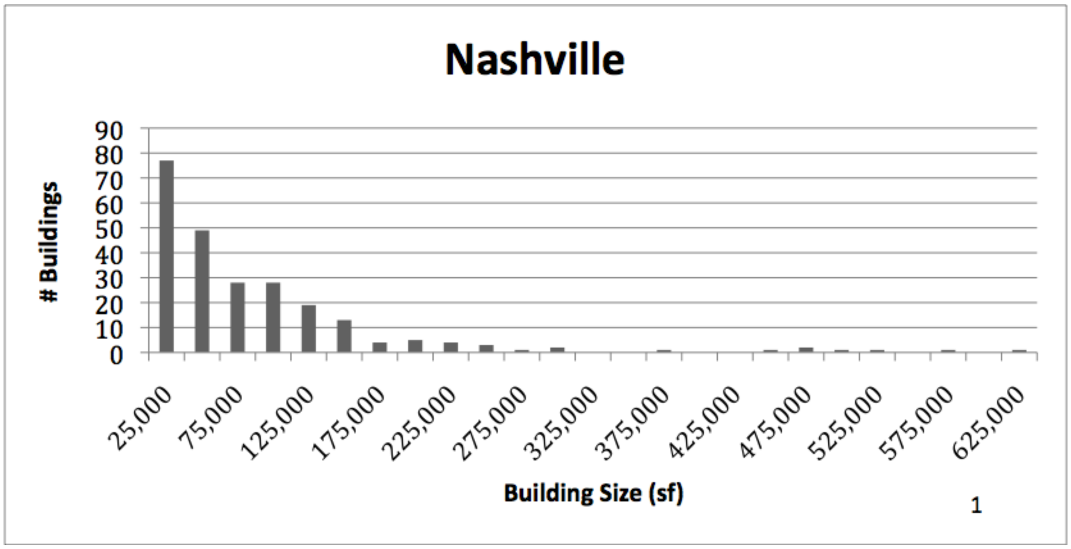
- **Construction Date.** Buildings that lacked a construction date fell into one of two categories. Established buildings built in previous decades were given the construction date of 1900 (meaning the building would not surpass any date threshold). Buildings that had not been constructed yet or were just recently completed were assigned 2008 (meaning the building would surpass all date thresholds). In some cases, the building was excluded from the analysis as an out-of-sample example.
- **Floors.** When this variable was not present, Google Street View was used to estimate the number of floors.
- **Lease Type.** When not specified, the building was considered triple net. In data sets in which the vast majority of buildings lacked this information, this variable group was dropped.
- **Rent.** Extreme outliers were dropped (assumed to be typographical error) along with any building that lacked a lease rate.
- **Submarket**. Since this variable was the most arbitrary, the buildings were mapped and smaller submarkets merged with larger while the larger were split into sub-submarkets when necessary and reasonable.
- **Class.** If a building lacked this information, it was compared to other buildings within its submarket to determine its class. If this status was questionable, the building was dropped. In some cases, classes were merged due to a lack of observations.
- **Features.** Not all markets had detailed feature information. Therefore, these variables were subject to a case-by-case review. If the data were questionable, the variable group was dropped.
- **Geographic Information**. In the event the Geocoding software returned a null value, the building was given a coordinate by which it was a neighbor to no other building.

Model Estimation Methodology

As already mentioned, this analysis employed a hedonic price model integrated with a spatial error model (SEM). The hedonic portion was used for extracting the effects of varying features/specifications. The SEM was used to extract the assumed spatial interaction within the residual, which was assumed to follow a normal distribution if the model was adequately specified, between neighboring buildings. When specifying each market's model, a ground-up approach was taken. The first variables introduced in the model were the submarket/class (intercept terms). Then different construction-related and size variables were tested until the adjusted r-squared was maximized. Then the distance threshold was adjusted to further maximize the adjusted r-squared, but consideration was made to avoid overfitting this variable. With the base model complete, feature-related variables were introduced while those found to be insignificant were subtracted (the mixed-use variable was not removed regardless of significance).

Suggested Articles for Those Interested in Learning More about Similar Analyses

The modeling technique used in this paper is by no means exceptional or unique. Many articles have been published that employ similar techniques on office rent data using a hedonic price model. An article by Franz Fuerst titled "Office Rent Determinants: A Hedonic Panel Analysis" is a well-rounded discussion of analyzing office rents using a hedonic price model. In that article, the author examined New York City office rents using a similar methodology in dissecting office rents but provided detailed information on assumptions and statistical issues of such analyses. Also recommended for anyone interested in spatial econometrics are works by Luke Anselin and James P. LeSage, who pioneered and wrote the estimation procedures employed in this paper.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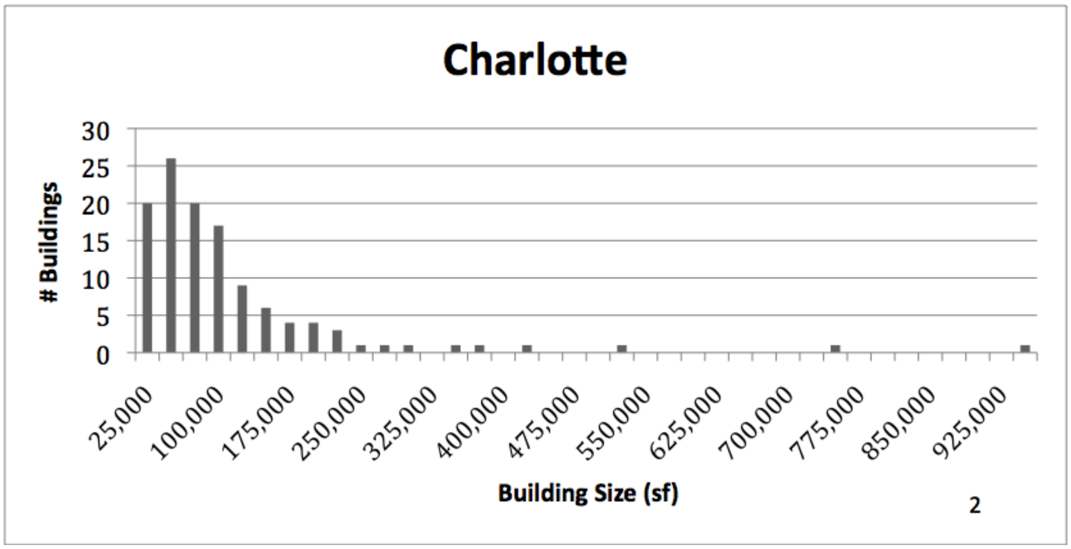
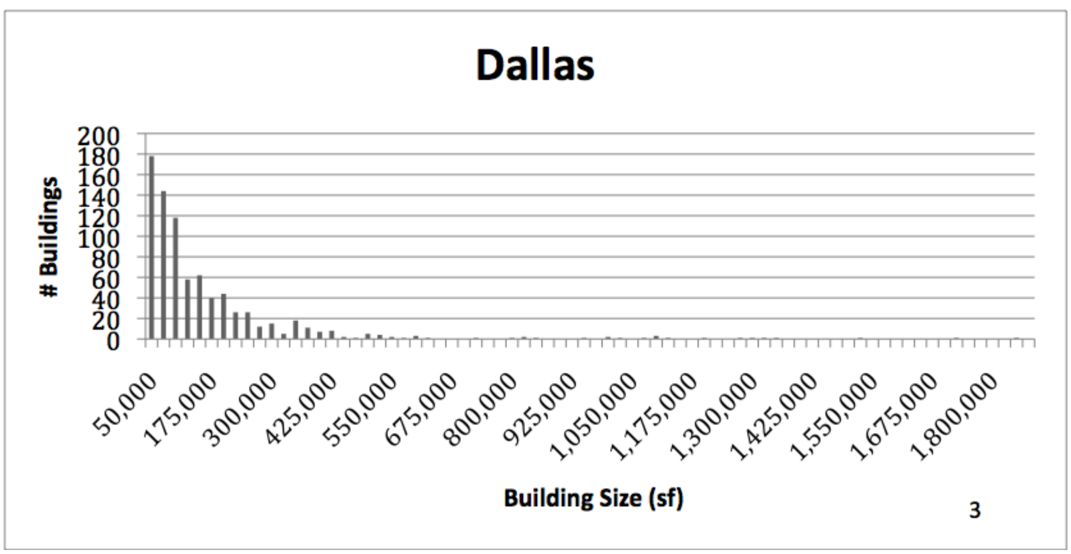
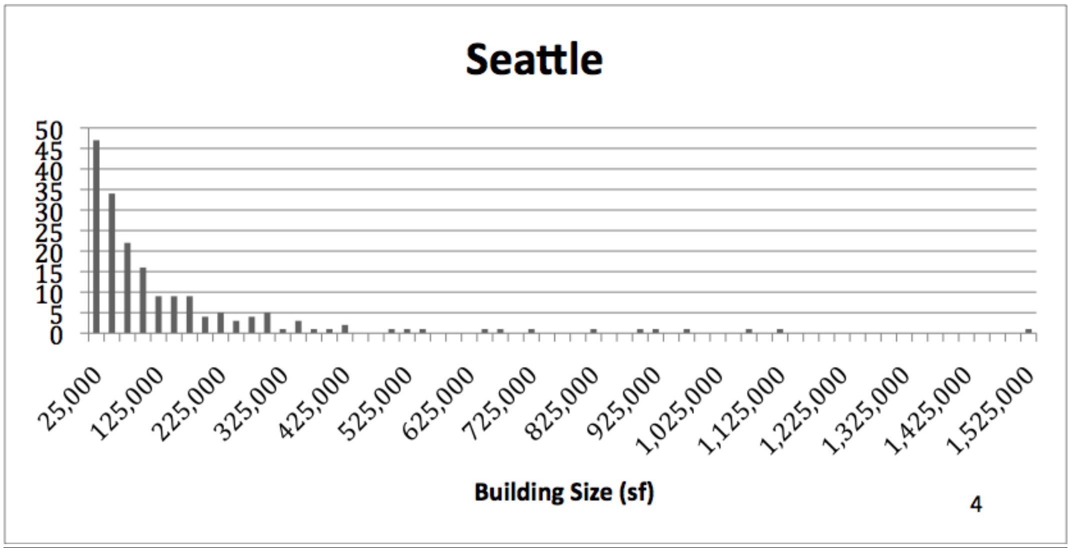
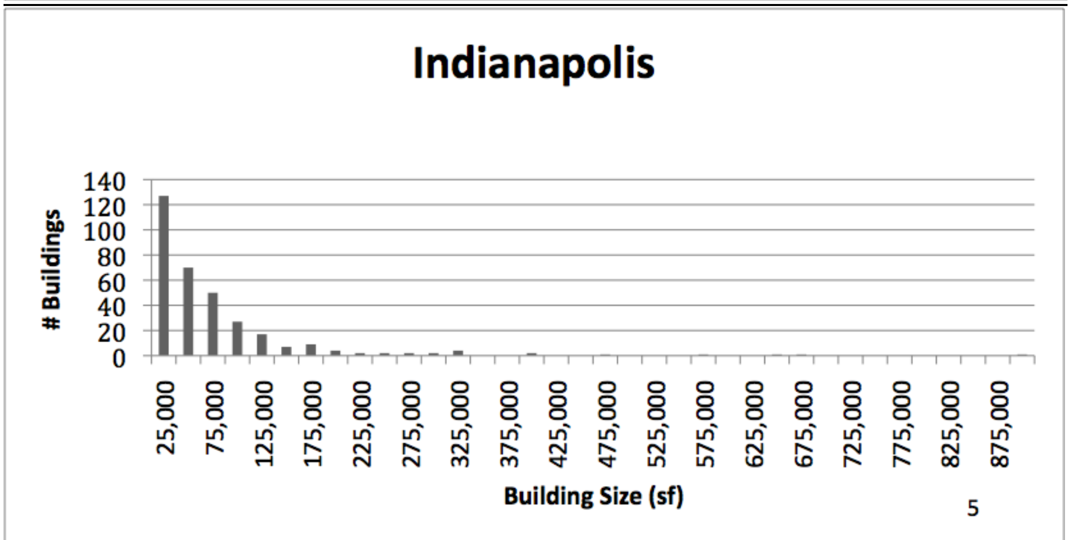
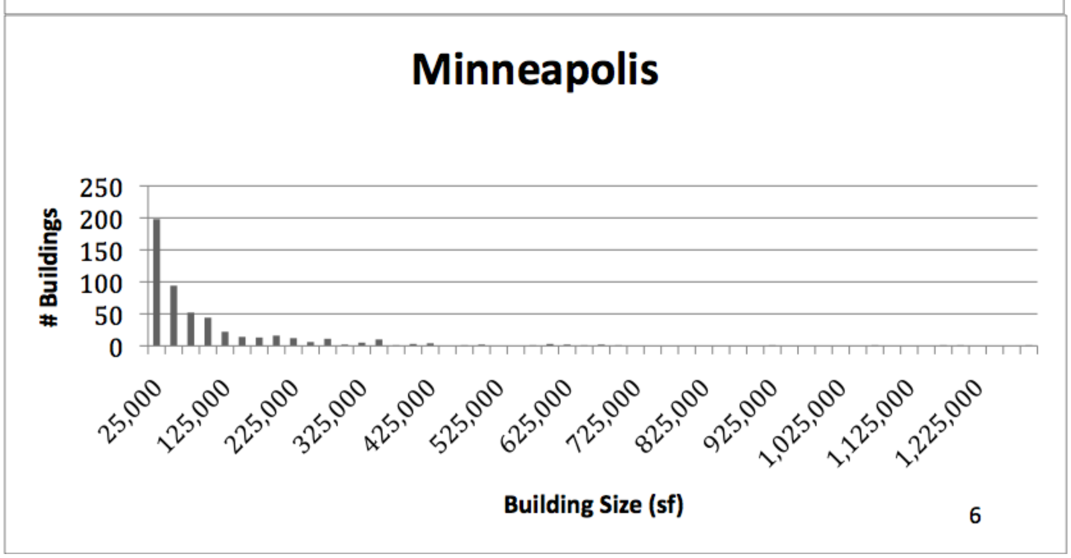
Buildings
90
80
70
60
50
40
30
20
10
0
25,000
75,000
125,000
175,000
225,000
275,000
325,000
375,000
425,000
475,000
525,000
575,000
625,000
Building Size (sf)
1

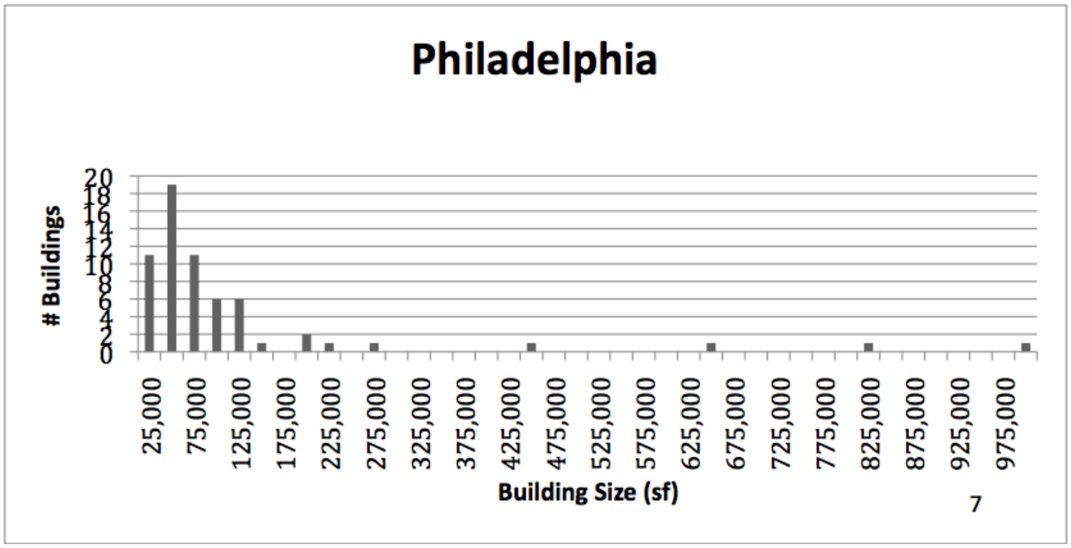

Charlotte
Buildings
30
25
20
15
10
5
0
25,000
100,000
175,000
250,000
325,000
400,000
475,000
550,000
625,000
700,000
775,000
850,000
925,000
Building Size (sf)
2

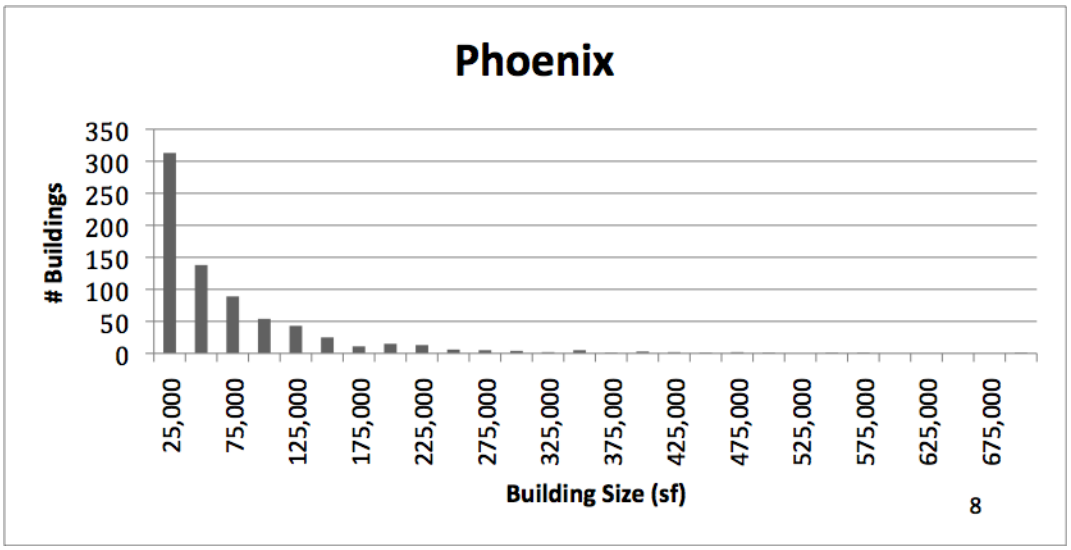

Dallas
Buildings
200
180
160
140
120
100
80
60
40
20
0
50,000
175,000
300,000
425,000
550,000
675,000
800,000
925,000
1,050,000
1,175,000
1,300,000
1,425,000
1,550,000
1,675,000
1,800,000
Building Size (sf)
3


Seattle
50
45
40
35
30
25
20
15
10
5
0
25,000
125,000
225,000
325,000
425,000
525,000
625,000
725,000
825,000
925,000
1,025,000
1,125,000
1,225,000
1,325,000
1,425,000
1,525,000
Building Size (sf)
4

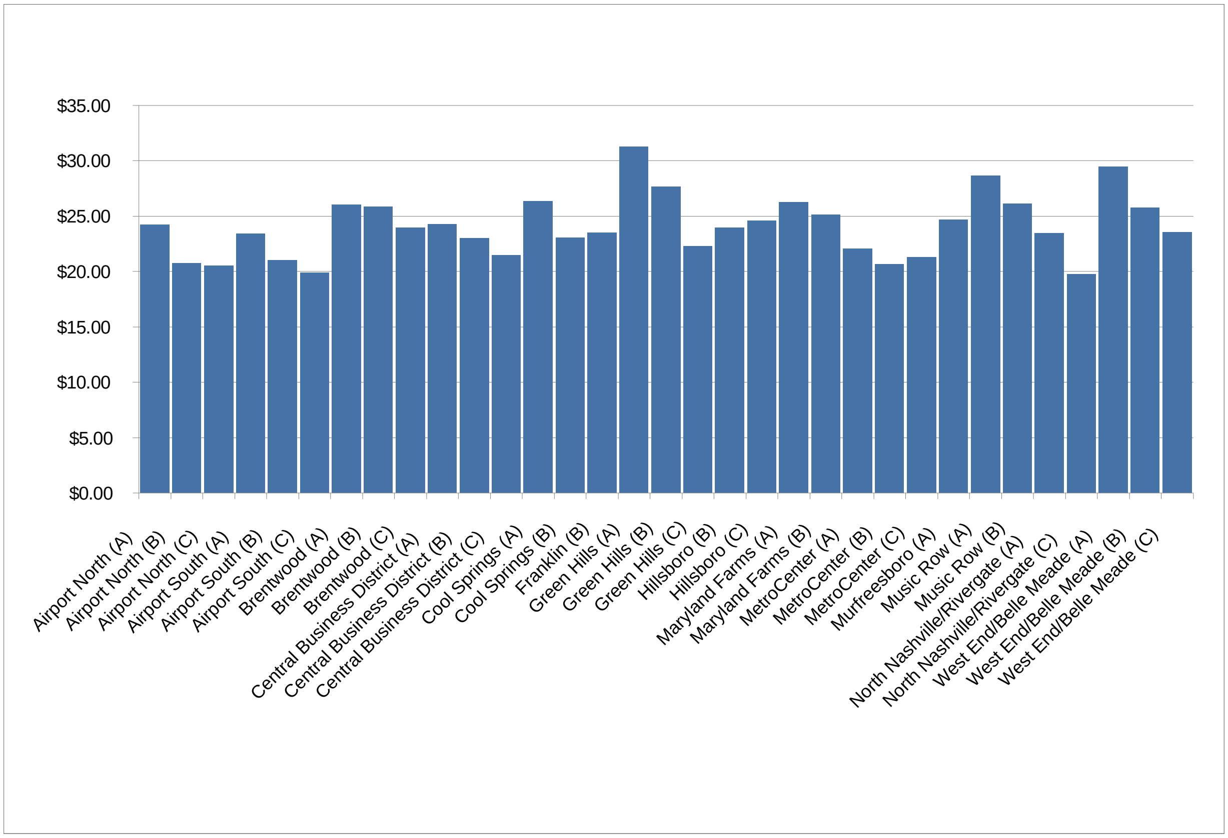

Indianapolis
Buildings
140
120
100
80
60
40
20
0
25,000
75,000
125,000
175,000
225,000
275,000
325,000
375,000
425,000
475,000
525,000
575,000
625,000
675,000
725,000
775,000
825,000
875,000
Building Size (sf)
5


Minneapolis
Buildings
250
200
150
100
50
0
25,000
125,000
225,000
325,000
425,000
525,000
625,000
725,000
825,000
925,000
1,025,000
1,125,000
1,225,000
Building Size (sf)
6


Philadelphia
Buildings
20
18
16
14
12
10
8
6
4
2
0
25,000
75,000
125,000
175,000
225,000
275,000
325,000
375,000
425,000
475,000
525,000
575,000
625,000
675,000
725,000
775,000
825,000
875,000
925,000
975,000
Building Size (sf)
7


Phoenix
Buildings
350
300
250
200
150
100
50
0
25,000
75,000
125,000
175,000
225,000
275,000
325,000
375,000
425,000
475,000
525,000
575,000
625,000
675,000
Building Size (sf)
8

Nashville Submarket/Price Premium Graph



For the Nashville Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, Built or Renovated After 1965 (negative value), Built or Renovated After 1993, Built or Renovated After 2004, RBA Above 50,000 SF, RBA Above 125,000 SF and RBA Above 300,000 SF. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $1.79. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Nashville Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	1.79	1.97	0.049
Built or Renovated After 1965	-1.80	-2.87	0.004
Built or Renovated After 1993	1.41	4.66	0.000
Built or Renovated After 2004	0.83	1.71	0.088
RBA Above 50,000 SF	0.57	2.24	0.025
RBA Above 125,000 SF	0.92	2.88	0.004
RBA Above 300,000 SF	1.45	2.03	0.042
Coefficient of Spatial Autocorrelation*	0.12	1.57	0.115

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Airport North (A)	19.04	23.98	0.000
Airport North (B)	15.57	19.46	0.000
Airport North (C)	15.37	13.93	0.000
Airport South (A)	18.25	16.30	0.000
Airport South (B)	15.86	21.20	0.000
Airport South (C)	14.73	19.10	0.000
Brentwood (A)	20.86	24.63	0.000
Brentwood (B)	20.68	24.74	0.000
Brentwood (C)	18.79	15.77	0.000
Central Business District (A)	19.12	18.98	0.000
Central Business District (B)	17.82	29.89	0.000
Central Business District (C)	16.28	23.87	0.000
Cool Springs (A)	21.19	26.42	0.000
Cool Springs (B)	17.90	18.29	0.000
Franklin (B)	18.35	12.99	0.000
Green Hills (A)	26.08	27.46	0.000
Green Hills (B)	22.51	27.46	0.000
Green Hills (C)	17.10	17.80	0.000
Hillsboro (B)	18.75	20.78	0.000
Hillsboro (C)	19.44	18.92	0.000
Maryland Farms (A)	21.09	29.36	0.000
Maryland Farms (B)	19.92	26.50	0.000
MetroCenter (A)	16.90	13.58	0.000
MetroCenter (B)	15.46	16.13	0.000
MetroCenter (C)	16.13	14.40	0.000
Murfreesboro (A)	19.52	15.07	0.000
Music Row (A)	23.48	17.95	0.000
Music Row (B)	20.96	19.70	0.000
North Nashville/Rivergate (A)	18.27	16.70	0.000
North Nashville/Rivergate (C)	14.61	15.95	0.000
West End/Belle Meade (A)	24.30	31.17	0.000
West End/Belle Meade (B)	20.55	27.00	0.000
West End/Belle Meade (C)	18.38	22.70	0.000

Model Statistics

R-Squared: 0.7878

Log-Likelihood: -452.39188

Observations: 296

Variables: 40

* A spatial errors model (SEM) assumes the model's error term, or residual value, is correlated between neighboring observations (i.e. adjacent buildings in the case of this analysis). The resulting correlation statistic indicates presence, or lack of, unobserved homogeneity between neighboring buildings. The estimated coefficient is the correlation between neighboring buildings and their rent residuals, or difference between the predicted rent and actual rent. The probability statistic is used to determine if the estimated coefficient is statistically different from zero, or no correlation. Low probability statistic implies high statistical significance and less probable the value is actually zero. Asymptotic T-Statistics are used in estimating the probability statistics.

Nashville OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	1.66	1.74	0.083
Built or Renovated After 1965	-1.75	-2.56	0.011
Built or Renovated After 1993	1.43	4.38	0.000
Built or Renovated After 2004	0.84	1.58	0.115
RBA Above 50,000 SF	0.56	2.04	0.042
RBA Above 125,000 SF	0.94	2.73	0.007
RBA Above 300,000 SF	1.38	1.79	0.075

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Airport North (A)	18.94	22.69	0.000
Airport North (B)	15.58	18.31	0.000
Airport North (C)	15.25	12.75	0.000
Airport South (A)	18.18	14.99	0.000
Airport South (B)	15.76	19.80	0.000
Airport South (C)	14.67	17.97	0.000
Brentwood (A)	20.76	23.04	0.000
Brentwood (B)	20.58	23.37	0.000
Brentwood (C)	18.75	15.67	0.000
Central Business District (A)	19.00	17.57	0.000
Central Business District (B)	17.77	27.90	0.000
Central Business District (C)	16.18	22.17	0.000
Cool Springs (A)	21.15	24.92	0.000
Cool Springs (B)	17.94	17.25	0.000
Franklin (B)	18.28	13.18	0.000
Green Hills (A)	26.08	26.56	0.000
Green Hills (B)	22.44	26.07	0.000
Green Hills (C)	17.03	16.75	0.000
Hillsboro (B)	18.68	19.92	0.000
Hillsboro (C)	19.37	17.76	0.000
Maryland Farms (A)	21.02	27.35	0.000
Maryland Farms (B)	19.87	24.77	0.000
MetroCenter (A)	16.82	13.55	0.000
MetroCenter (B)	15.51	15.05	0.000
MetroCenter (C)	16.23	13.63	0.000
Murfreesboro (A)	19.46	13.88	0.000
Music Row (A)	23.47	17.03	0.000
Music Row (B)	20.87	19.14	0.000
North Nashville/Rivergate (A)	18.53	16.22	0.000
North Nashville/Rivergate (C)	14.46	14.84	0.000
West End/Belle Meade (A)	24.22	29.31	0.000
West End/Belle Meade (B)	20.55	25.40	0.000
West End/Belle Meade (C)	18.33	21.28	0.000

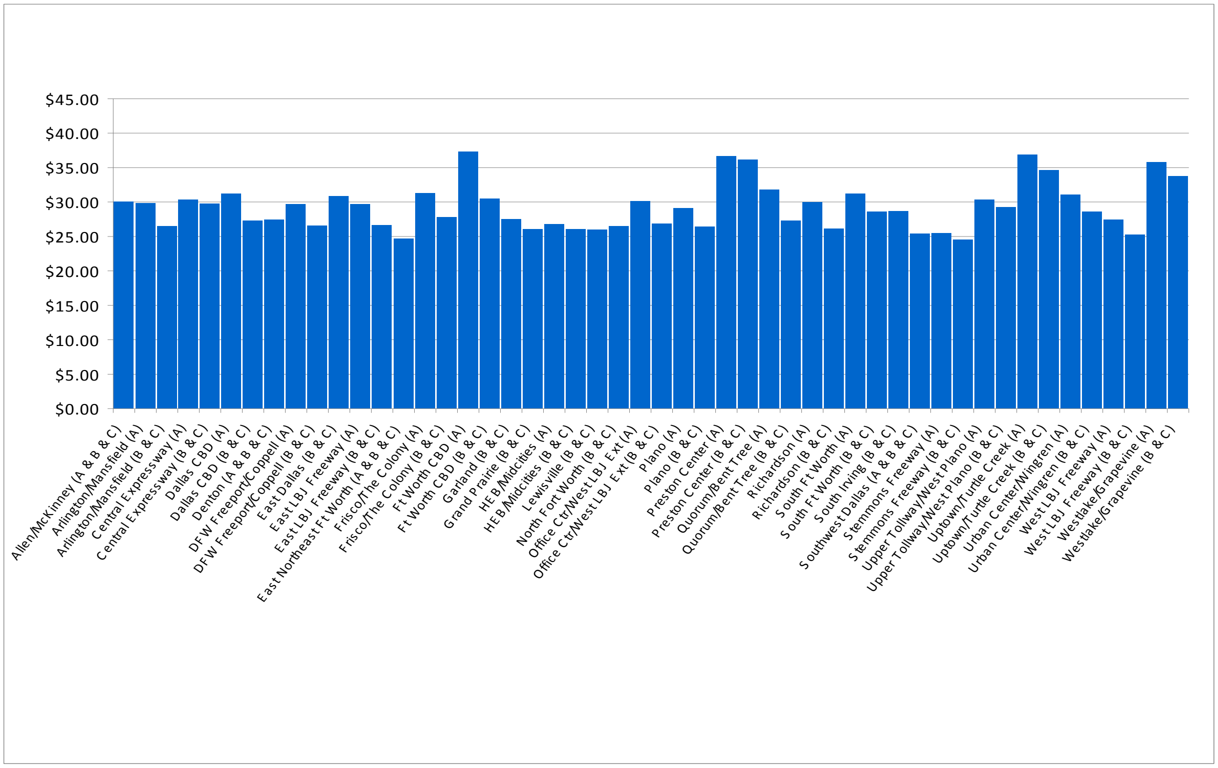
Model Statistics

R-Squared: 0.7857

Observations: 296

Variables: 40

Dallas Submarket/Price Premium Graph



For the Dallas Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, Lease Type Triple Net (negative value), Renovated (negative value), Built or Renovated After 1975, Built or Renovated After 1994, Built or Renovated After 2003, Rentable Building Area Above 75,000 SF, Bank Branch On-Site, Concierge Service, Conference Center, Adjacency to a Mall and Street Level Retail. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $1.99. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Dallas Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	1.99	2.54	0.011
Built or Renovated After 1975	2.00	4.48	0.000
Built or Renovated After 1994	2.18	6.96	0.000
Built or Renovated After 2003	1.75	4.99	0.000
Renovated	-2.71	-8.03	0.000
RBA Above 75,000 SF	0.55	2.01	0.044
Lease Type: Triple Net	-3.58	-8.96	0.000
Bank Branch On-Site	0.82	2.99	0.003
Concierge Service	1.59	3.47	0.001
Conference Center	0.89	2.75	0.006
Adjacency to a Mall	3.44	2.69	0.007
Street Level Retail	4.35	2.98	0.003
Coefficient of Spatial Autocorrelation*	0.198	7.794	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Allen/McKinney (A & B & C)	16.76	16.14	0.000
Arlington/Mansfield (A)	16.59	14.64	0.000
Arlington/Mansfield (B & C)	13.21	16.94	0.000
Central Expressway (A)	17.04	18.32	0.000
Central Expressway (B & C)	16.49	23.71	0.000
Dallas CBD (A)	17.90	20.12	0.000
Dallas CBD (B & C)	13.98	19.33	0.000
Denton (A & B & C)	14.15	8.49	0.000
DFW Freeport/Coppell (A)	16.38	12.64	0.000
DFW Freeport/Coppell (B & C)	13.27	15.38	0.000
East Dallas (B & C)	17.54	10.52	0.000
East LBJ Freeway (A)	16.38	18.79	0.000
East LBJ Freeway (B & C)	13.35	20.99	0.000
East Northeast Ft. Worth (A & B & C)	11.42	10.67	0.000
Frisco/The Colony (A)	18.02	14.96	0.000
Frisco/The Colony (B & C)	14.54	12.75	0.000
Ft. Worth CBD (A)	24.00	15.09	0.000
Ft. Worth CBD (B & C)	17.20	15.03	0.000
Garland (B & C)	14.21	12.45	0.000
Grand Prairie (B & C)	12.79	6.23	0.000
HEB/Midcities (A)	13.50	8.35	0.000
HEB/Midcities (B & C)	12.78	15.37	0.000
Lewisville (B & C)	12.69	12.61	0.000
North Fort Worth (B & C)	13.23	6.42	0.000
Office Ctr/West LBJ Ext (A)	16.81	16.66	0.000
Office Ctr/West LBJ Ext (B & C)	13.55	18.63	0.000
Plano (A)	15.81	12.61	0.000
Plano (B & C)	13.10	14.26	0.000
Preston Center (A)	23.39	23.92	0.000
Preston Center (B & C)	22.90	18.92	0.000
Quorum/Bent Tree (A)	18.53	25.13	0.000
Quorum/Bent Tree (B & C)	14.00	22.73	0.000
Richardson (A)	16.71	15.39	0.000
Richardson (B & C)	12.82	17.37	0.000
South Ft. Worth (A)	17.91	9.99	0.000
South Ft. Worth (B & C)	15.32	21.09	0.000
South Irving (B & C)	15.36	12.81	0.000
Southwest Dallas (A & B & C)	12.14	10.35	0.000
Stemmons Freeway (A)	12.20	9.39	0.000
Stemmons Freeway (B & C)	11.25	16.85	0.000
Upper Tollway/West Plano (A)	17.07	20.85	0.000
Upper Tollway/West Plano (B & C)	15.95	16.42	0.000
Uptown/Turtle Creek (A)	23.60	27.22	0.000
Uptown/Turtle Creek (B & C)	21.34	21.35	0.000
Urban Center/Wingren (A)	17.76	19.56	0.000
Urban Center/Wingren (B & C)	15.34	14.15	0.000
West LBJ Freeway (A)	14.19	9.96	0.000
West LBJ Freeway (B & C)	11.95	13.71	0.000
Westlake/Grapevine (A)	22.53	13.51	0.000
Westlake/Grapevine (B & C)	20.49	9.88	0.000

Model Statistics

R-Squared: 0.6459
Log-Likelihood: -1687.1221
Observations: 799
Variables: 62

* See note page 34.

Dallas OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	1.69	2.15	0.032
Built or Renovated After 1975	1.80	3.94	0.000
Built or Renovated After 1994	2.27	6.94	0.000
Built or Renovated After 2003	1.80	4.89	0.000
Renovated	-2.74	-7.78	0.000
RBA Above 75,000 SF	0.57	2.02	0.044
Bank Branch On-Site	0.98	3.41	0.001
Concierge Service	1.64	3.39	0.001
Conference Center	0.92	2.69	0.007
Adjacency to a Mall	3.89	2.93	0.003
Street Level Retail	4.57	2.97	0.003
Lease Type: Triple Net	-3.55	-8.56	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Allen/McKinney (A & B & C)	16.99	17.40	0.000
Arlington/Mansfield (A)	16.77	15.02	0.000
Arlington/Mansfield (B & C)	13.35	17.80	0.000
Central Expressway (A)	17.31	19.20	0.000
Central Expressway (B & C)	16.53	25.18	0.000
Dallas CBD (A)	17.96	20.69	0.000
Dallas CBD (B & C)	13.94	20.29	0.000
Denton (A & B & C)	14.23	8.13	0.000
DFW Freeport/Coppell (A)	16.73	12.68	0.000
DFW Freeport/Coppell (B & C)	13.50	16.53	0.000
East Dallas (B & C)	17.56	10.03	0.000
East LBJ Freeway (A)	16.33	18.90	0.000
East LBJ Freeway (B & C)	13.34	21.73	0.000
East Northeast Ft. Worth (A & B & C)	11.43	11.26	0.000
Frisco/The Colony (A)	17.91	15.75	0.000
Frisco/The Colony (B & C)	14.29	12.87	0.000
Ft. Worth CBD (A)	24.30	15.41	0.000
Ft. Worth CBD (B & C)	17.34	16.47	0.000
Garland (B & C)	13.74	11.93	0.000
Grand Prairie (B & C)	12.80	5.92	0.000
HEB/Midcities (A)	13.68	8.72	0.000
HEB/Midcities (B & C)	13.02	16.47	0.000
Lewisville (B & C)	12.62	13.35	0.000
North Fort Worth (B & C)	13.30	6.14	0.000
Office Ctr/West LBJ Ext (A)	16.97	17.11	0.000
Office Ctr/West LBJ Ext (B & C)	13.64	19.80	0.000
Plano (A)	15.62	12.61	0.000
Plano (B & C)	13.21	15.14	0.000
Preston Center (A)	23.40	25.65	0.000
Preston Center (B & C)	23.17	19.28	0.000
Quorum/Bent Tree (A)	18.81	26.09	0.000
Quorum/Bent Tree (B & C)	14.19	23.79	0.000
Richardson (A)	16.87	16.47	0.000
Richardson (B & C)	12.92	18.73	0.000
South Ft. Worth (A)	18.42	10.30	0.000
South Ft. Worth (B & C)	15.46	22.12	0.000
South Irving (B & C)	15.03	13.76	0.000
Southwest Dallas (A & B & C)	12.22	10.89	0.000
Stemmons Freeway (A)	12.27	9.33	0.000
Stemmons Freeway (B & C)	11.35	18.24	0.000
Upper Tollway/West Plano (A)	17.12	21.92	0.000
Upper Tollway/West Plano (B & C)	16.10	16.66	0.000
Uptown/Turtle Creek (A)	23.77	28.66	0.000
Uptown/Turtle Creek (B & C)	21.37	21.84	0.000
Urban Center/Wingren (A)	17.78	20.94	0.000
Urban Center/Wingren (B & C)	15.44	14.60	0.000
West LBJ Freeway (A)	14.16	9.90	0.000
West LBJ Freeway (B & C)	11.95	14.88	0.000
Westlake/Grapevine (A)	22.54	15.61	0.000
Westlake/Grapevine (B & C)	20.69	10.30	0.000

Model Statistics

R-Squared: 0.6386
Observations: 799
Variables: 62

Charlotte Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	1.82	1.66	0.097
Built or Renovated After 1976	3.61	3.09	0.002
Built or Renovated After 1985	3.75	3.78	0.000
Built or Renovated After 2004	4.68	5.11	0.000
Renovated	2.92	2.74	0.006
RBA Above 100,000 SF	-1.38	-2.06	0.040
LEED	5.13	1.84	0.065
At Least 2 Floors	4.76	4.71	0.000
Coefficient of Spatial Autocorrelation*	-0.27	-2.44	0.015

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
CBD	17.46	10.39	0.000
CBD (Class B)	15.42	7.24	0.000
East Charlotte (Class B)	6.77	4.14	0.000
Midtown	8.00	2.98	0.003
Midtown (Class B)	15.14	8.97	0.000
Northeast Charlotte	6.06	4.58	0.000
Pineville	7.63	4.42	0.000
Pineville (Class B)	9.23	4.83	0.000
South Charlotte	14.85	7.68	0.000
South Charlotte (Class B)	13.00	9.79	0.000
Southeast Charlotte	11.01	4.76	0.000
Southeast Charlotte (Class B)	4.97	2.63	0.008
Southwest Charlotte	4.71	3.64	0.000
Southwest Charlotte (Class B)	4.53	3.70	0.000

Model Statistics

R-Squared: 0.5117
Log-Likelihood: -236.07581
Observations: 107
Variables: 22

* See note page 34.

Charlotte OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	1.29	1.00	0.321
Built or Renovated After 1976	6.14	4.63	0.000
Built or Renovated After 1985	3.85	3.14	0.002
Built or Renovated After 2004	4.68	4.26	0.000
Renovated	2.46	2.03	0.045
RBA Above 100,000 SF	-1.24	-1.49	0.139
LEED	5.84	1.83	0.070
At Least 2	5.78	4.66	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
CBD	17.16	8.55	0.000
CBD (Class B)	14.62	5.96	0.000
East Charlotte (Class B)	7.92	3.82	0.000
Midtown	7.99	2.57	0.012
Midtown (Class B)	14.24	7.43	0.000
Northeast Charlotte	5.58	3.49	0.001
Pineville	7.65	3.85	0.000
Pineville (Class B)	9.08	4.09	0.000
South Charlotte	14.61	6.34	0.000
South Charlotte (Class B)	12.59	7.75	0.000
Southeast Charlotte	11.71	4.40	0.000
Southeast Charlotte (Class B)	4.08	1.83	0.071
Southwest Charlotte	4.46	2.77	0.007
Southwest Charlotte (Class B)	4.90	3.23	0.002

Model Statistics

R-Squared: 0.4879

Observations: 107

Variables: 22

Seattle Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	-1.93	-0.89	0.376
Built or Renovated After 1995	-1.62	-1.83	0.067
Built or Renovated After 2003	4.27	2.95	0.003
RBA Above 50,000 SF	3.12	3.61	0.000
At Least 16 Floors	2.33	1.93	0.054
Lease Type: Full Service Gross	2.67	2.94	0.003
Coefficient of Spatial Autocorrelation*	-0.29	-2.30	0.021

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Ballard/U Dist (B)	24.41	18.50	0.000
Ballard/U Dist (C)	21.14	9.46	0.000
Belltown/Denny Regrade (A)	24.98	14.53	0.000
Belltown/Denny Regrade (B)	21.98	12.94	0.000
Belltown/Denny Regrade (C)	16.08	4.97	0.000
Capitol Hill/Central Dist (B)	24.09	17.16	0.000
Lake Union (A)	22.49	8.70	0.000
Lake Union (B)	22.53	13.35	0.000
Lake Union (C)	21.78	6.79	0.000
Northgate/N Seattle (A)	19.23	5.42	0.000
Northgate/N Seattle (B)	19.36	13.05	0.000
Pioneer Sq/Waterfront (A)	21.52	7.26	0.000
Pioneer Sq/Waterfront (B)	19.67	14.15	0.000
Pioneer Sq/Waterfront (C)	18.84	8.48	0.000
Queen Anne/Magnolia (A)	25.19	10.00	0.000
Queen Anne/Magnolia (B)	17.78	11.48	0.000
S. Seattle (A)	21.63	4.74	0.000
S. Seattle (B)	17.66	10.21	0.000
S. Seattle (C)	14.51	6.59	0.000
Seattle CBD (A)	26.74	16.25	0.000
Seattle CBD (B)	20.48	16.06	0.000
Seattle CBD (C)	16.18	4.79	0.000

Model Statistics

R-Squared: 0.4357

Log-Likelihood: -523.28304

Observations: 201

Variables: 28

* See note page 34.

Seattle OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	-1.93	-0.81	0.420
Built or Renovated After 1995	-1.66	-1.72	0.087
Built or Renovated After 2003	4.02	2.42	0.016
RBA Above 50,000 SF	2.97	3.16	0.002
At Least 16 Floors	2.39	1.82	0.071
Lease Type: Full Service Gross	2.81	2.90	0.004

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Ballard/U Dist (B)	23.87	14.85	0.000
Ballard/U Dist (C)	22.08	7.55	0.000
Belltown/Denny Regrade (A)	24.96	12.80	0.000
Belltown/Denny Regrade (B)	22.00	11.43	0.000
Belltown/Denny Regrade (C)	16.00	4.52	0.000
Capitol Hill/Central Dist (B)	24.10	14.05	0.000
Lake Union (A)	23.55	8.18	0.000
Lake Union (B)	22.49	11.94	0.000
Lake Union (C)	20.96	5.67	0.000
Northgate/N Seattle (A)	18.95	5.02	0.000
Northgate/N Seattle (B)	19.03	10.70	0.000
Pioneer Sq/Waterfront (A)	21.34	6.60	0.000
Pioneer Sq/Waterfront (B)	19.76	12.73	0.000
Pioneer Sq/Waterfront (C)	18.84	7.66	0.000
Queen Anne/Magnolia (A)	25.59	9.23	0.000
Queen Anne/Magnolia (B)	18.30	10.32	0.000
S Seattle (A)	22.23	4.29	0.000
S Seattle (B)	17.45	8.93	0.000
S Seattle (C)	15.71	6.12	0.000
Seattle CBD (A)	26.72	14.79	0.000
Seattle CBD (B)	20.38	14.47	0.000
Seattle CBD (C)	16.07	4.38	0.000

Model Statistics

R-Squared: 0.4223
Observations: 201
Variables: 28

Indianapolis Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	0.69	0.75	0.454
Built or Renovated After 1990	0.72	2.64	0.008
Built or Renovated After 2005	1.76	3.12	0.002
Renovated	-1.03	-2.82	0.005
RBA Above 150,000 SF	1.93	4.60	0.000
At Least One Floor Available	-0.68	-2.56	0.010
Coefficient of Spatial Autocorrelation*	0.36	5.33	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Downtown (A)	18.79	26.66	0.000
Downtown (B)	17.60	39.27	0.000
Downtown (C)	14.34	24.36	0.000
East (B & C)	12.24	9.04	0.000
Fishers (A)	16.93	15.68	0.000
Fishers (B)	15.31	15.83	0.000
Keystone (A)	19.34	31.61	0.000
Keystone (B)	17.05	36.69	0.000
Midtown (A)	17.84	12.46	0.000
Midtown (B)	18.32	19.85	0.000
Midtown (C)	12.73	9.42	0.000
North/Carmel (A)	18.67	36.95	0.000
North/Carmel (B)	16.58	43.53	0.000
North/Carmel (C)	14.81	22.48	0.000
Northeast (A)	18.12	25.93	0.000
Northeast (B)	15.75	36.49	0.000
Northeast (C)	13.59	16.65	0.000
Northwest (A)	17.98	27.32	0.000
Northwest (B)	15.64	29.94	0.000
South (A)	18.79	17.13	0.000
South (B)	14.55	16.86	0.000
South (C)	12.51	15.27	0.000
West (B)	14.37	23.93	0.000
West (C)	12.69	15.02	0.000

Model Statistics

R-Squared: 0.6024
Log-Likelihood: -590.47934
Observations: 353
Variables: 30

* See note page 34.

Indianapolis OLS

Feature Variables

Variable	**Coefficient**	**Asymptot t-stat**	**z-probability**
Member of a Mixed-Use Development	0.56	0.59	0.559
Built or Renovated After 1990	0.82	2.87	0.004
Built or Renovated After 2005	1.68	2.80	0.005
Renovated	-0.90	-2.32	0.021
RBA Above 150,000 SF	1.90	4.15	0.000
At Least One Floor Available	-0.53	-1.88	0.061

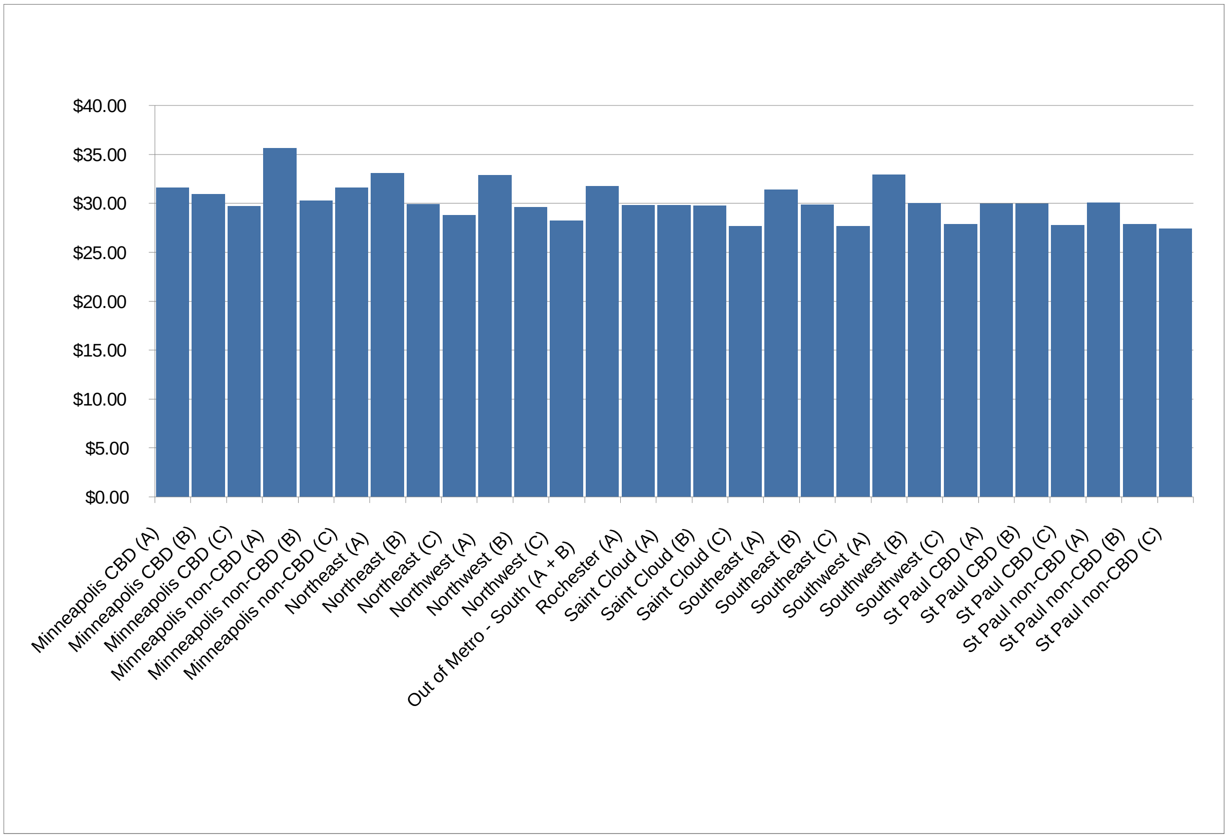
Submarket (Building Class)

Variable	**Coefficient**	**Asymptot t-stat**	**z-probability**
Downtown (A)	18.79	26.41	0.000
Fishers (A)	16.71	14.26	0.000
Keystone (A)	19.13	33.30	0.000
Midtown (A)	16.99	11.65	0.000
North/Carmel (A)	18.94	42.71	0.000
Northeast (A)	18.17	27.48	0.000
Northwest (A)	18.26	32.18	0.000
South (A)	18.46	18.45	0.000
Downtown (B)	17.57	43.35	0.000
Fishers (B)	15.77	18.99	0.000
Keystone (B)	17.01	46.66	0.000
Midtown (B)	18.05	20.24	0.000
North/Carmel (B)	16.24	53.55	0.000
Northeast (B)	15.78	49.95	0.000
Northwest (B)	15.26	34.07	0.000
South (B)	14.41	21.57	0.000
West (B)	14.28	28.07	0.000
Downtown (C)	14.27	24.73	0.000
East (B+C)	12.29	10.78	0.000
Midtown (C)	12.33	10.96	0.000
North/Carmel (C)	14.82	25.21	0.000
Northeast (C)	13.24	20.35	0.000
South (C)	12.52	14.25	0.000
West (C)	12.30	13.94	0.000

Model Statistics

R-Squared: 0.5722
Rbar-squared: 0.5722
Observations: 353
Variables: 30

Minneapolis Submarket/Price Premium Graph



For the Minneapolis Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Base Rent, Built or Renovated After 1992, Built or Renovated After 2004, RBA Above 200,000 SF, RBA Above 700,000 SF and Lease Type Full Service Gross. The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $2.39. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Minneapolis Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	2.39	0.80	0.424
Built or Renovated After 1992	0.92	2.03	0.042
Built or Renovated After 2004	2.17	2.91	0.004
RBA Above 200,000 SF	1.87	4.07	0.000
RBA Above 700,000 SF	5.65	3.81	0.000
Lease Type: Full Service Gross	4.82	11.31	0.000
Coefficient of Spatial Autocorrelation*	0.14	6.55	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Minneapolis CBD (A)	13.78	13.80	0.000
Minneapolis CBD (B)	13.13	27.56	0.000
Minneapolis CBD (C)	11.90	13.39	0.000
Minneapolis non-CBD (A)	17.83	9.57	0.000
Minneapolis non-CBD (B)	12.46	13.80	0.000
Minneapolis non-CBD (C)	13.78	9.37	0.000
Northeast (A)	15.27	16.61	0.000
Northeast (B)	12.11	18.45	0.000
Northeast (C)	10.94	11.11	0.000
Northwest (A)	15.03	21.19	0.000
Northwest (B)	11.78	24.27	0.000
Northwest (C)	10.43	11.37	0.000
Out of Metro - South (A + B)	13.91	6.32	0.000
Rochester (A)	12.00	4.87	0.000
Saint Cloud (A)	12.00	6.79	0.000
Saint Cloud (B)	11.92	6.99	0.000
Saint Cloud (C)	9.86	6.63	0.000
Southeast (A)	13.58	19.48	0.000
Southeast (B)	12.06	24.95	0.000
Southeast (C)	9.82	11.49	0.000
Southwest (A)	15.11	26.11	0.000
Southwest (B)	12.20	34.35	0.000
Southwest (C)	10.06	12.85	0.000
St. Paul CBD (A)	12.15	11.46	0.000
St. Paul CBD (B)	12.16	17.39	0.000
St. Paul CBD (C)	9.92	4.68	0.000
St .Paul non-CBD (A)	12.22	5.72	0.000
St. Paul non-CBD (B)	10.06	9.41	0.000
St. Paul non-CBD (C)	9.55	6.16	0.000

Model Statistics

R-Squared: 0.3785
Log-Likelihood: -1082.2747
Observations: 503
Variables: 35

* See note page 34.

Minneapolis OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	2.50	0.78	0.434
Built or Renovated After 1992	0.92	1.97	0.050
Built or Renovated After 2004	2.35	3.04	0.003
RBA Above 200,000 SF	1.89	4.00	0.000
RBA Above 700,000 SF	5.62	3.61	0.000
Lease Type: Full Service Gross	4.79	10.86	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
Minneapolis CBD (A)	13.83	13.52	0.000
Minneapolis CBD (B)	13.05	28.27	0.000
Minneapolis CBD (C)	11.76	12.99	0.000
Minneapolis non-CBD (A)	17.33	9.79	0.000
Minneapolis non-CBD (B)	12.50	14.05	0.000
Minneapolis non-CBD (C)	13.80	8.97	0.000
Northeast (A)	15.25	16.26	0.000
Northeast (B)	12.11	18.41	0.000
Northeast (C)	10.97	10.64	0.000
Northwest (A)	15.14	21.42	0.000
Northwest (B)	11.84	24.16	0.000
Northwest (C)	10.61	11.36	0.000
Out of Metro - South (A + B)	13.73	5.97	0.000
Rochester (A)	11.90	5.35	0.000
Saint Cloud (A)	11.89	6.44	0.000
Saint Cloud (B)	11.93	6.69	0.000
Saint Cloud (C)	9.87	6.36	0.000
Southeast (A)	13.65	19.45	0.000
Southeast (B)	12.01	24.49	0.000
Southeast (C)	9.96	11.66	0.000
Southwest (A)	15.07	25.90	0.000
Southwest (B)	12.22	35.07	0.000
Southwest (C)	10.14	13.19	0.000
St. Paul CBD (A)	12.25	11.45	0.000
St. Paul CBD (B)	12.12	18.20	0.000
St. Paul CBD (C)	9.71	4.39	0.000
St. Paul non-CBD (A)	12.21	5.47	0.000
St. Paul non-CBD (B)	10.23	9.82	0.000
St. Paul non-CBD (C)	9.66	6.15	0.000

Model Statistics

R-Squared: 0.3675

Observations: 503

Variables: 35

Philadelphia Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	-1.96	-3.47	0.001
Built or Renovated After 1975	6.14	4.63	0.000
Built or Renovated After 2003	3.35	4.44	0.000
Renovated	-1.37	-1.78	0.075
RBA Above 200,000 SF	3.84	3.34	0.001
At Least 3 Floors	5.33	7.57	0.000
Not Class A Building	-1.72	-3.25	0.001
Lease Type: Plus Utilities	-1.53	-1.74	0.081
TWP Zoning	2.77	3.24	0.001
Coefficient of Spatial Autocorrelation*	-0.45	-3.31	0.001

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
CBD	11.46	6.29	0.000
Conshohocken	13.68	6.94	0.000
Exton/West Chester	14.62	9.68	0.000
Great Valley Malvern	10.67	5.58	0.000
King of Prussia	13.85	7.94	0.000
Lower Bucks County (East)	13.60	8.44	0.000
Lower Bucks County (West)	13.60	8.41	0.000
Main Line	16.43	10.39	0.000
Southern New Jersey	8.97	4.99	0.000
Trevose/I-95	12.54	7.60	0.000

Model Statistics

R-Squared: 0.7478
Log-Likelihood: -86.185234
Observations: 58
Variables: 19

* See note page 34.

Philadelphia OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	-1.88	-2.11	0.042
Built or Renovated After 1975	6.81	3.76	0.001
Built or Renovated After 2003	3.01	3.29	0.002
Renovated	-1.53	-1.64	0.108
RBA Above 200,000 SF	4.14	2.61	0.013
At Least 3 Floors	4.81	5.19	0.000
Not Class A Building	-1.20	-1.61	0.115
Plus Utilities	-0.88	-0.84	0.405
TWP Zoning	2.68	2.43	0.020

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
CBD	11.15	4.71	0.000
Conshohocken	13.37	5.10	0.000
Exton/West Chester	13.78	6.48	0.000
Great Valley Malvern	9.93	3.97	0.000
King of Prussia	13.23	5.75	0.000
Lower Bucks County (East)	12.87	5.79	0.000
Lower Bucks County (West)	12.99	6.02	0.000
Main Line	16.38	7.54	0.000
Southern New Jersey	8.41	3.60	0.001
Trevose/I-95	12.30	5.57	0.000

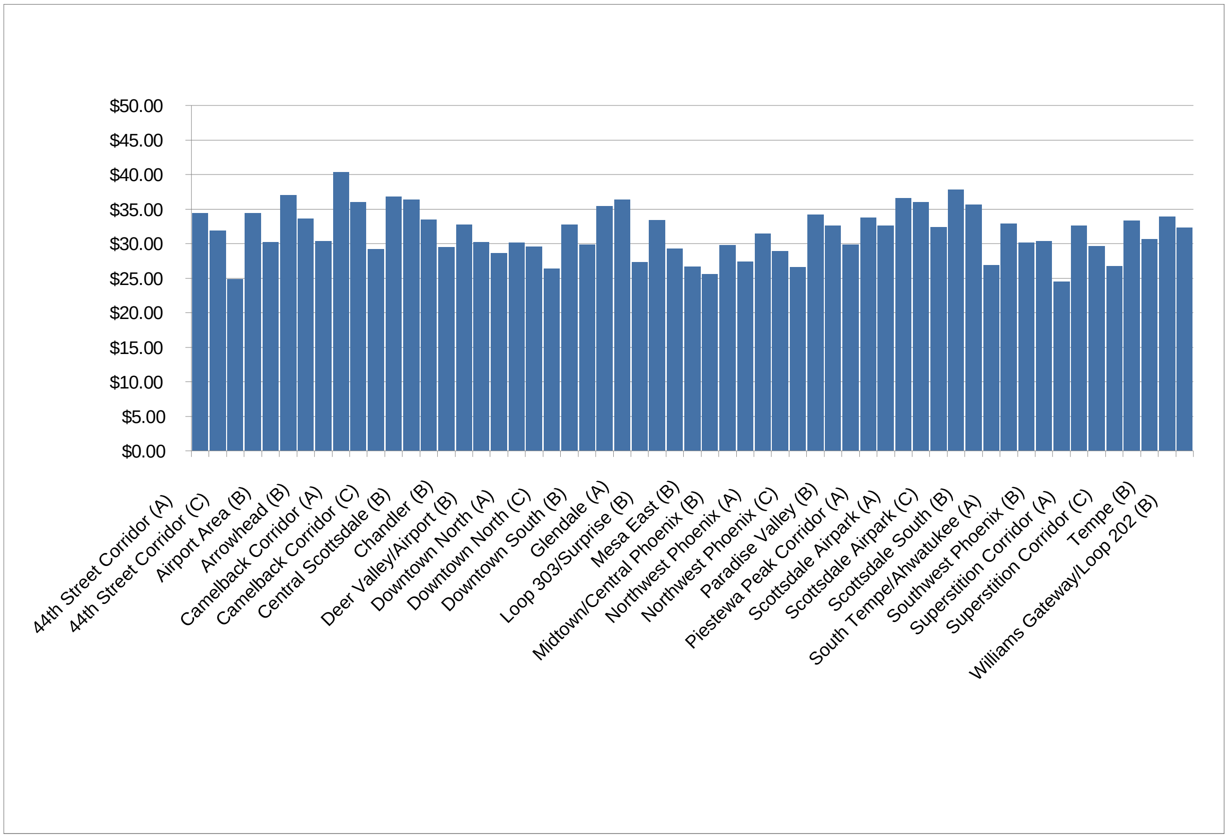
Model Statistics

R-Squared: 0.7060

Observations: 58

Variables: 19

Phoenix Submarket/Price Premium Graph



For the Phoenix Submarket, statistical inferences included in the graphical representation include Non-Mixed-use and Mixed-Use Factors. The Non-Mixed-use Factors include Full Service Gross Base Rent, Least Type: Triple Net (negative value), Renovated (negative value), Built or Renovated After 1978, Built or Renovated After 1996, Built or Renovated After 2006, RBA Above 175,000 SF, RBA Above 450,000 SF, At Least 8 Floors and Medical (SPC). The Mixed-Use premium (Member of a Mixed-Use Development) for this submarket was computed as a standard factor of $ .02. For further amplification, please refer to the variable details for this submarket in the SEM model results in the appendix.

Phoenix Model

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	0.02	0.01	0.992
Built or Renovated After 1978	1.38	1.90	0.057
Built or Renovated After 1996	2.15	5.16	0.000
Built or Renovated After 2006	2.38	3.48	0.001
Renovated	-2.24	-3.38	0.001
RBA Above 175,000 SF	1.93	2.60	0.009
RBA Above 450,000 SF	4.78	2.66	0.008
At Least 8 Floors	3.50	3.73	0.000
Least Type: Triple Net	-4.36	-9.51	0.000
Medical (SPC)	2.76	5.82	0.000
Coefficient of Spatial Autocorrelation*	-0.03	-2.18	0.029

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
44th Street Corridor (A)	22.11	18.29	0.000
44th Street Corridor (B)	19.59	13.69	0.000
44th Street Corridor (C)	12.52	4.36	0.000
Airport Area (A)	22.09	10.61	0.000
Airport Area (B)	17.95	17.26	0.000
Arrowhead (A)	24.73	8.62	0.000
Arrowhead (B)	21.31	17.94	0.000
Arrowhead (C)	18.10	10.63	0.000
Camelback Corridor (A)	28.07	23.24	0.000
Camelback Corridor (B)	23.67	26.16	0.000
Camelback Corridor (C)	16.87	8.48	0.000
Central Scottsdale (A)	24.52	20.34	0.000
Central Scottsdale (B)	24.05	24.92	0.000
Chandler (A)	21.14	7.15	0.000
Chandler (B)	17.20	13.42	0.000
Deer Valley/Airport (A)	20.50	13.96	0.000
Deer Valley/Airport (B)	17.96	17.35	0.000
Deer Valley/Airport (C)	16.29	5.67	0.000
Downtown North (A)	17.82	11.59	0.000
Downtown North (B)	17.29	16.65	0.000
Downtown North (C)	14.13	6.96	0.000
Downtown South (A)	20.48	11.40	0.000
Downtown South (B)	17.55	12.08	0.000
Downtown South (C)	23.14	9.42	0.000
Glendale (A)	24.04	11.00	0.000
Glendale (B)	15.08	6.28	0.000
Loop 303/Surprise (B)	21.11	13.14	0.000
Mesa Downtown (B)	17.04	7.34	0.000
Mesa East (B)	14.40	6.18	0.000
Mesa East (C)	13.30	6.32	0.000
Midtown/Central Phoenix (B)	17.45	16.12	0.000
Midtown/Central Phoenix (C)	15.11	6.64	0.000
Northwest Phoenix (A)	19.17	12.84	0.000
Northwest Phoenix (B)	16.65	17.83	0.000
Northwest Phoenix (C)	14.31	6.22	0.000
Paradise Valley (A)	21.95	12.20	0.000
Paradise Valley (B)	20.26	16.43	0.000
Paradise Valley (C)	17.58	7.31	0.000
Piestewa Peak Corridor (A)	21.51	7.50	0.000
Piestewa Peak Corridor (B)	20.32	17.47	0.000
Scottsdale Airpark (A)	24.31	22.77	0.000
Scottsdale Airpark (B)	23.67	25.13	0.000
Scottsdale Airpark (C)	20.11	7.04	0.000
Scottsdale South (A)	25.51	16.82	0.000
Scottsdale South (B)	23.37	19.50	0.000
Scottsdale South (C)	14.65	7.34	0.000
South Tempe/Ahwatukee (A)	20.61	9.84	0.000
South Tempe/Ahwatukee (B)	17.82	15.39	0.000
Southwest Phoenix (B)	18.07	10.99	0.000
Southwest Phoenix (C)	12.15	7.49	0.000
Superstition Corridor (A)	20.34	11.39	0.000
Superstition Corridor (B)	17.35	17.35	0.000
Superstition Corridor (C)	14.42	7.04	0.000
Tempe (A)	21.03	10.63	0.000
Tempe (B)	18.31	14.79	0.000
West I-10 (B)	21.59	13.31	0.000
Williams Gateway/Loop 202 (B)	20.06	13.12	0.000

Model Statistics

R-Squared: 0.5355

Log-Likelihood: -1681.578

Observations: 691

* See note page 34.

Variables: 67

Phoenix OLS

Feature Variables

Variable	Coefficient	Asymptot t-stat	z-probability
Member of a Mixed-Use Development	0.00	0.00	0.999
Built or Renovated After 1978	1.39	1.93	0.054
Built or Renovated After 1996	2.14	4.89	0.000
Built or Renovated After 2006	2.37	3.29	0.001
Renovated	-2.24	-3.21	0.001
RBA Above 175,000 SF	1.92	2.45	0.015
RBA Above 450,000 SF	4.76	2.52	0.012
At Least 8 Floors	3.51	3.55	0.000
Least Type: Triple Net	-4.37	-9.05	0.000
Medical (SPC)	2.76	5.55	0.000

Submarket (Building Class)

Variable	Coefficient	Asymptot t-stat	z-probability
44th Street Corridor (A)	22.07	17.69	0.000
44th Street Corridor (B)	19.58	13.19	0.000
44th Street Corridor (C)	12.46	4.14	0.000
Airport Area (A)	22.05	10.12	0.000
Airport Area (B)	17.94	16.78	0.000
Arrowhead (A)	24.59	8.17	0.000
Arrowhead (B)	21.30	17.42	0.000
Arrowhead (C)	18.16	10.14	0.000
Camelback Corridor (A)	28.08	22.63	0.000
Camelback Corridor (B)	23.67	25.45	0.000
Camelback Corridor (C)	16.89	8.07	0.000
Central Scottsdale (A)	24.50	19.75	0.000
Central Scottsdale (B)	24.03	24.33	0.000
Chandler (A)	20.89	6.72	0.000
Chandler (B)	17.19	12.96	0.000
Deer Valley/Airport (A)	20.49	13.41	0.000
Deer Valley/Airport (B)	17.95	16.94	0.000
Deer Valley/Airport (C)	16.27	5.40	0.000
Downtown North (A)	17.81	11.18	0.000
Downtown North (B)	17.29	16.15	0.000
Downtown North (C)	14.12	6.63	0.000
Downtown South (A)	20.48	10.88	0.000
Downtown South (B)	17.57	11.50	0.000
Downtown South (C)	23.12	8.93	0.000
Glendale (A)	24.05	10.48	0.000
Glendale (B)	15.08	6.00	0.000
Loop 303/Surprise (B)	21.07	12.54	0.000
Mesa Downtown (B)	16.97	6.95	0.000
Mesa East (B)	14.44	5.91	0.000
Mesa East (C)	13.32	6.05	0.000
Midtown/Central Phoenix (B)	17.45	15.61	0.000
Midtown/Central Phoenix (C)	15.15	6.33	0.000
Northwest Phoenix (A)	19.15	12.33	0.000
Northwest Phoenix (B)	16.61	17.38	0.000
Northwest Phoenix (c)	14.24	5.89	0.000
Paradise Valley (A)	21.95	11.66	0.000
Paradise Valley (B)	20.26	15.96	0.000
Paradise Valley (C)	17.60	7.00	0.000
Piestewa Peak Corridor (A)	21.53	7.15	0.000
Piestewa Peak Corridor (B)	20.34	16.84	0.000
Scottsdale Airpark (A)	24.33	22.26	0.000
Scottsdale Airpark (B)	23.66	24.73	0.000
Scottsdale Airpark (C)	20.04	6.68	0.000
Scottsdale South (A)	25.54	16.23	0.000
Scottsdale South (B)	23.38	18.82	0.000
Scottsdale South (C)	14.61	6.96	0.000
South Tempe/Ahwatukee (A)	20.64	9.37	0.000
South Tempe/Ahwatukee (B)	17.83	14.89	0.000
Southwest Phoenix (B)	18.05	10.55	0.000
Southwest Phoenix (C)	12.17	7.14	0.000
Superstition Corridor (A)	20.35	10.93	0.000
Superstition Corridor (B)	17.36	16.88	0.000
Superstition Corridor (C)	14.44	6.73	0.000
Tempe (A)	20.94	10.10	0.000
Tempe (B)	18.29	14.24	0.000
West I-10 (B)	21.59	12.82	0.000
Williams Gateway/Loop 202 (B)	20.05	12.58	0.000

Model Statistics

R-Squared: 0.5354
Observations: 691
Variables: 67

Research Principals

Dr. Dominic (Nick) F. Minadeo
Dr. Minadeo is the second vice president and director of research for Colliers Turley Martin Tucker’s Nashville office with 10 years of experience in real estate market research.

Dr. Minadeo retired from the armed forces in 1993 after 25.5 years of service. Nick is currently a consultant for the U.S. Department of Labor, Bureau of Labor Statistics Short-Term Forecasting Consortium. He is also an adjunct instructor, Troy University, Global Campus, where he teaches principles of economics. Dr. Minadeo is on the faculty of the University of Phoenix, Nashville and the campus business lead faculty area chair; he teaches undergraduate economics, statistics, research principles and criminal justice communication, as well as graduate economic and statistics courses.

Justen Perry
Justen Perry is currently finishing a master’s degree in economics from Middle Tennessee State University with a concentration in financial economics. He completed his undergraduate work at the University of Tennessee at Martin, where he obtained a bachelor’s degree in business administration with a double major in finance/economics and management. He is currently interning for Colliers Turley Martin Tucker in Nashville, where he has been since the beginning of March. He is also the owner of a startup research company, Middle Tennessee Research Analytics, which focuses on both qualitative and quantitative research, along with Adam Sawyer, also an author of this paper.

Adam Sawyer
Adam Sawyer has a master's degree in economics from Middle Tennessee State University with a concentration in financial economics. He currently works for an institutional equity research firm following public homebuilders and related industries. His background in programming and statistics was employed in creating this paper's analysis.

References

Articles

- http://www.ciremagazine.com/article.php?article_id=845

Citations

1. **Dallas City Data**
   http://www.city-data.com/us-cities/The-South/Dallas.html
2. **Craig's Ranch**
   http://www.craigranchtx.com/
3. **Lynx Light Rail**
   http://www.charmeck.org/Departments/CATS/LYNX/home.htm
4. **2003 Challenge**
   http://aiaseattle.org/node/1977
5. **Seattle Light Rail**
   http://www.seattle.gov/transportation/lightrail.htm
6. **Ameriplex Wildlife Designation**
   http://www.indianawildlife.org/newsWildlifeNeighborhood.htm
7. **Hiawatha Light Rail**
   http://www.metrotransit.org/rail/
8. **Philadelphia City Data Quote**
   http://www.city-data.com/us-cities/The-Northeast/Philadelphia.html
9. **Septa**
   http://www.septa.org/
10. **Phoenix Light Rail**
    http://phoenix.about.com/od/transbus/a/lightrail.htm
11. **STAR**
    http://www.stpaul.gov/index.asp?nid=1162

City Data Pages

- **Minneapolis**
  http://www.city-data.com/us-cities/The-Midwest/Minneapolis-Economy.html
- **Philadelphia**
  http://www.city-data.com/us-cities/The-Northeast/Philadelphia.html
- **Seattle**
  http://www.city-data.com/us-cities/The-West/Seattle.html
- **Charlotte**
  http://www.city-data.com/us-cities/The-South/Charlotte.html
- **Nashville**
  http://www.city-data.com/us-cities/The-South/Nashville.html
- **Dallas**
  http://www.city-data.com/us-cities/The-South/Dallas.html
- **Indianapolis**
  http://www.city-data.com/us-cities/The-Midwest/Indianapolis.html
- **Phoenix**
  http://www.city-data.com/us-cities/The-West/Phoenix.html

HUD

- http://www.hud.gov/

Market Statistics

- **Charlotte**
  http://quickfacts.census.gov/qfd/states/37/3712000.html
- **Dallas**
  http://quickfacts.census.gov/qfd/states/48/4819000.html
- **Indianapolis**
  http://quickfacts.census.gov/qfd/states/18/1836003.html
- **Minneapolis**
  http://quickfacts.census.gov/qfd/states/27/2743000.html
- **Nashville**
  http://quickfacts.census.gov/qfd/states/47/4752006.html
- **Philadelphia**
- http://quickfacts.census.gov/qfd/states/42/4260000.html
- **Phoenix**
  http://quickfacts.census.gov/qfd/states/04/0455000.html
- **Seattle**
  http://quickfacts.census.gov/qfd/states/53/5363000.html

Mixed-Use Developments in the Twin Cities

- http://www.lisc.org/twin_cities/assets/asset_upload_file884_6670.pdf

New Markets Tax Credit

- http://www.cdfifund.gov/what_we_do/programs_id.asp?programID=5

Resources

- Jeff Bonar (Seattle)
- Jim Mayland (Minneapolis)
- Mike Ottillio (Dallas)
- Stewart Park (Phoenix)
- Rose Penny (Philadelphia)
- Kate Reilly (Charlotte)
- Keith Zeff (St. Louis)

TIF Bonds

- http://www.cdfa.net/cdfa/cdfaweb.nsf/pages/tifbondsrated.html
- http://www.nysedc.org/memcenter/TIF%20Paper.pdf

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