# Determinants of the Terms and Performance of Office Leases

Lynn M. Fisher

and

Brian A. Ciochetti

Department of Urban Studies and Planning, and
Center for Real Estate
Massachusetts Institute of Technology

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## Abstract

The most fundamental element of value to office properties is the cash flow generated by office rents. The long term leases that govern these cash flows are therefore of primary importance. Yet relatively little empirical research has been done on commercial leases, largely because of a lack of large-scale, detailed databases on such leases. In this paper, we begin to examine the contractual nuances of commercial office leases using a proprietary set of leases that are written from 2001-2005 from a single landlord with a significant portfolio of office buildings throughout the U.S. We address several pieces of conventional wisdom, which in effect seem to assume great homogeneity among office leases. To the contrary, we find wide variation in lease lengths, size, the presence of options, and the frequency and level of tenant improvements. Further, these contractual terms vary systematically with the type of tenant industry, across geographic markets and in the presence of other lease terms. The use of options is more likely in longer leases, however, leases are still frequently renegotiated. The rate at which tenants renew leases varies across cohorts of lease length and is generally lower than conventional assumptions at about 55%.

While exploratory in nature, we think that many of these findings are consistent with attempts by both landlords and tenants to minimize the costs of contracting, and that such an "optimal contracting" perspective can provide insight and perhaps a useful framework for understanding the phenomenon of leasing, and leasing strategy, in greater depth.

## Introduction

The most fundamental element of value to office properties is the cash flow generated by office rents. The long term leases that govern these cash flows are therefore of primary importance. Yet relatively little empirical research has been done on commercial leases, largely because of a lack of large-scale, detailed databases on such leases. Due to a collaborative effort between an industry partner and MIT/CRE, a new and detail rich data set has been made available for research. Even that this exploratory stage, we are excited by the prospect of new findings that will certainly lead to a better understanding of these fundamental contracts.

Anyone who has modeled the leases in an office building will attest to their complexity. On the other hand, leases often fail to be sufficiently flexible to adjust to changing circumstances. Changes wrought by the exercise of options in a lease or the renegotiation of lease terms can cause considerable changes to cash flows, the amount of space occupied and the duration of the landlord-tenant relationship. However, these sorts of changes are rarely modeled and little is known about how various rights and obligations, as well renegotiation, affect the value of office buildings.

In this paper, we begin to examine the contractual nuances of commercial office leases using a proprietary set of leases that are written from 2001-2005 from a single landlord with a significant portfolio of office buildings throughout the U.S. We address several pieces of conventional wisdom, which in effect seem to assume great homogeneity among office leases. To the contrary, we find wide variation in lease lengths, size, the presence of options, and the frequency and level of tenant improvements. Further, these contractual terms vary systematically with the type of tenant industry, across geographic markets and over time.

We take advantage of the structure of our data to examine the rate at which leases are renegotiated, and our findings challenge industry and academic standards for lease valuation which assume that the price and other terms of a lease are fixed for the lease's duration. In particular, we observe that 14% of all new leases during a 5 year window of time incur some sort of renegotiation. For more seasoned new leases, this rate of

renegotiation climbs to 25 - 35%. For leases commenced in 2001, nearly 18% result in early terminations. While we do not speculate as to whether contracts were optimally written *ex ante*, our investigation of lease renegotiation documents that the hazards of long term contracting are real and establishes renegotiation as a source of intra lease risk that deserves attention in the valuation and management of office buildings.

Finally, we calculate a rate of renewal for a subset of relatively short leases that could have naturally expired during our sample period. We find that the renewal rate is merely 55% relative to a commonly used rate of 70% or 75% in industry lease models. Further this rate is seen to vary across cohorts of different lease length.

While exploratory in nature, we think that many of these findings are consistent with attempts by both landlords and tenants to minimize the costs of contracting, and that such an "optimal contracting" perspective can provide insight and perhaps a useful framework for understanding the phenomenon of leasing, and leasing strategy, in greater depth. On one hand, short term leases provide for greater flexibility, but they induce frequent (costly) bargaining over time. Long term leases may reduce bargaining costs by stipulating the terms of trade for a long period of time, but may result in poor adaptation of the contract to future events and lead to renegotiation. The use of options and other contractual rights (like sub-leasing) may also influence these transactions costs. Further work is warranted to better model the effective length of leases and their options and to specify a structural model that can help uncover the influence of supply and demand in determining the structure of observed lease contracts. This work is on-going in collaboration between MIT/CRE and industry, and will form the subject of future papers.

In the next section, we describe the relatively short academic literature on leasing characteristics and lease length. The following section describes the data set and then we report summary statistics for various aspects of the leases, the tenants and the markets covered in some detail. Then, we employ exploratory regression analysis to examine at a basic level the relationships between lease length and other lease, market and tenant characteristics. The final two sections explore lease outcomes and renegotiation activity.

## Literature

Leases define the cash flows, rights and privileges of tenants and landlords. In doing so, leases create a governance structure affecting the value of leased real estate assets. Despite the obvious importance of leases to asset value, little is known empirically about the determinants and tradeoffs among different lease provisions and the impact of these provisions on lease performance. Recently, some researchers have investigated the strategic motivation for and the implication of lease structures. For example, the one strand of literature examines the choice and pricing of alternate contractual terms in the presence of asymmetric information (Benjamin, *et. al.* 1992; Mooradian and Yang 2000, 2002). The implications of these models is that landlords may be able to price discriminate by offering a menu of contracts that appeal to different tenants. Wheaton (2000) suggests that agency problems in retail leasing may explain percentage lease arrangements. In this sense, the Wheaton analysis shows how the lease arrangement improves the value of the relationship by anticipating opportunistic behavior of one party or another.

One feature that has received little attention in the real estate academic literature is the variation in lease length and the association between lease length and other contractual provisions. In the economics literature, empirical studies of coal and natural gas leases have examined lease length (Joskow 1987; Mulherin 1988). These studies relate contract length to the potential for a landlord to expropriate the tenant's sunk investments. When such opportunities exist, longer leases which avoid renegotiation are expected to be socially optimal and the empirical data confirm this prediction.

With respect to real estate, Geltner and Miller (2001) suggest that lease length largely reflects tradeoffs between releasing costs and needs for flexibility. Fisher (2004) observes cross-sectional variation in average lease lengths across different uses of space in a sample of sale and leaseback transactions. She speculates that lease length is related to the expected difficulty of lease renegotiation and renewal. McCann and Ward (2004) model various transaction costs in determining the optimal length of leases when tenants expect to make repeated transactions within a finite span of time. Like the previous work, they view lease length as an endogenous part of the lease contracting decision.

On one hand, short leases provide flexibility so that the contractual relationship can be constantly adapted to current business and market conditions. Indeed, when long-term contracts are written, the contract may inhibit the efficient renegotiation of the relationship as time progresses and the original terms of the contract begin to diverge from those that would be optimal under current market conditions. On the other hand, frequent bargaining can be costly, and especially so in the presence of sunk investments which may allow one party may attempt to expropriate value from the other. Therefore, the choice of contract length is expected to reflect the tradeoffs between the expected costs of repeated bargaining resulting from short term leases and the expected costs of poor adaptation that result from longer leases (Crocker and Masten 1988).

While some researchers have used option pricing to value lease terms like cancellation options (Schallheim and McConnell 1985; Grenadier 1995), options to renew "at market," for example, have no financial option value. Such "worthless" options may be valuable to landlords and tenants because the option sets a starting place for bargaining by pre-specifying the terms at which renewal can occur (thus reducing bargaining costs), while preserving flexibility by adapting the lease to market conditions upon renewal or by allowing the relationship to dissolve in the case of a non-renewal. Several economic studies consider the use of options in addition to lease length to manage leasing relationships (Crocker and Masten 1985, 1988). These authors also point out that unilateral options are often preferred to more complicated contingency clauses in contracts due to lower costs of enforcement. Their studies investigate unilateral options designed to promote flexibility and which operate like liquidated damages clauses by allowing the one or the other party to "breach" the original contract for a price. In the case of office leases, options to contract, terminate (cancel) and expand operate in this fashion. And while these options can be theoretically valued as financial options with a particular strike price, we are interested in their strategic value in providing for efficient adaptation in long term leases.

## Data

The data used in this study are from a proprietary set of detailed office lease data from a single, large industry participant who owns a significant portfolio of office properties in

the U.S. While the use of a single firm's lease data seems restrictive, these leases cover a wide range of metropolitan areas and are negotiated in a decentralized manner that should reflect market prices and norms. The data cover leases in portfolio from 2001-2005 that incur some activity either initiating or modifying the lease. Following an initial cleaning and recoding of the data, we have information concerning more that 10,000 distinct leases across 39 geographic markets. Within this set of leases, 4,875 leases are identified as new leases.

The lease observations that represent on-going relationships present difficulties in understanding the scope of the entire lease. What is captured in this data during the 2001-2005 window is any activity that constitutes a change to the existing use of space by a tenant. Because amendments are often recorded with respect to a change to the use of a particular subset of space, say, an expansion of 2,000 square feet, we do not always observe the total amount of space covered by the lease or the initial lease length, etc. Therefore, new leases provide the most complete picture of the lease structure. The drawback to focusing on only new leases, however, is that the short time series truncates many of these leases before we observe how they resolve.

On the other hand, the novelty of this data is precisely the fact that we can observe the renegotiation of the lease by observing groups of activity that set forth current and future modifications to the lease. For example, some leases specify *ex ante* that a tenant will take down different portions of space at certain dates in the future. We think it is important to distinguish whether an apparent space expansion was planned and part of complex contract as opposed to an unexpected change negotiated after the initial lease was written. Understanding the rate at which leases are renegotiated may constitute a significant improvement to our understanding of intra-lease risk.

We apply several filters to ensure a robust data set for analysis. In particular, we drop leases in markets with less than 100 observations and leases that are less than 12 months in length (1038 total observations).[1] Of the remaining leases, another one is dropped because it is an outlier in terms of length (65 years), 3 are removed because they are less

[1] We also drop leases in one market with more than 100 lease observations due to a lack of option data.

than 200 square feet in size and 21 others are eliminated because they are miscoded in a way that we cannot interpret them. 157 other leases must be dropped due to incomplete building information regarding location or class. This leaves 3,655 new leases with complete information for analysis.

## Summary Statistics

In this section we investigate and describe the characteristics of the new leases with respect to size, length, geographic market, tenant industry, tenant improvements and options. The 3,655 new leases are distributed across 14 markets and 18 industries. The data primarily cover lease activity during 2001 – 2005. More precisely, a lease is included if it commences in 2001 or after, although it may have been negotiated prior to 2001 (that is, it may have an activity date preceding 2001). We use an activity date, distinct from the leases commencement date, as a proxy for the lease execution date. Random inspections confirm that activity dates largely correspond to the date of the lease or amendment and are typically, although not always, prior to the commencement date. Some activity dates are post-commencement, and these observations correspond to retroactive activity on the lease (again, as confirmed by random inspections). The data end in December of 2005, and leases negotiated in 2005 may have not yet commenced when the sample period ends. Therefore, leases in the data set are negotiated between 1999 and 2005 with commencement dates between 2001 and 2007.

The sample is composed primarily of class A, suburban office leases (see Table 3 below). The leases mostly utilize base year expense structures (70%), although a significant minority is in triple net leases (23%) and fewer still are gross leases (7%). As mentioned, all of the 14 markets have at least 100 observations, and the lease observations in any particular market are generated by no less than 14 different buildings.

### *Size*

In terms of square footage, the markets with the most new lease activity over the sample period are San Francisco, Chicago, Seattle, Boston, and San Jose, respectively (Table 1). The average newly leased space is 5,953 square feet, although the median size is only

2,882 square feet. The smallest leases are 200 square feet and the largest are in excess of 150,000 square feet.

**Table 1. Square Footage of New Leases by Market**

| Market | Mean | Median | Mkt Total | % Sample | # Leases |
|---|---|---|---|---|---|
| San Francisco | 7,112 | 2,931 | 2,802,097 | 12% | 394 |
| Chicago | 6,330 | 3,182 | 2,620,448 | 12% | 414 |
| Seattle | 6,809 | 2,819 | 2,321,760 | 10% | 341 |
| Boston | 8,107 | 4,017 | 2,269,866 | 10% | 280 |
| San Jose | 5,287 | 2,696 | 2,077,949 | 9% | 393 |
| Los Angeles | 6,946 | 3,270 | 1,944,951 | 9% | 280 |
| Orange County | 4,109 | 2,375 | 1,467,035 | 6% | 357 |
| Atlanta | 7,274 | 3,715 | 1,316,506 | 6% | 181 |
| Washington DC | 11,437 | 4,740 | 1,246,666 | 6% | 109 |
| Portland | 4,133 | 2,275 | 1,074,612 | 5% | 260 |
| Denver | 5,042 | 2,928 | 877,336 | 4% | 174 |
| Oakland | 4,790 | 2,936 | 637,126 | 3% | 133 |
| Sacramento | 2,790 | 1,813 | 599,841 | 3% | 215 |
| San Diego | 4,046 | 2,680 | 501,721 | 2% | 124 |
| **Total** | 5,953 | 2,882 | 21,757,914 | 100% | 3655 |

Table 2 describes tenant types according to industry groups. Legal, software, investment services and consulting firms are the four largest tenants in terms of space occupied in new leases during the sample period. Tenants for whom no NAICs code is available are grouped into the category “other industries.” These tenants tend to occupy smaller spaces, and therefore we suspect that these tenants represent a group of smaller firms on average.

**Table 2. Square Footage of New Leases by Tenant Industry**

| Industry | Mean | Median | Industry Total | % Sample | # Leases |
|---|---|---|---|---|---|
| Legal | 6,873 | 2,943 | 2,412,251 | 11% | 351 |
| Software | 7,275 | 3,263 | 1,986,080 | 9% | 273 |
| Investment Services | 5,277 | 2,757 | 1,799,301 | 8% | 341 |
| Consulting | 5,391 | 2,762 | 1,655,063 | 8% | 307 |
| Media | 6,838 | 3,249 | 1,600,173 | 7% | 234 |
| Credit Companies | 5,188 | 2,951 | 1,504,529 | 7% | 290 |
| Insurance | 7,200 | 4,065 | 1,461,613 | 7% | 203 |
| Other industries | 4,043 | 2,059 | 1,443,418 | 7% | 357 |
| Acct. & Admin. | 4,813 | 2,615 | 1,212,890 | 6% | 252 |
| Engineering & Tech. | 7,279 | 3,156 | 1,179,257 | 5% | 162 |
| Banking | 6,616 | 3,911 | 800,566 | 4% | 121 |
| Public Administration | 14,172 | 6,496 | 751,120 | 3% | 53 |
| Healthcare & Pharm. | 6,483 | 3,179 | 745,500 | 3% | 115 |
| Computer Manuf. | 6,118 | 3,409 | 660,761 | 3% | 108 |
| Real Estate | 4,293 | 2,324 | 592,410 | 3% | 138 |
| Personal Services | 6,576 | 2,835 | 532,641 | 2% | 81 |
| Engergy, Utilities & Const. | 4,612 | 2,537 | 521,128 | 2% | 113 |
| Retail, Wholesale & Transp. | 6,287 | 2,737 | 502,939 | 2% | 80 |
| Manufacturing | 5,214 | 1,995 | 396,274 | 2% | 76 |
| **Total** | 5,953 | 2,882 | 21,757,914 | 100% | 3,655 |

While the typical size of individual leases vary across industries, so too do the average and median lease size across intra-metropolitan locations and class (Table 3). In fact, the average size of individual leases is significantly different for both CBD versus suburban location and between class A and B space.[2]

**Table 3. Size of New Leases by Location and Class**

| Location | Mean | Median | Market Total | % Sample | # Leases |
|---|---|---|---|---|---|
| CBD | 7,444 | 3,313 | 6,364,710 | 29% | 855 |
| Suburban | 5,498 | 2,750 | 15,400,000 | 71% | 2800 |
| Total | 5,953 | 2,882 | 21,764,710 | 100% | 3655 |
| | | | | | |
| **Class** | **Mean** | **Median** | **Market Total** | **% Sample** | **# Leases** |
| A | 6,171 | 3,004 | 17,400,000 | 80% | 2827 |
| B | 5,210 | 2,341 | 4,313,524 | 20% | 828 |
| Total | 5,953 | 2,882 | 21,713,524 | 100% | 3655 |

[2] The classification of space is meant to represent its quality (class A being of higher quality than class B, for example), but is in fact a self-reported measure by property owners that is not well defined.

### *Lease Length*

The length of leases is of particular interest in this study. If transaction costs and business needs vary across firms and markets, we might expect to observe systematic variation in lease length with different tenants, in different geographic markets or with other provisions or options embedded in the lease. For our sample of 3,655 new leases, 50% of the sample has lease lengths between 36 and 61 months, with a median lease length of 48 months. The longest leases are between 15 and 16 years in length, while the smallest are just 1 year in length due to the restrictions that we have placed on the data. In Figure 1 we provide a histogram of lease lengths according to 12 month intervals. The mode of the data is clearly 5 years, however 50% of the sample is comprised of leases that are 4 years or less in length. In Figure 2 we further group the leases into baskets of lease lengths of generally 24 months which will prove to be useful for further analysis. These baskets are defined as 12-35 months (1 year), 36-59 months (3 years), 60-83 months (5 years), 84 months plus (7+ years).

In Table 4, we report on lease lengths by tenant type. A median lease length of 3 years is characteristic of different sorts of manufacturing, energy, software and media firms, while many other industries exhibit median tendencies around 5 years in length.

**Table 4. New Lease Length in Months by Industry**

| Industry | Mean | Median | # Leases |
|---|---|---|---|
| Public Administration | 65 | 60 | 53 |
| Insurance | 59 | 60 | 203 |
| Healthcare & Pharm. | 59 | 60 | 115 |
| Legal | 58 | 60 | 351 |
| Banking | 58 | 60 | 121 |
| Personal Services | 57 | 60 | 81 |
| Engineering & Tech. | 57 | 60 | 162 |
| Acct. & Admin. | 53 | 60 | 252 |
| Investment Services | 53 | 60 | 341 |
| Manufacturing | 51 | 38 | 76 |
| Retail, Wholesale & Transp. | 51 | 60 | 80 |
| Real Estate | 50 | 39 | 138 |
| Consulting | 49 | 39 | 307 |
| Credit Companies | 46 | 48 | 290 |
| Media | 45 | 37 | 234 |
| Computer Manuf. | 45 | 37 | 108 |
| Engergy, Utilities & Const. | 44 | 38 | 113 |
| Other industries | 41 | 36 | 357 |
| Software | 40 | 36 | 273 |
| Total Sample | 50 | 48 | 3655 |

We note in Table 5 how lease lengths vary by geographic market, but it is unclear whether these differences simply reflect a composition effect according the distribution of tenants in that market or some other influence. We rank markets according to the percent of new square footage in the longest length category (7+ years). Looking at this longest length category, it is striking to find wide variation. At the low end, 10% of the total square footage in Sacramento is held in long term leases, while up to 55% of the square footage in Boston is governed by leases of 7 or more years. Lease lengths also vary systematically with location and class of space. Leases located in CBDs and in class A spaces have a median lease length of 60 months, while suburban spaces have a median length of 39 months and class B spaces, 36 months.

**Table 5. Percent of a Market's New Lease Square Footage by Lease Length**

| | Length Category | | | |
|---|---|---|---|---|
| | 1 year | 3 years | 5 years | 7+ years |
| Sacremento | 11% | 30% | 48% | 10% |
| Orange County | 16% | 30% | 42% | 13% |
| San Diego | 16% | 33% | 39% | 13% |
| Oakland | 9% | 22% | 51% | 18% |
| Portland | 8% | 15% | 52% | 25% |
| San Jose | 19% | 25% | 30% | 27% |
| Denver | 10% | 25% | 38% | 27% |
| Los Angeles | 17% | 20% | 27% | 37% |
| Atlanta | 8% | 18% | 32% | 42% |
| San Francisco | 11% | 17% | 28% | 44% |
| Seattle | 10% | 11% | 36% | 44% |
| Washington DC | 11% | 10% | 33% | 46% |
| Chicago | 10% | 12% | 26% | 52% |
| Boston | 9% | 10% | 27% | 55% |
| Total | 12% | 18% | 33% | 37% |

Lease length also varies according to the size of the lease. Table 6 describes the mean and median size of leases with different lengths. There is a pronounced difference in square footage among the different lease lengths. Further analysis shows that the each category of lease length's mean size (across all markets) is significantly different from the next longer lease category. These differences are significant at the 5% level between 1 year and 3 year lease lengths, and at better than the .001% level for the other comparisons. It is also interesting to observe the importance of the longer leases as they represent the bulk of the square footage of new lease activity (with the smallest proportion of actual leases). Indeed, for many markets, the mean square footage of the longest leases is 2-3 times the average square footage of 5 year leases.

**Table 6. Mean Lease Length and Square Footage by Market**

| | | Mean Square Footage | | | | |
|---|---|---|---|---|---|---|
| **Market** | **Mean Length** | **1 year** | **3 year** | **5 year** | **7+ year** | **# Leases** |
| Orange County | 41 | 2,256 | 2,930 | 6,351 | 20,779 | 357 |
| San Jose | 41 | 2,850 | 3,927 | 6,066 | 22,990 | 393 |
| San Diego | 43 | 2,311 | 3,044 | 6,711 | 9,164 | 124 |
| Sacramento | 47 | 1,564 | 2,420 | 3,283 | 6,904 | 215 |
| Denver | 48 | 2,745 | 3,235 | 5,461 | 18,182 | 174 |
| San Francisco | 49 | 3,036 | 4,231 | 5,900 | 27,819 | 394 |
| Oakland | 50 | 2,553 | 3,230 | 5,453 | 15,953 | 133 |
| Portland | 50 | 1,842 | 2,528 | 4,035 | 22,664 | 260 |
| Los Angeles | 53 | 5,644 | 4,685 | 5,087 | 19,202 | 280 |
| Atlanta | 53 | 2,787 | 4,358 | 7,214 | 18,521 | 181 |
| Seattle | 54 | 3,881 | 2,714 | 5,821 | 21,135 | 341 |
| Chicago | 58 | 2,816 | 3,391 | 4,737 | 16,144 | 414 |
| Boston | 60 | 3,857 | 3,998 | 5,327 | 21,351 | 280 |
| Washington DC | 68 | 17,230 | 5,855 | 8,652 | 17,831 | 109 |
| Total | 51 | 3,107 | 3,495 | 5,461 | 19,697 | 3,655 |

### *Tenant Improvements*

Of new leases, 77% contain positive amounts of tenant improvements. In our data, tenant improvements are recorded if the landlord is responsible for the build-out whether or not they bear the full cost directly. The mean allocation of tenant improvements (TIs) for leases with positive TI allowances is $15.43 per square foot and the median amount is $11.49. As one might expect, there is large variation in TIs across markets and tenant industries. In Table 7, Boston and Washington D.C. stands out as having high mean and median TIs, while 88% of the new leases written in Sacramento have positive levels of TIs.

**Table 7. Tenant Improvements by Market ($ psf)**
**(summary statistics calculated for leases with *positive* amounts of TIs)**

| Market | Mean | Median | # Leases | % Pos. |
|---|---|---|---|---|
| Boston | 26.39 | 21.91 | 222 | 79% |
| Washington DC | 22.87 | 23.81 | 83 | 76% |
| San Francisco | 20.47 | 17.59 | 294 | 75% |
| Los Angeles | 17.71 | 15.00 | 212 | 76% |
| Chicago | 17.27 | 12.83 | 322 | 78% |
| Oakland | 16.95 | 15.00 | 113 | 85% |
| Seattle | 15.29 | 11.21 | 260 | 76% |
| Denver | 13.22 | 11.43 | 139 | 80% |
| Portland | 12.47 | 11.00 | 211 | 81% |
| Atlanta | 12.44 | 11.61 | 128 | 71% |
| Orange County | 10.52 | 8.00 | 271 | 76% |
| San Jose | 10.21 | 6.61 | 286 | 73% |
| Sacramento | 9.99 | 7.00 | 190 | 88% |
| San Diego | 9.79 | 8.13 | 101 | 81% |
| Total | 15.43 | 11.49 | 2832 | 77% |

By tenant type, software, computer manufacturing and the other industry category have the lowest TI allocations while insurance and personal service companies have the highest mean tenant improvements (Table 8). There is also a significant difference in the mean TIs between CBD and suburban leases ($21.45 and $13.66 psf) and between class A versus class B ($16.31 and $12.30 psf).

**Table 8. Tenant Improvements by Tenant Industry**

| Industry | Mean | Median | # Leases | % Pos. |
|---|---|---|---|---|
| Insurance | 20.25 | 17.10 | 176 | 87% |
| Personal Services | 19.97 | 17.89 | 64 | 79% |
| Legal | 17.92 | 14.55 | 281 | 80% |
| Banking | 17.57 | 16.27 | 93 | 77% |
| Investment Services | 17.49 | 12.66 | 266 | 78% |
| Public Administration | 16.78 | 15.00 | 45 | 85% |
| Consulting | 15.78 | 12.00 | 231 | 75% |
| Engineering & Tech. | 15.67 | 10.00 | 130 | 80% |
| Acct. & Admin. | 15.56 | 12.00 | 207 | 82% |
| Healthcare & Pharm. | 15.24 | 12.00 | 100 | 87% |
| Manufacturing | 14.80 | 10.00 | 61 | 80% |
| Retail, Wholesale & Transp. | 14.68 | 11.43 | 67 | 84% |
| Media | 14.11 | 10.79 | 172 | 74% |
| Real Estate | 13.79 | 9.00 | 104 | 75% |
| Credit Companies | 13.39 | 10.00 | 236 | 81% |
| Engergy, Utilities & Const. | 13.29 | 10.00 | 83 | 73% |
| Software | 13.15 | 8.75 | 198 | 73% |
| Computer Manuf. | 12.41 | 10.31 | 84 | 78% |
| Other industries | 11.54 | 9.00 | 234 | 66% |
| Total Sample | 15.43 | 11.49 | 2832 | 77% |

We also chart average tenant improvements per lease (per square foot) and the average square footage of new leases over the years covered by our sample in Figure 3. There is a rise in average TIs, deal square footage and lease length over time, although our time series is admittedly short. Medians produce a similar trend.

### *Options*

The final set of lease characteristics to be described is the presence of various types of options within the sample of new leases. Options give the holder the right but not the obligation to do something, and the exercise of the option is often subject to terms set forth in the description of the option. In particular, fees for events like the termination or reduction of space or the rent at which a renewal may commence are often negotiated at the time of writing the option. This can significantly reduce transaction costs for one or both parties *ex post*. Take for example the option to renew at market rents. An option to renew may provide flexibility to a tenant, because she does not have to continue to use the space (she does not have to exercise the option and can allow the lease to expire). On

the other hand, the presence of the option assures her that if it is desirable to continue the relationship, the landlord cannot extract additional (above market) rent from her just because she has revealed her wish to continue occupancy. Such an opportunity may exist whenever it is costly for the tenant to move or when the next best space for occupancy does not provide the same business value as the space currently occupied. This is easy to imagine in the case of highly specialized space with significant tenant improvements or when proximity to certain clients matters.

While new leases in our sample are often associated with multiple options, 38% of the sample has at least 1 option, and 32% has at least 1 *renewal* option. Other options include options to contract (in less than 1% of new leases) or expand (1.5%), rights of first offer and refusal (10% grouped together) and termination options (10%). Only in Los Angeles to a majority of new leases contain options, however, and the least frequent use of options is 27% is found in San Diego (Table 9). Over 20% of new leases in Atlanta, Boston and Los Angeles have more than one option.

**Table 9. Percent of Leases with None, 1 or more than 1 Option by Market**

| | Number of Options | | |
|---|---|---|---|
| **Market** | **None** | **1** | **> 1** |
| Los Angeles | 49% | 28% | 23% |
| Sacramento | 52% | 37% | 12% |
| Oakland | 52% | 32% | 17% |
| Washington DC | 55% | 30% | 15% |
| Boston | 58% | 21% | 21% |
| Portland | 59% | 27% | 14% |
| Atlanta | 60% | 18% | 23% |
| San Jose | 63% | 26% | 10% |
| Seattle | 64% | 18% | 18% |
| Chicago | 64% | 19% | 17% |
| San Francisco | 68% | 23% | 10% |
| Orange County | 69% | 23% | 8% |
| Denver | 71% | 16% | 13% |
| San Diego | 73% | 17% | 10% |
| Total | 62% | 24% | 15% |

Further analysis reveals that the rate at which options are observed in leases does not seem to vary systematically between CBD and suburban locations, however the rate is significantly different along other dimensions. For example, 40% of leases over class A

space have options, while only 28% of leases over class B space have one or more options. In addition, we report below in Table 10 the mean size, length and TIs of leases, and these means are significantly different between option sub-samples. In general, larger leases for longer periods of time and with higher TI allocations are more likely to contain options.

**Table 10. Mean Square Footage, Length and TIs by Options**

| | Mean | | | |
|---|---|---|---|---|
| # Options | Sq. Footage | Length | TIs | # Leases |
| None | 4,541 | 43 | $8.67 | 2260 |
| 1 | 5,291 | 55 | $14.13 | 861 |
| > 1 | 12,998 | 76 | $22.39 | 534 |

## Ex Ante Determinants of Lease Length

In this section, we seek to further explore the *ex ante* determinants of lease length. In particular, we want to see if any of the univariate relationships dominate each other. For example, are differences in length across markets explained by different compositions of tenants or lease sizes? In addition, we want to investigate the time trend in lease lengths. Although we capture only a small part of the business or real estate cycle, we observe several variables of interest, like tenant improvements, size and length moving together not only in cross-section, but over time.

The literature suggests two tradeoffs in determining lease length between the transaction costs of frequent negotiation on one hand and inflexibility of long leases on the other. Obviously, an equilibrium outcome is determined by both the landlord and tenants in the market who may value these tradeoffs differently. In this section, we begin to investigate lease length in a multivariate context by looking at variation in lease size, tenant types, the extent of tenant improvements and market conditions. We also introduce quarterly vacancy rates by market, CBD versus suburban location and class from Torto Wheaton to investigate differences across markets. However, we do not have an *ex ante* prediction about the relationship between vacancy level and lease length. It may be the case that the transaction costs to landlords and tenants are not symmetric when market vacancies are high or low, and therefore the equilibrium lease lengths may reflect bargaining between landlord and tenant.

To begin, we chart the frequency of leases according to lease length and by commencement year in Figure 4. We add the level of real private nonresidential investment in machinery and software on the right hand vertical axis. Notice the slight positive trend in the amount of real private nonresidential investment and the frequency of long (7+ year) leases. We also observe in Figure 3 that the average amount of tenant improvements per square foot per lease and the average size of leases are increasing over the sample period.

If bargaining costs are positively associated with (sunk) investments in a particular leased space, then we might expect both landlords and tenants to prefer longer leases under these conditions. Landlords might prefer longer leases in the presence of large tenant improvements since they may incur high transaction costs in disassembling such improvements and placing the space back into the market. Tenants want to avoid the possibility that the landlord can expropriate higher rent from them if their next best alternative is less desirable or will require new investment to specialize. The level of tenant improvements may also proxy for business investment in general. Fisher (2004) models the importance of non-contractible tenant and landlord investment activity as one determinant of lease length. If firms actively engaged in physical investments are also planning to make other investments, say in human capital that will be located in a particular place, they may prefer longer term leases in order be assured of the gains to those investments as well.

Alternatively, tenants may use options to contract ex ante over the rights to continue using the space. In this way they can retain the ability to negotiate a renewal but set boundaries to mitigate the landlord's negotiating power.[3] However, the choice between a long term lease and a shorter lease with an option to renew will likely depend on the price of those features which is beyond our currently modeling. Our simple analysis thus far, however, shows that tenant improvements, longer leases and the use of more options are indeed positively correlated

[3]We should also note that landlords sometimes finance tenant improvements in the lease rate and so a longer lease term may also be desirable in order to amortize the investment at a certain payment level.

Likewise, the very large square footage spaces may be hard to come by in the market and there may be fewer potential tenants for such space. Bargaining may be more costly due to increased complexity when the space spreads over different floors or suites within the building. In this case, we might again expect both landlords and tenants to prefer longer leases when large spaces are brought under contract.

We begin our exploratory regressions simply by modeling lease length in months as a function of the size of the leased space and its square in specification 1 in Table 17. As predicted, the size of the space has a positive but non-linear relationship with lease length. We further control for market conditions by differentiating CBD and suburban buildings and class A and B space in specification 2. Next, we add in tenant improvements per square foot and its square. The signs on all coefficients are as expected based on our prior summary statistics. In addition, the fit of each coefficient improves with the addition of additional right hand side controls. In the analysis that follows, each of these factors is remarkably robust to a variety of specifications.

In specification 4 we incorporate dummy variables for the type of tenant industry. In particular, we think that firms in different industries will have different preferences for flexibility due to the volatility of their business, or that they will be more or less concerned about securing a particular location (address) in the market. The omitted industry group is Accounting and Administrative. Recalling that the mean lease length of accounting firms in the sample is 53 months, several tenant types register significantly shorter lease lengths on average, all else equal. Software, computer and media stand out as having typically short lease lengths and are considered more volatile industries. The smaller tenants represented by “other industries” also have significantly shorter leases. Overall, the final specification in Table 17 accounts for 48% of the variation in lease length across the sample.

As noted previously, lease length also varies across geographic markets, but we are unsure whether this is merely a composition effect of the particular tenants or typical size of spaces, etc. Introducing controls for MSAs into specification 5 in Table 18 indicates that several markets differ from Atlanta, the omitted MSA. Notice that industry of the

tenant is still controlled for in these specifications in Table 18, however we suppress these results as they remain largely unchanged from specification 4. Several of the California MSAs stand out as having shorter leases even once we control for other factors like size, tenant improvements and tenant industry.

To further investigate the source of differences across markets, we introduce a lagged four quarter average vacancy rate relative to the activity date of an individual new lease.[4] Quarterly vacancy rates are available for each MSA according to class and CBD versus suburban location and are matched to leases on those criteria and the lease activity date. Therefore, we use the lagged vacancy rate as a substitute for both the MSA dummies and the suburban and class B dummy variables found in previous specifications. Effectively, the lagged vacancy rate gauges a short term vacancy level for a particular submarket at a particular time. In specification 6, the explanatory variables of interest change little and the coefficient of the lagged vacancy rate is negative and significantly different form zero.

We believe that lagged vacancy rate is an effective substitute for the omitted dummy variables. Higher vacancy sub-markets tend to be suburban, class B space and these leases tend to be shorter. Given the short time series, we are not sure that the vacancy rate adds to our understanding of lease length.. We suspect that this relationship is fodder for further investigation, especially with a longer time series and controls for changes in employment and other forward looking measures that might help identify the variation in expected bargaining costs across these markets.

Returning to our observation from Figure 4 about the increasing frequency of long leases, if we control for either the activity or commencement year or quarter of individual leases, neither set of controls is significant nor affects the robustness of the other variables. In other words, we appear to explain the increasing lease lengths well. Our results must be interpreted with care since we only observe a short period of time, but our analysis suggests that the apparent trend in lease length over the cycle may be related to the

[4] For example, if a lease was written in the 4th quarter of 2003 (to perhaps commence at some future date), then the lagged vacancy rate is calculated as the average quarterly vacancy from 4th quarter of 2002 to the 3rd quarter 2003 (stated in annual terms).

increasing size of spaces rented and the investments made in those spaces during an upswing of the business cycle.

Finally, we return to the use of dummy controls for MSAs and submarkets and introduce indicators for whether options are present in the lease in specifications 8 and 9. A dummy variable for whether or not any leases are present in the lease has a positive coefficient and improves the fit of the model. Further specifying whether there is a renewal, termination or right of first offer or refusal present further refines the specification. Options are much more likely to be present in longer leases. Notice that termination option has the largest coefficient of just over nine months and is significantly different from the renewal coefficient and the omitted category, no options. This result is intuitive since termination options help improve flexibility and might be most valuable in the context of a longer lease, while renewal options help reduce transaction costs of renegotiation in shorter leases. Overall, leases are much more likely to have options when they are longer.

## Outcomes

We now shift focus from the writing of a lease, to performance, given a particular lease. With respect to outcomes, a new lease can either renew, non-renew, terminate early or be on-going in that it has not yet reach expiration and has not renewed, expired or terminated. We observe that 16% of the leases in the sample renew, 5% do not renew and 7% terminate, leaving 72% of the sample unresolved (on-going). The rate of on-going leases is high because of the relatively short 5 year window that we are able to examine. Table 11 further examines the rate of renewal and termination by year in which the leases commence. For example, more than one-third of the leases written in 2001 renew, 19% do not renew and 15% terminate early. A slightly higher percentage (18%) of leases commencing in 2002 terminate early.

**Table 11. Frequency of Outcomes by Commencement Year**
**(% of total leases each year in parentheses)**

| | Commencement Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Outcome** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **Total** |
| On-going | 48 | 300 | 573 | 667 | 884 | 145 | 4 | 2,621 |
| | **(30.77)** | **(40.82)** | **(63.67)** | **(81.34)** | **(98.77)** | **(100.00)** | **(100.00)** | **(71.71)** |
| Renewal | 55 | 233 | 184 | 90 | 7 | 0 | 0 | 569 |
| | **(35.26)** | **(31.70)** | **(20.44)** | **(10.98)** | **(0.78)** | **(0.00)** | **(0.00)** | **(15.57)** |
| Non-Renewal | 29 | 72 | 53 | 38 | 2 | 0 | 0 | 194 |
| | **(18.59)** | **(9.80)** | **(5.89)** | **(4.63)** | **(0.22)** | **(0.00)** | **(0.00)** | **(5.31)** |
| Termination | 24 | 130 | 90 | 25 | 2 | 0 | 0 | 271 |
| | **(15.38)** | **(17.69)** | **(10.00)** | **(3.05)** | **(0.22)** | **(0.00)** | **(0.00)** | **(7.41)** |
| Total | 156 | 735 | 900 | 820 | 895 | 145 | 4 | 3,655 |
| | (100.00) | (100.00) | (100.00) | (100.00) | (100.00) | (100.00) | (100.00) | (100.00) |

Obviously, the seasoning of leases matters for the measure of lease outcomes. We can further refine the description of renewals, non-renewals and terminations by examining a subset of new leases which could have naturally expired prior to the end of 2005 (the expiring sub-sample). This approach provides the truest rate of renewal and termination but is restricted to 777 leases which represent 21% of all new leases and about 11% of the total square footage of the sample. The distribution of lease lengths by commencement year in this sub-sample is provided in Figure 5. One year leases dominate the sub-sample of expiring leases (with 350 leases), followed by 3 year leases (225 leases) and 2 year leases (194 leases).

We find that the overall rate of renewal in this sub-sample is 55% (Table 12). If we look at the rate of renewal according to the length of the lease, we find that this 55% renewal rate is comprised of a blended rate of 60% for 1 year leases, 53% for 2 year and 49% for 3 year leases. Corresponding to our earlier observation about options and lease length, only 5% of the leases in have renewal options in the expiring sub-sample.

The rate of non-renewal for the expiring sub-sample is 34% and 11% of the leases terminates early. Ignoring the handful of 4 year leases, notice that longer leases are more likely to terminate, while the shorter leases are more likely to renew in Table 12. Only 11 leases in the sub-sample have terminations options.

**Table 12. Frequency of Lease Outcomes by Lease Length for Expiring Sub-Sample (% of total by lease length in parentheses)**

| | Lease Length (years) | | | | |
|---|---|---|---|---|---|
| **Outcome** | **1** | **2** | **3** | **4** | **# Leases** |
| Renewal | 210 | 103 | 111 | 5 | 429 |
| | **(60)** | **(53)** | **(49)** | **(63)** | **(55)** |
| Nonrenewal | 116 | 68 | 77 | 3 | 264 |
| | **(33)** | **(35)** | **(34)** | **(38)** | **(34)** |
| Termination | 24 | 23 | 37 | 0 | 84 |
| | **(7)** | **(12)** | **(16)** | **(0)** | **(11)** |
| Total | 350 | 194 | 225 | 8 | 777 |
| | (100) | (100) | (100) | (100) | (100) |

## Subsequent Activity and Lease Renegotiation

We now investigate the frequency with which leases are renegotiated. As a first step, we observe distinct activity dates that are subsequent to the writing of the new lease as a way of identifying lease activity that is not obligated by the terms of the initial new lease. As defined here, a subsequent activity includes the renewal of a lease, an expansion, an early contraction or an early termination. Natural terminations or contractions of space are not considered renegotiations as these events are anticipated. Nor are other events, like expansions, that commence after the initial lease has begun but which were negotiated as part of the initial lease and are considered an obligation, not an option.[5] For the purposes of this section, we will consider the first activity subsequent to the new lease to create our measure of renegotiation. However we should note that just over 5% of the new leases in our sample have more than one potential renegotitation between 2001 and 2005. The reader may notice, therefore, small discrepancies between our measure of outcome and our measure of renegotiation because renegotiations may undercount some terminations when other activity intervenes before the termination.

We find that 26% of the total sample of new leases has some activity subsequent to the writing of a new lease. This rate of subsequent activity for the whole sample clearly

[5] In this case, the activity date of the expansion, say, would be the same as the activity date of the new lease. However the two events would have different commencement dates.

understates the unconditional propensity, as the newest leases in the sample are barely seasoned.

Table 13 shows the impact of seasoning on our observation of subsequent activity. Here we see that leases commenced in 2001 or 2002 had some sort of further, subsequent activity following the writing of a new lease 57% and 48% of the time, respectively.

**Table 13. Frequency of Renegotiation**
**(% of total leases for each year in parentheses)**

| | Commencement Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Subseq. Activity?** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **Total** |
| **No** | 67 | 383 | 600 | 655 | 863 | 144 | 4 | 2716 |
| | (43) | (52) | (67) | (80) | (96) | (99) | (100) | (74) |
| **Yes** | 89 | 352 | 300 | 165 | 32 | 1 | 0 | 939 |
| | **(57)** | **(48)** | **(33)** | **(20)** | **(4)** | **(1)** | **(0)** | **(26)** |
| **Total** | 156 | 735 | 900 | 820 | 895 | 145 | 4 | 3655 |
| | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) |

We want to identify when leases are renegotiated in order to examine *intra* lease volatility, and so we define lease renegotiations as events that change the *ex ante* terms of a lease. There are clues about this sort of activity within the data from entries about early renewals and early terminations and contractions. In addition, the coding of the type of activity represented in each observation in the data provides further evidence. For example, expansions that occur in conjunction with a renewal of the existing leased space are coded differently from expansions that happen during the course of an existing lease period. Taken together we identify subsequent lease activity that takes effect early as constituting a renegotiation of the lease. Expansions, contractions, renewals and terminations can all be considered renegotiations in the sense that the terms of current activity supersede the terms of the initial lease. For example, some renewal activity is coded as early because the renewal negotiations result in the terms of the renewal being placed into effect prior to the end of the current lease.

To further refine our definition of renegotiation, we also net out any subsequent activities that correspond to the existence of an option for that sort of activity. That is, a subsequent expansion is not considered a renegotiation of the lease if an option to expand

existed in the initial new lease. This assessment results in 43 observations in which early expansions correspond with an option to expand, and 2 other observations in which early terminations correspond to rights to terminate. This is interesting since expansions options appear rather infrequently in our sample and yet they are effectively the only options which are exercised by our calculation. The leases that exercise options represent just under 5% of leases in which we observe subsequent activity.

Conditional on our observation of further lease activity, 55% of such activity represents renegotiations (Table 14). The table also reveals that unconditionally, 14% of the new leases in the sample incur some renegotiation (Panel B).[6] The most frequent types of early renegotiations are expansions, followed by early terminations, early renewals and early contractions (Panel A). Clearly, we need to keep in mind that these statistics represent activity in particular markets over a particular span of time. Nevertheless, the frequency of non-contractual activity (renegotiation) is striking.

**Table 14. Frequency of Subsequent Activity and Early Renegotiation (% by subsequent activity or not in parentheses)**

| **Panel A.** | | | | | | |
|---|---|---|---|---|---|---|
| | **Renegotiation Activity** | | | | | |
| **Subseq. Activity?** | **Expansion** | **Renewal** | **Reduction** | **Termination** | **Contractual Event** | **Total** |
| **No** | 0 | 0 | 0 | 0 | 2716 | 2,716 |
| row % | (0) | (0) | (0) | (0) | (100) | (100) |
| **Yes** | 208 | 89 | 27 | 182 | 433 | 939 |
| row % | **(22)** | **(9)** | **(3)** | **(19)** | **(46)** | **(100)** |
| **Total** | 208 | 89 | 27 | 182 | 3149 | 3,655 |
| row % | **(6)** | **(2)** | **(1)** | **(5)** | **(86)** | **(100)** |
| **Panel B.** | | | | | | |
| Total % of leasees renegotiated: | | | | | | **(14)** |
| Total % of leases renegotiated conditional on some subsequent activity: | | | | | | **(54)** |

Turning to the expiring sub-sample in Table 15, we find that unconditionally 20% of the leases incur some early renegotiation. Conditional upon activity subsequent to the new lease, only 32% are considered renegotiations. For this sub-sample, early terminations

[6] Early renegotiation affects new leases that represent 16% of the total square footage in the sample of new leases.

are the most frequent form of renegotiation, which is perhaps not surprising given the time period covered.

**Table 15. Frequency of Early Renegotiation for Expiring Sub-Sample (% by subsequent activity or not in parentheses)**

**Panel A.**

| | Renegotiation Activity | | | | | |
|---|---|---|---|---|---|---|
| **Subseq. Activity?** | **Expansion** | **Renewal** | **Reduction** | **Termination** | **Contractual Event** | **Total** |
| **No** | 0 | 0 | 0 | 0 | 287 | 287 |
| row % | (0) | (0) | (0) | (0) | (100) | (100) |
| **Yes** | 34 | 30 | 11 | 84 | 331 | 490 |
| **row %** | **(7)** | **(6)** | **(2)** | **(17)** | **(68)** | **(100)** |
| **Total** | 34 | 30 | 11 | 84 | 618 | 777 |
| **row %** | **(4)** | **(4)** | **(1)** | **(11)** | **(80)** | **(100)** |

**Panel B.**

| | |
|---|---|
| Total % of leasees renegotiated: | **(20)** |
| Total % of leases renegotiated conditional on some subsequent activity: | **(32)** |

In Table 16, we find that the type of early renegotiation activity varies according to the lease length, although the rate of renegotiation is remarkably consistent with each length category's weight in the overall sample. To see this assertion, simply compare the percentages in the "Contractual Event" column of Table 16 with the percentages in the "Total" column. We observe more early reductions and terminations in the shorter leases. Given the nature of the time period which we are observing, the rate of early terminations and renewals may indicate leases with above market rents. That is, these leases were no longer in synch with current market conditions and incentives existed to breach or renegotiate as the leases approach expiration. On the other hand, longer leases are more likely to incur renewal and expansion activity within the window of time that we observe them.

**Table 16. Frequency of Early Renegotiation Activity by Length Category (Highlighted percentages indicate percent representation in that renegotiation type greater than the percentage of that type of lease in the overall sample.)**

| | Renegotiation Activity | | | | | |
|---|---|---|---|---|---|---|
| **Length Category** | **Expansion** | **Renewal** | **Reduction** | **Termination** | **Contractual Event** | **Total** |
| **1** | 28 | 19 | 8 | 55 | 713 | 823 |
| column% | (13) | (21) | **(30)** | **(30)** | (23) | (23) |
| **3** | 50 | 36 | 11 | 84 | 917 | 1,098 |
| column% | (24) | **(40)** | **(41)** | **(46)** | (29) | (30) |
| **5** | 100 | 33 | 6 | 37 | 1144 | 1,320 |
| column% | **(48)** | **(37)** | (22) | (20) | (36) | (36) |
| **7** | 30 | 1 | 2 | 6 | 375 | 414 |
| column% | **(14)** | (1) | (7) | (3) | (12) | (11) |
| **Total** | 208 | 89 | 27 | 182 | 3149 | 3,655 |
| column% | (100) | (100) | (100) | (100) | (100) | (100) |

Early renegotiations could also be associated with tenant types. It is well known that many software and technology firms, for example, failed during the recession of 2001. If we investigate renegotiation activity by tenant industry, the highest rates of early terminations are found in *other industries* and the software industry (14% and 9% of all terminations, respectively). The largest number of early terminations is found in leases that commenced in 2002.[7]

## Conclusions

We think this paper represents one of the first empirical investigations of lease length and renegotiation activity using a commercial real estate dataset. The choice of lease length is shown to be robustly related to the size of the space to be leased, the extent of tenant improvements to be carried out, tenant industry, market conditions and the presence of options. Importantly, if tenant improvements and size of space tend to vary over the business cycle, so too may the average length of leases in portfolio. We also find that leases are not complete in the sense that 14% of the leases in our sample within a relatively short time period experience renegotiation and lease renewals are less frequent than often assumed, although our findings are clearly a function of the time period covered by our sample. In addition, lease terminations are not infrequent and

[7] This holds in terms of square footage as well.

demonstrate the potential costs of long-term contracting. As market rents begin to diverge from contract rents, renegotiations may be come efficient. Understanding the implications of leases for how those renegotiations proceed, their frequency and their severity is an important line of inquiry.

The rate of early renegotiation and the presence of options in leases suggest that *effective lease length* between a landlord and tenant can be shorter or longer than the stated contractual lease length. An effective lease length measure, like effective rent, can provide a better measure of the impact of leases on the expected cash flow and risk in properties with long-term leases. In addition, we have begun to define a measure of renegotiation that could help track and assess this intra lease risk as we accumulate a greater time series of data. Further investigation into the linkages between transactions costs in different markets and lease characteristics is also warranted. Such an exercise can only contribute to our understanding of leases, cash flow, risk and values associated with commercial real estate investments.

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**Figure 1. New Lease Length by Years**

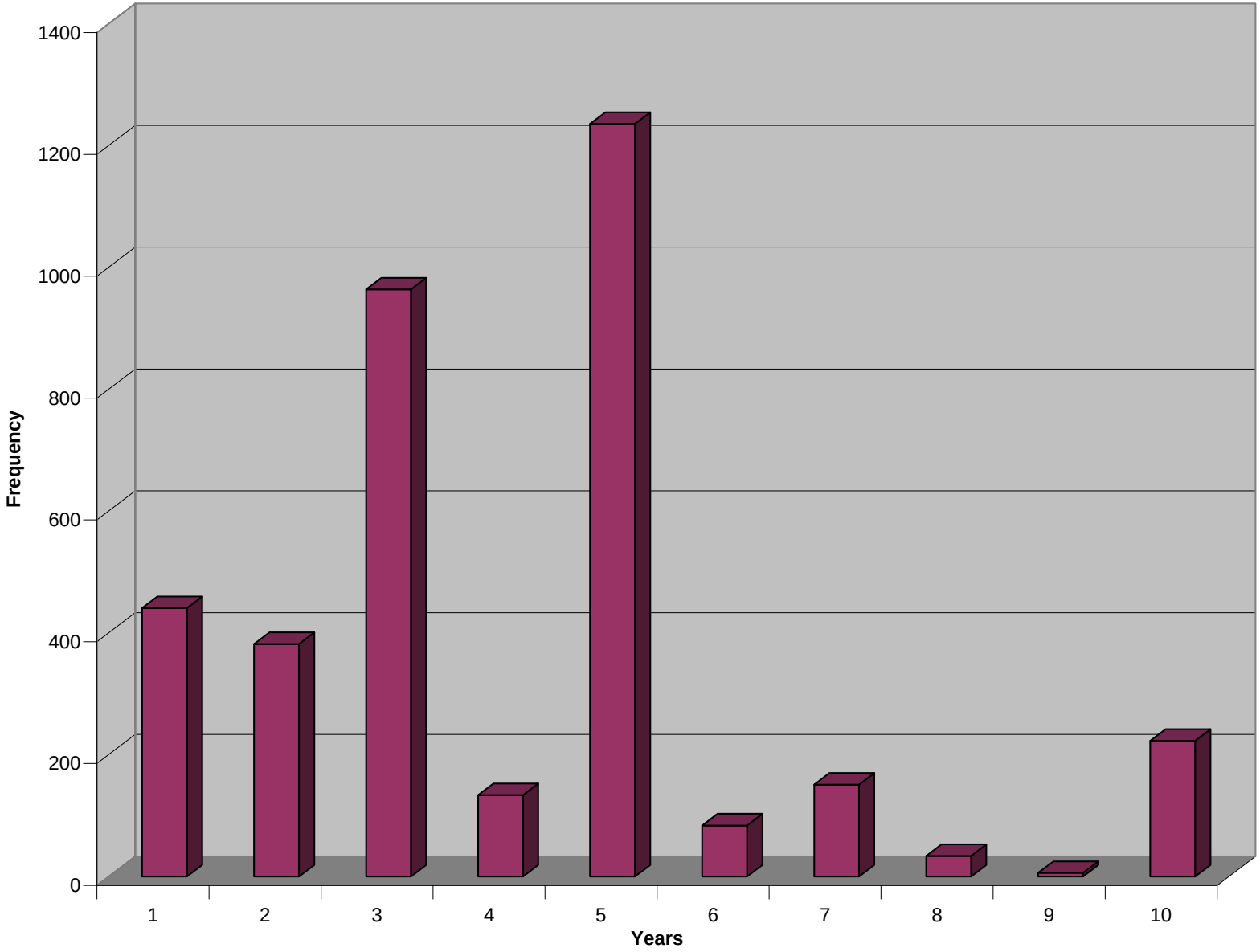

**Figure 2. New Lease Length by Length Categories (24 months)**

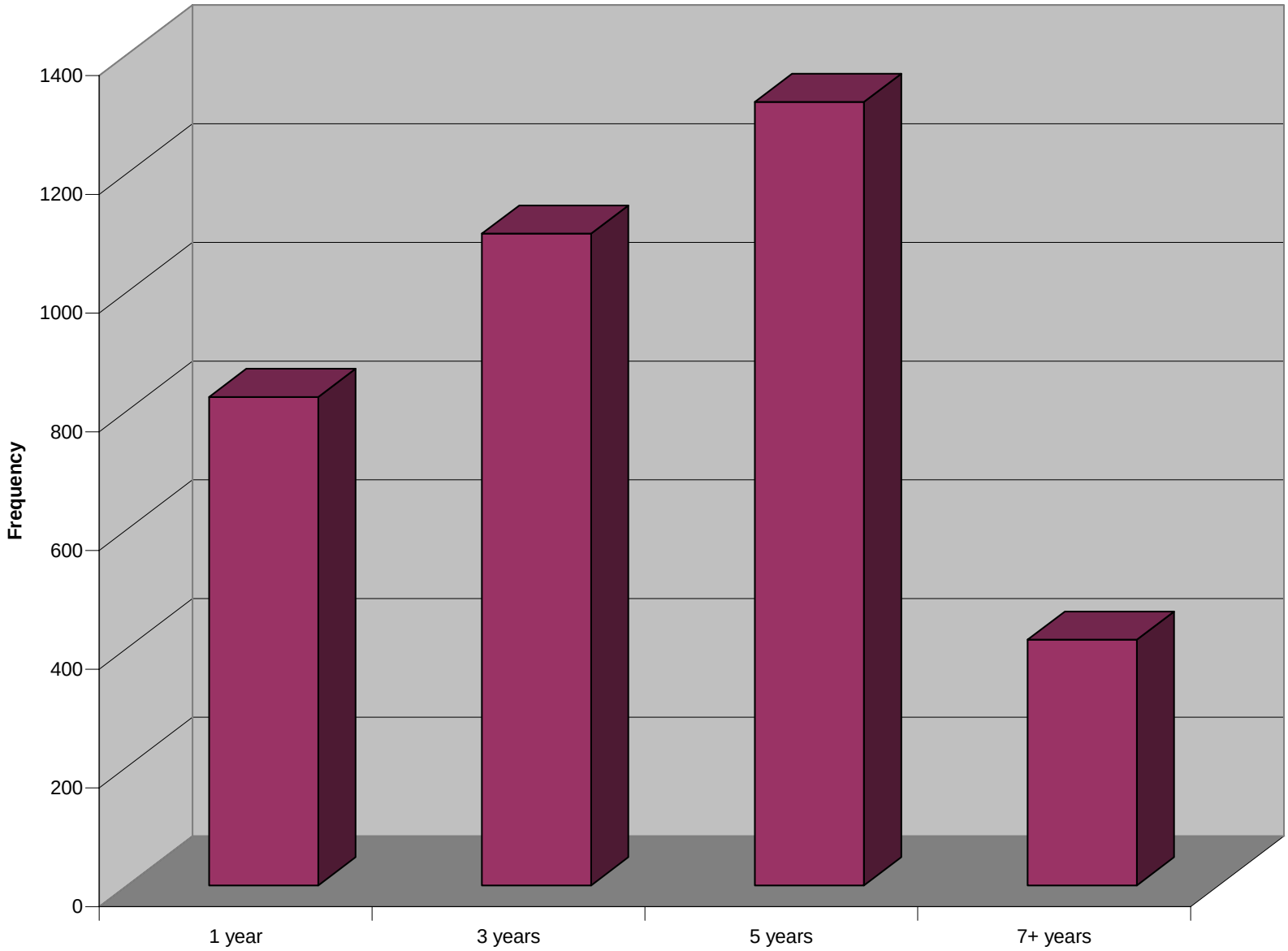

**Figure 3. Average Tenant Improvements ($ psf) and Average Lease Size (sf) over Time**

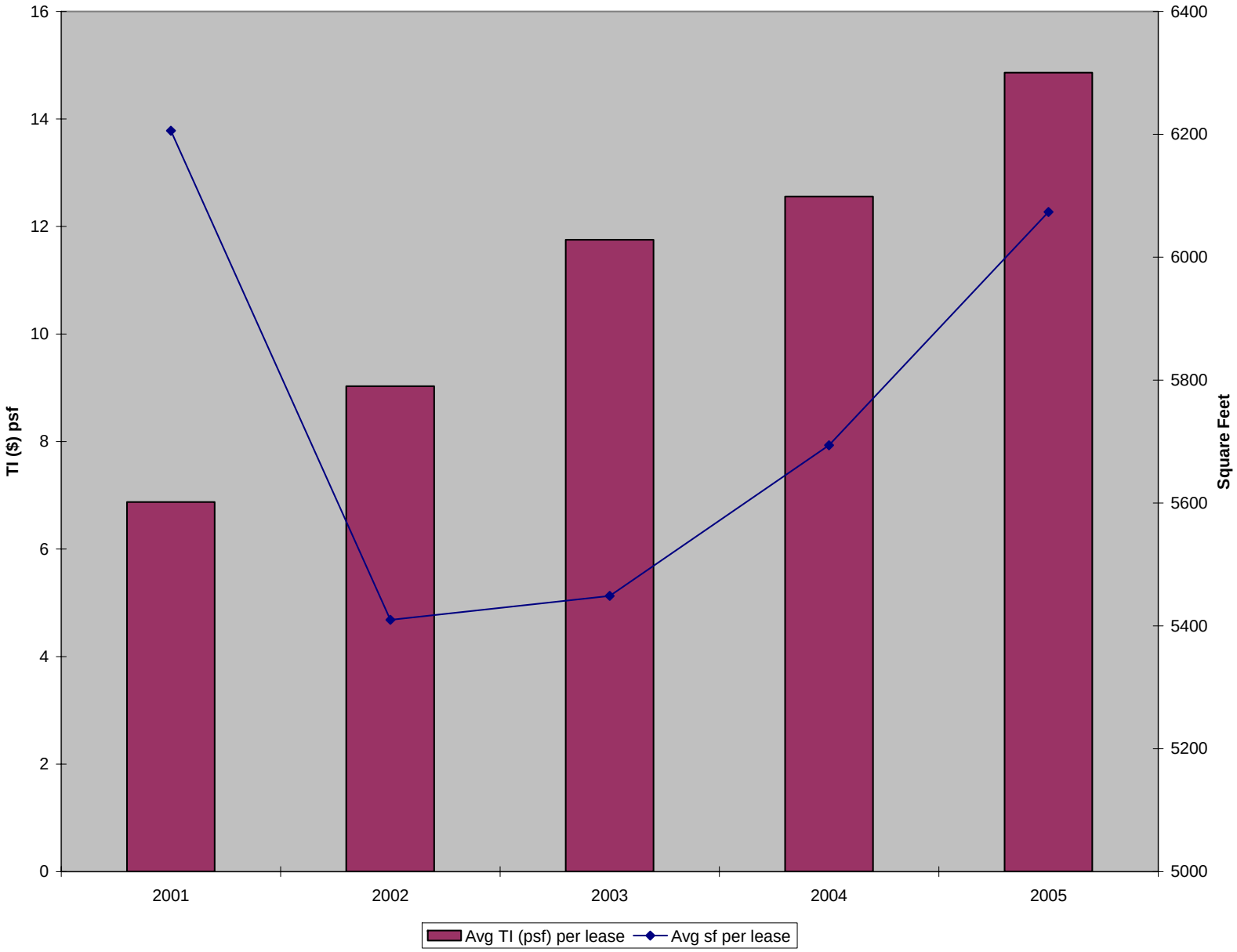

**Figure 4. Lease Length by Commencement Year**

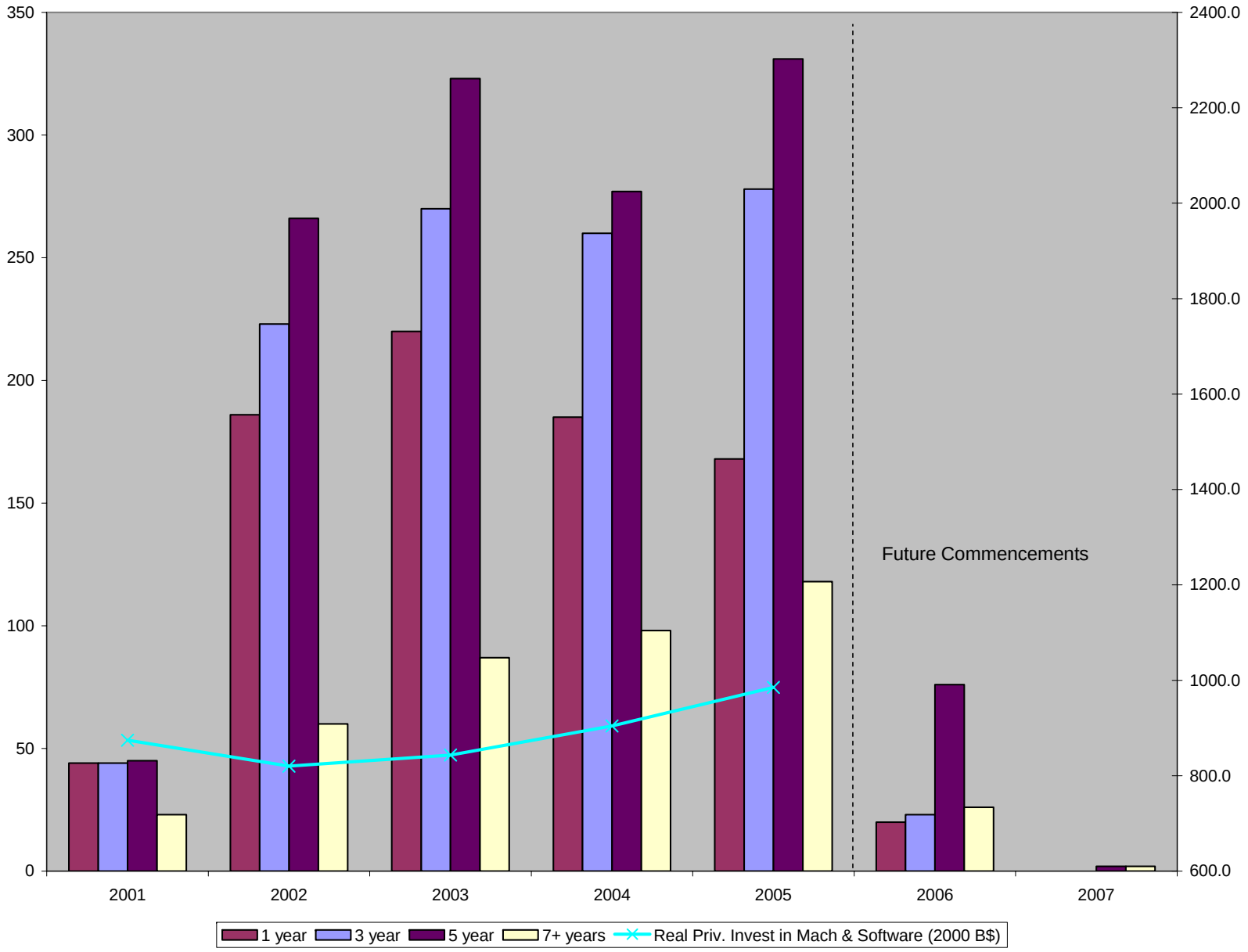

**Figure 5. Lease Length (in years) for Expiring Sub-Sample**

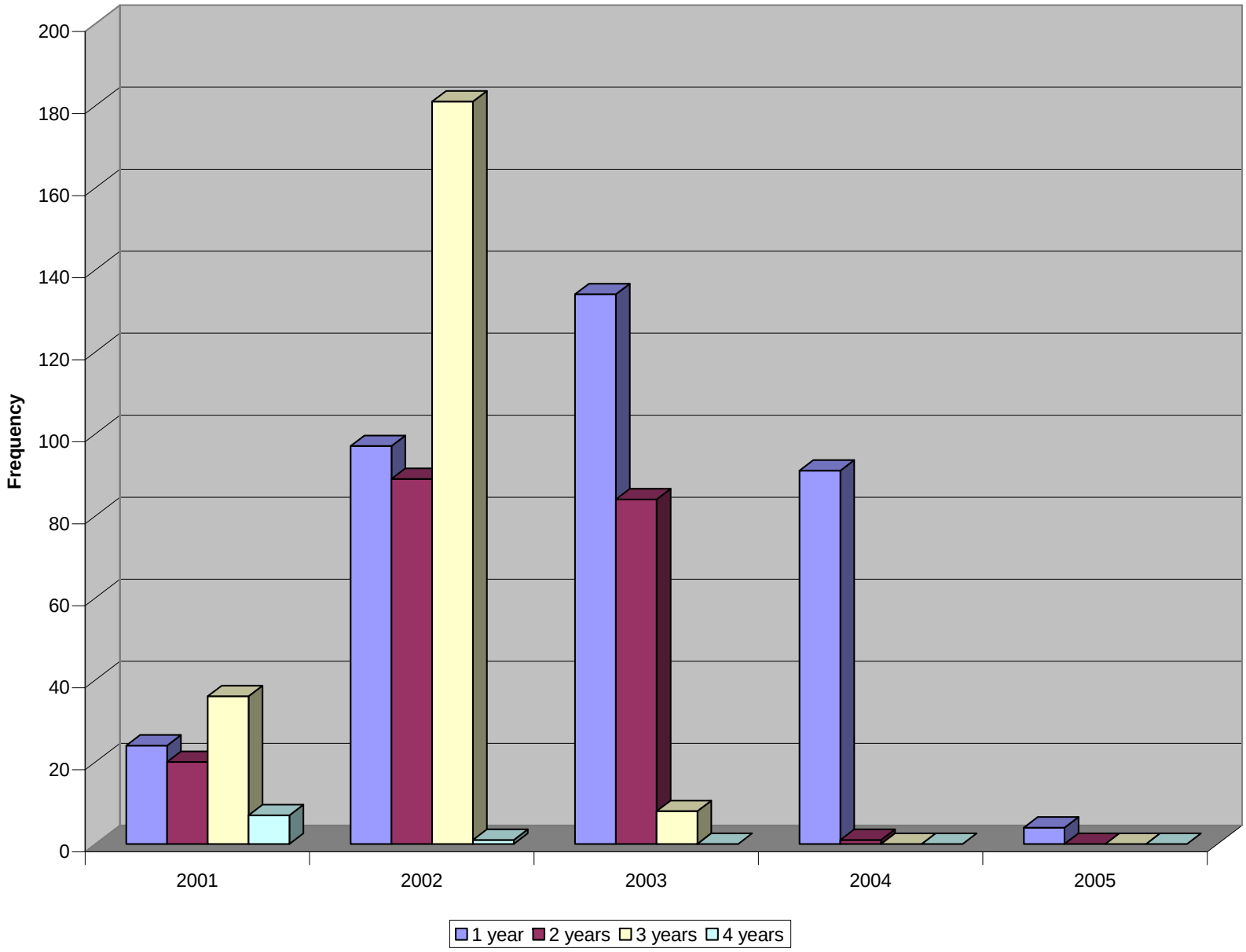

**Table 17. Lease Length Regressions**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Square feet (x1000) | 1.7537 *** | 1.7041 *** | 1.2318 *** | 1.2530 *** |
| | (0.1051) | (0.1029) | (0.0940) | (0.0940) |
| Square feet squared | -0.0049 *** | -0.0048 *** | -0.0031 *** | -0.0032 *** |
| | (0.0009) | (0.0009) | (0.0008) | (0.0008) |
| Suburban | | -8.8077 *** | -5.3693 *** | -4.3913 *** |
| | | (1.0184) | (0.9185) | (0.9180) |
| Class B | | -5.8519 *** | -3.3337 *** | -2.7911 *** |
| | | (0.9007) | (0.7910) | (0.7825) |
| Tenant improvement ($/sf) | | | 1.4295 *** | 1.3724 *** |
| | | | (0.0716) | (0.0709) |
| Tenant improve. Squared | | | -0.0131 *** | -0.0125 *** |
| | | | (0.0017) | (0.0017) |
| Banking | | | | 1.6904 |
| | | | | (2.6183) |
| Computer Manuf. | | | | -6.4910 ** |
| | | | | (2.2362) |
| Consulting | | | | -3.7743 * |
| | | | | (1.6435) |
| Credit Companies | | | | -5.2864 *** |
| | | | | (1.5281) |
| Energy, Utilities & Const. | | | | -6.6669 *** |
| | | | | (1.9879) |
| Engineering & Tech. | | | | 1.3248 |
| | | | | (1.9922) |
| Healthcare & Pharm. | | | | 3.4815 |
| | | | | (2.3506) |
| Insurance | | | | -1.1116 |
| | | | | (1.7555) |
| Investment Services | | | | -1.3080 |
| | | | | (1.6484) |
| Legal | | | | 1.6569 |
| | | | | (1.5672) |
| Manufacturing | | | | -0.5803 |
| | | | | (2.6480) |
| Media | | | | -7.5580 *** |
| | | | | (1.8042) |
| Other industries | | | | -5.8422 *** |
| | | | | (1.6081) |
| Personal Services | | | | -0.6939 |
| | | | | (2.8527) |
| Public Administration | | | | 0.0090 |
| | | | | (3.7695) |
| Real Estate | | | | 0.2135 |
| | | | | (2.0363) |
| Retail, Wholesale & Transp. | | | | -3.6479 |
| | | | | (2.3299) |
| Software | | | | -11.6445 *** |
| | | | | (1.5998) |
| constant | 40.7579 *** | 49.1032 *** | 35.5457 *** | 38.0335 *** |
| | (0.5509) | (1.0740) | (1.0108) | (1.5814) |
| N | 3655 | 3655 | 3655 | 3655 |
| F | 211.92 | 146.92 | 330.49 | 98.86 |
| Adjusted R squared | 0.2657 | 0.2909 | 0.4647 | 0.4829 |

**Standard errors in parentheses; * p<.05; ** p<.01; *** p<.001**

**Table 18. Lease Length Regressions**
**(industry dummies included in all specifications)**

| | 5 | | 6 | | 7 | | 8 | |
|---|---|---|---|---|---|---|---|---|
| Square feet (x1000) | 1.2157 | *** | 1.2502 | *** | 1.1298 | *** | 1.0599 | *** |
| | (0.0942) | | (0.0948) | | (0.0899) | | (0.0898) | |
| Square feet squared | -0.0030 | *** | -0.0032 | *** | -0.0026 | *** | -0.0024 | *** |
| | (0.0008) | | (0.0008) | | (0.0007) | | (0.0006) | |
| Suburban | -3.3254 | *** | | | -3.6198 | *** | -3.4487 | *** |
| | (1.0005) | | | | (0.9831) | | (0.9753) | |
| Class B | -3.2609 | *** | | | -2.6733 | *** | -2.4272 | *** |
| | (0.8237) | | | | (0.8071) | | (0.8001) | |
| Tenant improvement ($/sf) | 1.3373 | *** | 1.3791 | *** | 1.1738 | *** | 1.1465 | *** |
| | (0.0703) | | (0.0700) | | (0.0686) | | (0.0684) | |
| Tenant improve. Squared | -0.0115 | *** | -0.0119 | *** | -0.0094 | *** | -0.0096 | *** |
| | (0.0017) | | (0.0016) | | (0.0016) | | (0.0016) | |
| Boston | -4.6719 | * | | | -4.4319 | * | -3.6950 | |
| | (2.0363) | | | | (2.0028) | | (1.9800) | |
| Chicago | 0.0975 | | | | 0.3491 | | 0.1458 | |
| | (1.9762) | | | | (1.9488) | | (1.9262) | |
| Washington DC | 0.9348 | | | | 1.1141 | | 2.3498 | |
| | (3.1291) | | | | (3.0583) | | (3.0365) | |
| Denver | -4.2280 | * | | | -3.5657 | | -3.4167 | |
| | (1.9940) | | | | (1.9660) | | (1.9616) | |
| Oakland | -7.0242 | ** | | | -7.1320 | *** | -6.2301 | ** |
| | (2.1263) | | | | (2.0680) | | (2.0310) | |
| Los Angeles | -4.2882 | * | | | -4.9267 | * | -4.3841 | * |
| | (2.0136) | | | | (1.9969) | | (1.9795) | |
| Orange County | -8.0745 | *** | | | -7.7185 | *** | -6.9544 | *** |
| | (1.7328) | | | | (1.7088) | | (1.7006) | |
| Portland | -1.9148 | | | | -1.9214 | | -1.6182 | |
| | (1.8508) | | | | (1.8277) | | (1.8091) | |
| Sacramento | -2.1730 | | | | -3.2351 | | -2.4780 | |
| | (1.9363) | | | | (1.9071) | | (1.8865) | |
| San Diego | -6.2949 | ** | | | -5.5694 | * | -5.2076 | * |
| | (2.3655) | | | | (2.2941) | | (2.2679) | |
| Seattle | -1.6979 | | | | -1.3574 | | -1.1022 | |
| | (1.8744) | | | | (1.8522) | | (1.8413) | |
| San Francisco | -8.8243 | *** | | | -8.0682 | *** | -6.8958 | *** |
| | (1.8390) | | | | (1.8166) | | (1.7954) | |
| San Jose | -5.1819 | ** | | | -5.5043 | ** | -4.9041 | ** |
| | (1.7480) | | | | (1.7367) | | (1.7217) | |
| Lagged vacancy | | | -0.2399 | *** | | | | |
| | | | (0.0691) | | | | | |
| Option | | | | | 8.1117 | *** | | |
| | | | | | (0.7507) | | | |
| Renewal Option | | | | | | | 5.0574 | *** |
| | | | | | | | (0.7603) | |
| Termination Option | | | | | | | 9.0472 | *** |
| | | | | | | | (1.2322) | |
| Right of First Refusal | | | | | | | 6.2568 | *** |
| | | | | | | | (1.3935) | |
| constant | 41.3240 | *** | 37.6343 | *** | 40.1751 | *** | 40.2181 | *** |
| | (2.2080) | | (1.7469) | | (2.1635) | | (2.1412) | |
| N | 3655 | | 3655 | | 3655 | | 3655 | |
| F | 71.14 | | 100.24 | | 77.05 | | 76.60 | |
| Adjusted R squared | 0.4931 | | 0.4792 | | 0.5105 | | 0.5204 | |

**Standard errors in parentheses; * p<.05; ** p<.01; *** p<.001**