Another Look at Nonresidential Building Prices

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Abstract:

In the early 1990's, former BEA Chief Statistician Frank de Leeuw explored the possibility of using project data from F.W. Dodge to estimate hedonic price indexes for nonresidential buildings. He rejected the idea citing the lack of "quality" characteristics in the data and that the results were not much different from the indexes currently in use. This paper re-examines the feasibility of price indexes using the Dodge data set. Using data for a single state, Maryland, price indexes for seven types of nonresidential buildings were estimated and were found to be reasonable. This paper concludes that the use of Dodge data as the basis for price indexes are feasible and worthy of further investigation.

Review of de Leeuw:
Another Look at Nonresidential Building Prices

Section 1: Introduction

Investment in nonresidential structures is a fairly important component of GDP. Over the 1984 to 2003 time period, investment expenditures in nonresidential structures has averaged 3.3% of GDP. In spite of its importance, the deflation of nonresidential structures remains an area of concern due to the reliance on input cost indexes (such as the Turner cost index) that lack a firm statistical foundation. Though some improvement has been made, much still needs to be done. A little history should put this issue in context.

The deflation of construction expenditures has a long and difficult history. This history goes back to the 1961 NBER Price Statistics Review Committee which commented that BEA's structures deflators are "defective in almost every possible way." Work by Gordon (1968) and Musgrave (1969) led to major revisions in the deflation of construction as described in BEA (1974). The most notable improvement was the introduction of a price index for the construction of single family homes. That index was based on hedonic regressions that provide a better way to control for differences in the characteristics across homes.

The issue was raised again some years later by Pieper (1989) who, once again, pointed out the deficiencies in construction deflation, particularly for nonresidential types of construction. Some improvement was made with work by de Leeuw (1991a) and de Leeuw (1993) which introduced an hedonic price index for multi-family housing. This unpublished index is computed annually by the Census Bureau and is used by BEA.

For other structures, in the most recent (2003) comprehensive revision BEA introduced nonresidential building price indexes for warehouses, office buildings, factories, and schools for 1997 forward. These indexes are based on hedonic regressions of costs and square footage using data from R.S. Means Company's *Square Foot Costs* publication. Though the indexes are cost based measures, they represent a closer match to output-based indexes than the previous deflators. (See BEA (2003) for details.)

De Leeuw (1991b) used data from the major projects file from F.W. Dodge to construct hedonic price indexes for six types of nonresidential buildings. These building types are elementary schools, middle and high schools, office buildings, department stores, food stores, and shopping centers. Indexes for the years 1986 to 1990 were estimated. De Leeuw concluded that although the estimated price indexes did diverge widely, their average tracked closely with the BEA deflator. This observation, along with the observation that the Dodge data set is lacking in other potentially important "quality" variables, led de Leeuw to reject the hedonic approach using the Dodge data set as an improvement over the then-current BEA index.

This paper revisits the usefulness of the Dodge data for constructing indexes in light of several developments over the last decade. First is the adoption of chained-type quantity indexes as the featured measure for real expenditures in the National Income and Product Accounts (NIPA's). For the constant dollar measures that BEA used until 1995, the use of an average deflator for nonresidential buildings might not have much impact on the aggregate estimates of real investment or real GDP. However, that cannot necessarily be said for real measures based on the Fisher formula where variations in the component prices and quantities that comprise the index can have a measurable effect on the behavior of the aggregate index. Second, although an index based on the limited quality data in the Dodge data set may be upwardly biased due to a lack of important "quality" characteristics - energy efficiency being a commonly cited characteristic - other data sources can be used to estimate the magnitude of these biases and then adjust the base index. The energy consumption surveys conducted periodically by the Energy Information Administration (EIA) are an example of supplementary data that could be used to improve a base index based on the Dodge data set. It should be noted, however, that none of the indexes in current use adjust for energy efficiency either. Finally, if a feasible index can be developed from the Dodge data set, it is always possible to improve the data collection as the use of the index becomes more common. Many surveys have been improved over time as shortcomings in the data quality and quantity become apparent. Finally, Pieper (1985) also qualitatively examined the use of hedonics and found them to be promising.

This paper takes another look at the feasibility of using simple hedonic regressions to price indexes for nonresidential buildings. This paper uses a small sample of the Dodge data set provided for just such a purpose.

The rest of this paper is as follows. Section 2 describes the Dodge data set. Section 3 reports on the regression results and the indexes derived from the results. It also addresses the issue of parameter stability of the coefficients. Section 4 argues for further work using the Dodge data set including longer time series, expanded construction types, and directions for further research to overcome perceived "quality" shortcomings in the data.

Section 2: Data Description

The data set used in this paper is a sample of the projects file compiled by F.W. Dodge.[1] The complete Dodge file comprises construction projects nationwide, classified by type of construction, type of owner (private or public), location of the project, and some major characteristics of the project. The sample used for this paper is for projects in the state of Maryland from January 2000 through August 2004. Naturally, Maryland is hardly representative of the nation as a whole, being a small state with a concentration in service producing industries rather than goods producing industries. For example, in 2004, Maryland had only 1.9% of total U.S. employment. Its manufacturing employment is 6.1% of total state employment while its government employment (Federal, State, and Local) is 18.5% of total state employment. These figures contrast with 11.3% and 16.2% for the nation as a whole. With the caveat that the data set is hardly representative of the nation as a whole, the analysis proceeds to compute indexes to investigate the feasibility of the data.

Since this analysis focuses on the computation of annual indexes, the data for the partial year of 2004 were treated as a full year's worth of data for purposes of estimating the index. Other than affecting the sample size, the exclusion of the final months of 2004 should not change the overall implications of the results.

Table 1 describes the data fields for each project record. The data of most importance to this paper are the types of structures, dates, project value, square footage, and number of stories.

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[1] See http://dodge.construction.com/Analytics/MarketMeasurement/CAS.asp for a description.

Because data on "Major Alteration" and "Nonbuildings" have a contract value but not square footage or stories, these projects were excluded from the analysis

The following major types of construction were chosen for analysis:

Apartments	Automotive service buildings
Manufacturing plants	Office and bank buildings
Parking garages	Retail stores
Warehouses (excl. mfg. owned)	

These types of construction were chosen get a reasonable view of the possibilities of the data and to get a sense of the feasibility of estimating output prices indexes. The following types of construction were not analyzed, but are mentioned here to illustrate the potential expansion of indexes that could be computed.

Warehouses (mfg. owned)	Laboratories (mfg. owned)
Laboratories (non. mfg. owned)	Schools and colleges
Libraries and museums	Hospitals and other health treatment
Capitals/Court houses/City halls	Other government service buildings
Houses of worship	Other religious buildings
Amusement, social, recreational bldgs	Misc. nonresidential buildings

It should be noted, at this point, that not all of the data in the data set were exploited in that each type of construction had a more detailed classification that could have been included as separate types of construction or as dummy variables in the hedonic regression. For example, warehouses were further classified as refrigerated or non-refrigerated - a classification that can potentially be included as a quality characteristic. This variable was not included due to sample size (only 3 were found in the data set).

Table 2 provides descriptive statistics for the major variables used in the hedonic regressions. The variables are project value, square footage, number of stories, and an addition/alteration (add/alt) dummy. In all cases, the major variables of value and square footage show an extreme rightward skewness in levels. In all cases, the standard deviation of these variables exceeds the average. It should also be noted that the difference between the mean of these variables and the median is also quite large. After taking logarithms, the skewness of these variables becomes less pronounced. To illustrate, Figure 1 shows histograms of contract value and square footage in both level and log form for apartment buildings. Figure 2 does the same for retail stores. These graphs suggest that value and square footage should enter in the hedonic regression in log form rather than level form. This form is standard for past studies of construction value on square footage such as the Census Bureau's single family index[2], de Leeuw (1991b), and BEA (2004).

The next section describes the estimating regression and the results.

Section 3: Regression Results

Many forms of the hedonic function have been used in past research, but the one chosen for this paper is the time dummy method to estimate the effect of time on prices. This form was used in de Leeuw's original paper since it has the advantage of simplicity. However, it does have some drawbacks since it imposes restrictions that each year has a fixed effect on value and that the effects of quality characteristics on value are held constant throughout the sample period. These drawbacks are discussed in the next section.

The specification of the equation follows that used in de Leeuw (1991a). The general form of the hedonic function is

$$P_i = A S_i^{\alpha} \prod_{j=1}^{n} e^{\beta_j x_i^j} \prod_{t=1}^{T} e^{\gamma_t d_i^t} e^{\varepsilon_i}$$

where P_i is the project value for a particular type of structure, S_i is the square footage of the project, x_i^j are other quality characteristics, d_j^t are year dummies, and ε_i is an error term. The quality characteristics included in the regressions reported here are number of stories of the building and a dummy variable with a value of 1 if the project is an addition/alteration project and 0 if it is new construction. In log form, the estimating equation becomes

$$\ln P_i = \alpha_1 + \alpha_3 \ln S_i + \beta_1 x_i^1 + \beta_2 x_i^2 + \gamma_1 d_i^{2001} + \gamma_2 d_i^{2002} + \gamma_3 d_i^{2003} + \gamma_4 d_i^{2004} + \varepsilon_i$$

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[2] See http://www.census.gov/const/C25/newresindextext.html for details.

where x^1 is the number of stories of the building, x^2 is the add/alt dummy, and the *d's* are the year dummies. The variable for number of stories enters in linearly for the simple fact that some projects classified as "Additions" have a zero for the number of stories. Thus, the stories variable cannot enter in log form.

Table 3 reports the regression results. The results are generally positive with high R^2's and significance for the square footage and number of stories variables. All of the R^2's are higher than those reported in de Leeuw (1993) for apartment buildings and de Leeuw (1991b) for the others. With the exception of apartment buildings, the add/alt variable is not significant which suggests that the costs of adding square footage to an existing structure is not more economical than new construction. The coefficients on the square footage variable are less than one, with manufacturing plants being the exception. This suggest economies of scale in construction of large projects. In only two cases is the coefficient on square footage statistically equal to one on the basis of a Wald test; auto services buildings and manufacturing plants which suggests constant returns to scale.

The middle part of the table shows tests for heteroskedasticity in the residuals. Heteroskedasticity was present in the regressions for auto services buildings, manufacturing plants, and office & bank buildings. The presence of heteroskedasticity does not bias the coefficient estimates, but does make them inefficient in that the standard errors on the coefficients cannot be trusted. These regressions were re-estimated using White's (1980) heteroskedastic consistent standard errors and the results were not changed.

A set of secondary regressions were performed using only the log of square footage and year dummies as the independent variables. These regressions were run to test the notion that square footage is the primary explanatory variable in construction costs and to what extent additional variables changed the results. In all cases, the R^2's of the secondary regressions were (to three digits) equal to or slightly less than the R^2's of the full regressions. This suggests that not only is square footage a primary explanatory variable on construction costs, it is far more important than the other variables. However, while not shown, the coefficient estimates for the year dummies tended to be a bit higher than the full regressions. This suggests that square footage alone can bias a hedonic price index upwards relative to indexes that include a broader variable set.

Price indexes can be computed from the coefficients for the time dummy variables. Each coefficient is interpreted as the expected percentage increase in project value for that year over the base year of 2000 holding characteristics constant. So, for example, the price of building apartment buildings in 2001 have an expected increase of 0.6% in value over 2000, buildings built in 2002 have an expected increase of 8.6% in value over 2000, and so on. Formally, if we let *X* be the log of the base year index value, then the index for 2000 to 2004 based on the regression coefficients for apartment buildings is computed as follows.

Year	Log of index	Antilog of index	Index
2000	X	Exp(X)	100.0
2001	X + 0.0057	Exp(X + 0.0057)	100.6
2002	X + 0.0861	Exp(X + 0.0861)	109.0
2003	X + 0.1315	Exp(X + 0.1315)	114.1
2004	X + 0.1973	Exp(X + 0.1973)	121.8

Table 4 reports the indexes for the seven types of construction analyzed here. For comparison purposes, the table also shows the comparable indexes published by BEA, although the indexes derived here cover only one state and are not strictly comparable to the nationwide BEA indexes.

Stability of Coefficients:

One drawback mentioned in the previous section in using regressions of the type used here is that the effect of a quality characteristic on value is implicitly fixed throughout the sample period. In previous work on multi-family housing, de Leeuw (1991a) and (1993) uses single year regressions of project value on quality characteristics that allow for variability of the coefficients.

There is not much argument that the primary determinant of project value for a building is square footage. Therefore this is the primary variable for the examination of the stability of the regression results. A quick test for stability of the square footage coefficient is detailed in Table 5. This table shows the coefficient for single year regressions of the log of square footage along with the estimated standard error. The bottom part of the table details the F-statistic for a Wald test for the restriction that the single year coefficient is the same as the full sample coefficient. P-values for the probability of the null hypothesis that the two coefficients are the same are also shown. The table also highlights those yearly estimates that have a p-value of 25% or less. While it is standard to use significance values of 5% or 10%, the smaller sample size of the yearly regressions which yield standard errors of two to three times that of the full sample estimate would probably be too permissive in accepting estimates that appear to be different on the surface, but would pass statistically because of the high standard errors. The cut-off value of 25% was judgementally chosen so as to allow for sufficient variation in the yearly coefficient estimates, but not so overly restrictive as to be unreasonable.

With one exception, all the types of construction have at least two years where the elasticity of square footage on value is not statistically the same as the full sample estimate. This suggests the coefficient on square footage is sensitive to the time period used and may be a substantial issue if a longer time period were studied. The lone exception is parking garages where all years are significant.

This suggests that yearly regressions may be desirable over an extended span of years.

Section 4: Conclusion

While the scope of this paper is necessarily limited by the extent of the sample data set used, it does show promise for the use of the full Dodge data set to generate output price indexes for nonresidential buildings. Chwelos, Berndt, and Cockburn (2004) suggests three criteria for inclusion of characteristics in an hedonic framework:

1. they are homogeneous economic variables;
2. they are building blocks from which heterogeneous goods are created; and
3. they are valued by both buyers and sellers.

There is not much argument that square footage is the primary characteristic for building value and that square footage satisfies the three criteria mentioned above. Therefore, price indexes based on this characteristic would be valid and would be a crude beginning to establishing proper price indexes for nonresidential buildings.

The results presented in this paper suggest that this line of research is promising. The indexes presented here are true output price indexes and are conceptually better than cost-based indexes. The resulting indexes produced for this paper show that the indexes are comparable to the price indexes in current use and that national indexes could be even better. The Dodge data have the potential to greatly expand the types of construction that could be covered by output price indexes. It was mentioned above that not all of the characteristics in the data set were exploited due to sample size limitation, a more comprehensive study could rectify this. Obviously, the next logical step in this line of research is to study the full national data set and for several years so as to get a better picture of the behavior of these price indexes for the nation as a whole and over the business cycle, or cycles depending on the time frame of the sample. Naturally, this expansion would raise questions as to the frequency of the regression equations (i.e. annual, bi-annual, pooled) and geographic aggregation.[3]

As to the question of the lack of quality characteristics, I would argue three points. One, quality characteristics are already lacking in the current indexes. So the move to an output based price index from cost based price indexes is an improvement, if possibly a small one. Two, other data sources can be used to estimate the “bias” in the lack of quality characteristics in these indexes. It was mentioned that the periodic energy use surveys of the EIA can be used to get a measure of the improvement in energy efficiency in nonresidential buildings that could form the basis for incorporating a bias adjustment to the building price indexes. Gort, Greenwood, and Rupert (1998) use office rentals in a general equilibrium framework to estimate technical progress in office buildings. Other data sources are possible if they can be found. Three, once meaningful quality characteristics are defined then data collection can always be improved. Improvements to data collection are always being made and the Dodge data should be no different.

This paper is an attempt to show the feasibility and potential of using the Dodge projects file for the estimation of prices indexes for nonresidential buildings. The results are promising and the author would urge that research in this direction continue.

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[3] My colleague at BEA, Bruce Grimm, raised the issue of intrastate differences in costs noting a wide spread in costs between, say, urban and rural areas. This issue of interstate and intrastate cost differences is an area for further investigation.

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Table 1 - Description of Data Fields for each Project

Field Name	Field Description	Example
MO	Month	8
YEAR	Year	2004
YEARMO	Year:Month	2004:08
STC	Dodge Structure Code	3
STCNAME	Dodge Structure Code Name	Warehouses (Non-Refrig.)
STG	Dodge Structure Group code	2
STGNAME	Dodge Structure Group Name	Warehouses (ex. mfg. owned)
STHNAME	Dodge Structure Header (Nonres, Res, NonBuilding)	Nonres.
NAAMN	New/Add/Alt (goes farther back in history than NAA4)	NEW
NAA4	New/Add/Alt/Add & Alt Code	1
NAA4NAME	New/Add/Alt/Add & Alt Name	New
OWN	Owner Code	1
OWNNAME	Owner Code Name (Private, Public)	PRIVATE
STRYS	Number of Storys	1
AREA	Square Footage of the building in thous.	10
VALUE	Construction contract value in thous.	400
STAMN	State code	MD
FIPS	FIPS county code (a few exceptions)	24015
FIPSNAME	County Name	CECIL, MD

Table 2 - Descriptive Statistics for Dodge Variables

	Apartments	Automotive Service Buildings	Mfg. Plants	Office & Bank Buildings	Parking Garages	Retail Stores	Warehouses
# Obs.	1046	171	79	924	156	808	380
Value ($000's)							
mean	2683.5	671.8	1563.4	2006.7	6521.9	1497.8	2187.0
st. dev.	5396.3	885.9	3177.8	5347.3	13308.2	3202.9	5766.5
median	503.5	350.0	375.0	400.5	2949.5	500.0	750.0
maximum	51500.0	6081.0	20000.0	80000.0	140000.0	45000.0	88437.0
minimum	75.0	65.0	75.0	11.0	75.0	65.0	24.0
log mean	6.62	5.99	6.16	6.31	7.57	6.33	6.70
log st. dev.	1.54	0.99	1.47	1.50	1.79	1.31	1.32
log median	6.22	5.86	5.93	5.99	7.99	6.21	6.62
Sq. Feet (000's)							
mean	44.54	9.04	28.51	26.20	165.25	23.83	51.42
st. dev.	81.77	10.64	53.74	69.09	317.47	49.90	118.01
median	10.55	5.10	6.40	5.10	69.50	5.95	16.10
maximum	733.0	70.2	292.0	1300.0	3000.0	600.0	1452.4
minimum	0.70	0.8	1.8	0.1	1.2	0.4	0.5
log mean	2.63	1.74	2.28	1.94	3.84	2.08	2.92
log st. dev.	1.50	0.93	1.37	1.51	1.88	1.35	1.37
log median	2.36	1.63	1.86	1.63	4.24	1.78	2.78
Number Stories							
mean	2.01	0.97	0.96	1.54	3.37	0.96	1.21
st. dev.	1.96	0.48	0.61	1.68	2.81	0.41	0.66
median	2.00	1.00	1.00	1.00	3.00	1.00	1.00
maximum	19	4	3	18	13	3	6
minimum	0	0	0	0	0	0	0
% Add/Alt	3.5%	27.5%	35.4%	25.1%	11.5%	22.2%	18.9%

Table 3 - Regression Results for Apartments and Selected Nonresidential Buildings

	Apartments	Automotive Service Buildings	Mfg. Plants	Office & Bank Buildings	Parking Garages	Retail Stores	Warehouses
Constant	3.95	4.048	3.57	4.398	4.034	4.129	3.878
	(139.8)	(47.47)	(28.51)	(148.1)	(43.00)	(75.35)	(61.96)
ln (sq ft)	0.959	0.955	1.010	0.927	0.934	0.858	0.924
	(96.98)	(31.27)	(35.15)	(91.31)	(41.88)	(65.34)	(64.69)
Stories (number)	0.042	0.196	0.241	0.046	0.007	0.382	0.058
	(5.546)	(3.289)	(3.519)	(5.078)	(0.458)	(8.569)	(2.077)
Add/Alt (dummy)	0.161	0.139	0.950	-0.041	0.077	0.034	0.017
	(2.667)	(0.242)	(1.231)	(-1.518)	(0.871)	(0.835)	(0.357)
Dummy variables for years							
2001	0.0057	0.0937	0.1033	0.0342	-0.1141	-0.0394	0.0507
	(0.188)	(1.217)	(0.982)	(1.003)	(-1.300)	(-0.850)	(0.936)
2002	0.0861	0.1228	0.0800	0.0612	-0.0876	0.0852	0.0609
	(2.484)	(1.521)	(0.761)	(1.847)	(-0.994)	(1.749)	(1.205)
2003	0.1315	0.0993	-0.0646	0.0634	-0.0618	0.1289	0.0732
	(4.045)	(1.295)	(-0.607)	(1.838)	(-0.684)	(2.550)	(1.351)
2004	0.1973	0.0874	0.1026	0.1319	-0.1311	0.0869	0.0461
	(4.892)	(0.931)	(0.886)	(3.311)	(-1.351)	(1.506)	(0.819)
Summary Statistics:							
R-sq	0.949	0.887	0.964	0.949	0.966	0.877	0.929
S.E.	0.347	0.332	0.280	0.337	0.331	0.460	0.350
# Obs.	1046	171	79	924	156	808	380
White Heteroskedasticity Test: (p-values in parenthesis)							
F-stat:	7.328	1.451	1.281	0.998	2.171	5.200	2.939
	(0.000)	(0.171)	(0.263)	(0.440)	(0.027)	(0.000)	(0.002)
R2*Obs:	65.61	12.83	11.31	8.992	18.42	44.73	25.35
	(0.000)	(0.170)	(0.255)	(0.438)	(0.031)	(0.000)	(0.003)
SECONDARY REGRESSION							
Constant	3.95	4.167	3.82	4.385	4.050	4.417	3.935
	(139.8)	(54.22)	(35.72)	(153.2)	(45.65)	(104.8)	(72.03)
ln (sq ft)	0.992	0.998	1.046	0.964	0.937	0.900	0.930
	(133.9)	(35.38)	(40.93)	(129.4)	(65.64)	(71.79)	(69.56)
R-sq	0.948	0.881	0.958	0.948	0.966	0.866	0.929

Table 4 - Derivation of the Price Indexes

	2000	2001	2002	2003	2004	
Coefficients:						
Apartments	..	0.0057	0.0861	0.1315	0.1973	
Auto service buildings	..	0.0938	0.1228	0.0993	0.0874	
Manufacturing	..	0.1033	0.0800	-0.0646	0.1026	
Office buildings	..	0.0342	0.0612	0.0634	0.1319	
Parking garages	..	-0.1141	-0.0876	-0.0618	-0.1311	
Retail buildings	..	-0.0168	0.1079	0.1259	0.1010	
Warehouses	..	0.0508	0.0690	0.0732	0.0461	
Log of indexes:						
Apartments	4.6052	4.6109	4.6913	4.7367	4.8025	
Auto service buildings	4.6052	4.6990	4.7280	4.7045	4.6926	
Manufacturing	4.6052	4.7084	4.6852	4.5406	4.7078	
Office buildings	4.6052	4.6393	4.6664	4.6686	4.7371	
Parking garages	4.6052	4.4911	4.5175	4.5434	4.4741	
Retail buildings	4.6052	4.5883	4.7130	4.7310	4.7062	
Warehouses	4.6052	4.6560	4.6742	4.6783	4.6513	
Derived indexes:						
Apartments	100.000	100.575	108.996	114.058	121.816	
Auto service buildings	100.000	109.833	113.071	110.440	109.133	
Manufacturing	100.000	110.878	108.327	93.744	110.809	
Office buildings	100.000	103.475	106.310	106.548	114.100	
Parking garages	100.000	89.220	91.609	94.010	87.715	
Retail buildings	100.000	98.330	111.391	113.415	110.630	
Warehouses	100.000	105.210	107.144	107.592	104.718	
BEA indexes:						
Apartments	100.000	102.789	106.163	109.951	115.753	Multi-family res.
Auto service buildings	100.000	103.776	107.205	110.057	114.444	Other commercial
Manufacturing	100.000	103.502	106.635	108.466	112.570	Manufacturing
Office buildings	100.000	103.018	105.480	108.539	112.931	Office
Parking garages	100.000	103.776	107.205	110.057	114.444	Other commercial
Retail buildings	100.000	103.811	107.273	110.141	114.483	Multi-merch shop.
Warehouses	100.000	103.811	107.273	110.141	114.483	Warehouses

Table 5 - Elasticity of Value to Square Footage

Types of Construction		2000-2004	2000	2001	2002	2003	2004
Apartments	Coef	0.960	0.895*	0.954	0.973	0.937	1.046*
	S.E.	(0.010)	(0.026)	(0.022)	(0.023)	(0.021)	(0.023)
	Obs.	1046	242	286	174	227	117
Auto svc	Coef	0.955	0.878	0.934	1.058*	0.888*	1.055*
	S.E.	(0.031)	(0.078)	(0.079)	(0.069)	(0.046)	(0.068)
	Obs.	171	34	41	34	42	21
Mfg.	Coef	1.010	1.022	1.114*	0.881*	0.967	1.007
	S.E.	(0.029)	(0.083)	(0.041)	(0.075)	(0.046)	(0.064)
	Obs.	79	15	15	17	21	11
Offices	Coef	0.927	0.931	0.954*	0.865*	0.941	0.899
	S.E.	(0.011)	(0.022)	(0.019)	(0.028)	(0.020)	(0.033)
	Obs.	924	196	199	226	188	115
Parking	Coef	0.934	0.946	0.905	0.953	0.908	0.939
	S.E.	(0.022)	(0.048)	(0.062)	(0.051)	(0.044)	(0.074)
	Obs.	156	23	39	37	33	24
Retail	Coef	0.858	0.906*	0.856	0.817	0.809*	0.883
	S.E.	(0.013)	(0.029)	(0.023)	(0.036)	(0.033)	(0.027)
	Obs.	808	196	200	167	147	98
Warehouses	Coef	0.924	0.904	0.875*	0.840*	0.969*	0.992*
	S.E.	(0.014)	(0.030)	(0.033)	(0.039)	(0.029)	(0.030)
	Obs.	380	93	76	64	79	67
Apartments	F-Stat:	-	6.197	0.082	0.325	1.276	14.31
	(p-val):	-	(0.014)	(0.775)	(0.570)	(0.260)	(0.000)
Auto svc	F-Stat:	-	0.978	0.069	2.229	2.119	2.145
	(p-val):	-	(0.331)	(0.795)	(0.146)	(0.154)	(0.161)
Mfg.	F-Stat:	-	0.021	6.663	2.917	0.862	0.001
	(p-val):	-	(0.887)	(0.026)	(0.111)	(0.366)	(0.974)
Offices	F-Stat:	-	0.040	2.120	5.045	0.501	0.702
	(p-val):	-	(0.842)	(0.147)	(0.026)	(0.480)	(0.404)
Parking	F-Stat:	-	0.069	0.220	0.151	0.328	0.005
	(p-val):	-	(0.795)	(0.642)	(0.701)	(0.571)	(0.947)
Retail	F-Stat:	-	2.694	0.008	1.282	2.280	0.848
	(p-val):	-	(0.102)	(0.928)	(0.259)	(0.133)	(0.359)
Warehouses	F-Stat:	-	0.477	2.314	4.662	2.435	4.981
	(p-val):	-	(0.492)	(0.133)	(0.035)	(0.123)	(0.029)

* : Coefficient with p-values less than 0.25.

Figure 1 - Value and Square Footage for Apartment Buildings

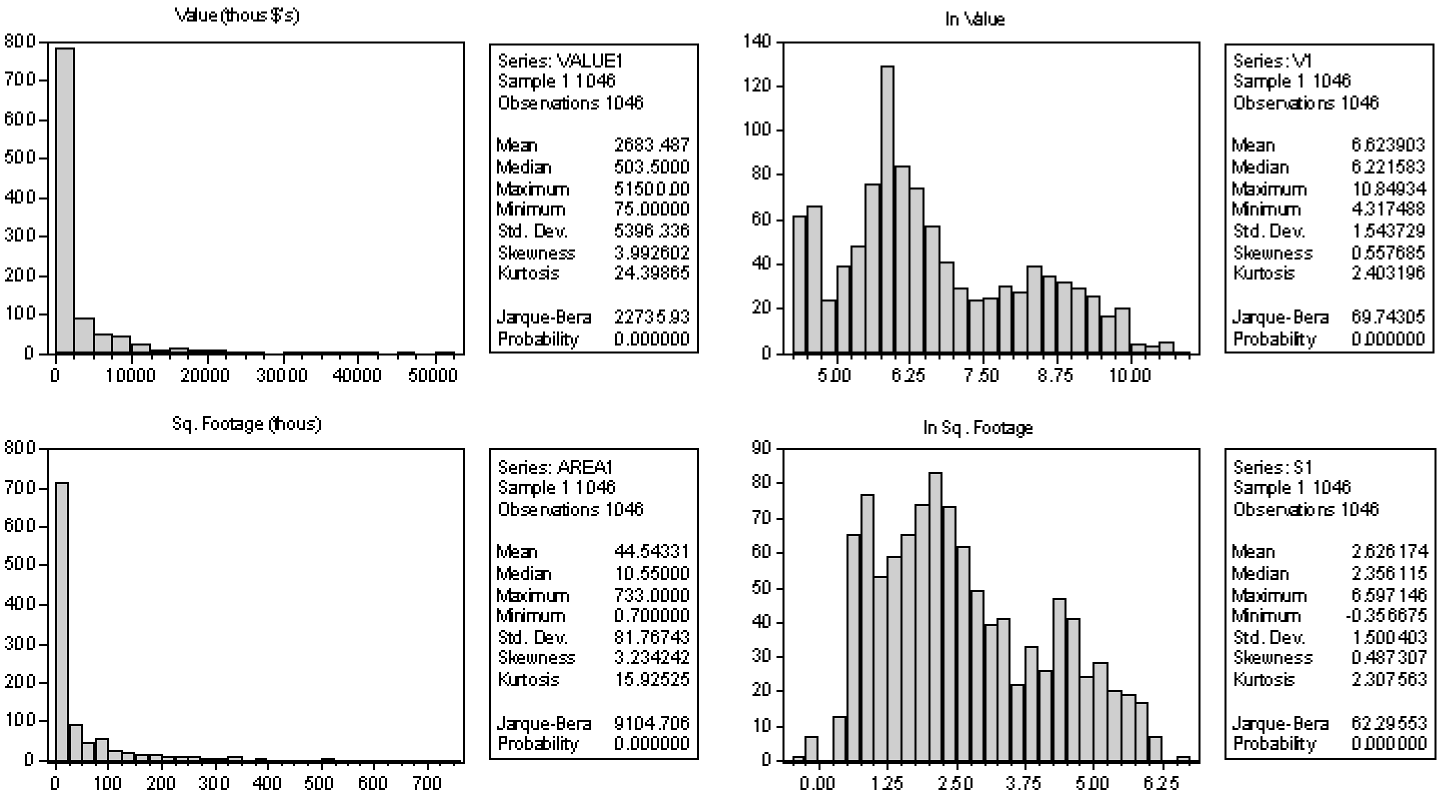

Figure 2 - Value and Square Footage for Retail Stores