Analyzing the IBA Database Transaction Results

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Many articles have been written about The Institute of Business Appraisers' database. Some have been critical stating that it is dated and without enough data points. The following presentation provides ample statistics to dispel the cynics and provides cogent reliable results that will enable business valuation professionals the tools to rely upon when including the database within valuation reports.

The IBA SIC Code Data Used in the Analyses

The following SIC Codes were used to determine to what extent they each provided reliable results for the direct market transactional data method:

1 – SIC Code #2752, Commercial Printing – Lithographic
2 – SIC Code #5992, Florists
3 – SIC Code #7231, Beauty Shops

The IBA Database Study

The data was analyzed with the use of the regression analysis within Excel (found within the toolbar under Tools/Data Analysis/Regression). Regression simply trends the relationship results (in this instance: sales price to gross sales or sales price to seller's discretionary earnings) of the known ratios to establish a variance to a trendline. A trendline is the "line" which intersects the results approximating the most centrist straight line. Each ratio results in being a specific distance from the trendline; the closer the result is to the trendline the more reliable the data becomes. This regression technique is known as R-squared or the coefficient of determination. The R-square yields a measure of the result from zero to one (0 to 1.0). An R-squared result that is closer to zero (0) demonstrates a lack of reliability while an R-squared result that is closer to one (1.0) demonstrates a high reliability. Therefore, an R-square result that is greater than 0.500 for all of the data graphed is more reliable than an R-squared that is below 0.500. The results in the analyses that are greater than 0.500 are noted in bold type in the following graphs.

First, each SIC code was stratified into prescribed segments. Then the price/gross and the price/earnings ratios for each segment were sorted to determine the high, low, mean and median. Finally, the ratios for each segment were examined by using regression analysis ("R-squared") to determine the reliability of the results.

The following presents the basic information, the segments, and the results for each SIC code:

#2752 – Commercial Printing: Data Information and Segments Defined

The database contained three hundred sixteen (316) transactions through February 7, 2005. Five (5) transactions were removed for the following reasons: two (2) transactions disclose only a sales price, one (1) discloses negative earnings, and two (2) disclose unusually high price/earnings ratios.

The data was then divided into the following segments for extracting and comparing the results, as follows:

1 – the entire database sans the five (5) transactions eliminated and described above; 311 transactions.
2 – annual gross sales from $0 to $100,000.
3 – annual gross sales from $100,001 to $200,000.
4 – annual gross sales from $201,000 to $300,000.
5 – annual gross sales from $0 to $300,000.
6 – annual gross sales from $300,001 to $600,000.
7 – annual gross sales from $600,001 to $900,000.
8 – annual gross sales from $900,001 to $1,200,000.
9 – annual gross sales from $0 to $600,000.
10 – annual gross sales from $600,001 to $1,200,000.
11 – annual gross sales from $1,200,001 to $5,000,000.
12 – annual gross sales from $5,000,001 to $23,000,000.
13 – sales transactions with a geographic area from the east coast (MA, ME, CT, NY, PA, MD, NC, GA, FL and "Mid-Atlantic").
14 – sales transactions with a geographic area other than from the east coast.
15 – transactions with sales dates from 1970 through 1989.
16 – transactions with sales dates from 1990 through 2004.
17 – transactions with sales dates from 2000 through 2004.

#2752 – Commercial Printing: Results

	Price / Gross						
Segment	High	Low	Mean	Median	R^2	Ranking	Number of Transactions
1	3.080	0.040	0.607	**0.520**	**0.887**	**2**	311
2	3.080	0.160	0.923	0.690	0.202	-	44
3	1.500	0.100	0.572	**0.520**	0.181	-	82
4	3.010	0.090	0.541	0.450	0.071	-	68
5	3.080	0.090	0.638	**0.520**	0.229	-	194
6	1.230	0.120	0.552	0.540	0.141	-	57
7	0.830	0.240	0.591	0.560	0.259	-	23
8	0.920	0.290	0.520	0.420	0.343	-	7
9	3.080	0.090	0.618	**0.520**	0.446	-	251

Price / Gross

Segment	High	Low	Mean	Median	R^2	Ranking	Number of Transactions
10	0.920	0.240	0.575	0.550	0.265	-	30
11	2.000	0.040	0.606	0.510	0.201	-	19
12	0.700	0.290	0.452	0.420	**0.666**	**5**	11
13	3.010	.0180	0.720	0.560	**0.804**	**4**	89
14	3.080	0.040	0.579	0.510	**0.924**	**1**	183
15	3.000	0.160	0.638	0.485	**0.584**	**6**	78
16	3.080	0.040	0.603	0.530	**0.870**	**3**	227
17	3.010	0.310	0.963	0.610	0.051	-	6
Median	3.010	0.120	0.603	**0.520**	0.265		

Price / Earnings

Segment	High	Low	Mean	Median	R^2	Ranking	Combined Ranking
1	37.000	0.520	3.564	2.220	**0.718**	**7**	**3**
2	37.000	0.580	5.113	2.920	0.169	-	-
3	27.200	0.630	3.166	2.000	0.192	-	-
4	28.570	0.520	2.811	1.855	0.144	-	-
5	37.000	0.520	3.360	1.970	0.331	-	-
6	6.500	1.180	2.603	2.600	0.446	-	-
7	9.640	1.390	2.871	2.365	0.168	-	-
8	23.080	2.310	6.906	2.740	**0.909**	**3**	-
9	37.000	0.520	3.184	2.045	**0.590**	**8**	-
10	23.080	1.390	3.678	2.510	0.333	-	-
11	13.060	1.480	4.041	3.410	**0.805**	**4**	-
12	28.000	3.930	10.889	4.940	0.228	-	-
13	11.500	0.630	2.677	**2.300**	**0.945**	**2**	**1**
14	37.000	0.580	3.712	2.080	**0.740**	**5**	**2**
15	333.330	0.580	12.040	2.700	0.105	-	-
16	28.570	(6.670)	3.094	2.140	**0.735**	**6**	**3**
17	2.690	1.470	2.074	1.820	**0.998**	**1**	-
Median	28.000	0.630	3.360	**2.300**	0.446		

The above results for SIC code #2752 lead to the following conclusions.

Clearly, Segment 13 (sales transactions in the east coast) discloses the best combined results for the price/gross and price/earnings ratios. The R-squared is well above 0.500 for both ratios; 0.804 and 0.945, respectively. Segment 14 (sales transactions other than in the east coast) also results in an R-squared above 0.500; 0.924 and 0.740, respectively.

It is interesting that, Segment 1 (comprising 311) came in a tie for third place; 0.887 and 0.718, respectively. Also, several other segments result in at least one (1) ratio in excess of the R2 midpoint of 0.500.

Consider, though, the near "perfect" regression for Segment 17 (all sales from 2000 through 2004) for the price/earnings ratio of 0.998. It demonstrates a median price/earnings ratio of 1.820 which is well below the median of the medians of 2.300 for the group. This might indicate that the most recent sales illustrate a decline in the multiple and based on the appraiser's analyses might be the "correct" ratio to use.

It is remarkable to note that Segment 1 exhibits results which could be relied upon for the entire spectrum of the transactions. Sometimes companies with greater sales would command a greater ratio, however, Segment 1 seems to demonstrate that this might possibly not be the case. Also, Segment 1's median result of 0.520 equals the median of the medians. It should be noted that Segment 14's price/gross ratio, which is ranked number 1, is only 0.010 less than the median of the medians.

#5992 – Florist: Data Information and Segments Defined

The database contained three hundred three (303) transactions through February 7, 2005. Two (2) transactions were removed because they contain incomplete information. One (1) transaction discloses only a sales price, while the other transaction discloses only an annual sales amount and a discretionary earnings amount.

The data was divided into the following segments for extracting and comparing the results, as follows:

1 – the entire database sans the two (2) transactions eliminated and described above; 301 transactions.
2 – annual gross sales from $0 to $100,000.
3 – annual gross sales from $100,001 to $200,000.
4 – annual gross sales from $201,000 to $300,000.
5 – annual gross sales from $0 to $300,000.
6 – annual gross sales from $300,001 to $600,000.
7 – annual gross sales from $600,001 to $900,000.
8 – annual gross sales from $900,001 to $1,200,000.
9 – annual gross sales from $0 to $600,000.
10 – annual gross sales from $600,001 to $1,200,000.
11 – sales transactions with a geographic state from the east coast (MA, ME, CT, NY, PA, MD, NC, GA, FL and "Mid-Atlantic").
12 – all other sales transactions with a geographic state other than from the east.
13 – transactions with sales dates from 1982 through 1989.
14 – transactions with sales dates from 1990 through 2004.
15 – transactions with sales dates from 2000 through 2004.

#5992 – Florists: Results

Price / Gross

Segment	High	Low	Mean	Median	R^2	Ranking	Number of Transactions
1	3.310	0.070	0.438	**0.380**	**0.653**	**3**	301
2	3.310	0.210	0.675	0.495	0.012	-	48
3	1.860	0.070	0.394	**0.380**	0.109	-	114
4	0.810	0.110	0.361	0.330	0.152	-	67
5	3.310	0.070	0.443	**0.380**	0.281	-	229
6	1.520	0.070	0.419	0.355	0.107	-	58
7	0.710	0.240	0.427	0.390	0.070	-	7
8	0.640	0.260	0.449	0.490	0.370	-	7
9	3.310	0.070	0.438	**0.380**	0.454	-	287
10	0.710	0.240	0.438	0.400	0.370	-	14
11	3.310	0.090	0.472	**0.380**	**0.596**	**5**	112
12	1.320	0.070	0.433	0.390	**0.708**	**2**	135
13	1.320	0.160	0.465	0.400	**0.845**	**1**	68
14	3.310	0.070	0.428	0.365	**0.607**	**4**	224
15	3.310	0.070	0.539	0.440	**0.585**	**6**	31
Median	1.860	0.070	0.438	**0.380**	0.371		

Price / Earnings

Segment	High	Low	Mean	Median	R^2	Ranking	Combined Ranking
1	41.000	0.310	2.620	1.830	0.394	-	-
2	27.000	0.350	3.851	**1.940**	0.015	-	-
3	11.670	0.310	1.942	1.430	0.179	-	-
4	41.000	0.700	2.939	1.780	0.196	-	-
5	41.000	0.310	2.565	1.720	0.231	-	-
6	15.880	0.350	2.612	2.075	0.087	-	-
7	7.970	1.910	4.001	2.770	0.005	-	-
8	3.830	2.130	2.706	2.480	**0.856**	**1**	-
9	41.000	0.310	2.575	1.800	0.282	-	-
10	7.970	1.910	3.462	2.650	0.346	-	-
11	15.880	0.310	2.616	1.880	0.177	-	-
12	41.000	0.440	3.025	1.980	**0.570**	**2**	**1**
13	41.000	0.550	4.062	2.280	**0.512**	**3**	**2**
14	11.670	0.310	2.260	1.780	0420	-	-
15	7.970	0.350	2.583	2.090	0.073	-	-
Median	15.880	0.350	2.620	**1.940**	0.231		

The above results for SIC code #5992 lead to the following conclusions.

Clearly, Segment 12 (sales transactions other than in the east coast) discloses the best combined results. The R-squared is well above 0.500 for the price/gross ratio (0.708) and above 0.500 for the price/earnings ratio (0.570). Segment 13 appears to exhibit the best results; however, the price/earnings regression ratio is too close to 0.500 and would be less reliable.

Segment 11 (sales transactions in the east coast) demonstrates only one (1) R-squared result above 0.500, that being the price/gross ratio. However, even though Segment 12's price/gross ratio R-squared result (0.708) is far superior to Segment 11's result (0.596), the median result is only a one hundredth difference (0.390 to 0.380).

Also note that Segment 1's price/gross ratio R-squared result (0.653), which is for the entire database, demonstrates a median result (0.380) equal to the result in Segment 11 and again is only a one hundredth difference from Segment 12's median result. Further note that the median of the median results for the price/gross ratio is 0.380.

The results for the price/earnings are more puzzling. Only Segment 8 and to some degree Segment 12 exhibit R-squared results that could easily be relied upon. However, while Segment 8's regression result (0.856) is the highest, its median result (2.480) is the third highest. And while Segment 12's R-squared result (0.570) is the second highest, its median result (1.980) is within 0.040 of the result for the median of the medians. This certainly raises the question, should Segment 8 still be ignored?

Since seller's discretionary earnings are company specific, this study indicates that the price/earnings ratio is not a very stable barometer to guide and gauge any ratio reliance. The only ratio that may be gleaned from this particular set of ratios is possibly the median of the medians (1.940) as a "tool" for a sanity check.

#7231 – Beauty Shops: Data Information and Segments Defined

The database contained three hundred twenty-nine (329) transactions through February 7, 2005. Nine (9) transactions were removed for the following reasons: eight (8) transactions only disclose a sales price, while the remaining transaction has an unusually high gross sales of $12,472,000.

The data were divided into the following segments for extracting and comparing the results, as follows:

1 – the entire database sans the nine (9) transactions eliminated and described above; 320 transactions.
2 – annual gross sales from $0 to $100,000.
3 – annual gross sales from $100,001 to $200,000.
4 – annual gross sales from $201,000 to $300,000.
5 – annual gross sales from $0 to $300,000.
6 – annual gross sales from $300,001 to $600,000.

7 – annual gross sales from $600,001 to $900,000.
8 – annual gross sales from $900,001 to $1,200,000.
9 – annual gross sales from $0 to $600,000.
10 – annual gross sales from $600,001 to $1,200,000.
11 – sales transactions with a geographic area from the east coast (MA, ME, CT, NY, PA, MD, NC, GA, FL and "Mid-Atlantic").
12 – all other sales transactions with a geographic area other than from the east.
13 – transactions with sales dates from 1983 through 1989.
14 – transactions with sales dates from 1990 through 2004.
15 – transactions with sales dates from 2000 through 2004.

#7231 – Beauty Shops: Results

Price / Gross

Segment	High	Low	Mean	Median	R^2	Ranking	Number of Transactions
1	4.000	0.040	0.367	0.300	**0.910**	**2**	320
2	4.000	0.070	0.534	0.430	0.250	-	86
3	1.460	0.060	0.330	**0.280**	0.094	-	102
4	0.630	0.100	0.299	**0.280**	0.015	-	48
5	4.000	0.060	0.398	0.330	0.297	-	236
6	0.750	0.050	0.264	0.220	0.094	-	64
7	2.890	0.040	0.517	0.220	0.005	-	9
8	0.330	0.040	0.157	0.150	0.012	-	9
9	4.000	0.050	0.369	0.300	0.407	-	300
10	2.890	0.040	0.337	0.180	0.052	-	18
11	1.460	0.040	0.333	**0.280**	0.461	-	144
12	1.200	0.070	0.375	0.320	**0.706**	**3**	115
13	1.060	0.070	0.404	0.355	**0.999**	**1**	50
14	4.000	0.040	0.358	**0.280**	0.206	-	261
15	2.890	0.070	0.396	0.270	0.181	-	52
Median	2.890	0.050	0.367	**0.280**	0.206		

Price / Earnings

Segment	High	Low	Mean	Median	R^2	Ranking	Combined Ranking
1	24.000	0.120	2.038	1.380	0.118	-	-
2	20.000	0.290	2.289	**1.385**	0.456	-	-
3	21.000	0.250	1.847	1.200	0.094	-	-
4	3.000	0.450	1.493	1.350	0.321	-	-
5	21.000	0.250	1.924	1.350	0.377	-	-
6	24.000	0.120	2.148	1.555	0.046	-	-

	Price / Earnings						
Segment	High	Low	Mean	Median	R^2	Ranking	Combined Ranking
7	22.470	0.270	4.471	1.610	0.031	-	-
8	2.200	0.740	1.298	1.255	0.488	-	-
9	24.000	0.120	1.977	1.365	0.265	-	-
10	22.470	0.270	2.884	1.410	0.005	-	-
11	24.000	0.120	2.077	1.420	0.336	-	-
12	21.000	0.540	2.078	1.400	**0.552**	**2**	**2**
13	21.000	0.570	2.773	1.620	**0.632**	**1**	**1**
14	24.000	0.120	1.928	1.350	0.102	-	-
15	22.470	0.120	2.334	1.420	0.016	-	-
Median	22.470	0.250	2.077	**1.385**	0.265		

The above results for SIC code #7231 lead to the following conclusions.

Clearly, Segment 13 (sale transactions with dates from 1983 through 1989) discloses the best combined results. The R-squared is nearly perfect for the price/gross ratio (0.999) and above the midpoint for the price/earnings ratio (0.632). However, even though Segment 11's price/gross ratio is only slightly below (0.461) the 0.500 midpoint for the R-squared, its median (0.280) matches the median of the median results for the group as a whole.

It should be significantly noted that Segment 1's price/gross ratio R-squared result (0.910), which is for the entire database (sans removals), demonstrates a median result (0.300) only 0.020 greater than the median of the median results (0.280). Also, Segment 1's price/gross median is only 0.020 lower than Segment 12's median result of 0.320.

The results for the price/earnings ratio are puzzling here as well. Only Segments 12 and 13 exhibit R-squared results that could be reasonably relied upon. Note, while Segment 12's R-squared result (0.552) is almost too low, its median result (1.400) is only 0.015 above the median of the medians. Also note that while Segment 1's R-squared result is the lowest (0.118), its median result (1.380) is, basically, equal to the median of the median results (1.385). Even though Segment 12's median result is only 0.015 greater than the median of the medians, a valuator must use experience to determine which ratio to implement.

Again, since seller's discretionary earnings are company specific, this SIC code study indicates that in this particular instance the price/earnings ratio is not a very stable barometer to guide and gauge any ratio reliance. The only ratio that may be gleaned from this particular set of ratios is possibly the median of the medians (1.385) as a "tool" for a sanity check.

Further Study Analyses by Geographic, Time and Size Effects

Geographic Effects:

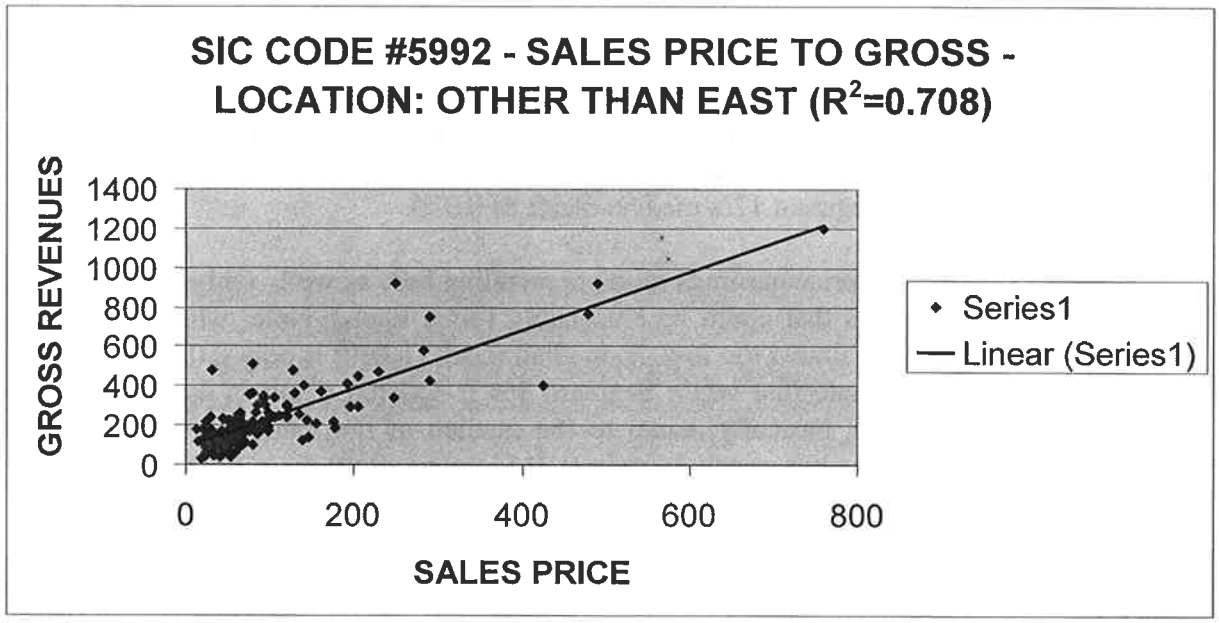
- **SIC Code #2752 – Commercial Printing**

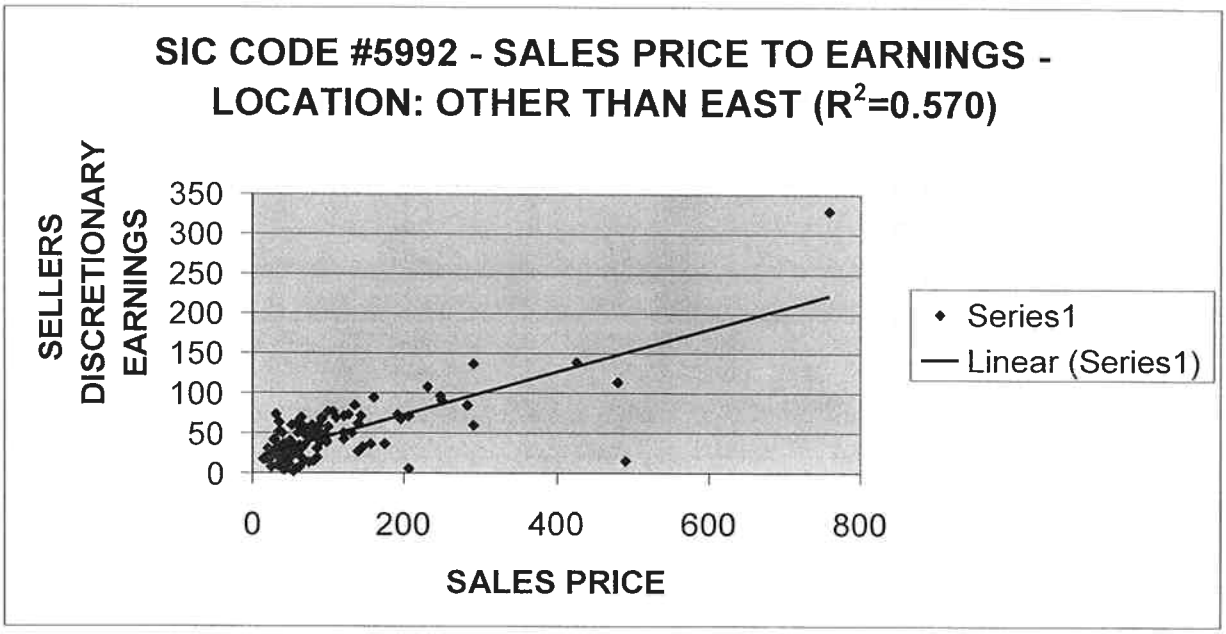
Segment 14, all other sales transactions with a geographic area other than from the east, was ranked #1 when the price/gross ratio was analyzed.

Segment 13, sales transactions with a geographic area from the east, exhibited a combined #1 price/earnings ratio was ranking with a #4 ranking when the price/gross ratio was analyzed and a #2 ranking when the analyzed.

- **SIC Code #5992 – Florists**

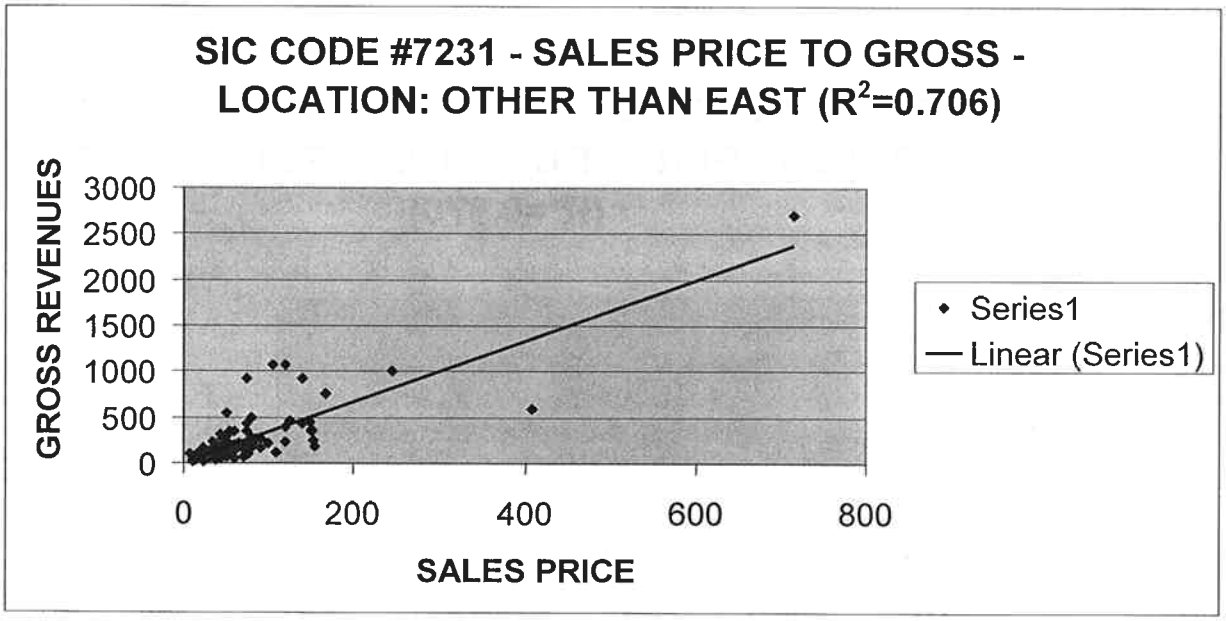
Segment 12, all other sales transactions with a geographic area other than the east, exhibited a combined #1 ranking with a #2 ranking when the price/gross ratio and the price/earnings ratio were analyzed.

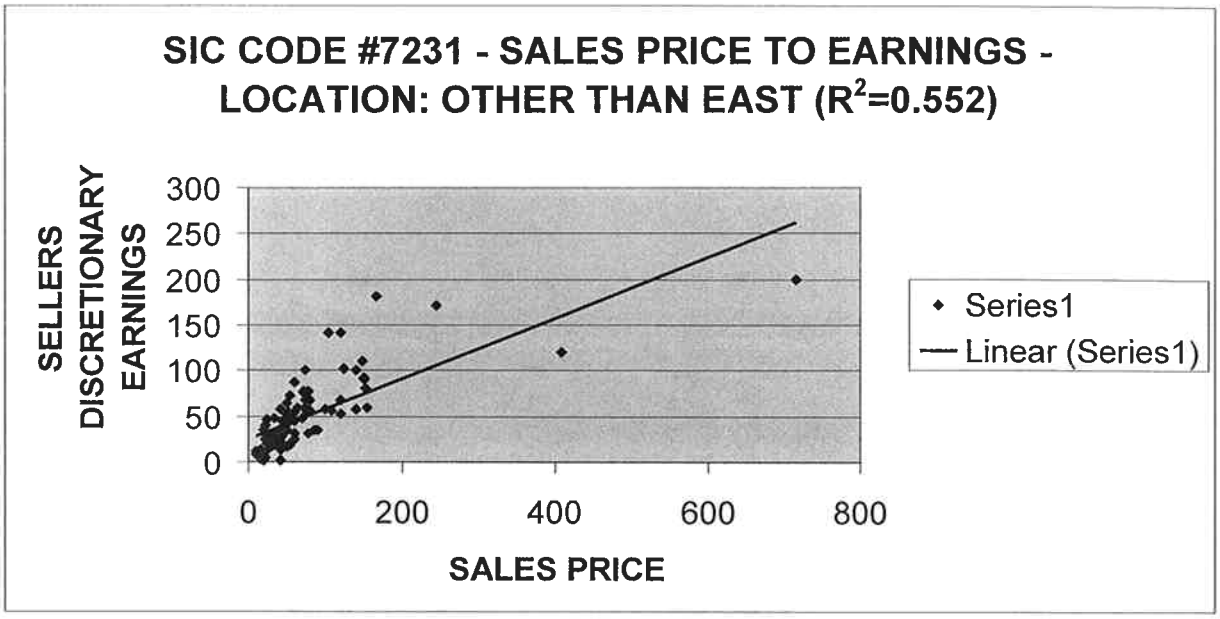




- **SIC Code #7231 – Beauty Shops**

Segment 12, all other sales transactions with a geographic area other than the east, exhibited a combined #2 ranking with a #3 ranking when the price/gross ratio was analyzed and a #2 ranking when the price/earnings ratio was analyzed.

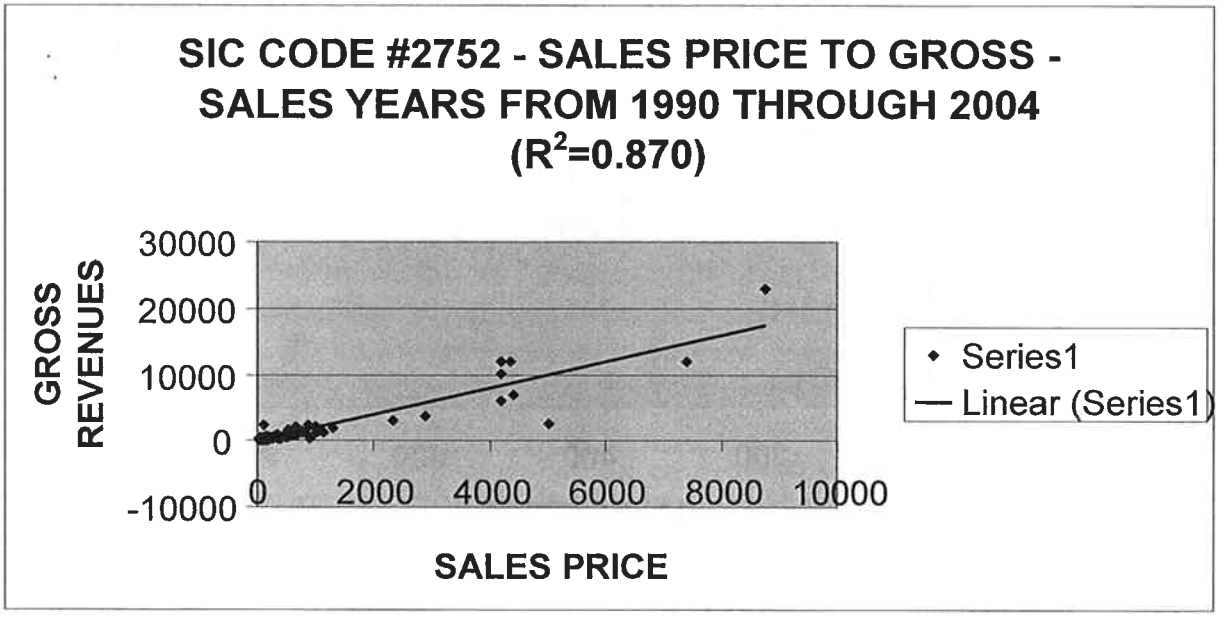


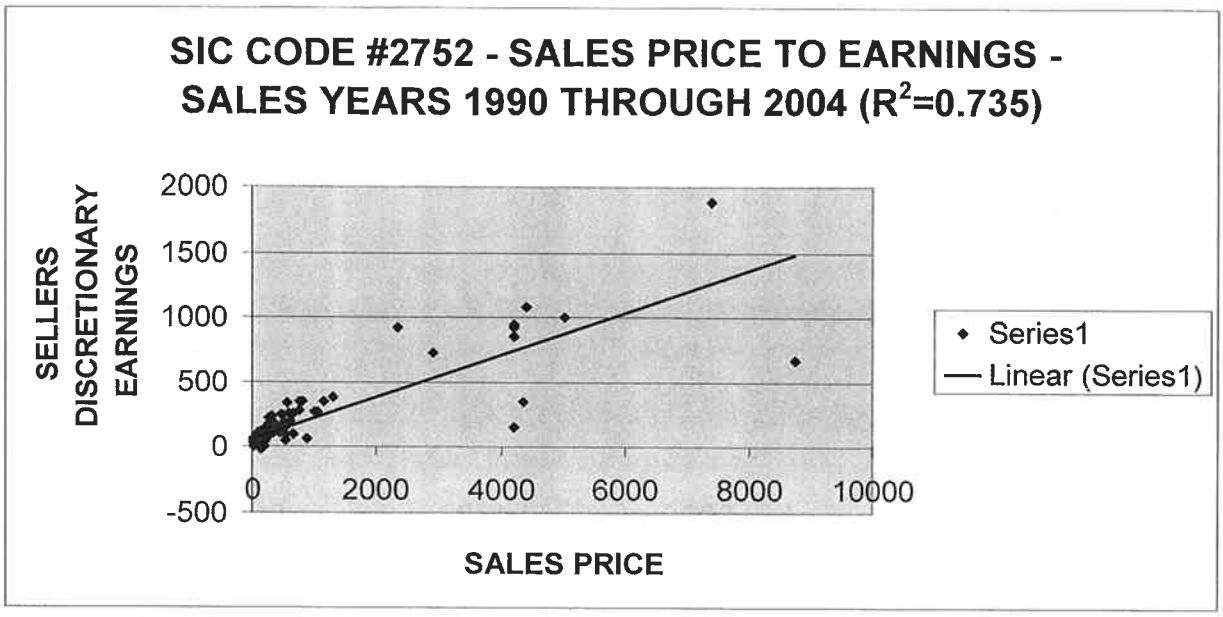


Time Effects:

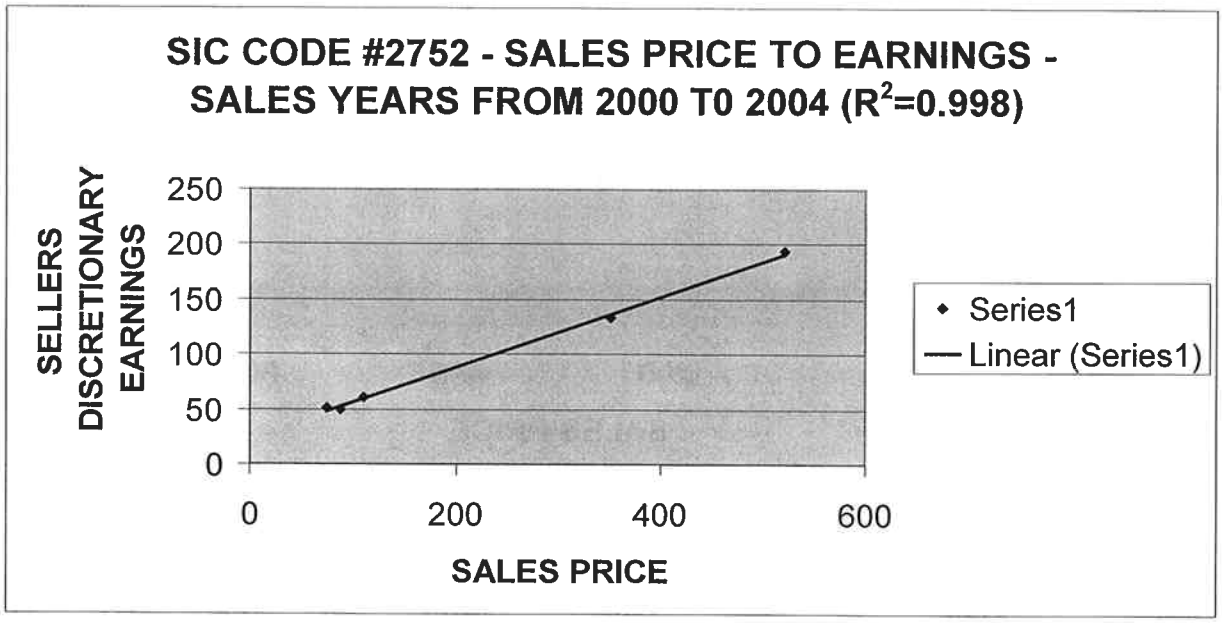
- **SIC Code #2752 – Commercial Printing**

Segment 16, transactions with sales dates from 1990 through 2004, exhibited a combined #3 ranking with a #3 ranking when the price/gross ratio was analyzed and a #6 ranking when the price/earnings ratio was analyzed.



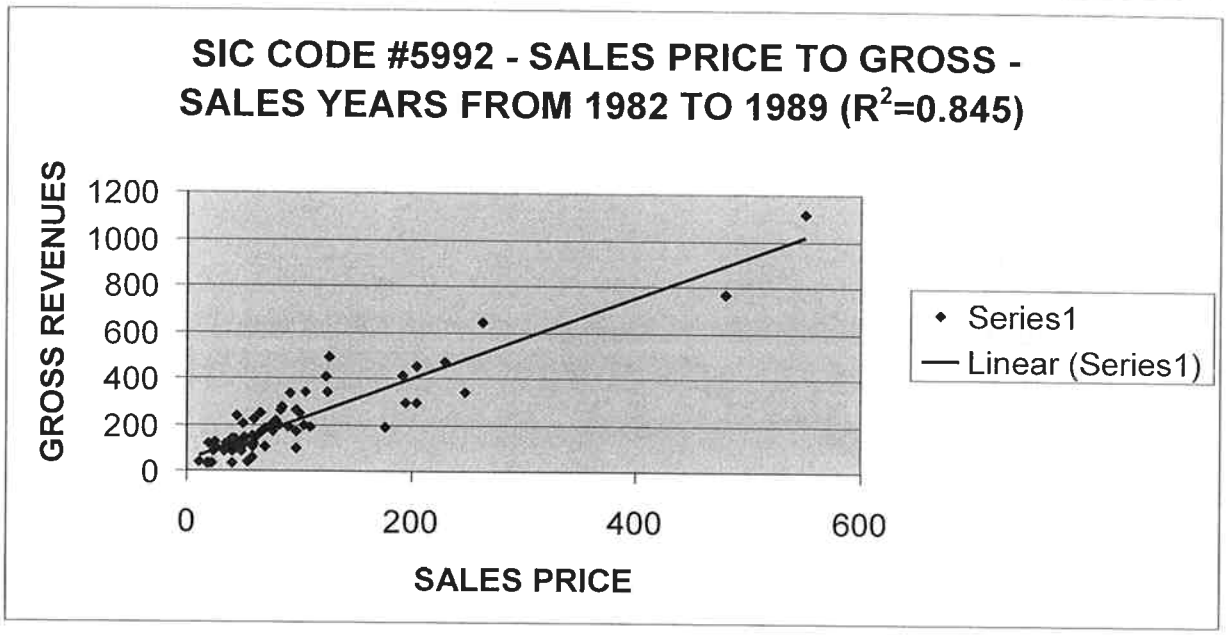


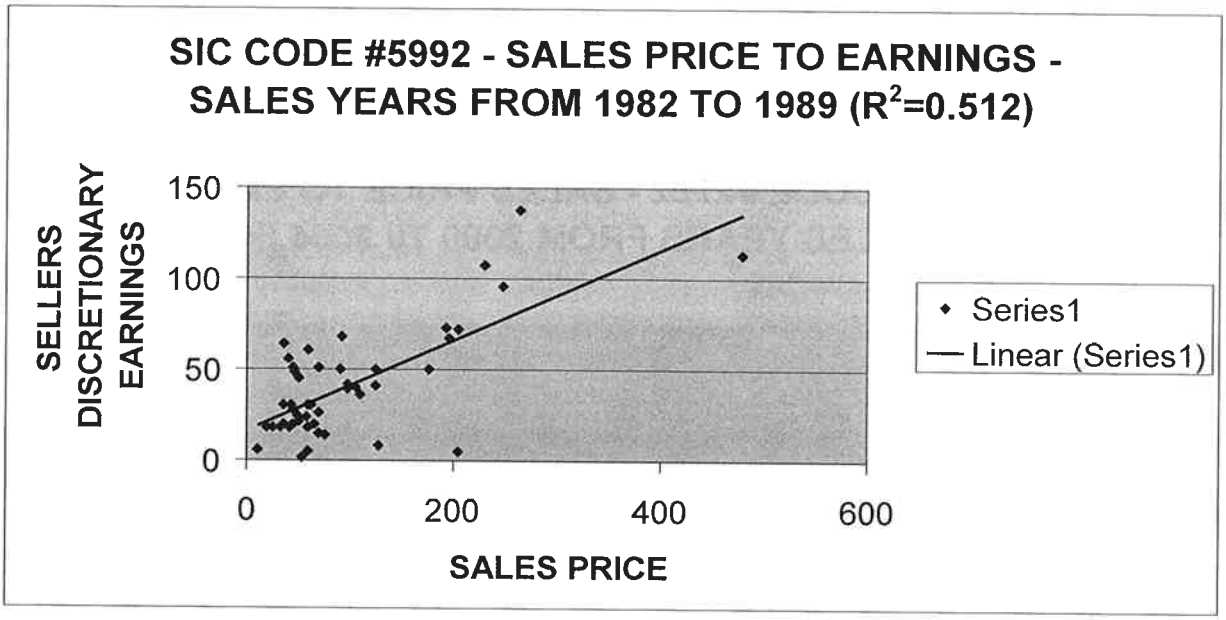
However, Segment 17, transactions with sales dates from 2000 through 2004, exhibited a #1 ranking when the price/earnings ratio was analyzed.



- **SIC Code #5992 – Florists**

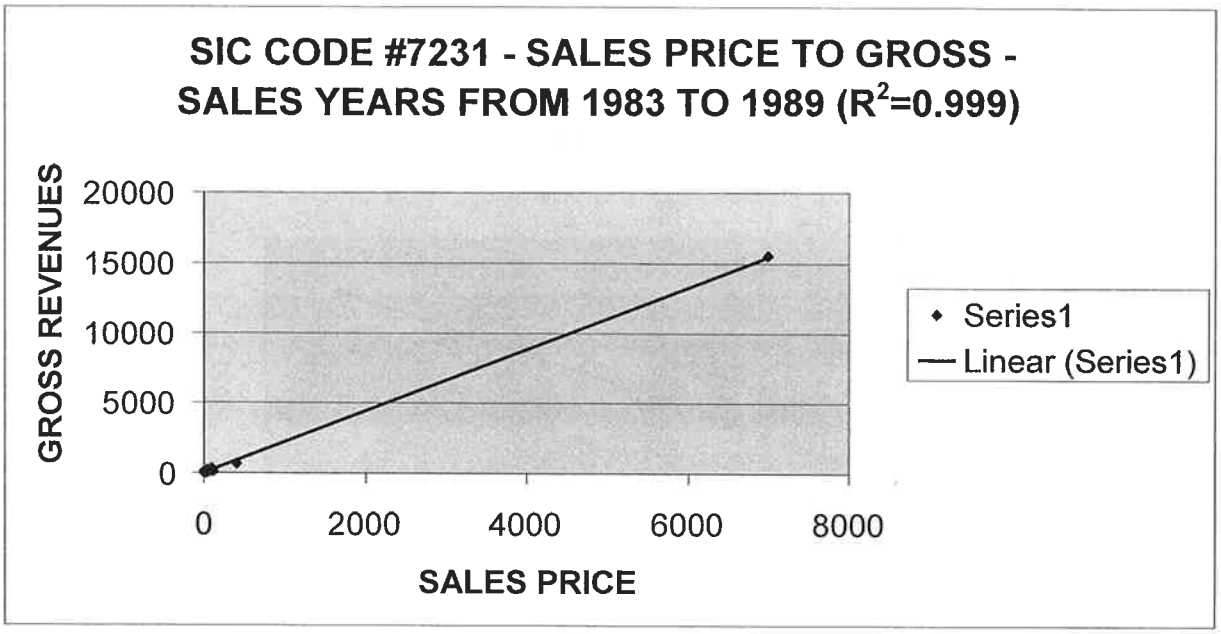
Segment 13, transactions with sales dates from 1982 through 1989, exhibited a combined #2 ranking with a #1 ranking when the price/gross ratio was analyzed and a #3 ranking when the price/earnings ratio was analyzed.

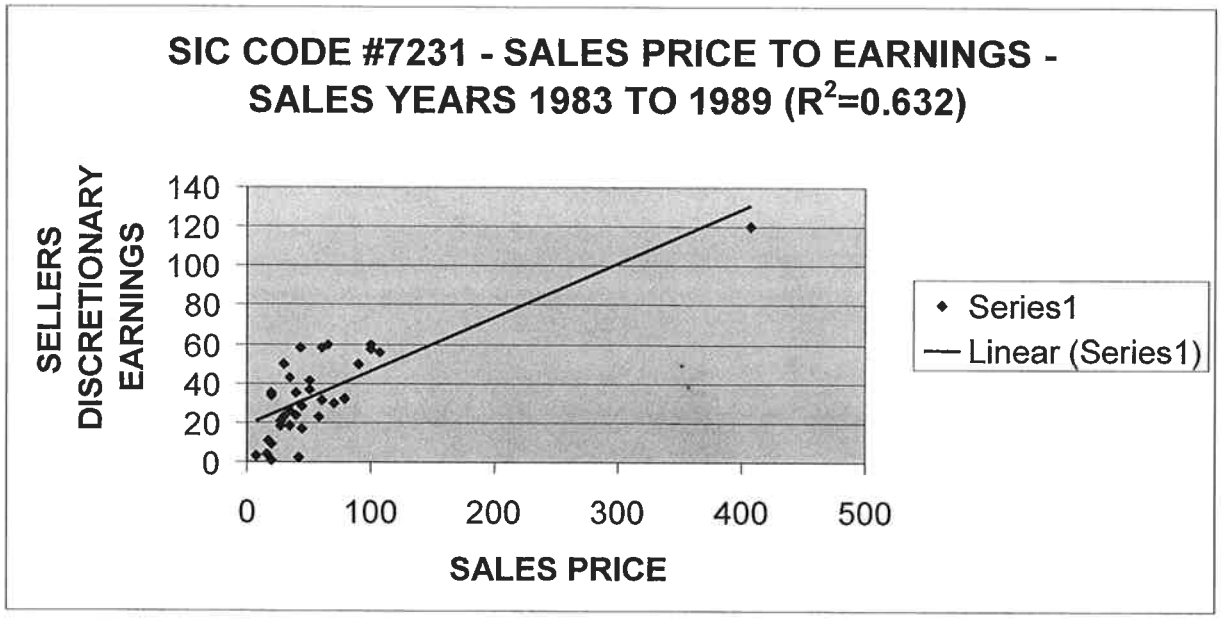




- **SIC Code #7231 – Beauty Shops**

Segment 13, transactions with sales dates from 1983 through 1989, exhibited a combined #1 ranking with a #1 ranking for both the price/gross ratio and the price/earnings ratio when they were analyzed.

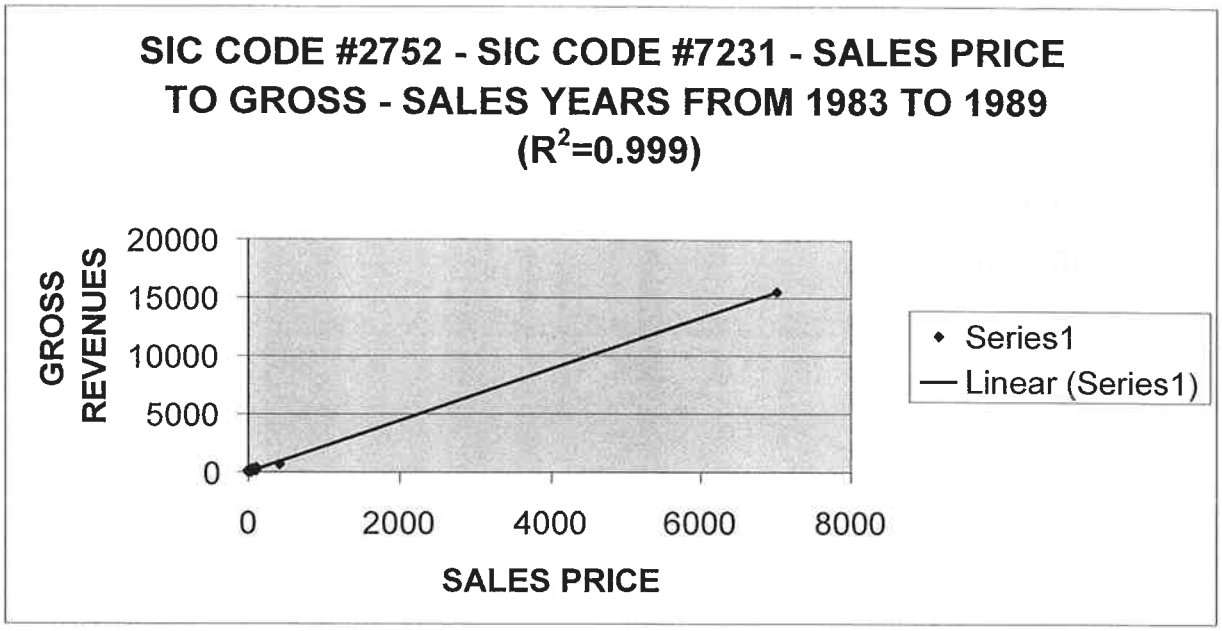


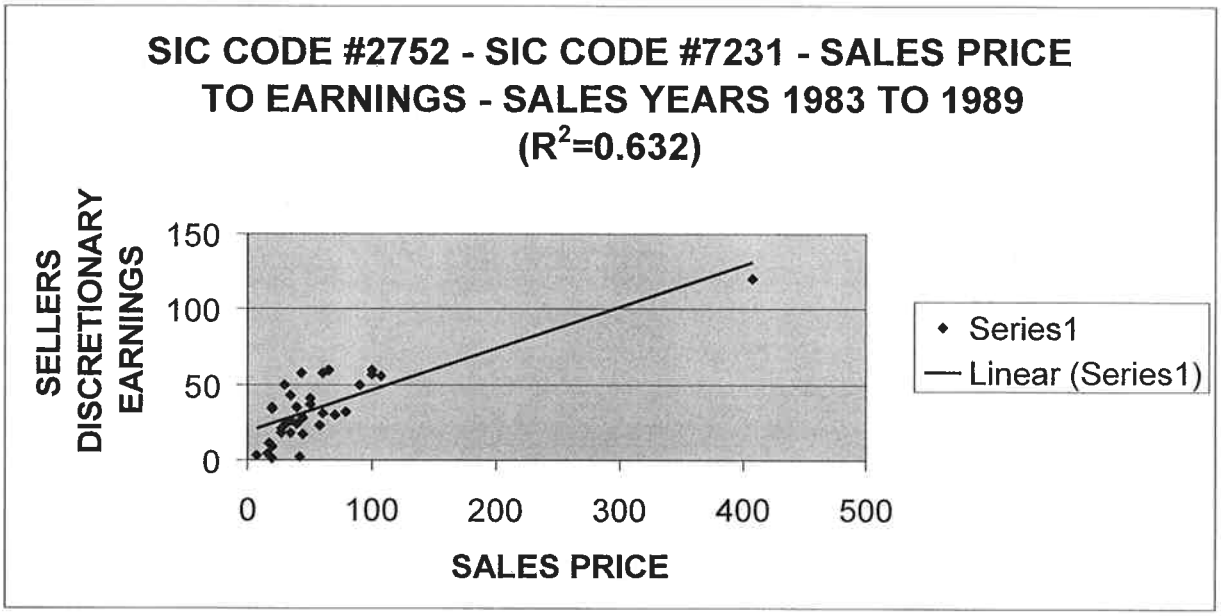


Size Effects (Gross Sales Range):

- **<u>SIC Code #2752 – Commercial Printing</u>**

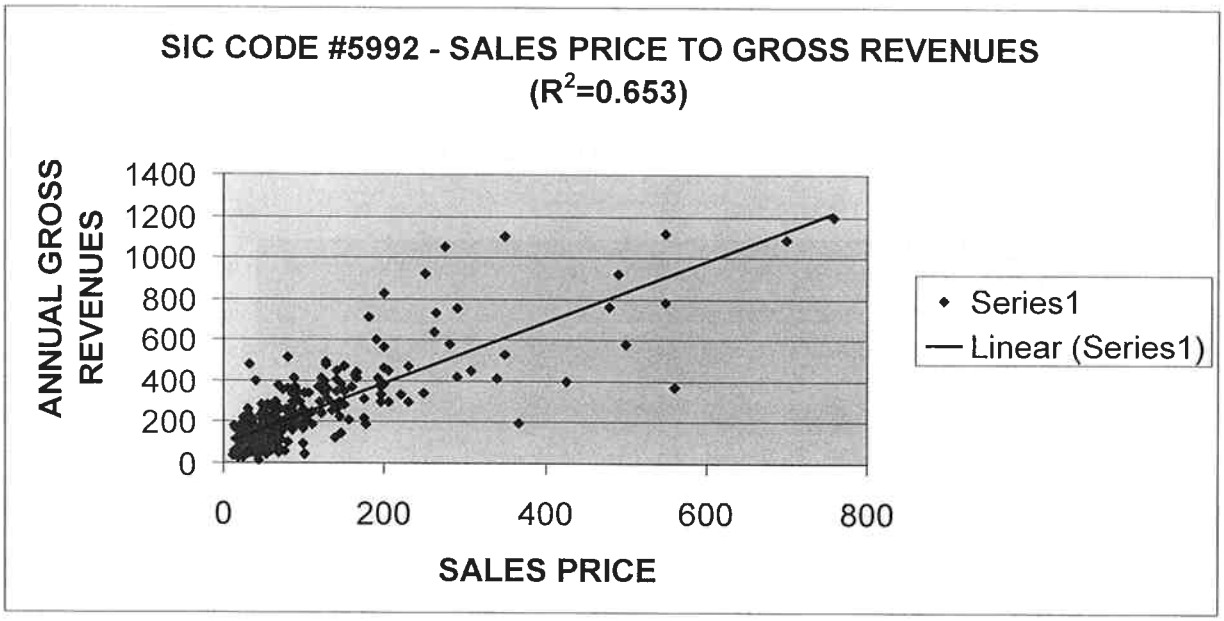
Segment 1, the entire database sans the five (5) transactions eliminated, exhibited a combined #3 ranking with a #2 ranking when the price/gross ratio was analyzed and a #7 ranking when the price/earnings ratio was analyzed.



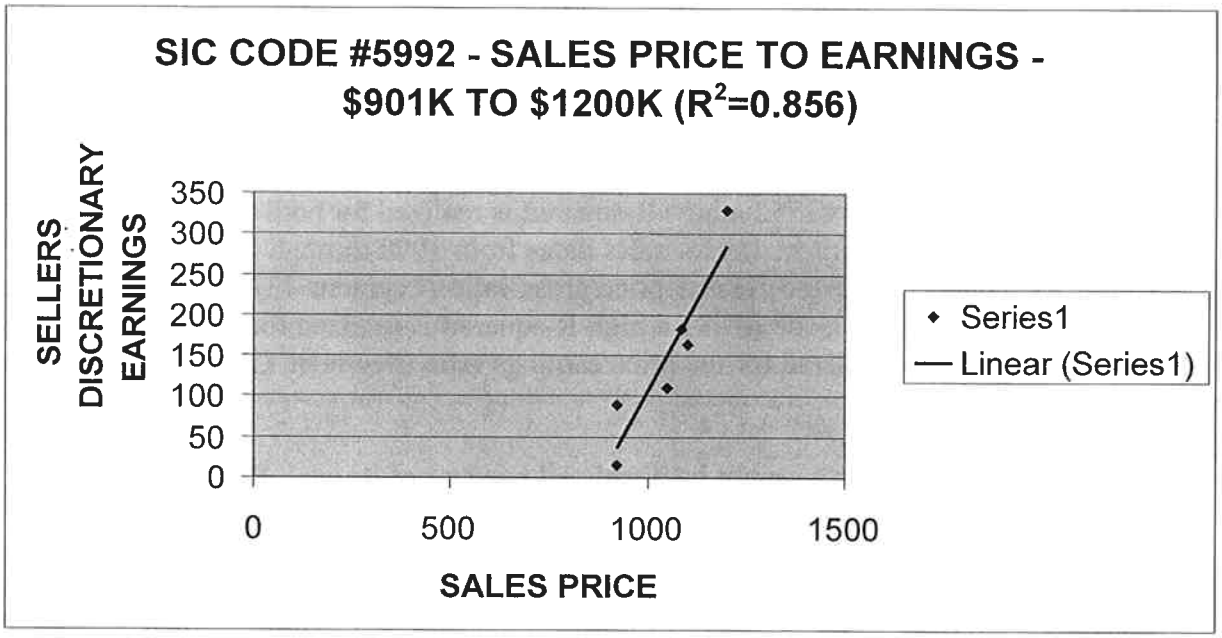


- **SIC Code #5992 – Florists**

Segment 1, the entire database sans the two (2) transactions eliminated, exhibited a #3 ranking when the price/gross ratio was analyzed.

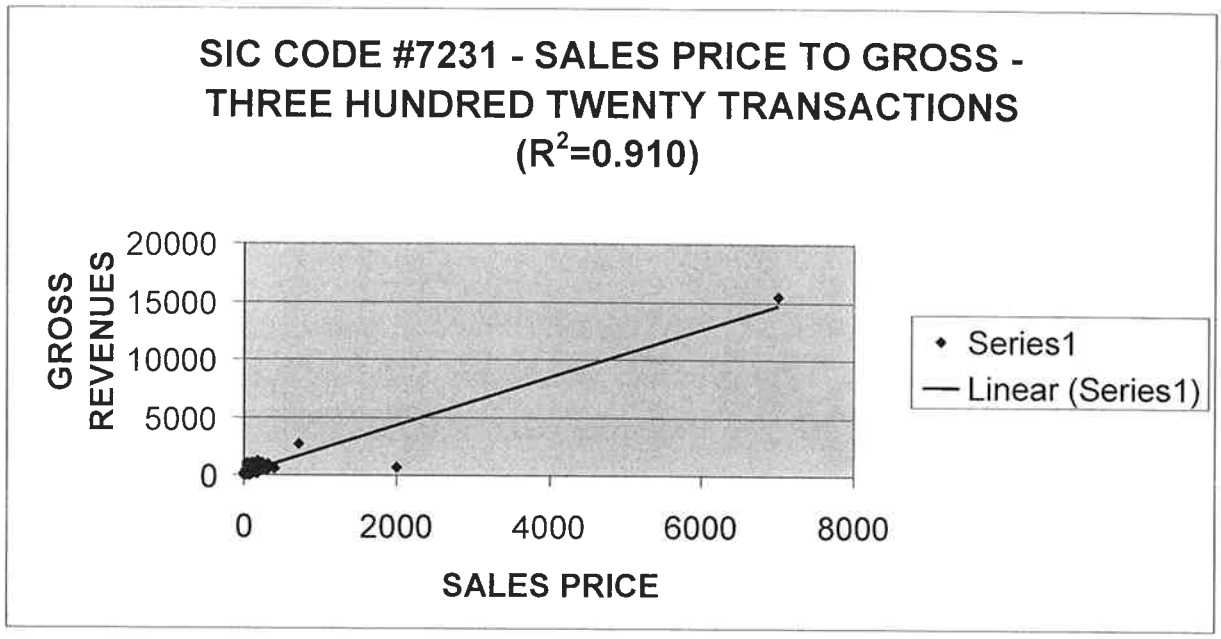


Segment 8, annual gross sales from $900,001 to $1,200,000, exhibited a #1 ranking when the price/earnings ratio was analyzed.



- **SIC Code #7231 – Beauty Shops**

Segment 1, the entire database sans the nine (9) transactions eliminated, exhibited a #2 ranking when the price/gross ratio was analyzed.



Study Conclusion

"Older" data can still be very useful. This study in particular proves (specifically for these three (3) SIC Codes) that when all of the transactions were considered for the price/gross ratio for each SIC Code (Segment 1), it yields very high R-squared ratios with rankings of 2 to 3. For SIC Code #2752, it also yields a strong indication for the price/earnings ratio with a ranking of 7. Time did not distort the R-squared ratio relationship.

Also, for SIC code #2752 a high R-squared is realized for both the price/gross ratio and the price/earnings ratio (Segment 16) for sales dates from 1990 through 2004. For SIC Code #5992 a high R-squared is realized for the price/gross ratio (Segment 13) for sales dates from 1982 through 1989. For SIC Code #7231 a high R-squared is realized for the price/gross ratio and a modest R-squared is realized for the price/earnings ratio (Segment 13) for sales dates from 1983 through 1989.

Therefore, older data cannot be dismissed because of its age. Remember that one constant remains true. While inflation occurs over time the amount of return a business owner expects to receive from the sale of the business will be adjusted for the time value of money. This will usually keep the resulting ratio relationships reasonably constant over time. (It is to be understood that additional factors could and would cause the ratios to change upward for certain company specific acquired assets, i.e.: market share, human capital, intellectual property, proprietary software, trade name, telephone number, website, infrastructure, contracts, special agreements, etc.)

Stratifying by gross sales within or near the range of the subject company's gross sales also yields valuable results. For SIC code #2752 a reasonably high R-squared is realized for the ~~price/gross ratio (Segment 12) for the annual gross sales ratio from $5,000,001 to $23,000,000.~~

However, the price/earnings ratio exhibits more results with a higher R-squared; Segment 8 (annual gross sales from $900,001 to $1,200,000) and Segment 11 (annual gross sales from $1,000,001 to $5,000,000). For SIC Code #5992 only the price/earnings ratio for Segment 8 with a ranking of #1 exhibits a very high R-squared.

Location is also thought to be a predominant factor when considering the data. This proves to be a strong indication for relying on the ratios as well. For SIC Code #2752, Segment 13 (sales from the east coast) exhibits very high R-squared's for both the price/gross ratio and the price/earnings ratio. Segment 14 (sales from other than the east coast) exhibits a very high R-squared for the price/gross ratio and a strong indication for the price/earnings ratio. For SIC Code #5992 Segment 11 (sales from the east coast) exhibits a moderate R-squared for the price/gross ratio, while Segment 12 (sales from other than the east coast) exhibits a reasonably strong R-squared indication for the price/gross ratio and a modest R-squared indication for the price/earnings ratio. Finally, for SIC Code #7231 only Segment 12 (sales from other than the east coast) exhibits reliable results for both the price/gross ratio (strong) and the price/earnings ratio (moderate).

Basically, the foregoing study illustrates that when a business valuator does not take the time to trend the IBA transactional market data results, it is almost impossible to verify the reliability of the data. Even if the data is identified as reliable, will the valuator realize the degree or strength of reliability that exists in the results?

Furthermore, without determining the R-square and the adjusted R-square (Excel also calculates this) the valuator cannot trust or use the results. If untested results are included in a report, the valuator will be open to scrutiny and questions as to the reliability of the value conclusion.

A valuator must fully understand how to use published data, regardless of what database is used, to ensure that the results will provide a useful indication of the subject company's value. Even if the resulting report will not be litigated, it is wise to follow procedures that will result in the best professional practices.

The IBA database is the largest database in existence. Even though there may be a limited number of data points, it still affords us with a wealth of information with which to analyze, interpret and assist us in the process of producing reliable business valuation conclusions.

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