

Stock Prices Analysis

Dhanashree Gadkari Arole, MS MBA

BACKGROUND:

The production pillar of video gaming faces everyday challenges to figure out ways that will embellish the final product's design. It could vary from making simple marketing decisions about which athlete's photo will be printed on a façade to complex queries about renewing licenses with the most lucrative in-game advertisers. It is highly necessary to segment niche audiences that are willing to pay premium prices for what they yearn the most.

ABSTRACT:

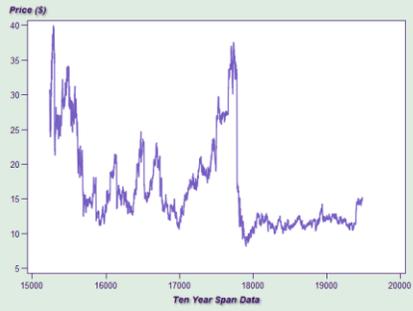
This paper researches traditional stock market prices for last ten years. The goal of this paper is to analyze financial data for three major players in video gaming industry; namely Electronic Arts, Activision Blizzard, and Nintendo. The data involves three parameters that are closely tracked to reflect low and high percentage marks. Many analysts monitor this sort of data to figure out key performance indicators in their budget models. SAS Enterprise Guide conveniently provides the capability to import Microsoft excel workbooks and overcome the hassle of format conversion for multiple data types, especially date and European euro to American dollar conversion.

One very useful feature is the ability to wrap lengthy data into meaningful ranges for visualizing implicit patterns embedded within large datasets. For instance, thousands of observations¹ that represent daily information can be organized into a quarterly basis helping to understand if seasonal trends are revealed over multiple years. Console games are generally shipped into market around holiday season for the masses to purchase. The hypothesis is to coordinate product launch with affiliated real world events, like coinciding the launch of Madden NFL with the Superbowl. In this particular scenario, analysts are interested in niche audiences such as immediate friends and family of real athletes. Their willingness to purchase latest and greatest at premium prices is driving criteria for this scenario analysis.

DATA ANALYSIS:

Wall Street starts its day by reporting what dollar value a company's stock opens with, which is factor of multiple parameters such as Market Sentiment, Performance of the industry, Earning results and Earning Guidance, Take-over or merger, New product introduction to markets or introduction of existing product to new markets, New major contracts or Government orders, Share buy-back, Dividend, Stock splits, Insider trading, Investment Gurus / Hedge Funds Trading, Analyst Upgrades / Downgrades, Additional / removal from / to stock index. Further as day progresses, the HIGH, LOW and CLOSE dollar values are also logged. This kind of data is publicly accessible to investors at finance portals like Yahoo, E*TRADE Finance et al. This paper uses basic data set that logs Open, High, Low and Close stock prices for Activision, Electronic Arts and Nintendo, with dates ranging from 2001 through 2013. Following three charts depict this data using SAS/GRAPH plug-in with Electronic Arts showing best average values over this ten year span.

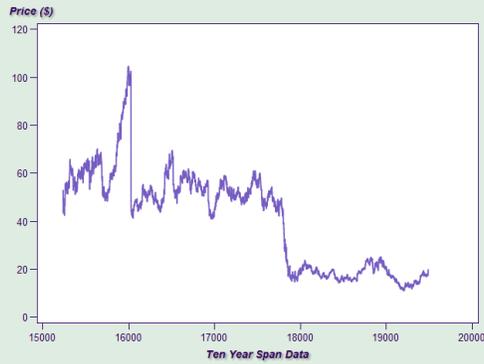
Activision Market Prices, Only OPEN



Start Date: Sep 17, 2001 End Date: May 8, 2013

Maximum Value: \$39.95 Minimum Value: \$8.2 Average Value: \$16.55

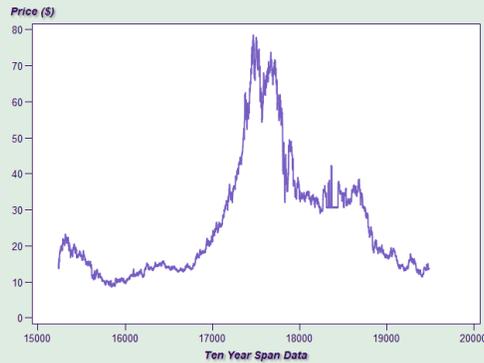
Electronic Arts Market Prices, Only OPEN



Start Date: Sep 17, 2001 End Date: May 8, 2013

Maximum Value: \$104.61 Minimum Value: \$11.04 Average Value: \$40.93

Nintendo Market Prices, Only OPEN



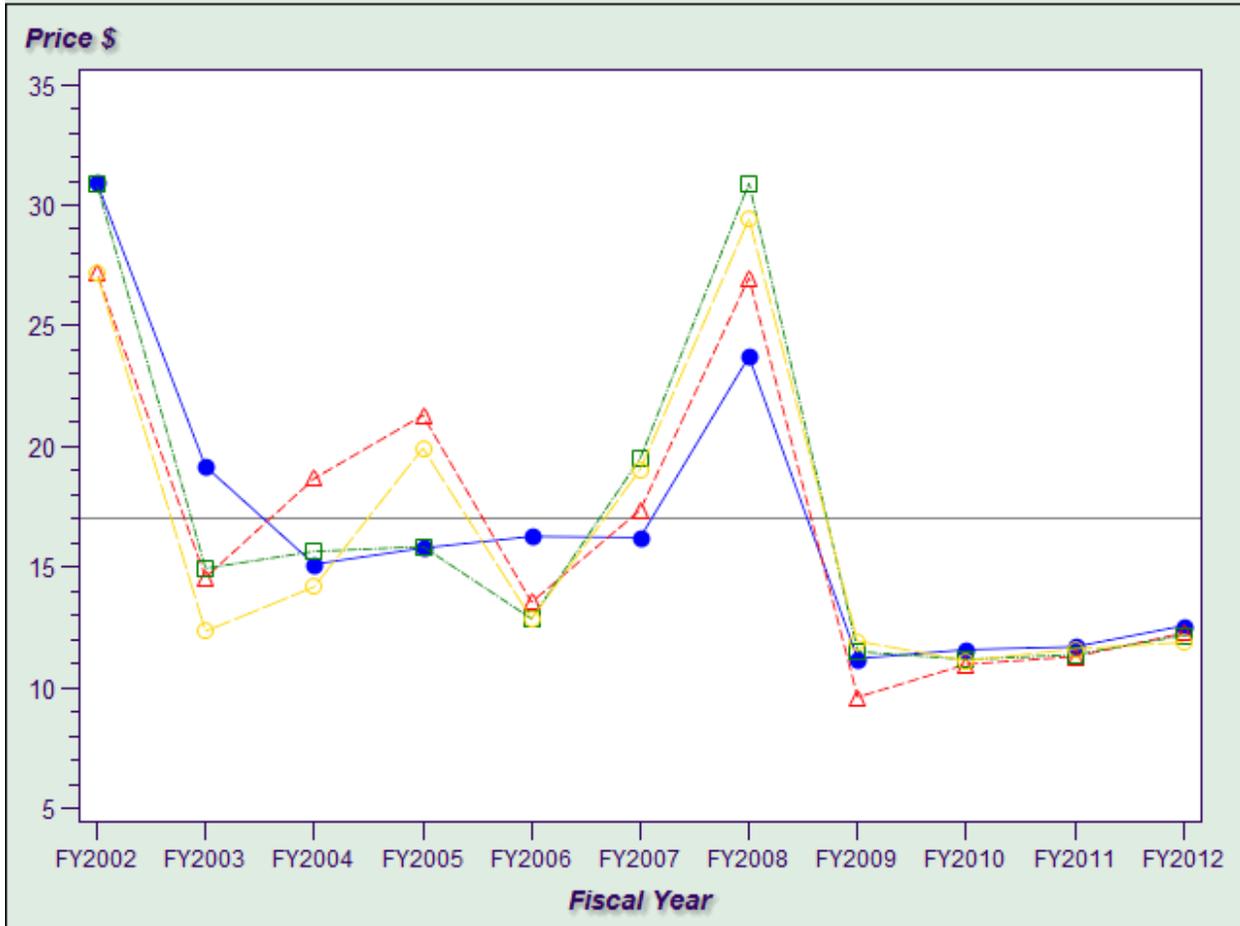
Start Date: Sep 17, 2001 End Date: May 8, 2013

Maximum Value: \$78.5 Minimum Value: \$8.55 Average Value: \$26.08

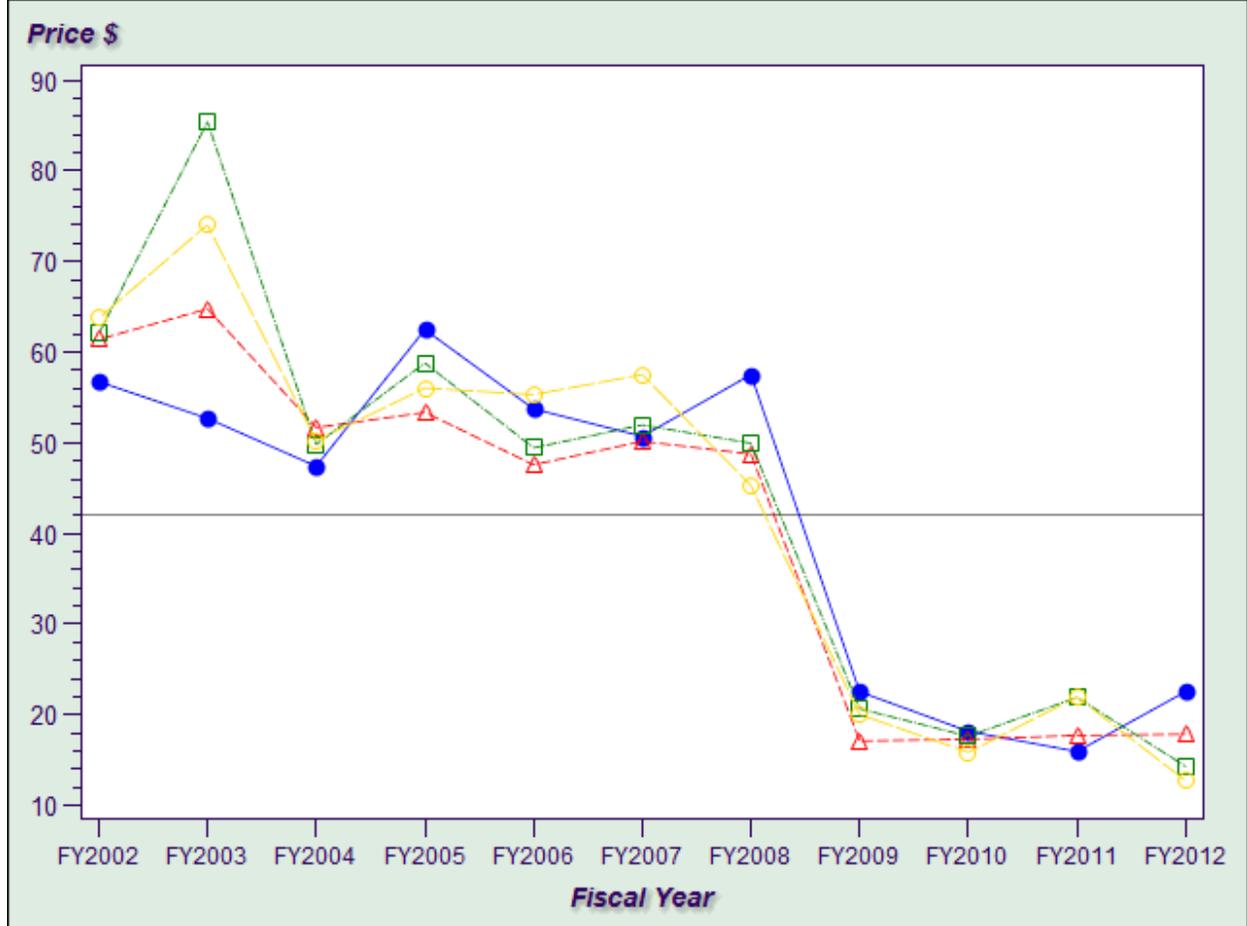
QUARTERLY ANALYSIS

The next step is to modify existing data structure to view data on quarterly basis. This approach will reveal any potential seasonality with the aid of a Durbin-Watson test and reveal how well a company is doing in comparison to its ten-year average statistic. Each chart has four datasets plotted; blue color for quarter 1 (Oct-Dec), red for quarter 2 (Jan-Mar), green for quarter 3 (Apr-Jun), and gold for quarter 4 (July-Sep).

Activision Quarterly Market Prices

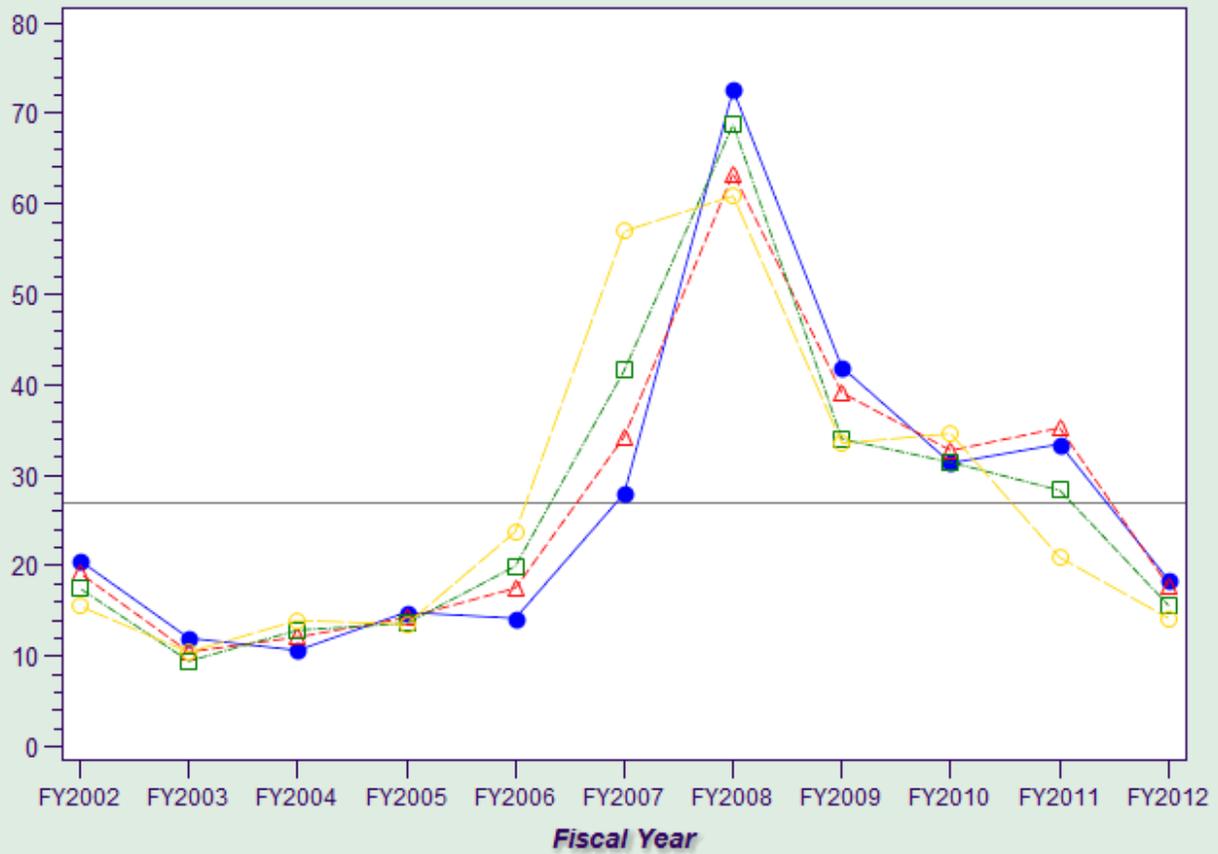


Electronic Arts Quarterly Market Prices



Nintendo Quarterly Market Prices

Price \$



DURBIN-WATSON TEST

Very powerful tool to translate key numerical statistics into qualitative information is the AUTOREGRESSION procedure. It has myriad of options that can be conveniently tweaked to examine data for a potential seasonality pattern and the relation to how well the company is performing on Wall Street. Durbin-Watson statistics provide mechanism to take closer look at important derivatives such as Sum of Squared Errors and Mean Square Error estimate. The DW= (default DW=1) option prints Durbin-Watson statistics up to the order n. The DWPROB option produces p-values for generalized Durbin-Watson test statistics for large sample sizes.

<i>Ordinary Least Squares Estimates</i>			
<i>SSE</i>	91716.5205	<i>DFE</i>	2928
<i>MSE</i>	31.32395	<i>Root MSE</i>	5.59678
<i>SBC</i>	18420.9866	<i>AIC</i>	18409.0211
<i>MAE</i>	4.05232863	<i>AICC</i>	18409.0252
<i>MAPE</i>	23.6211632	<i>HQC</i>	18413.3302
		<i>Regress R-Square</i>	0.2606
		<i>Total R-Square</i>	0.2606

<i>Durbin-Watson Statistics</i>			
<i>Order</i>	<i>DW</i>	<i>Pr < DW</i>	<i>Pr > DW</i>
198	1.7212	<.0001	1.0000
199	1.7263	<.0001	0.9999
200	1.7312	0.0001	0.9999
201	1.7358	0.0002	0.9998

Figure 1. DW Statistics for Activision

Potential seasonality = 199 observation

Equal to nine and half months

Ordinary Least Squares Estimates			
SSE	332335.064	DFE	2928
MSE	113.50241	Root MSE	10.65375
SBC	22193.1892	AIC	22181.2237
MAE	8.51161231	AICC	22181.2278
MAPE	24.9577212	HQC	22185.5328
		Regress R-Square	0.7276
		Total R-Square	0.7276

Durbin-Watson Statistics			
Order	DW	Pr < DW	Pr > DW
241	1.6906	<.0001	1.0000
242	1.6980	<.0001	0.9999
243	1.7055	0.0002	0.9998
244	1.7121	0.0004	0.9996

Figure 2. DW Statistics for Electronic Arts

Potential seasonality = 242 observation

Equal to eleven and half months

Nintendo

Ordinary Least Squares Estimates			
SSE	719992.912	DFE	2937
MSE	245.14570	Root MSE	15.65713
SBC	24524.4368	AIC	24512.4651
MAE	11.5078801	AICC	24512.4692
MAPE	52.7529097	HQC	24516.7758
		Regress R-Square	0.0755
		Total R-Square	0.0755

Durbin-Watson Statistics			
Order	DW	Pr < DW	Pr > DW

404	1.5874	<.0001	0.9999
405	1.5906	<.0001	0.9999
406	1.5937	0.0001	0.9999
407	1.5968	0.0002	0.9998

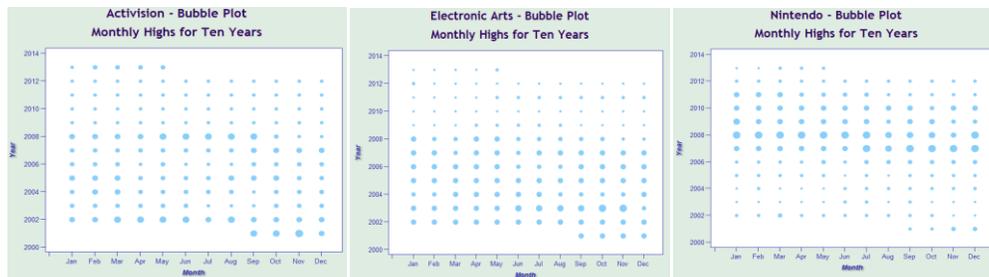
Figure 3. DW Statistics for Nintendo

Potential seasonality = 405 observation

Equal to nineteen months

MONTHLY ANALYSIS

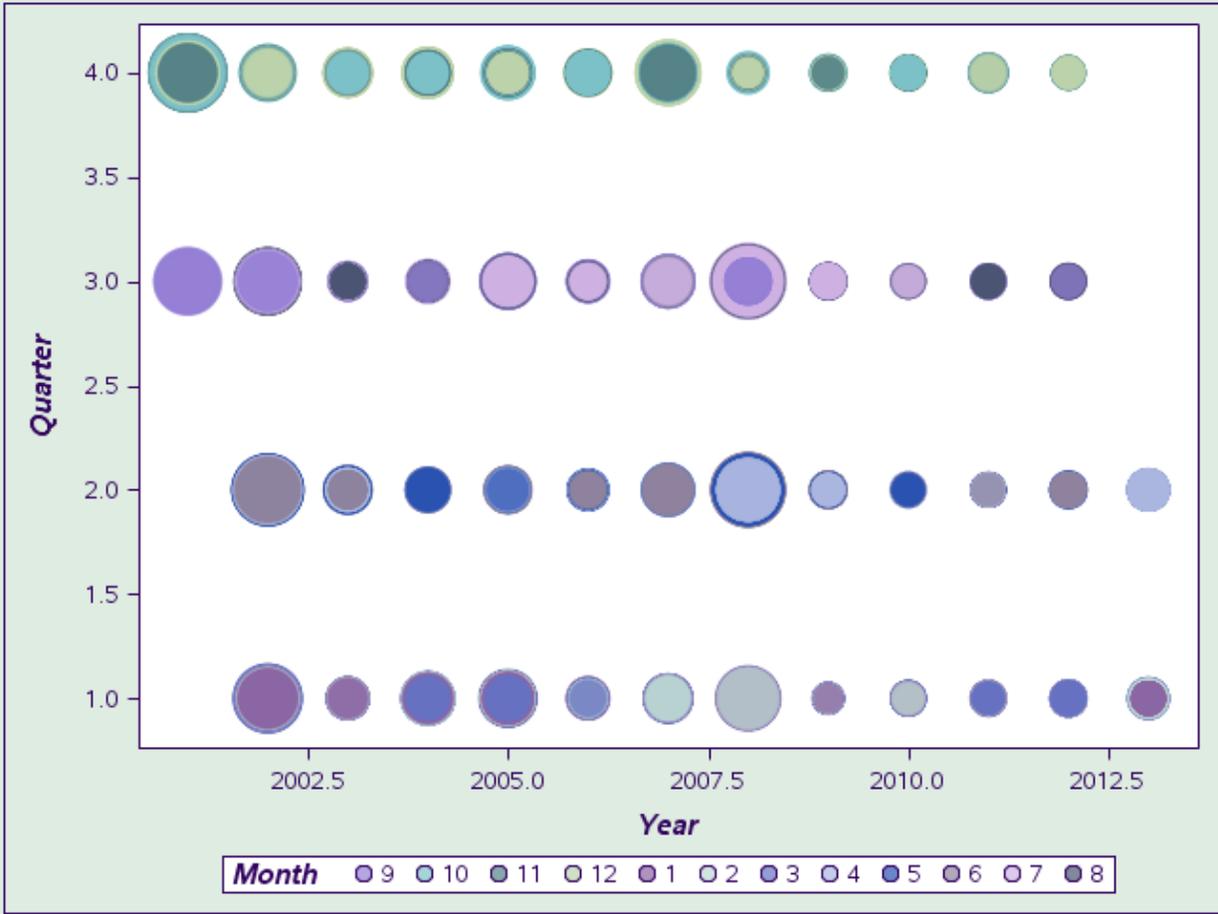
A very important view is ability to arrange data structure in a way so that prices can be compared across each month for span of ten years using Bubble charts. Following three charts plot these three variables – Year, Month, HighPrice depicting monthly highs for Activision, Electronic Arts and Nintendo respectively.



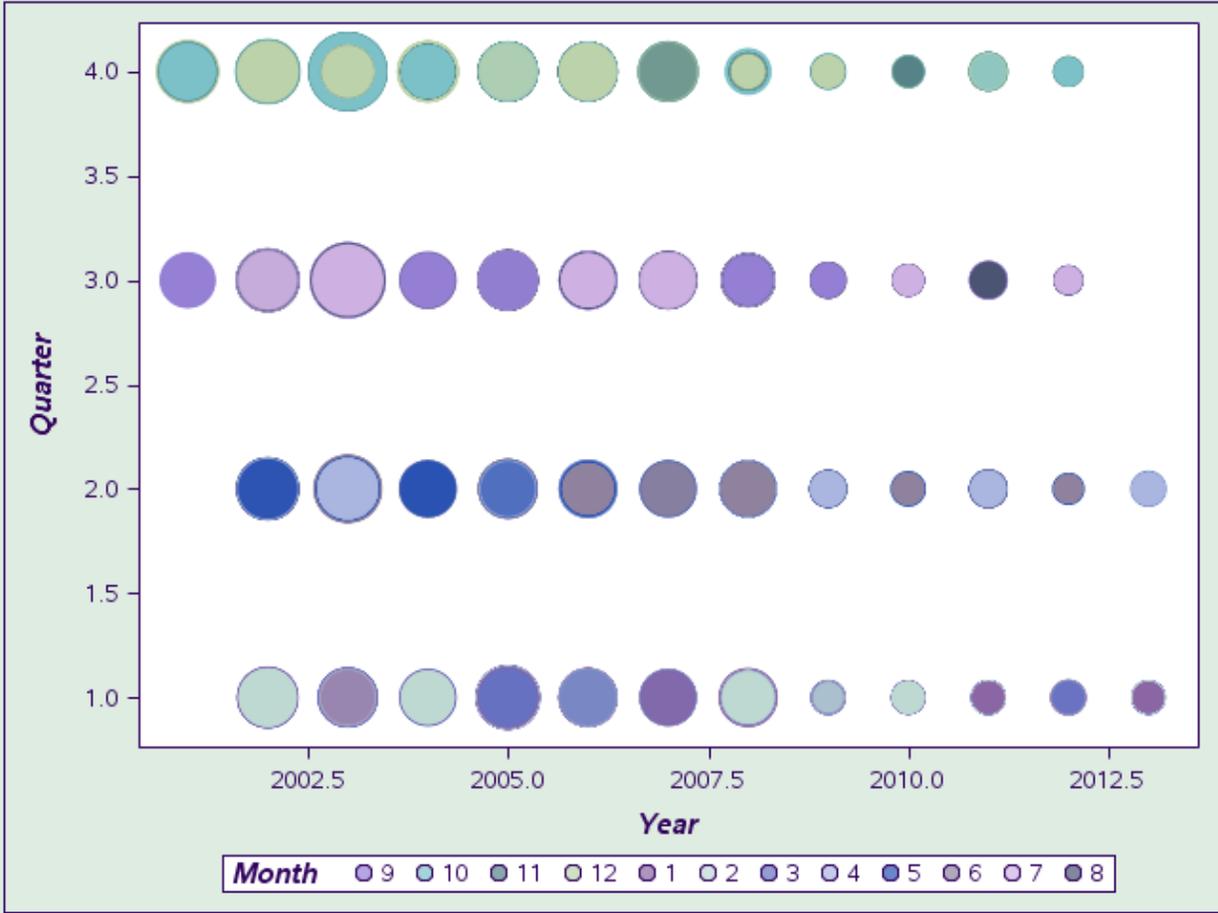
2008 has been very lucrative year for Nintendo as well as Activision. Last three years – 2010, 2011, 2012 have been slow for Electronic Arts, although over all holiday season around October – November turns out to be best while considering entire annual report. Activision is in similar situation as EA, showing slow progress for last four years including 2009.

Activision Bubble Chart

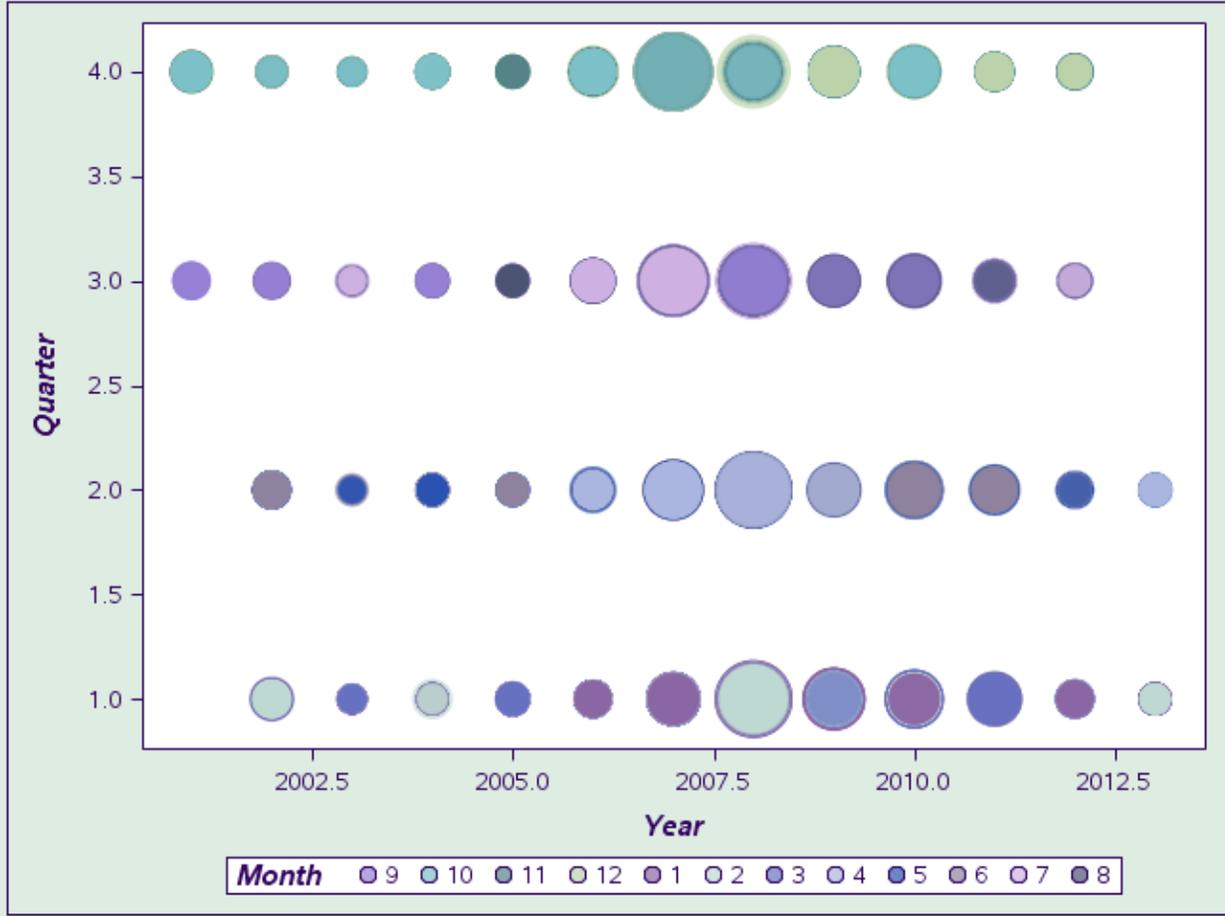
Monthly Highs

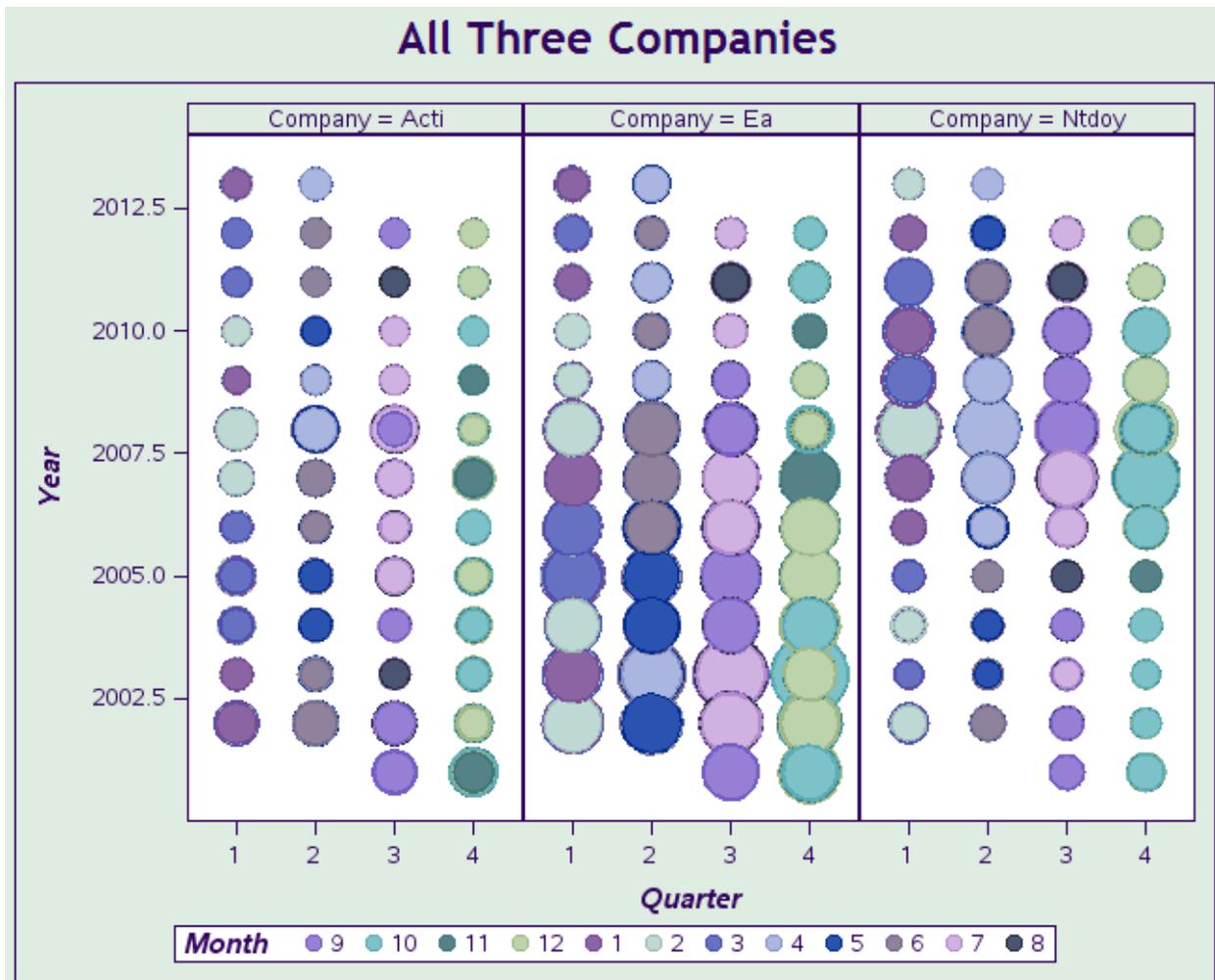


Electronic Arts Bubble Chart



Nintendo Bubble Chart





For views to compare data across all three companies in one attempt, it is useful to use proc sgpanel. This procedure lets analysts organize data in multiple panels based on a variable, in this particular scenario it is company. Furthermore, the numerical variable which is stock price, can be plotted against two time variables, quarter and year. Grouping is such methodical way of using month variable for categorization. Overall, sgpanel provides concise way of viewing over 9000 observations in a glance. In summary,

- Activision shows least stock prices
- Electronic Arts had high stock prices in years prior to mid-2008
- All three companies follow consistent stock prices across twelve months amounting to seasonal pattern referred to as product life cycle.

CONCLUSION

It is quite interesting to review financial data such as stock prices for three of the top video gaming industry players while observing the correlation between maximum highs. The ranges vary from a low USD of 11.33 to a high USD of 105.77 for Electronic Arts, a low USD of 8.54 to a high USD of 40.37 for Activision Blizzard and a low USD of 8.80 to a high USD of 78.50 for

Nintendo. SAS provides very crucial information visualization tools to derive insightful conclusions.

Appendix:

1 Dataset EAprices has approximately 2935 observations, dataset ntodyprices has 2939 observations, actiprices has 2931 observations.

References:

SAS Knowledge Base Documentation

Finance portal of Extrade