

Submitted by Henry Chan and LC, CSM Students, Spring 2006

Used Car Project

Introduction:

We will be comparing BMW 3-Series and Mercedes Benz C-Class.

We used cars.com to gather our data. We only included cars within 100 miles of San Mateo, or 100 miles of zip code 94401. We received 301 results for the BMW 3-series and 134 results for Mercedes Benz C-Class. We included all 3-series and C-Class cars from the year 1980 and up. In this analysis, both the AMG and M trim of the models are excluded since they belong in a class of their own. |

smcccd 4/4/06 11:27 AM

Comment: Good. Did you encounter any older than 1980? I doubt it, but if so, you should have included them. But it is well that you explain exactly what you did.

We predict that the Mercedes Benz C-Class and the BMW 3-Series are similarly priced and in direct competition in the new and used car market.

First we will explain the basic statistics of the data we collected.

Combined Data

		prix	Age
Brand	Benz	21165.14	4.2139303
		20988	3.8333333
		7308.933	2.6776569
	BMW	26181.484	4.0293466
		27995	2.8333333
		9094.1024	3.3136595
Column Summary		24701.051	4.0862069
		25996.5	2.8333333
		8897.0004	3.1296304

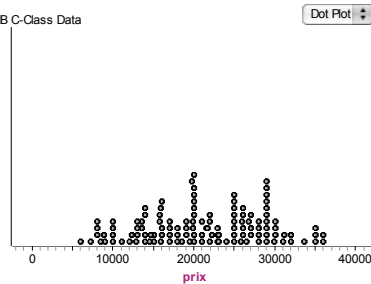
S1 =
S2 =
S3 =

It appears that the mean price for the BMW 3-series is higher than the C-Class (26181.48 vs. 21165.14). This shows that BMW 3-series are generally more expensive than the Mercedes C-Class. The median price for the 3-series and the C-Class is \$27995 and \$20988. This demonstrates that the 3-series is more expensive on average compared to the C-Class. We believe that this is because the BMW 3-Series is available as a convertible and a coupe. Convertibles have a higher price tag and thus pull the mean price up.

smcccd 4/4/06 11:27 AM
Comment: Hmm. This is the kind of thing that you could have investigated.

The mean ages for the C-Class and the 3-Series is very similar (4.21 and 4.03). It appears that the 3-Series cars in our data are slightly newer than the C-Class cars. This is part why the 3-Series has a higher average price than the C-Class.

The standard deviation of the 3-S
That means that 3-Series cars' pr

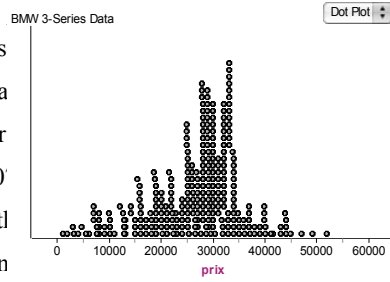


deviation of the C-Class.
ars.

smcccd 4/4/06 11:36 AM
Comment: Good

The dot plot of the C-Class prices: roughly symmetrical and very roughly shaped with the center at about 20000. The prices range from 6000 to 35975. So the range is 29975.

The dot plot of the 3-Series is als symmetrical and roughly bell sha the center at about 27000. The pr from 1000 to 51777 (Range = 50 the range for 3-Series is greater tl range for C-Class just as mention



that the BMW 3-Series is distributed more widely over the price range.

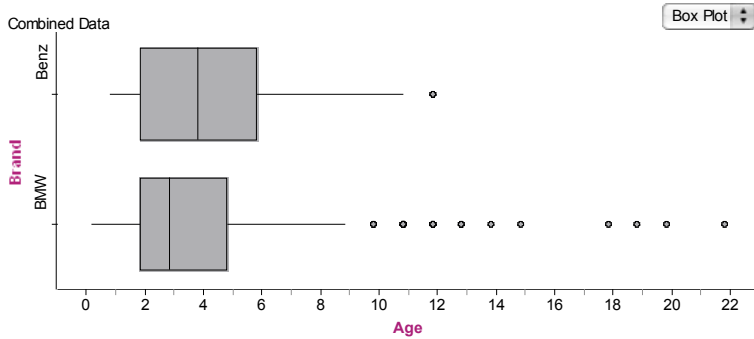
smcccd 4/4/06 11:38 AM
Deleted: more

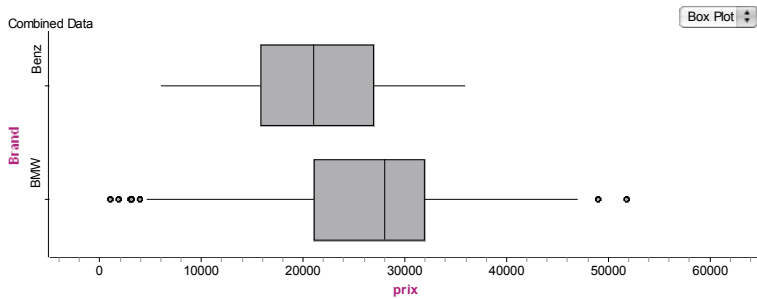
smcccd 4/4/06 11:39 AM
Comment: In statistics, we do not use the word "distributed" in quite the way it is used in everyday language.

It seems very strange that there are cars that cost more than 45000. We are guessing that the dealers that are selling the car at more than 45000 are trying to rip somebody off.

smcccd 4/4/06 11:42 AM
Comment: I am not surprised. It is very easy for a nearly new C class or 3 series to reach these kinds of prices. Again, it would have been easy to investigate this.

It is reasonable that the shapes of the two dot plot above are a bell shaped curve and symmetrical. This proves that there are always higher and lower priced cars than average. The average price is the most frequent price that we will see.





Above are modified box plots of age and the price. It looks like that Mercedes Benz's C-Class is on average generally older than BMW's 3-Series cars in this particular market. This could be another reason why the C-Class prices are lower in this set of data. There is only one outlier for the C-Class which will very slightly affect the mean.

smcccd 4/4/06 11:42 AM
Deleted: 1

The modified box plot of the data confirms that 3-series has a higher mean price than that of the C-Class. There are plenty of outliers present in both the age and price data. So this definitely affected the mean age and price of the 3-Series. If the outliers are removed, the mean price is 26655 as opposed to 26181 with the outliers. There are apparently no outliers in the C-Class data. Even with so many outliers on the cheaper side, the mean still goes up.

smcccd 4/4/06 11:43 AM
Deleted: definitely

smcccd 4/4/06 11:43 AM
Comment: Good.

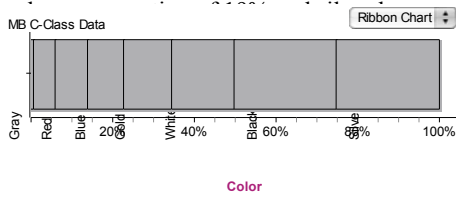
Then, we will take a look at the categorical variables.

Combined Data		Color								Row Summary
		Black	Blue	Gold	Gray	Green	Red	Silver	White	
Brand	Benz	28 0.25	10 0.089285714	13 0.11607143	6 0.053571429	1 0.0089285714	9 0.080357143	28 0.25	17 0.15178571	112 1
	BMW	52 0.19259259	47 0.17407407	1 0.0037037037	27 0.1	16 0.059259259	17 0.062962963	72 0.26666667	38 0.14074074	270 1
Column Summary		80 0.20942408	57 0.14921466	14 0.036649215	33 0.086387435	17 0.044502618	26 0.068062827	100 0.2617801	55 0.14397906	382 1

S1 =
S2 =

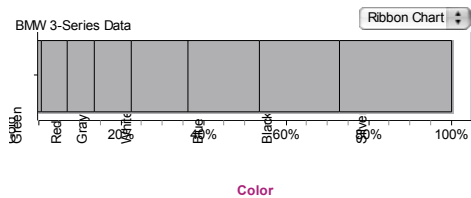
Although there aren't enough cases in the C-Class data compared to the 3-Series data, the data shows that black and silver are the most common colors for both 3-Series and C-Class. For the C-Class, black and silver both possess a proportion of 25% of the total cases. For 3-Series, black

smcccd 4/4/06 11:45 AM
Comment: How so? You have $n = 112$. That should be enough. Perhaps you just mean that the count is less for the Benz.



proportion of 26%. With the exception of the colors proportions. Thus, we can conclude that not only the class, but the available colors are similar as well.

smcccd 4/4/06 11:45 AM
Comment: Good

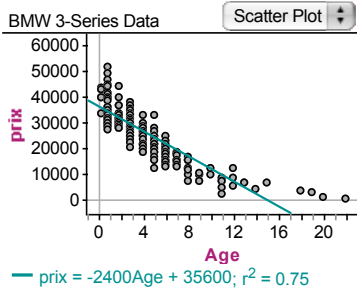


The ribbon charts confirms that black and silver are the most popular for both models, BMW 3-Series and Benz C-Class.

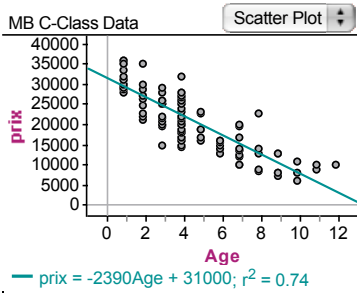
The categorical variables of color and manufacturer are not independent. There are different number of cars of each color in both Mercedes Benz and BMW.

smcccd 4/4/06 11:46 AM
Comment: Tres bon. You are one of the few groups that explored this.

Now we will look at the depreciation of these two models of cars.



The strength of the plots is fairly negative and strong. The correlation of both plots equals to about -0.86.



The Age vs. Price regression plot of these two models is very similar. These two models of cars depreciate at almost the same rate. The BMW 3-series depreciates at \$2400 a year while the MB C-Class depreciates at \$2390 a year. The y-intercept of the 3-series occurs at 35600, whereas the y-intercept of the C-Class occurs at 31000, showing that generally the BMW starts at a higher price than the Benz

smcccd 4/4/06 11:46 AM
Comment: Excellent!!

smcccd 4/4/06 11:47 AM
Deleted: . This does proves

smcccd 4/4/06 11:47 AM
Deleted: MB.

There are no influential observations in these two plots. Removing any case in the above plots did not significantly change the least squares line.

The correlation coefficient (r^2) for 3-series is 0.75, and the r^2 for C-Class is 0.74. This shows that 75% and 74% of the depreciation is explained by the age variable. Respectively 25% and 26% of the depreciation is explained by other variables such as color, condition, options, etc.

smcccd 4/4/06 11:48 AM
Comment: r^2 is not the correlation coefficient: it is related to the correlation coefficient, but it is a different thing.

smcccd 4/4/06 11:49 AM
Comment: Good.

Conclusion:

Our analysis of the BMW 3-Series and Mercedes Benz C-Class shows that our hypothesis is correct. Our data reveals that they are in direct competition with each other. This is true for both the new car and used car markets as both models of cars depreciate at the same rate. Although our analysis shows that the BMW 3-Series are on average more expensive than the C-Class, it is perfectly reasonable since the 3-Series includes the coupe and convertible models. In addition, the cars used for the C-Class data are overall older than the BMW 3-Series. The C-Class is only available as a sedan. As of the market today, a base model 3-Series starts at about \$30,000 and a base model C-Class starts at about \$29,000. The 3-Series is worldily recognized as “the best handling car in its class” while the C-Class is seen as the more luxurious sedan. As a matter of fact these two cars appeal to different customers in their very own right. Therefore, it is understandable that both BMW and Benz compete in attempt to win consumers over.

smcccd 4/4/06 11:50 AM
Comment: I don't think that this is true for the newer models, but they may not be listed as "C-class." I think hat the model designation is something like

smcccd 4/4/06 11:55 AM
Comment: Good.

smcccd 4/4/06 11:58 AM
Comment: The entire essay is good. I would like to use this one as an example to others. Well done.