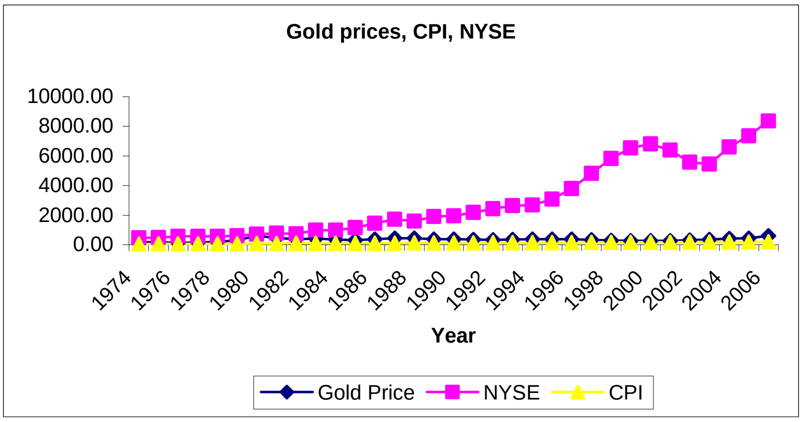
EE 325 HW 3 (Excel practice) ☺ Due in class on October 14th, 2011
Answer

1. Table 3.7 gives data on gold prices, the Consumer Price Index (CPI), and the New York Stock Exchange (NYSE) Index for the United States for the period 1974-2006. The NYSE Index includes most of the stocks listed on the NYSE, some 1500-plus
   a. Plot in the same scattergram gold prices, CPI, and the NYSE Index



   b. Estimate the two regressions

$$Gold\ \ price_t = \beta_1 + \beta_2 CPI_t + u_t$$
$$NYSE\ \ index_t = \beta_1 + \beta_2 CPI_t + u_t$$

$$Gold\ \ price_t = 215.286 + 1.038 CPI_t$$

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.419329731
R Square	0.175837423
Adjusted R Square	0.149251534
Standard Error	103.0725819
Observations	33

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	70266.19299	70266.19299	6.613937921	0.015135158
Residual	31	329342.6713	10623.95714		
Total	32	399608.8643			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	215.2856005	54.46850227	3.952478801	0.000416818	104.1963582	326.3748429
CPI	1.038430012	0.403782204	2.571757749	0.015135158	0.214910781	1.861949243

$$NYSE_t = -3444.9920 + 50.2972 CPI_t$$

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.915928425
R Square	0.838924879
Adjusted R Square	0.833728907
Standard Error	1010.442409
Observations	33

ANOVA

	df	SS	MS	F	Significance F
Regression	1	164846386.7	164846386.7	161.4567853	7.89485E-14
Residual	31	31650809.72	1020993.862		
Total	32	196497196.4			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-3444.99198	533.9662947	-6.45170307	3.41675E-07	-4534.023417	-2355.96055
CPI	50.29719147	3.958362692	12.70656465	7.89485E-14	42.22405756	58.37032537

(i)Test the hypothesis that $\beta_2 = 1$ at 5 $\alpha = 5\%$, that is, there is one-to-one relationship between gold prices and CPI

$$H_0 : \beta_2 = 1$$

$$H_1 : \beta_2 \neq 1$$

$$t = \frac{1.0384 - 1}{0.4038} = 0.0951$$

$$t > critical\ t\ value\ 2.042$$

$$Cannot\ reject\ H_0$$

$$The\ true\ coefficient\ is\ not\ statistically\ different\ \ from\ 1$$

(ii) Test the hypothesis that $\beta_2 = 1$ at $\alpha = 5\%$, that is, there is one-to-one relationship between NYSE index and CPI

$$H_0 : \beta_2 = 1$$

$$H_1 : \beta_2 \neq 1$$

$$t = \frac{50.297 - 1}{3.958} = 12.455$$

$$t > critical\ t\ value\ 2.042$$

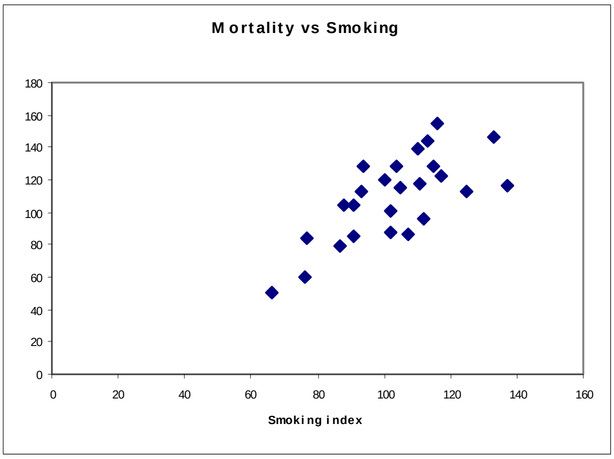
$$Reject\ H_0$$

$$The\ estimated\ coefficient\ is\ statistically\ different\ \ from\ 1$$

c. Between gold and stock, which investment would you choose? What is the basis on your decision?

From part b) investment in the stock market probably was a hedge against inflation.

2. Table 5.11 provides data on the lung cancer mortality index (100=average) and the smoking index (100=average) for 25 occupational groups.
   a. Plot the cancer mortality index against the smoking index. What general pattern do you observe?



   b. Letting Y= cancer mortality index and X = smoking index, estimate a linear regression model

$$\hat{Y}_i = -2.8853 + 2.0875X_i$$

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.716239801
R Square	0.512999453
Adjusted R Square	0.491825516
Standard Error	18.61538746
Observations	25

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	8395.749045	8395.749045	24.22787301	5.65763E-05
Residual	23	7970.250955	346.5326502		
Total	24	16366			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-2.885318878	23.03372164	-0.125264989	0.901402243	-50.53420217	44.76356442
Smoking	1.08753226	0.220945166	4.922181733	5.65763E-05	0.630472363	1.544592156

c. Test the hypothesis that smoking has no influence on lung cancer at $\alpha = 5\%$

$H_0 : \beta_2 = 0$

$H_1 : \beta_2 \neq 0$

$t = 4.9222$

$t > critical\ t\ value$

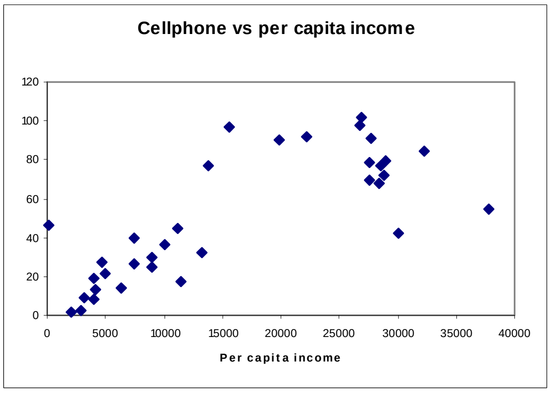
$Reject\ H_0$

Smoking is related to Mortality at the 5% *level of significance.*

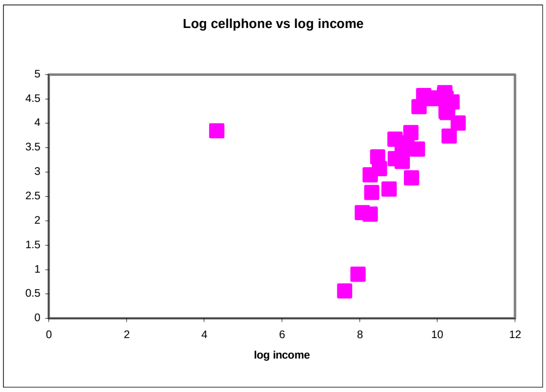
Or you can use p-value method for hypothesis testing

3.

a. Plot cell phone demand against purchasing power (PP) adjusted per capita income.



b. Plot the log of cell phone demand against the log of PP-adjusted per capita income.



c. From these two graphs, do you think that a double log model might provide a better fit to the data than the linear model? Estimate the double log model.

A double log model would most likely give smaller standard errors, and therefore more consistent estimates.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.77612129
R Square	0.602364256
Adjusted R Square	0.589938139
Standard Error	20.55544399
Observations	34

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	20482.24132	20482.24132	48.47566274	6.91402E-08
Residual	32	13520.84088	422.5262774		
Total	33	34003.0822			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	14.46729684	6.152374927	2.351497919	0.025019239	1.935319261	26.99927441	1.935319	26.99927
Pcapincome	0.002219142	0.00031873	6.962446606	6.91402E-08	0.00156991	0.002868374	0.00157	0.002868

$$\ln cellphone_i = -0.9374 + 0.4864 \ln PCIncome_i$$

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.579083368
R Square	0.335337547
Adjusted R Square	0.314566846
Standard Error	0.843069353
Observations	34

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	11.47513016	11.47513016	16.14473854	0.000332903
Residual	32	22.74450988	0.710765934		
Total	33	34.21964005			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.937362741	1.128855624	-0.830365479	0.412484668	-3.236766391	1.362040909
ln Income	0.48635607	0.121042764	4.018051585	0.000332903	0.239800029	0.732912112

d. How do you interpret the slope coefficient in the double-log model?

The slope of lnPCincome indicates the elasticity, so for a one percent change in PClnincome, we would expect to see about a 0.486 percent increase in cellphone demand.

e. Is the estimated slope coefficient in the double log model statistically significant at 5 % level?

$H_0 : \beta_2 = 0$

$H_1 : \beta_2 \neq 0$

$t = 4.0181$

$t > critical\ \ t\ \ value$

$Reject\ \ H_0$

The estimated slope coefficient in the double log model is statistically significant at 5% level.

Or you can use p-value method for hypothesis testing