

Joint Sensitivities

A joint sensitivity is one in which two or more variables are varied simultaneously. In this section, we will use the new product introduction example (introduced in Chapter 2, “Sensitivity Example”), in which prices are high when the market growth rate is high. When the market growth rate is low, competition is fierce and prices are low.

Open the Sensitivity file that was used in Chapter 2, NEWPROD.ASN (Windows) or NEWPROD.MSN (Macintosh). To enter the joint sensitivity data, choose Input or Change Joint Variable Data from the Structure menu. When prompted, name the joint variable *EconScen* and enter a short description. Sensitivity will automatically add J> at the beginning of the name to indicate that it is a joint sensitivity.

Next, enter the names of the variables in the joint sensitivity. If you enter the name of a variable already in the analysis, Sensitivity will fill in the data. You can modify the data, as was done with price in Figure 4.1. You can enter as many variables as you want in joint sensitivities. Figure 4.1 shows how your screen should look before you click the OK button.

The dialog box 'Input or Change Joint Variation' contains the following data:

Variable Name	Base Value	Variation Type	Low Modifier	High Modifier
MKTGR	.02	Additive	-.01	.02
PRICE	2.4	Multiplicative	.6	1.3

Figure 4.1

SENSITIVITY: ADVANCED TOPICS

Joint Sensitivities

Sensitivity will evaluate the joint sensitivity for the low-low and high-high combinations. Click OK and the Show Sensitivity Data screen appears. You can see that the joint sensitivity data have been added to the data already input. (The screen display is reproduced in Figure 4.2.)

Show Sensitivity Data						
Sensitivity name: New Product Introduction Example						
Model Name: E:\c:\supor95\newprod.xls\$NPV\$AA						
VARIABLE	DESCRIPTION	BASE	TYPE	LOW	HIGH	STATUS
MKTSHR	Peak Market Share	.25	VAL	.1	.5	OLD
MKTGR	Market Growth Rate	.02	ADD	-.01	.02	OLD
PRICE	Price	2.4	MUL	.6	1.3	OLD
INITYR	Year Sales Start	1991	VAL	1990	1992	OLD
GROWTH	Years from Start to Peak	3	VAL	3	5	OLD
LIFE	Years from Start to Decline	11	VAL	7	15	OLD
DECLINE	Years in Decline	5	VAL	4	10	OLD
VARCOST	Unit Cost	1.3	ADD	-.2	.3	OLD
FIXCOST	Fixed Cost	6	MUL	.8	1.25	OLD
CAP	Machine Capacity	15	VAL	13	17	OLD
CAPCOST	Cost per Machine	8	VAL	7	10	OLD
WCCAP	Working Capital/Sales	.12	VAL	.1	.15	OLD
INFLRATE	Inflation Rate	.04	VAL	0	.08	OLD
J>EconScen	Growth Rate and Price		JNT			NEW
Joint Sensitivity Data:						
NAME	VARIABLE	BASE	TYPE	LOW	HIGH	
J>EconScen	MKTGR	.02	ADD	-.01	.02	
	PRICE	2.4	MUL	.6	1.3	
Excel options: Open linked spreadsheets.						

Figure 4.2

When you choose Evaluate, Sensitivity remembers that you have only one new variation and asks whether you want to save time by evaluating only the new variation. If you just run the evaluation on the new variable, the Excel run is quite short.

Joint Sensitivities

One question remains: Now that we have price and market growth varying in the joint sensitivity, should we delete the separate variation of these two variables? If you are using the Sensitivity output to select variables as nodes for Supertree, and if the two variables are highly correlated, we recommend that you eliminate the two individual variables. You can do that by using the Delete Variables... command from the Structure menu.

After deleting price and market growth, choose Plot Results from the Analyze menu to plot the revised results. Your completed dialog box should look like the one in Figure 4.3.

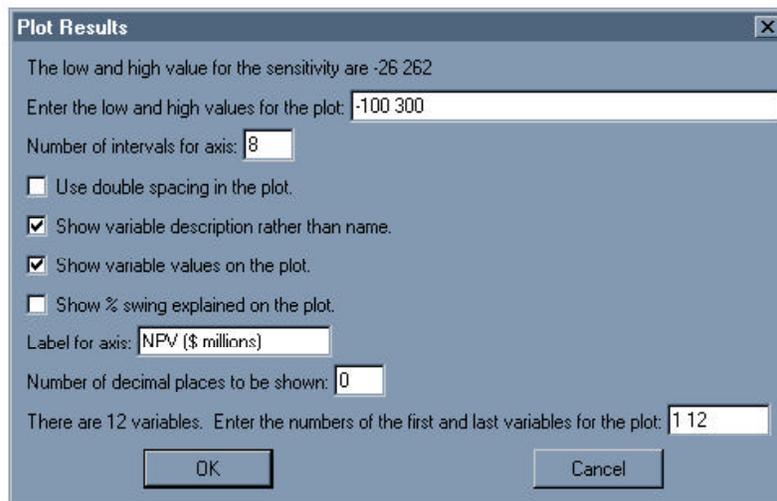


Figure 4.3

Click OK and the plot appears as shown in Figure 4.3a.

SENSITIVITY: ADVANCED TOPICS

Joint Sensitivities

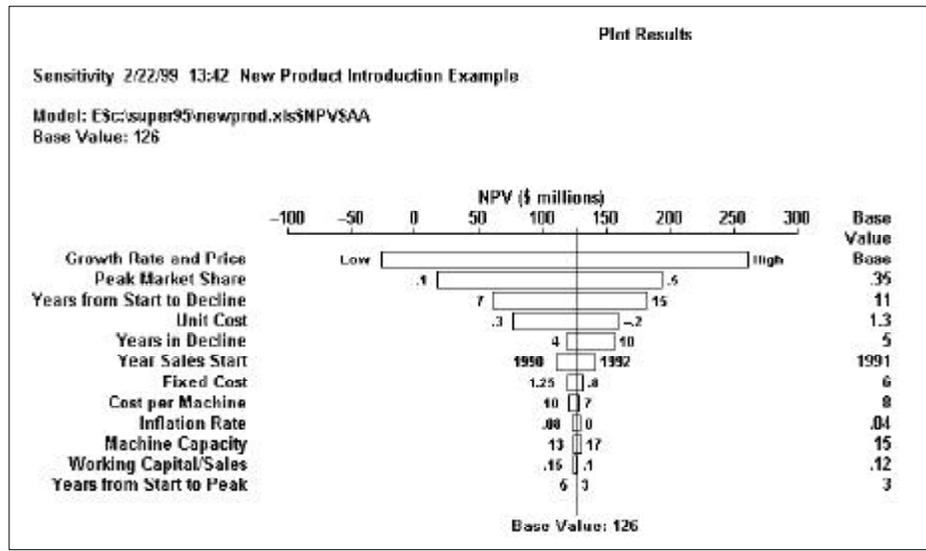


Figure 4.3a

Your choice of what to keep in the sensitivity plot and what to delete depends on the specifics of the analysis. (You will sometimes hear the above type of plot referred to as a “tornado diagram,” reflecting its characteristic shape.)

External Input

Occasionally sensitivity variations are not readily performed by the Sensitivity program. For example, sometimes the variation is the result of a direct estimate: “If that happens, then NPV goes down by 25 percent.” More often, the variation is the result of fairly elaborate recoding of the spreadsheet to account for a specific case: “If the tax laws change, I’ll have to redo the tax calculations completely.”

Sensitivity accepts direct input of “external” numbers (numbers generated outside Sensitivity) through the Input or Change External Sensitivity Data... command from the Structure menu. Note: Sensitivity automatically adds E> in front of the variation name to indicate this is an external sensitivity.

Figure 4.4 illustrates an example input screen.

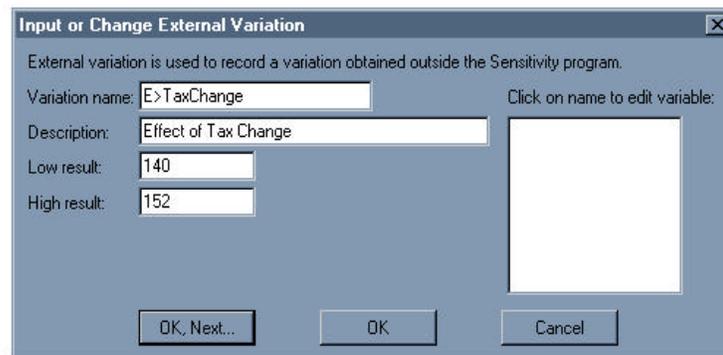


Figure 4.4

SENSITIVITY: ADVANCED TOPICS

External Input

The external sensitivity does not require evaluation but enters immediately into the output, as shown in Figure 4.5 (using the List Results... command from the Analyze menu).

List Results								
Model: E:\super95\newprod.xls\$NPV\$AA								
Base Value: 126								
Sensitivity 2/22/99 13:47 New Product Introduction Example								
Description	Base	Sens Type	Low Value	High Value	Low Result	High Result	Swing	% Swing Explained
Growth Rate and Price		Joint			-26	262	287	59.7
Peak Market Share	.35	Value	.1	.5	18	194	176	82.1
Years from Start to Decline	11	Value	7	15	61	102	121	92.7
Unit Cost	1.3	Add	-.2	.3	159	76	83	97.6
Years in Decline	5	Value	4	10	120	156	37	98.6
Year Sales Start	1991	Value	1990	1992	110	141	31	99.3
Effect of Tax Change		Ext			140	152	26	99.8
Fixed Cost	6	Mult	.8	1.25	131	120	12	99.9
Cost per Machine	8	Value	7	10	129	121	8	99.9
Inflation Rate	.04	Value	0	.08	129	123	6	100.0
Machine Capacity	15	Value	13	17	125	130	6	100.0
Working Capital/Sales	.12	Value	.1	.15	128	124	3	100.0
Years from Start to Peak	3	Value	3	5	126	126	0	100.0
Joint Sensitivity Data:								
NAME	VARIABLE	BASE	TYPE	LOW	HIGH			
J>EconScen	MKTGR	.02	ADD	-.01	.02			
	PRICE	2.4	MUL	.6	1.3			

Figure 4.5

Multiple Value Measures

Suppose you would like to see the sensitivity of both present value of revenue and the NPV of the product. Sensitivity handles this requirement through multiple value measures. All the value measures are evaluated by a single Evaluate command; this can be a tremendous time-saver.

Using the Enter or Change Model... command from the Structure menu, enter the list of values, separated by semicolons, under Result name or cell address. The screen below shows the input needed to calculate both NPV and the present value of revenue (Range name *PVRev* or cell *W65* of the spreadsheet) in the new product introduction example.

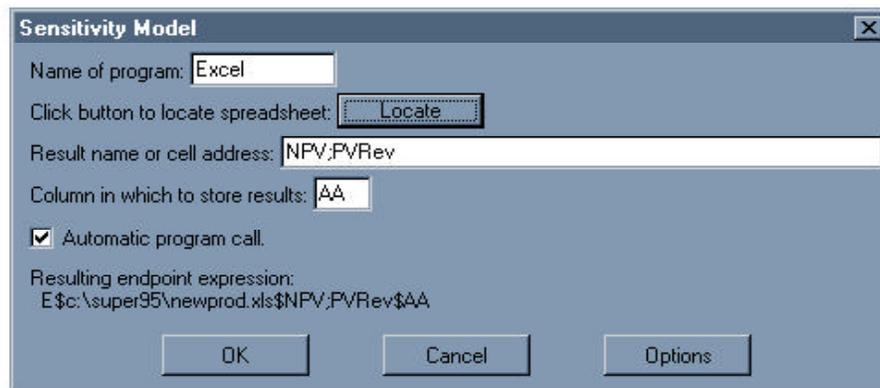


Figure 4.6

After you click OK and select Evaluate, the Analyze menu commands require that you specify the value measure to be displayed. The entry for *Display the results for value measure: 2* (line 3 in the display in Figure 4.7) causes the List Results... command to present the results for the second value measure, present value of revenue.

SENSITIVITY: ADVANCED TOPICS

Multiple Value Measures

In Figure 4.7, both the low and high results of the external variation Effect of Tax Change are zero. The input for an external variation is used for the first value measure only; when more than one value measure is used, zero is used for any other value measure for an external variation. (The external variation appears with a large swing since the swing is between base and zero—this variable should be deleted to avoid confusion.)

List Results

There are 2 value measures: NPV;PVRev
Results are displayed for value measure 2: PVRev

Model: E:\super95\newprod.xls\$NPV;PVRev\$AA

Base Value: 662
Sensitivity 2/22/99 13:55 New Product Introduction Example

Description	Base	Sens Type	Low Value	High Value	Low Result	High Result	Swing	% Swing Explained
Peak Market Share	.35	Value	.1	.5	189	946	757	35.2
Effect of Tax Change		Ext			0	0	662	62.2
Growth Rate and Price		Joint			385	918	534	79.7
Years from Start to Decline	11	Value	7	15	366	898	532	97.0
Years in Decline	5	Value	4	10	630	805	175	98.9
Year Sales Start	1991	Value	1990	1997	594	776	182	100.0
Years from Start to Peak	3	Value	3	5	662	662	0	100.0
Unit Cost	1.3	Add	-.2	.3	662	662	0	100.0
Fixed Cost	6	Mult	.8	1.25	662	662	0	100.0
Machine Capacity	15	Value	13	17	662	662	0	100.0
Cost per Machine	8	Value	7	10	662	662	0	100.0
Working Capital/Sales	.12	Value	.1	.15	662	662	0	100.0
Inflation Rate	.04	Value	0	.08	662	662	0	100.0

Joint Sensitivity Data:

NAME	VARIABLE	BASE	TYPE	LOW	HIGH
J>EconScen	MKTGR	.02	ADD	-.01	.02

Figure 4.7