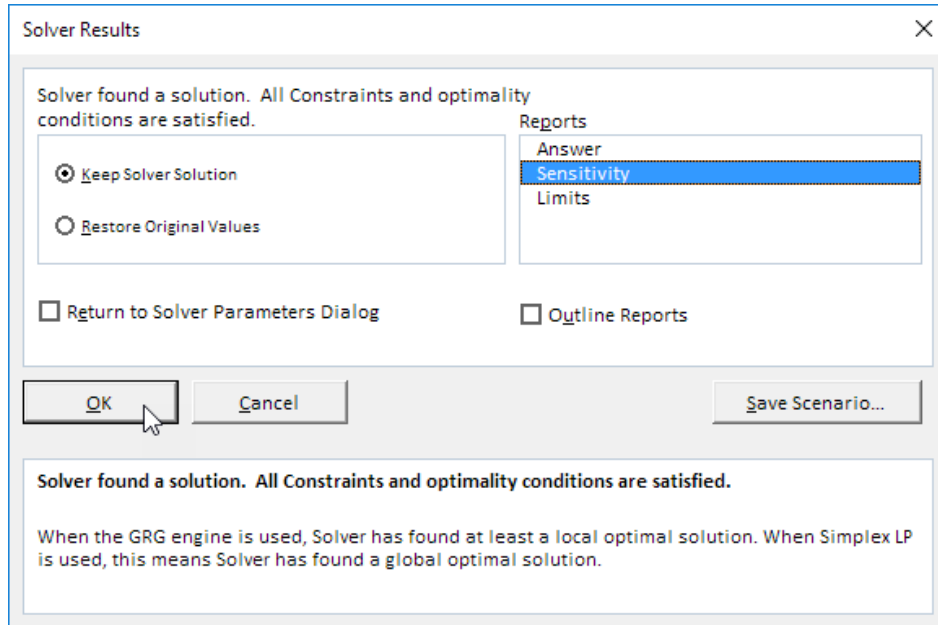# Sensitivity Analysis G+ Follow 19k

Reduced Cost | Shadow Price

Sensitivity analysis gives you insight in how the optimal solution changes when you change the coefficients of the model. After the solver found a solution, you can create a sensitivity report.

1. Before you click OK, select Sensitivity from the Reports section.

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Below you can find the optimal solution and the sensitivity report.

Solver

Learn more, it's easy

Transportation Problem

Assignment Problem

Shortest Path Problem

Maximum Flow Problem

Capital Investment

Sensitivity Analysis

Download Excel File

sensitivity-analysis.xlsx

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Most Read

Pivot Tables

Formulas and Functions

Charts

Analysis Toolpak

Drop-down List

	A	B	C	D	E	F	G	H	I	J
1	Cycle Trader									
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	94	54	0				25600	
13										

	A	B	C	D	E	F	G	H	I
1	Microsoft Excel 16.0 Sensitivity Report								
2	Worksheet: [sensitivity-analysis.xlsx]Sheet1								
3	Report Created: 3/17/2017 3:26:03 PM								
4									
5									
6	Variable Cells								
7				Final	Reduced	Objective	Allowable	Allowable	
8		Cell	Name	Value	Cost	Coefficient	Increase	Decrease	
9		C12	Order Size Bicycles	94	0	100	50	12.5	
10		D12	Order Size Mopeds	54	0	300	66.66666667	100	
11		E12	Order Size Child Seats	0	-20	50	20	1E+30	
12									
13	Constraints								
14				Final	Shadow	Constraint	Allowable	Allowable	
15		Cell	Name	Value	Price	R.H. Side	Increase	Decrease	
16		G7	Capital Used	93000	0.166666667	93000	28200	32400	
17		G8	Storage Used	101	100	101	54	23.5	
18									

It is optimal to order 94 bicycles and 54 mopeds. This solution gives the maximum profit of 25600. This solution uses all the resources available (93000 units of capital and 101 units of storage). You can find these numbers in the Final Value column.

Reduced Cost

The reduced costs tell us how much the objective coefficients (unit profits) can be increased or decreased before the optimal solution changes. If we increase the unit profit of Child Seats with 20 or more units, the optimal solution changes.

1. At a unit profit of 69, it's still optimal to order 94 bicycles and 54 mopeds. Below you can find the optimal solution.

	A	B	C	D	E	F	G	H	I	J
1	Cycle Trader									
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	69					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	94	54	0				25600	
13										

2. At a unit profit of 71, the optimal solution changes.

	A	B	C	D	E	F	G	H	I	J
1		**Cycle Trader**								
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	71					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	0	71.625	58.75				25658.75	
13										

Conclusion: it is only profitable to order child seats if you can sell them for at least 70 units.

Shadow Price

The shadow prices tell us how much the optimal solution can be increased or decreased if we change the right hand side values (resources available) with one unit.

1. With 101 units of storage available, the total profit is 25600. Below you can find the optimal solution.

	A	B	C	D	E	F	G	H	I	J
1		**Cycle Trader**								
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		101	≤	101	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	94	54	0				25600	
13										

2. With 102 units of storage available, the total profit is 25700 (+100).

	A	B	C	D	E	F	G	H	I	J
1		**Cycle Trader**								
2										
3			Bicycles	Mopeds	Child Seats					
4		Unit Profit	100	300	50					
5							Resources		Resources	
6							Used		Available	
7		Capital	300	1200	120		93000	≤	93000	
8		Storage	0.5	1	0.5		102	≤	102	
9										
10										
11			Bicycles	Mopeds	Child Seats				Total Profit	
12		Order Size	98	53	0				25700	
13										

Note: with a shadow price of 100 for this resource, this is according to our expectations. This shadow price is only valid between 101 - 23,5 and 101 + 54 (see sensitivity report).

7/7 Completed! Learn much more about the solver >

Go to Next Chapter: Analysis ToolPak