Option Explicit

Option Base 1

'Goal Seek for Microsoft EXCEL contains a algorithm to solve for the value of a single

'variable functions. This processs proceeds by iterations. Starting from an

'approximate trial solution an algorithm will gradually refine the working estimate

'until a prefixed precision has been reached. The problem with Goal Seek is that in

'only works "on-site". It means that the algorithm works directly on the cells of your

'worksheet where you have defined the function to solve for.

'To solve for the implied growth rate in your market value, follow these steps:

'1. Open the Goal Seek function in Excel (under Tools)

'2. Set cell B24 to the value in cell B28 by changing cell B14.

'3. You should see the implied growth rate in B14.

Sub Run\_Goal\_Seek()

With Worksheets("Section1")

.Range("B14").Value = 0.001

.Range("B24").GoalSeek Goal:=.Range("B28").Value, ChangingCell:=.Range("B14")

End With

End Sub

'Formula Range("B24") =

'=IF(B14=B19,-B10\*(1-B11)\*(B14/B15)+B10\*(1-B11)\*(1-B14/B15)\*(B16-1)+B10\*(1-B11)\*(1+B14)^B16\*(1-B20/B19)/(1+B19)^B16+(B10\*(1-B11)\*(1+B14)^B16\*(1+B20)\*(1-B20/B19)/(B19-B20))/(1+B19)^B16-B23 \_

,-B10\*(1-B11)\*(B14/B15)+B10\*(1-B11)\*(1-B14/B15)\*(1+B14)\*(1-(1+B14)^(B16-1)/(1+B19)^(B16-1))/(B19-B14)+B10\*(1-B11)\*(1+B14)^B16\*(1-B20/B19)/(1+B19)^B16+(B10\*(1-B11)\*(1+B14)^B16\*(1+B20)\*(1-B20/B19)/(B19-B20))/(1+B19)^B16-B23)

'Lets now try to derive the formulation in B24

Sub TEST\_GROWTH\_WORTH\_FORMULA\_FUNC()

With Worksheets("Section1")

Debug.Print GROWTH\_WORTH\_FORMULA\_FUNC(.Range("B10"), \_

.Range("B11"), \_

.Range("B15"), \_

.Range("B16"), \_

.Range("B19"), \_

.Range("B20"), \_

.Range("B14"), 0) = .Range("B24")

End With

End Sub

Function GROWTH\_WORTH\_FORMULA\_FUNC(ByVal EBIT\_VAL As Double, \_

ByVal TAX\_VAL As Double, \_

ByVal ROIC\_VAL As Double, \_

ByVal HOLDINGS\_PERIODS As Long, \_

ByVal WACC\_VAL As Double, \_

ByVal RISK\_FREE\_VAL As Double, \_

ByVal EBIT\_GROWTH\_VAL As Double, \_

Optional ByVal VERSION As Integer = 0) 'Riskfree Rate

'ByVal EQUITY\_VAL As Double, \_

'ByVal DEBT\_VAL As Double, \_

'ByVal CASH\_VAL As Double, \_

Dim A\_VAL As Double 'Value of assets in place

Dim Y\_VAL As Double

Dim X\_VAL As Double

'Dim P\_VAL As Double

Dim G\_VAL As Variant

Dim NG\_VAL As Variant

'On Error GoTo ERROR\_LABEL

'-------------------------------------------------------------------------------------

Select Case VERSION

'-------------------------------------------------------------------------------------

Case 0 'Nico! Growth Scenario - No Growth Scenario

'-------------------------------------------------------------------------------------

G\_VAL = GROWTH\_WORTH\_CALC\_FUNC(EBIT\_VAL, TAX\_VAL, WACC\_VAL, RISK\_FREE\_VAL, \_

HOLDINGS\_PERIODS, ROIC\_VAL, EBIT\_GROWTH\_VAL)

G\_VAL = G\_VAL(LBound(G\_VAL))

NG\_VAL = GROWTH\_WORTH\_CALC\_FUNC(EBIT\_VAL, TAX\_VAL, WACC\_VAL, RISK\_FREE\_VAL, \_

HOLDINGS\_PERIODS, ROIC\_VAL, 0)

NG\_VAL = NG\_VAL(LBound(NG\_VAL))

Y\_VAL = G\_VAL - NG\_VAL

'-------------------------------------------------------------------------------------

Case Else 'Damodaran!

'-------------------------------------------------------------------------------------

A\_VAL = EBIT\_VAL \* (1 - TAX\_VAL) / WACC\_VAL

'P\_VAL = (EQUITY\_VAL + DEBT\_VAL - CASH\_VAL - A\_VAL)

'Formula Range("B24") =

'=IF(B14=B19,-B10\*(1-B11)\*(B14/B15)+B10\*(1-B11)\*(1-B14/B15)\*(B16-1)+B10\*(1-B11)\*(1+B14)^B16\*(1-B20/B19)/(1+B19)^B16+(B10\*(1-B11)\*(1+B14)^B16\*(1+B20)\*(1-B20/B19)/(B19-B20))/(1+B19)^B16-B23 \_

,-B10\*(1-B11)\*(B14/B15)+B10\*(1-B11)\*(1-B14/B15)\*(1+B14)\*(1-(1+B14)^(B16-1)/(1+B19)^(B16-1))/(B19-B14)+B10\*(1-B11)\*(1+B14)^B16\*(1-B20/B19)/(1+B19)^B16+(B10\*(1-B11)\*(1+B14)^B16\*(1+B20)\*(1-B20/B19)/(B19-B20))/(1+B19)^B16-B23)

If EBIT\_GROWTH\_VAL = WACC\_VAL Then

Y\_VAL = -EBIT\_VAL \* (1 - TAX\_VAL) \* (EBIT\_GROWTH\_VAL / ROIC\_VAL) + EBIT\_VAL \* (1 - TAX\_VAL) \* \_

(1 - EBIT\_GROWTH\_VAL / ROIC\_VAL) \* (HOLDINGS\_PERIODS - 1) + EBIT\_VAL \* (1 - TAX\_VAL) \* (1 + EBIT\_GROWTH\_VAL) ^ HOLDINGS\_PERIODS \* \_

(1 - RISK\_FREE\_VAL / WACC\_VAL) / (1 + WACC\_VAL) ^ HOLDINGS\_PERIODS + (EBIT\_VAL \* (1 - TAX\_VAL) \* \_

(1 + EBIT\_GROWTH\_VAL) ^ HOLDINGS\_PERIODS \* (1 + RISK\_FREE\_VAL) \* \_

(1 - RISK\_FREE\_VAL / WACC\_VAL) / (WACC\_VAL - RISK\_FREE\_VAL)) / (1 + WACC\_VAL) ^ HOLDINGS\_PERIODS - A\_VAL

Else

Y\_VAL = -EBIT\_VAL \* (1 - TAX\_VAL) \* (EBIT\_GROWTH\_VAL / ROIC\_VAL) + EBIT\_VAL \* (1 - TAX\_VAL) \* \_

(1 - EBIT\_GROWTH\_VAL / ROIC\_VAL) \* (1 + EBIT\_GROWTH\_VAL) \* (1 - (1 + EBIT\_GROWTH\_VAL) ^ (HOLDINGS\_PERIODS - 1) / \_

(1 + WACC\_VAL) ^ (HOLDINGS\_PERIODS - 1)) / (WACC\_VAL - EBIT\_GROWTH\_VAL) + EBIT\_VAL \* (1 - TAX\_VAL) \* (1 + EBIT\_GROWTH\_VAL) ^ HOLDINGS\_PERIODS \* \_

(1 - RISK\_FREE\_VAL / WACC\_VAL) / (1 + WACC\_VAL) ^ HOLDINGS\_PERIODS + (EBIT\_VAL \* (1 - TAX\_VAL) \* (1 + EBIT\_GROWTH\_VAL) ^ HOLDINGS\_PERIODS \* \_

(1 + RISK\_FREE\_VAL) \* (1 - RISK\_FREE\_VAL / WACC\_VAL) / (WACC\_VAL - RISK\_FREE\_VAL)) / (1 + WACC\_VAL) ^ HOLDINGS\_PERIODS - A\_VAL

End If

'-------------------------------------------------------------------------------------

End Select

'-------------------------------------------------------------------------------------

GROWTH\_WORTH\_FORMULA\_FUNC = Y\_VAL 'Value added by future growth

Exit Function

ERROR\_LABEL:

GROWTH\_WORTH\_FORMULA\_FUNC = Err.Number

End Function

'If you are interested in the mechanics of the valuation, here are the cash flows

'for up to n years of high growth\_

Function GROWTH\_WORTH\_CALC\_FUNC( \_

ByVal OPERATING\_INCOME\_EBIT\_THIS\_YEAR\_VAL As Double, \_

ByVal EFFECTIVE\_TAX\_RATE\_VAL As Double, \_

ByVal COST\_OF\_CAPITAL\_VAL As Double, \_

ByVal RISKFREE\_RATE\_VAL As Double, \_

ByVal LENGTH\_GROWTH\_PERIOD\_VAL As Long, \_

ByRef RETURN\_ON\_INVESTED\_CAPITAL\_ON\_GROWTH\_VAL As Double, \_

ByVal EXPECTED\_GROWTH\_RATE\_IN\_OPERATING\_INCOME\_VAL As Double)

'OPERATING\_INCOME\_EBIT\_THIS\_YEAR\_VAL: Operating income for the most recent year

'EFFECTIVE\_TAX\_RATE\_VAL: Effective tax rate from income statement. Divide taxes paid by taxable income.

'COST\_OF\_CAPITAL\_VAL: If you want you can use the industry average

'RISKFREE\_RATE\_VAL: Long term riskfree rate in the currency of valuation.

'LENGTH\_GROWTH\_PERIOD\_VAL: Length of the period that you will be able to maintain high growth before becoming stable growth firm.

'RETURN\_ON\_INVESTED\_CAPITAL\_ON\_GROWTH\_VAL: While the default is set to the current ROIC, you can change it to reflect industry averages or trends you see at your company.

'EXPECTED\_GROWTH\_RATE\_IN\_OPERATING\_INCOME\_VAL: Expected compounded annual growth rate in operating income during high growth period.

Dim i As Long

Dim REINVESTMENT\_RATE\_VAL As Double

Dim REINVESTMENT\_RATE\_STABLE\_GROWTH\_VAL As Double

Dim AFTER\_TAX\_OPERATING\_INCOME\_VAL As Double

Dim REINVESTMENT\_VAL As Double

Dim FCFF\_VAL As Double

Dim FCFF\_DISCOUNTED\_VAL As Double

Dim TERMINAL\_YEAR\_OPERATING\_INCOME\_VAL As Double

Dim TERMINAL\_YEAR\_FCFF\_VAL As Double

Dim TERMINAL\_VAL As Double

Dim TODAY\_VAL As Double

'On Error GoTo ERROR\_LABEL

If RETURN\_ON\_INVESTED\_CAPITAL\_ON\_GROWTH\_VAL = 0 Then

REINVESTMENT\_RATE\_VAL = 0

Else

' Expected growth rate in high growth rate/ Return on Invested capital in high growth

REINVESTMENT\_RATE\_VAL = \_

EXPECTED\_GROWTH\_RATE\_IN\_OPERATING\_INCOME\_VAL / RETURN\_ON\_INVESTED\_CAPITAL\_ON\_GROWTH\_VAL

End If

If COST\_OF\_CAPITAL\_VAL = 0 Then

REINVESTMENT\_RATE\_STABLE\_GROWTH\_VAL = 0

Else

'Assume stable growth rate = riskfree rate; return on capital in

'stable growth = cost of capital

REINVESTMENT\_RATE\_STABLE\_GROWTH\_VAL = RISKFREE\_RATE\_VAL / COST\_OF\_CAPITAL\_VAL

End If

i = 0

AFTER\_TAX\_OPERATING\_INCOME\_VAL = 0

'Following the pure convention, which requires reinvestment to precede growth by a year.

'Reinvest the high growth reinvestment rate of current after-tax operating income to

'facilitate growth for year 1.

REINVESTMENT\_VAL = OPERATING\_INCOME\_EBIT\_THIS\_YEAR\_VAL \* (1 - EFFECTIVE\_TAX\_RATE\_VAL) \* REINVESTMENT\_RATE\_VAL

FCFF\_VAL = AFTER\_TAX\_OPERATING\_INCOME\_VAL - REINVESTMENT\_VAL

FCFF\_DISCOUNTED\_VAL = FCFF\_VAL

'Debug.Print FCFF\_DISCOUNTED\_VAL

For i = 1 To LENGTH\_GROWTH\_PERIOD\_VAL

AFTER\_TAX\_OPERATING\_INCOME\_VAL = OPERATING\_INCOME\_EBIT\_THIS\_YEAR\_VAL \* (1 - EFFECTIVE\_TAX\_RATE\_VAL) \* (1 + EXPECTED\_GROWTH\_RATE\_IN\_OPERATING\_INCOME\_VAL) ^ i

If i < LENGTH\_GROWTH\_PERIOD\_VAL Then

REINVESTMENT\_VAL = AFTER\_TAX\_OPERATING\_INCOME\_VAL \* REINVESTMENT\_RATE\_VAL

Else

'Reinvestment rate drops to stable period reinvestment rate in final year of high growth.

REINVESTMENT\_VAL = AFTER\_TAX\_OPERATING\_INCOME\_VAL \* REINVESTMENT\_RATE\_STABLE\_GROWTH\_VAL

End If

FCFF\_VAL = AFTER\_TAX\_OPERATING\_INCOME\_VAL - REINVESTMENT\_VAL

FCFF\_DISCOUNTED\_VAL = FCFF\_DISCOUNTED\_VAL + (FCFF\_VAL / (1 + COST\_OF\_CAPITAL\_VAL) ^ i)

Next i

TERMINAL\_YEAR\_OPERATING\_INCOME\_VAL = OPERATING\_INCOME\_EBIT\_THIS\_YEAR\_VAL \* (1 - EFFECTIVE\_TAX\_RATE\_VAL) \* (1 + EXPECTED\_GROWTH\_RATE\_IN\_OPERATING\_INCOME\_VAL) ^ LENGTH\_GROWTH\_PERIOD\_VAL \* (1 + RISKFREE\_RATE\_VAL)

TERMINAL\_YEAR\_FCFF\_VAL = TERMINAL\_YEAR\_OPERATING\_INCOME\_VAL \* (1 - REINVESTMENT\_RATE\_STABLE\_GROWTH\_VAL)

TERMINAL\_VAL = TERMINAL\_YEAR\_FCFF\_VAL / (COST\_OF\_CAPITAL\_VAL - RISKFREE\_RATE\_VAL)

TODAY\_VAL = FCFF\_DISCOUNTED\_VAL + TERMINAL\_VAL / (1 + COST\_OF\_CAPITAL\_VAL) ^ LENGTH\_GROWTH\_PERIOD\_VAL

GROWTH\_WORTH\_CALC\_FUNC = \_

Array(TODAY\_VAL, TERMINAL\_VAL, TERMINAL\_YEAR\_FCFF\_VAL, \_

TERMINAL\_YEAR\_OPERATING\_INCOME\_VAL, FCFF\_DISCOUNTED\_VAL, \_

REINVESTMENT\_RATE\_STABLE\_GROWTH\_VAL, REINVESTMENT\_RATE\_VAL)

Exit Function

ERROR\_LABEL:

GROWTH\_WORTH\_CALC\_FUNC = Err.Number

End Function