Valuation of a company. Calculation of NPV and Price Per Share.

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Executive Summary

This VBA project will allow to reduce time spend on mechanical calculation of NPV, CAPM, WACC and price per share and spent more time on decision making aspects of projects, like preferred capital structure, analysis of growth of EBIT, CAPEX and NWC.

In order to calculate NPV of the project, an analyst needs to create a table and calculate following data for every single period:

- Earnings before income tax
- Tax
- Net Operating profit after tax
- Depreciation
- Capital expenditures
- Change in Net Working Capital
- Future cash flow
- Total Future cash flow

In order to find NPV, the analyst should calculate terminal value and WACC. Data for CAPM could be obtained from http://finance.yahoo.com/ and http://www.standardandpoors.com/indices. Then WACC can be calculated using information about capital structure and CAPM:

$$WACC = \frac{E}{V} * Re + \frac{D}{V} * Rd * (1 - Tc)$$

In accordance with particular project or particular assumptions some of the mentioned above data can grow/decline at a constant rate or change in accordance with the established pattern.

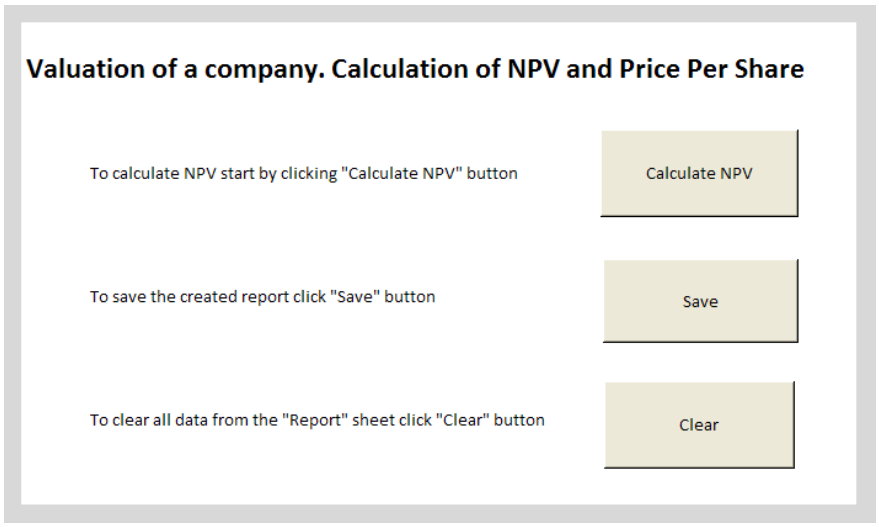
I have created NPV calculation macro, which will allow inputting available information into the series of forms and calculating NPV without manually creating a spreadsheet.

VBA macro automatically creates a final table with required information on the separate sheet “Report”

II. Implementation documentation

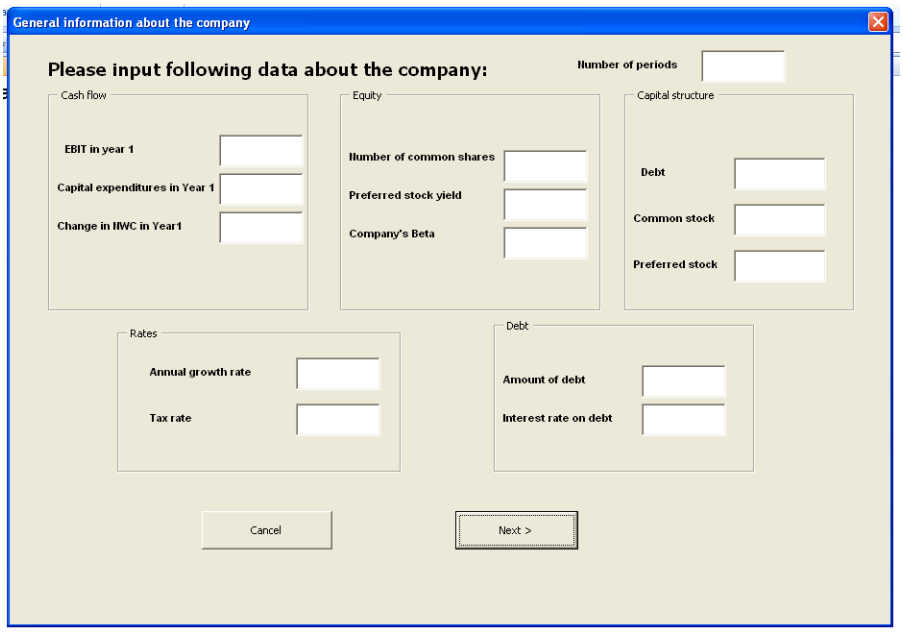
Step 1. Start.

In order to open the first form user should click on “Calculate NPV” button.



Step 2. General information about the company.

User should enter all required data in to the form “General information about the company”.



Following information is a detailed explanation of fields in the “General information about the company” form:

Number of periods – period for which Discounted Cash Flows for the firm are evaluated

Cash flow.

EBIT – Earnings before interest and taxes. It is a measure of a firm's profitability that excludes interest and income tax expenses. EBIT = Operating Revenue – Operating Expenses + Non-operating Income.

Capital expenditures - money spent to acquire or upgrade physical assets such as buildings and machinery.

Net working capital (NWC) - represents operating liquidity available to a business, NWC= current assets- current liabilities.

Data in the cash flow will be entered into the first year data column of the final table.

Equity

Number of common shares – current number of common shares issued by the company

Preferred stock yield – Dividend per preferred stock divided by preferred stock price. Usually for valuation purposes preferred stock yield makes sense if it is a perpetual preferred stock (preferred stock that has no maturity date). Also preferred stocks are really used for valuation. Therefore if there is no preferred stock for this company, user should indicate "0".

Company's Beta – a number describing the relation of its returns with that of the financial market as a whole.

Capital structure

A mix of a company's long-term debt, specific short-term debt, common equity and preferred equity.

Debt – percentage of debt in total capital (debt/(debt+equity))

Common stock – percentage of common stock in total capital (common stock/(debt+equity))

Preferred stock – percentage of preferred stock in total capital (preferred stock/(debt+equity))

If there is no preferred stock in the capital structure user should indicate "0".

Rates

Annual growth rate – annual business growth/decline rate adjusted for the inflation. It would be more accurate to use multi-stage growth/ declining model, rather than use just one rate for evaluation.

Tax rate – current tax rate on business.

Debt

Amount of debt

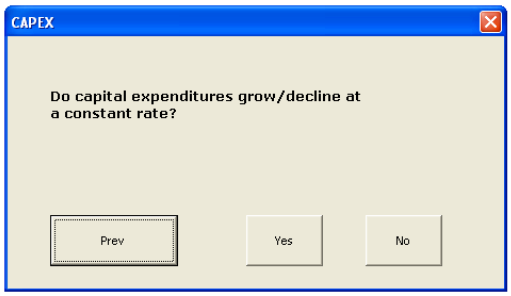
Interest rate – in accordance with company's credit rating (AAA, BB,BBB) and other conditions user should indicated as cost of debt for the company.

All rates, percentages should be indicated in this form in decimals.

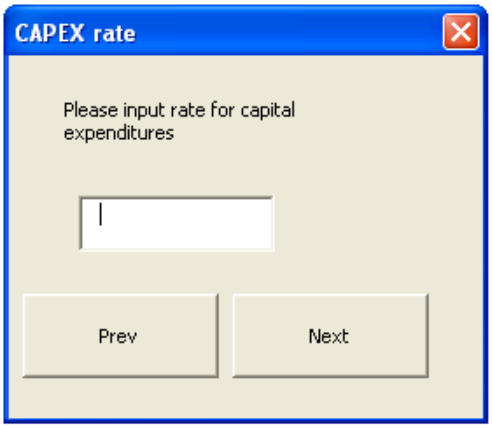
After all data entered into this form user should push enter, then next form will show up

Step 3. Capital expenditures.

During the next step the analyst should apply critical judgment and identify if capital expenditures for the project will grow/decline at a constant rate or will be different depending on the year.



1) If user assume that Capital expenditures will grow/decline at a constant rate (sales growth/decline rate or some other rate) than he should push "yes" and enter rate into the next form.



Rate should be indicated in decimal. If capital expenditures are declining then negative rate should be indicated in this form.

As mentioned earlier capital expenditures for year 1 are indicated in the first column marked as "Period 1". See code below.

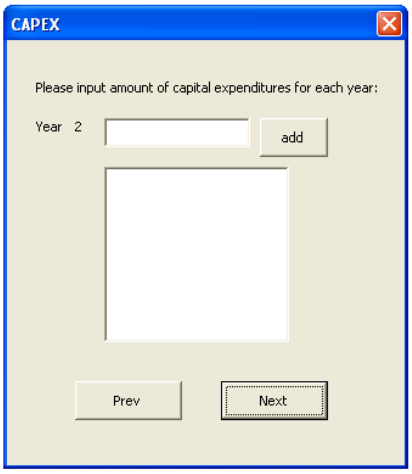
```
For X = 1 To nper
'Period
  Sheets("sheet3").Cells(3, X + 1).Value = X


'EBIT, CAPEX and NWC for the 1st year
  If X = 1 Then
    Sheets("sheet3").Cells(4, X + 1).Value = UserForm1.ebt.Value
    Sheets("sheet3").Cells(8, X + 1).Value = UserForm1.capex1.Value
    Sheets("sheet3").Cells(9, X + 1).Value = UserForm1.nwc1.Value
```

If capital expenditures are growing/declining at a constant rate, Capex, for following periods starting from year 2 to year x, will be calculated using formula.

Capex $_{\text{year n}}$ = (1+rate)*capex $_{\text{year (n-1)}}$

```
  Else

  Sheets("sheet3").Cells(8, X + 1).Value = Sheets("sheet3").Cells(8, X).Value * (1 + UserForm3.capexrate.Value)
  End If
```

2) If capital expenditures do not grow/decline at a constant rate user should click No and enter data in the next form. Data for CAPEX should be inputted starting from year 2.



After planned capital expenditures data for year 2 was entered into the field, user should press “Add” and add information about capital expenditures for the next year. All data about capital expenditures for the indicated periods of time will be entered into the final table in respective periods.

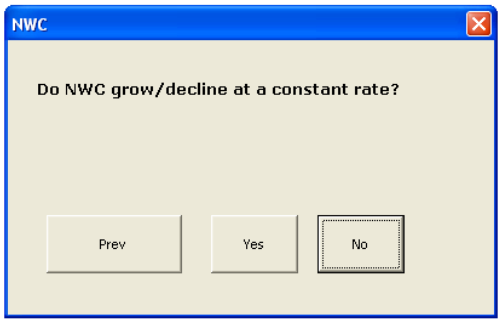
```
'CAPEX
If UserForm3.capexrate.Value = "" Then

Sheets("sheet3").Cells(8, X + 1).Value = Mid(UserForm4.lstyears.List(X - 2), InStr(1, UserForm4.lstyears.List(X - 2), ":")

Else
```

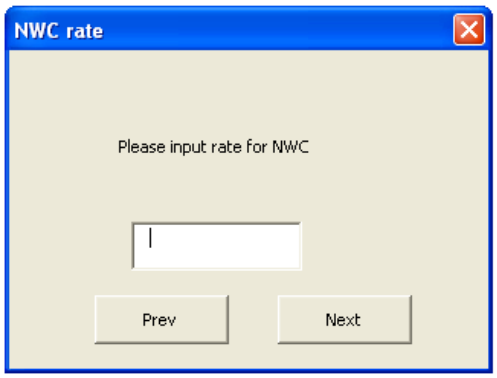
If user decided to change his approach he can go back by pushing “Prev” button and change entered data.

By clicking on the “Next” button the user will move on to the next form.

Step 4. Net working capital.

1) Next form has the same approach as the “CAPEX” form. If the analyst is aware that NWC will grow/decline at the constant rate, he should choose “yes” and indicate the rate (in the next form).



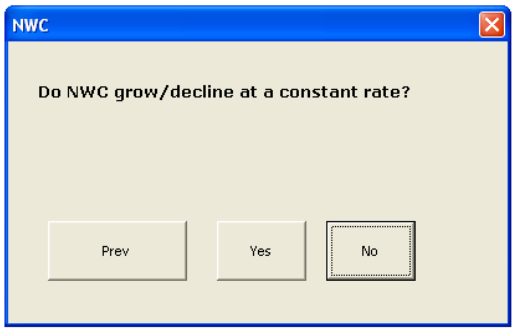


NWC for following periods starting from year 2 to year x will be calculated using formula:

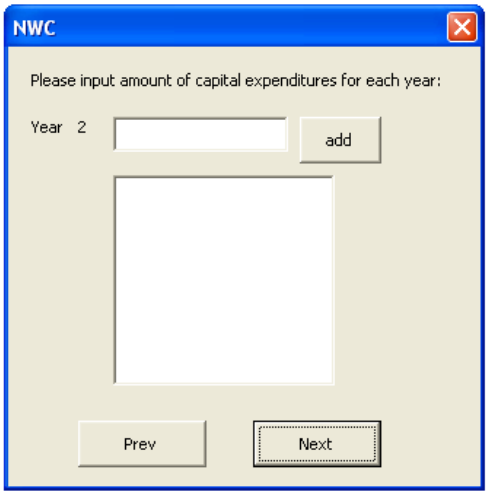
NWC $_{\text{year n}}$ = (1+rate)*NWC $_{\text{year (n-1)}}$

```
Else
Sheets("sheet3").Cells(9, X + 1).Value = Sheets("sheet3").Cells(9, X).Value * (1 + UserForm6.NWCrate.Value)
End If
```

2) If NWC does not grow/decline at a constant rate, the user should choose "no"



and enter data for NWC, starting from year 2, into the following form:



After NWC for year 2 was entered into the field, user should press “Add” and add information about NWC for another year. All data about NWC for the indicated periods of time will be entered into the final table in respective periods.

```
'NWC
If UserForm6.NWCrate.Value = "" Then
Sheets("sheet3").Cells(9, X + 1).Value = Mid(UserForm7.lstyears.List(X - 2), InStr(1, UserForm7.lstyears.List(X - 2), ":") +
Else
```

Step 5. Depreciation.

Next form contains information about fixed assets related to the project or possessed by the company.

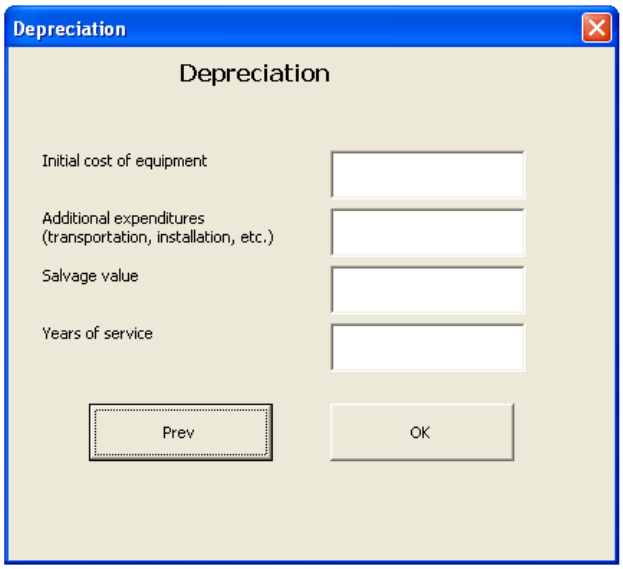
Following information is an explanation of fields in the “Depreciation” form:

Initial cost of the equipment or initial capital investments in the project should be indicated in the field “initial cost of equipment”.

Along with initial expenditures, sometimes a company carries additional expenditures that should be capitalized and depreciated together with the initial cost of the capital investment.

Salvage value - is the estimated value of an asset at the end of its useful life. In accounting, the salvage value of an asset is its remaining value after depreciation. This is also known as residual value or scrap value. Sometimes salvage value equals termination costs and therefore is not taken into consideration when calculating depreciation.

Years of service – is useful life of the equipment in accordance with accounting rules.

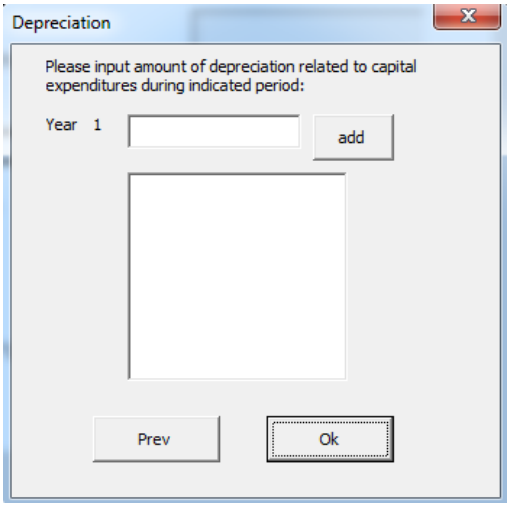


Straight-line depreciation is calculated as (Initial cost of the equipment + Additional expenditures – Salvage value)/ Years of service

If number of years in service is less than total number of periods indicated, then depreciation should be calculated only for number of years in service.

```
'Depreciation for capex
Sheets("sheet3").Cells(7, X + 1).Value = Mid(UserForm9.lstyears.List(X - 1), InStr(1, UserForm9.lstyears.List(X - 1), ":") + 2)
```

```
'Depreciation
If CInt(UserForm8.nyears.Value) > nper Then
    'Sheets("sheet3").Cells(7, X + 1).Value = (CInt(UserForm8.incost.Value) + CInt(UserForm8.adexp.Value) - CInt(UserForm8.salvagev.Va
    Sheets("sheet3").Cells(7, X + 1).Value = Sheets("sheet3").Cells(7, X + 1).Value + (CInt(UserForm8.incost.Value) + CInt(UserForm8.a
    Else
    For y = 1 To CInt(UserForm8.nyears.Value)
    For z = 1 To nper
    Sheets("sheet3").Cells(7, y + 1).Value = Sheets("sheet3").Cells(7, z + 1).Value + (CInt(UserForm8.incost.Value) + CInt(UserForm8.a
    Next
    Next
End If
```



Step 6. Calculations.

After user clicked on the “Ok” button on the “Depreciation” form macro performs calculations based on the information in the forms and data uploaded from web-sites. The final report will be posted by macro on the “Report” sheet.

A	B	C	D	E	F	G	H
Valuation of a company. Calculation of NPV and Price Per Share							
Period	**1.00**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**
EBIT	1,000.00	1,050.00	1,102.50	1,157.63	1,215.51	1,276.28	1,340.10
TAX	420.00	441.00	463.05	486.20	510.51	536.04	562.84
NOPAT	580.00	609.00	639.45	671.42	704.99	740.24	777.26
Depreciation	18.00	18.00	18.00	18.00	18.00		
CAPEX	100.00	110.00	121.00	133.10	146.41	161.05	177.16
change in NWC	50.00	55.00	60.50	66.55	73.21	80.53	88.58
FCF	448.00	462.00	475.95	489.77	503.38	498.67	511.52
Terminal value							10,922.94
Total FCF	448.00	462.00	475.95	489.77	503.38	498.67	11,434.46
NPV	8,082.51						
Debt	600.00						
Number of shares	100.00						
Price per share	74.83						

Step 7. Save or clear the report.

After the report is created user can either save the report or clear all calculations and rerun the report.

The “Clear” button:.

```
Sub clear()
Range("A3").CurrentRegion.Select
Selection.ClearContents
End Sub
```

The “Save” button:

```
Dim file_name As Variant


  file_name = Application.GetSaveAsFilename( _
      FileFilter:="Excel Files,*.xls,All Files,*.*", _
      Title:="Save As File Name")


  If file_name = False Then Exit Sub


  If LCase$(Right$(file_name, 4)) <> ".xls" Then
      file_name = file_name & ".xls"
  End If
  ActiveWorkbook.SaveAs Filename:=file_name
```

Description of the calculation process.

The calculation process performed by the “NPV calculation” macro is described below:

Tax expenditures for each period are calculated based on the tax rate entered into the first form and information about EBIT for the first year and EBIT growth rate

$EBIT_{year\ n} = (1+rate)*EBIT_{year\ (n-1)}$

```
'EBIT, CAPEX and NWC for the 1st year
  If X = 1 Then
    Sheets("sheet3").Cells(4, X + 1).Value = UserForm1.ebt.Value



  Else
    Sheets("sheet3").Cells(4, X + 1).Value = Sheets("sheet3").Cells(4, X).Value * (1 + UserForm1.grth.Value)
```

EBIT calculated for each period is multiplied by tax rate.

EBIT for year is taken from form 1 and entered into the period #1 column. EBIT for next periods calculated by multiplying the previous period EBIT by (1+growth rate).

```
'TAX for the year
Sheets("sheet3").Cells(5, X + 1).Value = Sheets("sheet3").Cells(4, X + 1).Value * (UserForm1.taxrate.Value)
```

Then NOPAT (net profit after tax) is calculated based on information about EBIT and tax expenditures for each period. NOPAT = EBIT – tax expenditures

```
'NOPAT
Sheets("sheet3").Cells(6, X + 1).Value = Sheets("sheet3").Cells(4, X + 1).Value - Sheets("sheet3").Cells(5, X + 1).Value
```

For capital expenditures during indicated period numbers calculated separately and should be indicated in the last form. Capex depreciation should be indicated starting from the first year.

FCF

Free cash flow (FCF) is calculated in as:

NOPAT + Depreciation – Capex – NWC

Sheets("sheet3").Cells(10, X + 1).Value = Sheets("sheet3").Cells(6, X + 1).Value + Sheets("sheet3").Cells(7, X + 1).Value - Sheets("sheet3").Cells(8, X + 1).Value - Sheets("sheet3").Cells(9, X + 1).Value

Terminal value

Terminal value - the value of an investment at the end of a period.

Terminal value is calculated as last year's FCF/ (WACC - growth rate)

WACC is calculated based on the information in the first form and data uploaded from 2 web-sites, growth rate is taken from first form.

```
'Terminal value
Sheets("sheet3").Cells(11, X).Value = Sheets("sheet3").Cells(10, X).Value / (wacc - UserForm1.grth.Value)
```

WACC = Wp*Dividend yield + Wd*Interest rate on debt*(1-tax rate)+We*CAPM

Wp – percentage of preferred stocks in capital, number is taken from capital structure field

Dividend yield – is taken from "Equity" field – "Preferred stock yield"

Wd – percentage of debt in total capital, number is taken from capital structure field

Interest rate is indicated in "Debt" field - "Interest rate on debt"

Tax rate is indicated in "Rates" – "tax rate"

We – percentage of common stocks in capital, number is taken from capital structure field

CAPM is calculated by using following formula:

Re (CAPM)= Rf+Beta*(Rm-Rf)

Rm -market return rate is uploaded from S&P web-site and this is year-to-date return(YTD) on S&P 500 portfolio. (web site http://www.standardandpoors.com/indices/sp-500/en/us/?indexId=spusa-500-usduf--p-us-l--)

```
With ActiveSheet.QueryTables.Add(Connection:= _
    "URL;http://www.standardandpoors.com/indices/sp-500/en/us/?indexId=spusa-500-usduf--p-us-l--" _
    , Destination:=Range("$A$13"))
    .Name = "?indexId=spusa-500-usduf--p-us-l--_1"
    .FieldNames = True
    .RowNumbers = False
    .FillAdjacentFormulas = False
    .PreserveFormatting = True
    .RefreshOnFileOpen = False
    .BackgroundQuery = True
    .RefreshStyle = xlInsertDeleteCells
    .SavePassword = False
    .SaveData = True
    .AdjustColumnWidth = True
    .RefreshPeriod = 0
    .WebSelectionType = xlEntirePage
    .WebFormatting = xlWebFormattingNone
    .WebPreFormattedTextToColumns = True
    .WebConsecutiveDelimitersAsOne = True
    .WebSingleBlockTextImport = False
    .WebDisableDateRecognition = False
    .WebDisableRedirections = False
    .Refresh BackgroundQuery:=False
End With

   With Sheet1.Range("A13").QueryTable
       .Connection = "URL;http://www.standardandpoors.com/indices/sp-500/en/us/?indexId=spusa-500-usduf--p-us-l--"
       .WebSelectionType = xlSpecifiedTables
       .WebFormatting = xlWebFormattingNone
       '.WebTables = "3"
       .WebPreFormattedTextToColumns = True
       .WebConsecutiveDelimitersAsOne = True
       .WebSingleBlockTextImport = False
       .WebDisableDateRecognition = False
       .WebDisableRedirections = False
       '.Refresh BackgroundQuery:=False
   End With
       getMarketRate = Sheet1.Range("A:A").Find(What:="PRICE RETURNS", LookIn:=xlFormulas, _
       LookAt:=xlPart, SearchOrder:=xlByRows, SearchDirection:=xlNext, _
       MatchCase:=False, SearchFormat:=False).Offset(1, 6).Value

End Function
```

Rf – risk free rate is uploaded from Google finance web-site and this is return on 10-year treasury bonds. (web site www.google.com/finance)

```
With ActiveSheet.QueryTables.Add(Connection:= _
    "URL;http://www.google.com/finance", Destination:=Range("$A$4"))
    .Name = "finance"
    .FieldNames = True
    .RowNumbers = False
    .FillAdjacentFormulas = False
    .PreserveFormatting = True
    .RefreshOnFileOpen = False
    .BackgroundQuery = True
    .RefreshStyle = xlInsertDeleteCells
    .SavePassword = False
    .SaveData = True
    .AdjustColumnWidth = True
    .RefreshPeriod = 0
    .WebSelectionType = xlSpecifiedTables
    .WebFormatting = xlWebFormattingNone
    .WebTables = "3"
    .WebPreFormattedTextToColumns = True
    .WebConsecutiveDelimitersAsOne = True
    .WebSingleBlockTextImport = False
    .WebDisableDateRecognition = False
    .WebDisableRedirections = False
    .Refresh BackgroundQuery:=False
End With

With Sheets("sheet1").Range("A4").QueryTable
      .Connection = "URL;http://www.google.com/finance"
      .WebSelectionType = xlSpecifiedTables
      .WebFormatting = xlWebFormattingNone
      .WebTables = "3"
      .WebPreFormattedTextToColumns = True
      .WebConsecutiveDelimitersAsOne = True
      .WebSingleBlockTextImport = False
      .WebDisableDateRecognition = False
      .WebDisableRedirections = False
      .Refresh BackgroundQuery:=False
  End With

     getRiskFreeRate = Sheet1.Range("A:A").Find(What:="10 year", LookIn:=xlFormulas, _
      LookAt:=xlPart, SearchOrder:=xlByRows, SearchDirection:=xlNext, _
      MatchCase:=False, SearchFormat:=False).Offset(0, 1).Value
```

Beta – is indicated by user in the first form.

```
Riskfreerate = getRiskFreeRate
Rmarket = getMarketRate

beta = CInt(UserForm1.beta.Value)

capm = Riskfreerate + beta * (Rmarket - Riskfreerate)
```

wacc = UserForm1.wpreferred.Value * UserForm1.pfrdstyield + UserForm1.wdebt.Value * (1 - UserForm1.taxrate.Value) * UserForm1.intrate + UserForm1.wcommon.Value * capm

Market premium (Rm-Rf)- for this assignment is taken from the indicated web-sites. Conceptually it would be more correct to use fixed Market Premium indicated by Ibbotson – 6.7%

Total cash flow

Total cash flow is the same as FCF except for the last year when last year's FCF + terminal value.

```
Sheets("sheet3").Cells(12, X + 1).Value = Sheets("sheet3").Cells(10, X + 1).Value


'TCF last year
Sheets("sheet3").Cells(12, X).Value = Sheets("sheet3").Cells(12, X).Value + Sheets("sheet3").Cells(11, X).Value
```

NPV

Total cash flow discounted at the calculated rate (WACC) by using NPV formula .

```
'NPV
RangeNPV = Range(Cells(12, 2), Cells(12, X + 1)).Select
NPV = Application.WorksheetFunction.NPV(wacc, RangeNPV)
Sheets("Report").Cells(13, 2).Value = NPV
```

This is value of the assets

In order to obtain value of equity debt should be subtracted of the calculated above number.

Debt amount was indicated by user in the first form.

Price per share

Price per share is (NPV-Debt)/Number of shares

Number of shares taken from the first form – "number of common shares"

Sheets("sheet3").Cells(16, 2).Value = (Sheets("sheet3").Cells(13, 2).Value - Sheets("sheet3").Cells(14, 2).Value) / Sheets("sheet3").Cells(15, 2).Value

Than following actions done to make this form look nice

```
Range("A3").CurrentRegion.Select
 Sheets("sheet3").ListObjects.Add(xlSrcRange, Range("A3").CurrentRegion, , xlYes).Name = _
    "Table1"

Range("Table1[#All]").Select
ActiveSheet.ListObjects("Table1").TableStyle = "TableStyleMedium9"
Selection.Style = "Comma"
Columns("A:A").Select
Selection.Font.Bold = True
Rows("3:3").Select
Selection.Font.Bold = True
ActiveWindow.DisplayGridlines = False
```

Learning and conceptual difficulties encountered.

During the course of the project I had following difficulties:

1) Separating calculations for year 1 from calculation for the following years of the project. The solution for using "If" statement and capturing values for Year 1 separately from the 1st form.
2) I had difficulties with indicating parameters from forms, for instance "form UserForm1.debt.Value"
3) There were some difficulties with uploading of data from the web-site and calculation of percentages based on downloaded data. (see code above)
4) The main problem was with forms which captured information about capital expenditures, net working capital and depreciation when these parameters didn't grow at a constant rate. This task included creation of the add button and then applying each of the values to the calculation of cash flow in the particular year. This is the code:

```
lstyears.AddItem "Year " & lblyear.Caption & ": " & txtAdd.Text
lblyear.Caption = CInt(lblyear.Caption) + 1
txtAdd.Text = ""
txtAdd.SetFocus
```

Professor Gove Allen helped me with multiple difficulties which I faced working on this project.

After I completed the project I became more comfortable with:

1) Loops "For… Next"
2) "if then … else" statements
3) Using cells references like "cells(x+1, 1)".
4) Using data inputted from different forms into calculation
5) Uploading data from web-sites
6) Defining variables

Summary

There were a lot of assumptions which were done in the calculation of NPV.

One thing which is not completely right is calculation of depreciation. If period indicated in the first form is greater than useful life indicated in the depreciation form, total depreciation in the final form doesn't show correct depreciation for capital expenditures incurred during indicated period.

Also it would be useful to put different restrictions, like total capital structure (We+Wd+Wp) should not exceed 1, in order to avoid potential human errors (errors of data entry).