…Over the next several days, I will present **4 different methods** of correctly calculating **Equity Cash Flow (ECF)** using **R**. The valuation technique of discounted cash flow (**DCF**) estimates equity value (**E**) as the present value of forecasted **ECF**. The appropriate discount rate for this flow definition is the cost of equity capital (**Ke**).

'ECF – Method 1' is defined as follows:

$$ECF_1 = DIV - \Delta PIC + \Delta MS - (II)(1 - T)$$

where

$$ECF_1 = Equity\ Cash\ Flow\ for\ 'Method\ 1'$$

$$DIV = Dividends$$

$$\Delta PIC = Change\ in\ 'Paid - in - Capital'$$

$$\Delta MS = Change\ in\ 'Marketable\ Securties'$$

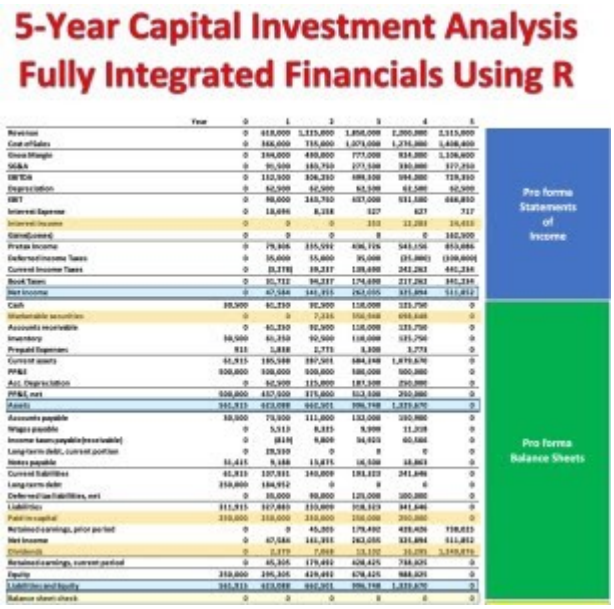
$$II = Interest\ Income$$

$$T = Composite\ Tax\ Rate$$

Note: **ECF** is not simply 'dividends.' A common misconception is that discounted dividends (**DIV**) provide equity value. An example of this is the common 'dividend growth' equity valuation model found in many corporate finance texts. All 'dividend growth' models that discount dividends (**DIV**) at the cost of equity capital (**Ke**) are incorrect unless forecasted **1)** marketable securities (**MS**) balances are zero, and **2)** there is no **issuance** or **repurchase** of equity shares.

The data assumes a **5-year year** hypothetical **capital project**. A single **revenue producing asset** is purchased at the end of '**Year 0**' and is sold at the end of '**Year 5**.' The **$500,000** asset is purchased assuming **50% debt** and **50% equity** financing.

Further, the data used to estimate **ECF** in this example are taken from **fully integrated pro forma financial statements** and other relevant data assumptions including the corporate tax rate. This particular example only requires financial data from integrated **pro forma income statements** and **balance sheets**. These 2 pro forma financial statements are shown below with the relevant data rows highlighted.



https://www.dropbox.com/s/xwy97flxe99gqr9/financials.pdf?dl=0

The above link provides access to a **PDF** of all financial statement pro forma data and is easily zoomable for viewing purposes.

The relevant data used to calculate **ECF** are initially placed in a tibble.

```
library(tidyverse)
```

```
data <- tibble(Year = c(0:5),
               div  = c(0, 2379, 7068, 13102, 16295, 1249876),
               MS   = c(0, 0, 7226, 350948, 698648, 0),
               ii   = c(0, 0, 0, 253, 12283, 24453),
               pic  = c(250000, 250000, 250000, 250000, 250000, 0),
               T_   = c(0.25, 0.40, 0.40, 0.40, 0.40, 0.40))

data
```

```
> data
# A tibble: 6 x 6
   Year     div      MS    ii     pic    T_
  <int>   <dbl>   <dbl> <dbl>   <dbl> <dbl>
1     0       0       0     0  250000  0.25
2     1    2379       0     0  250000  0.4
3     2    7068    7226     0  250000  0.4
4     3   13102  350948   253  250000  0.4
5     4   16295  698648 12283  250000  0.4
6     5 1249876       0 24453       0  0.4
```

An **R** function is created to rotate the data in standard financial data presentation format (each

data line item occupies a single row instead of a column)

```
rotate <- function(r) {

  p <- t(as.matrix(as_tibble(r)))

  return(p)

}
```

View the rotated data.

```
rotate(data)
```

```
> rotate(data)
          [,1]     [,2]     [,3]     [,4]     [,5]      [,6]
Year      0.00      1.0      2.0      3.0      4.0       5.0
div       0.00   2379.0   7068.0  13102.0  16295.0 1249876.0
MS        0.00      0.0   7226.0 350948.0 698648.0       0.0
ii        0.00      0.0      0.0    253.0  12283.0   24453.0
pic  250000.00 250000.0 250000.0 250000.0 250000.0       0.0
T_        0.25      0.4      0.4      0.4      0.4       0.4
```

An **R** function reads in the appropriate data, performs the necessary calculations, and outputs the data. The **R** output is then placed in a spreadsheet to formatting purposes.

'ECF – Method 1' R function

```
ECF_1 <- function(a) {

  ECF1 <-     tibble( T_             = a$T_,
                      pic            = a$pic,
                      chg_pic        = pic - lag(pic, default=0),
                      MS             = a$MS,
                      ii             = a$ii,
                      Year           = c(0:(length(T_)-1)),
                      div            = a$div,
                      net_new_equity = -chg_pic,
                      chg_MS         = MS - lag(MS, default=0),
                      ii_AT          = -ii*(1-T_),
                      ECF1           = div + net_new_equity
                                       + chg_MS + ii_AT )

  ECF1 <- rotate(ECF1)

  return(ECF1)

}
```

View R Output

```
ECF_method_1 <- ECF_1( data)
ECF_method_1
```

```
> ECF_method_1
                    [,1]     [,2]     [,3]     [,4]     [,5]      [,6]
T_                  0.25      0.4      0.4      0.4      0.4       0.4
pic            250000.00 250000.0 250000.0 250000.0 250000.0       0.0
chg_pic        250000.00      0.0      0.0      0.0      0.0 -250000.0
MS                  0.00      0.0   7226.0 350948.0 698648.0       0.0
ii                  0.00      0.0      0.0    253.0  12283.0   24453.0
Year                0.00      1.0      2.0      3.0      4.0       5.0
div                 0.00   2379.0   7068.0  13102.0  16295.0 1249876.0
net_new_equity -250000.00      0.0      0.0      0.0      0.0  250000.0
chg_MS              0.00      0.0   7226.0 343722.0 347700.0 -698648.0
ii_AT               0.00      0.0      0.0   -151.8  -7369.8  -14671.8
ECF1          -250000.00   2379.0  14294.0 356672.2 356625.2  786556.2
```

Excel formatting applied to R Output

$$ECF_1 = DIV - \Delta PIC + \Delta MS - II(1 - T)$$

Equity Cash Flow
ECF - Method 1

Year	0	1	2	3	4	5
Dividends	0	2,379	7,068	13,102	16,295	1,249,876
Less: Net New Equity	(250,000)	0	0	0	0	250,000
Plus: Increase in Marketable Securities	0	0	7,226	343,722	347,700	(698,648)
Less: Interest Income (After-tax)	0	0	0	(152)	(7,370)	(14,672)
Equity Cash Flow	(250,000)	2,379	14,294	356,672	356,624	786,557

It is quite evident there is far more than just dividends (**DIV**) involved in the proper calculation of **ECF**. Use of a **'dividend growth' equity valuation model** in this instance would result in **significant model error**.

This **ECF** calculation example is taken from my newly published textbook, '**Advanced Discounted Cash Flow (DCF) Valuation using R**.' It is discussed in far greater detail along with development of the integrated financials using **R** as well as numerous, advanced **DCF** valuation modeling approaches – some never before published.