Live Case: S&P500 (3 of 3)

Aug 10, 2023. -=-

Agenda: Analyzing a particular Sector within the S&P500 Index *We have chosen to deeply analyze the HEALTH TECHNOLOGY Sector.*

S&P 500 Data - PRELIMINARY SETUP

1. We will continue our analysis of the S&P 500. Load the data, as described in the chapter Live Case: S&P500 (1 of 3)

```
# Read S&P500 stock data present in a Google Sheet.
library(gsheet)
prefix <- "https://docs.google.com/spreadsheets/d/"
sheetID <- "11ahk9uWxBkDqrhNm7qYmiTwrlSC53N1zvXYfv7ttOCM"
url500 <- paste(prefix,sheetID) # Form the URL to connect to
sp500 <- gsheet2tbl(url500) # Read it into a tibble called sp500
```

No encoding supplied: defaulting to UTF-8.

2. Rename columns, as described in the chapter Live Case: S&P500 (1 of 3).

```
suppressPackageStartupMessages(library(dplyr))

# Define a mapping of new column names
new_names <- c(
  "Date", "Stock", "StockName", "Sector", "Industry",
  "MarketCap", "Price", "Low52Wk", "High52Wk",
  "ROE", "ROA", "ROIC", "GrossMargin",
  "OperatingMargin", "NetMargin", "PE",
  "PB", "EVEBITDA", "EBITDA", "EPS",
  "EBITDA_YOY", "EBITDA_QYOY", "EPS_YOY",
  "EPS_QYOY", "PFCF", "FCF",
  "FCF_QYOY", "DebtToEquity", "CurrentRatio",
```

```
  "QuickRatio", "DividendYield",
  "DividendsPerShare_YOY", "PS",
  "Revenue_YOY", "Revenue_QYOY", "Rating"
)
# Rename the columns using the new_names vector
sp500 <- sp500 %>%
  rename_with(~ new_names, everything())
```

3. Remove Rows containing no data or Null values, as described in the chapter Live Case: S&P500 (1 of 3).

```
# Check for blank or null values in the "Stock" column
hasNull <- any(sp500$Stock == "" | is.null(sp500$Stock))
if (hasNull) {
    # Remove rows with null or blank values from the dataframe tibble
    sp500 <- sp500[!(is.null(sp500$Stock) | sp500$Stock == ""), ]
}
```

4. The S&P500 shares are divided into multiple Sectors. Thus, model Sector as a factor() variable, as described in the chapter Live Case: S&P500 (1 of 3).

```
sp500$Sector <- as.factor(sp500$Sector)
```

5. Stock Ratings: The S&P500 shares have Technical Ratings such as {Buy, Sell, ..}. Model the data column Rating as a factor() variable, as described in the chapter Live Case: S&P500 (1 of 3).

```
sp500$Rating <- as.factor(sp500$Rating)
```

6. Low52WkPerc: Create a new column to track Share Prices relative to their 52 Week Low, as described in the chapter Live Case: S&P500 (1 of 3).

```
sp500 <- sp500 %>% mutate(Low52WkPerc = round((Price - Low52Wk)*100 / Low52Wk,2))
colnames(sp500)
```

```
[1] "Date"          "Stock"         "StockName"
[4] "Sector"        "Industry"      "MarketCap"
[7] "Price"         "Low52Wk"       "High52Wk"
```

```
[10] "ROE"                "ROA"                   "ROIC"
[13] "GrossMargin"        "OperatingMargin"       "NetMargin"
[16] "PE"                 "PB"                    "EVEBITDA"
[19] "EBITDA"             "EPS"                   "EBITDA_YOY"
[22] "EBITDA_QYOY"        "EPS_YOY"               "EPS_QYOY"
[25] "PFCF"               "FCF"                   "FCF_QYOY"
[28] "DebtToEquity"       "CurrentRatio"          "QuickRatio"
[31] "DividendYield"      "DividendsPerShare_YOY" "PS"
[34] "Revenue_YOY"        "Revenue_QYOY"          "Rating"
[37] "Low52WkPerc"
```

Well done! Our data is now ready for analysis!!

7. Creating a new column MarketCapBillions = MarketCap/1000,000,000

```
sp500 <- sp500 %>% mutate(MarketCapBillions = MarketCap/ 1000000000)
colnames(sp500)
```

```
 [1] "Date"               "Stock"                 "StockName"
 [4] "Sector"             "Industry"              "MarketCap"
 [7] "Price"              "Low52Wk"               "High52Wk"
[10] "ROE"                "ROA"                   "ROIC"
[13] "GrossMargin"        "OperatingMargin"       "NetMargin"
[16] "PE"                 "PB"                    "EVEBITDA"
[19] "EBITDA"             "EPS"                   "EBITDA_YOY"
[22] "EBITDA_QYOY"        "EPS_YOY"               "EPS_QYOY"
[25] "PFCF"               "FCF"                   "FCF_QYOY"
[28] "DebtToEquity"       "CurrentRatio"          "QuickRatio"
[31] "DividendYield"      "DividendsPerShare_YOY" "PS"
[34] "Revenue_YOY"        "Revenue_QYOY"          "Rating"
[37] "Low52WkPerc"        "MarketCapBillions"
```

SECTOR LEVEL ANALYSIS begins here

Filter the data by sector Health Services, and display the number of stocks in the sector

```
ts <- sp500 %>%
        filter(Sector=='Health Services')

nrow(ts)
```

```
[1] 12
```

There are 12 number of of stocks in the sector Health Services

Select the Specific Coulumns from the filtered dataframe `ts` (Health Services)

```
ts2 <- ts %>%
        select(Date, Stock, StockName,Sector,  Industry, MarketCap, Price,Low52Wk, High52W
                ROE, ROA,ROIC,GrossMargin, GrossMargin,
                NetMargin, Rating)

colnames(ts2)
```

```
 [1] "Date"        "Stock"       "StockName"   "Sector"      "Industry"
 [6] "MarketCap"   "Price"       "Low52Wk"     "High52Wk"    "ROE"
[11] "ROA"         "ROIC"        "GrossMargin" "NetMargin"   "Rating"
```

Arrange the Dataframe by ROE

```
ts3 <- ts2 %>% arrange(desc(ROE))
```

Top 10 Shares in Sector Health Services Based on ROE

```
head(ts3,10)
```

```
# A tibble: 10 x 15
   Date   Stock StockName Sector Industry MarketCap Price Low52Wk High52Wk   ROE
   <chr>  <chr> <chr>     <fct>  <chr>         <dbl> <dbl>   <dbl>    <dbl> <dbl>
 1 8/12/~ DVA   DaVita I~ Healt~ Medical~    9.26e 9 102.     65.3      107 60
 2 8/12/~ MOH   Molina H~ Healt~ Managed~    1.77e10 303.    256.       374 28.4
 3 8/12/~ IQV   IQVIA Ho~ Healt~ Service~    3.95e10 216.    166.       249 19.7
 4 8/12/~ HUM   Humana I~ Healt~ Managed~    6.05e10 484.    423.       571 19.5
 5 8/12/~ ELV   Elevance~ Healt~ Managed~    1.10e11 467.    412        550 17.3
 6 8/12/~ CI    The Cign~ Healt~ Managed~    8.49e10 287.    240.       340 14.9
 7 8/12/~ DGX   Quest Di~ Healt~ Service~    1.51e10 135.    120.       158 12.5
 8 8/12/~ UHS   Universa~ Healt~ Hospita~    8.54e 9 136.     82.5      159 11.6
 9 8/12/~ CNC   Centene ~ Healt~ Managed~    3.60e10  66.4    61.3      98.5 10.4
10 8/12/~ LH    Laborato~ Healt~ Service~    1.9 e10 214.    172.       226  8.31
# i 5 more variables: ROA <dbl>, ROIC <dbl>, GrossMargin <dbl>,
#   NetMargin <dbl>, Rating <fct>
```

Mutate a data column called (Low52WkPerc), then show top 10 ROE stocks

```
ts4 <- ts3 %>% mutate(Low52WkPerc = round((Price - Low52Wk)*100 / Low52Wk,2))
head(ts4[,c(1:3,10,16)],10)
```

```
# A tibble: 10 x 5
   Date       Stock StockName                                      ROE Low52WkPerc
   <chr>      <chr> <chr>                                        <dbl>       <dbl>
 1 8/12/2023  DVA   DaVita Inc.                                  60           56.4
 2 8/12/2023  MOH   Molina Healthcare Inc                        28.4         18.2
 3 8/12/2023  IQV   IQVIA Holdings, Inc.                         19.7         30.2
 4 8/12/2023  HUM   Humana Inc.                                  19.5         14.4
 5 8/12/2023  ELV   Elevance Health, Inc.                        17.3         13.5
 6 8/12/2023  CI    The Cigna Group                              14.9         19.3
 7 8/12/2023  DGX   Quest Diagnostics Incorporated               12.5         12.0
 8 8/12/2023  UHS   Universal Health Services, Inc.              11.6         64.4
 9 8/12/2023  CNC   Centene Corporation                          10.4          8.3
10 8/12/2023  LH    Laboratory Corporation of America Holdings    8.31        24.4
```

Summary Statistics of ROE

```r
ts3 <- na.omit(ts3)

ROESum <- ts3 %>%
  summarise(
    Mean = mean(ROE),
    Median= sd(ROE),
    Median= median(ROE),
    Q1 = quantile(ROE, probs = 0.25, na.rm = TRUE),
    Q3 = quantile(ROE, probs = 0.75, na.rm = TRUE),
    Min = min(ROE),
    max = max(ROE)
  )

ROESum <- round(ROESum,2)
ROESum
```

```
# A tibble: 1 x 6
   Mean Median    Q1    Q3   Min   max
  <dbl>  <dbl> <dbl> <dbl> <dbl> <dbl>
1  22.4   12.5  11.6  19.7  8.31    60
```

Summary Statistics of All key variables in Sector Health Services

```r
ts3 <- na.omit(ts3)

ROESum <- ts3 %>%
  summarise(
    Mean = mean(ROE),
    Median= sd(ROE),
    Median= median(ROE),
    Q1 = quantile(ROE, probs = 0.25, na.rm = TRUE),
    Q3 = quantile(ROE, probs = 0.75, na.rm = TRUE),
    Min = min(ROE),
    max = max(ROE)
  )

ROESum <- round(ROESum,2)
```

```r
ROASum <- ts3 %>%
  summarise(
    Mean = mean(ROA),
    Median= sd(ROA),
    Median= median(ROA),
    Q1 = quantile(ROA, probs = 0.25, na.rm = TRUE),
    Q3 = quantile(ROA, probs = 0.75, na.rm = TRUE),
    Min = min(ROA),
    max = max(ROA)
  )

ROASum <- round(ROASum,2)

ROICSum <- ts3 %>%
  summarise(
    Mean = mean(ROIC),
    Median= sd(ROIC),
    Median= median(ROIC),
    Q1 = quantile(ROIC, probs = 0.25, na.rm = TRUE),
    Q3 = quantile(ROIC, probs = 0.75, na.rm = TRUE),
    Min = min(ROIC),
    max = max(ROIC)
  )

ROICSum <- round(ROICSum,2)

GrossMarginSum <- ts3 %>%
  summarise(
    Mean = mean(GrossMargin),
    Median= sd(GrossMargin),
    Median= median(GrossMargin),
    Q1 = quantile(GrossMargin, probs = 0.25, na.rm = TRUE),
    Q3 = quantile(GrossMargin, probs = 0.75, na.rm = TRUE),
    Min = min(GrossMargin),
    max = max(GrossMargin)
  )

GrossMarginSum <- round(GrossMarginSum,2)

NetMarginSum <- ts3 %>%
  summarise(
```

```
      Mean = mean(NetMargin),
      Median= sd(NetMargin),
      Median= median(NetMargin),
      Q1 = quantile(NetMargin, probs = 0.25, na.rm = TRUE),
      Q3 = quantile(NetMargin, probs = 0.75, na.rm = TRUE),
      Min = min(NetMargin),
      max = max(NetMargin)
    )

  NetMarginSum <- round(NetMarginSum,2)

  Metrics <- c("ROE","ROA","ROIC","GrossMargin","NetMargin")

  ftab <- rbind(ROESum, ROASum, ROICSum, GrossMarginSum, NetMarginSum)
  ftab <- cbind(Metrics, ftab)
  ftab
```

	Metrics	Mean	Median	Q1	Q3	Min	max
1	ROE	22.42	12.50	11.60	19.70	8.31	60.00
2	ROA	4.50	4.34	4.18	5.12	2.96	5.91
3	ROIC	5.81	5.98	5.14	6.35	4.20	7.37
4	GrossMargin	23.27	25.55	22.96	27.09	7.94	32.83
5	NetMargin	6.15	5.65	5.01	7.48	4.29	8.33

Summary Statistics of ROE by each Sector of S&P500

```
  SectorROE <- sp500 %>%
    group_by(Sector) %>%
    summarise(
      Mean = mean(na.omit(ROE)),
      Median= sd(na.omit(ROE)),
      Median= median(na.omit(ROE)),
      Q1 = quantile(na.omit(ROE), probs = 0.25, na.rm = TRUE),
      Q3 = quantile(na.omit(ROE), probs = 0.75, na.rm = TRUE),
      Min = min(na.omit(ROE)),
      max = max(na.omit(ROE))
    )

  cbind(Sector = SectorROE$Sector, round(SectorROE[,2:7],2))
```

```
              Sector   Mean Median    Q1    Q3     Min    max
1      Commercial Services  37.60  26.40 13.40 43.60    3.50  175.0
2           Communications   8.08   9.05  0.52 16.12   -8.01   23.2
3        Consumer Durables  13.56  17.75  8.11 25.38  -51.40   45.2
4    Consumer Non-Durables 132.99  18.15  7.45 32.12  -10.80 2880.0
5        Consumer Services  25.25  10.90  1.82 38.68 -186.00  360.0
6     Distribution Services  81.18  39.15 32.17 62.62   13.50  295.0
7     Electronic Technology  31.39  18.90  9.63 35.40  -14.20  157.0
8          Energy Minerals  90.99  33.80 26.62 41.25   19.30  954.0
9                  Finance  22.29  10.80  7.64 15.97  -30.00  714.0
10          Health Services  20.26  16.10 11.82 19.65    8.31   60.0
11        Health Technology  23.04  13.30  6.89 24.25  -51.00  253.0
12      Industrial Services  20.71  22.50  9.42 31.10    7.67   36.3
13      Non-Energy Minerals  13.64  13.50  2.69 21.80   -3.83   36.8
14       Process Industries  27.85  18.00 13.85 26.80  -11.70  151.0
15    Producer Manufacturing  23.96  18.00 12.80 29.40  -13.60   95.9
16             Retail Trade  30.05  25.50 15.10 40.00    2.98   66.9
17      Technology Services  53.07  18.85 11.17 31.83  -70.60  844.0
18           Transportation  37.20  34.60 19.90 50.20    4.13  104.0
19                Utilities   7.96   8.70  7.64 10.60  -45.60   44.6
```

ANALYSIS OF HEALTH SERVICES SECTOR

1. Market Cap of all companies in Sector Health Services

```
library(janitor)
library(kableExtra)
# Market Cap by Stock
MCap <- ts3 %>%
  group_by(Stock) %>%
  summarise(
    MarketCapCr = sum(na.omit(MarketCap)/10000000))

# Sp500 Market Cap

SP500MarketCap <- sum(ts3$MarketCap/10000000)

# calculating % market cap
PercentMarketCap <- round(MCap$MarketCapCr*100/SP500MarketCap,2)
MCapTab <- cbind(MCap,PercentMarketCap)
```

```
# sorting by PercentMarketCap
MCapTab <- MCapTab %>% arrange(desc(PercentMarketCap))


MCapTab <- MCapTab %>%
  adorn_totals("row")

MCapTab <- knitr::kable(MCapTab, "html") %>% kable_styling()
MCapTab
```

Stock	MarketCapCr	PercentMarketCap
IQV	3950	43.22
LH	1900	20.79
DGX	1510	16.52
DVA	926	10.13
UHS	854	9.34
Total	9140	100.00

2. Shares which are most attractively priced in Sector Health Services

```
AttrShares <- ts4 %>% arrange(Low52WkPerc)
AttrShares <- AttrShares[, c(2:4,7,8,10,11,16)]

AttrShares <- knitr::kable(AttrShares, "html") %>% kable_styling()
AttrShares
```

Stock	StockName	Sector	Price	Low52Wk	ROE	ROA
CNC	Centene Corporation	Health Services	66.430	61.3400	10.40	3.31
DGX	Quest Diagnostics Incorporated	Health Services	134.830	120.4000	12.50	5.91
UNH	UnitedHealth Group Incorporated	Health Services	503.250	445.6800	NA	8.27
ELV	Elevance Health, Inc.	Health Services	467.445	412.0000	17.30	6.10
HUM	Humana Inc.	Health Services	484.165	423.2900	19.50	6.16
MOH	Molina Healthcare Inc	Health Services	302.885	256.1900	28.40	6.98
CI	The Cigna Group	Health Services	286.890	240.5000	14.90	4.65
LH	Laboratory Corporation of America Holdings	Health Services	214.060	172.0895	8.31	4.18
IQV	IQVIA Holdings, Inc.	Health Services	215.880	165.7500	19.70	4.34
HCA	HCA Healthcare, Inc.	Health Services	269.820	178.3200	NA	11.00
DVA	DaVita Inc.	Health Services	102.100	65.2800	60.00	2.96
UHS	Universal Health Services, Inc.	Health Services	135.670	82.5000	11.60	5.12

PROFITABILITY OF HEALTH SERVICES SECTOR

1. Shares have highest ROE within Sector Technology Services

```
AttrShares <- ts4 %>% arrange(desc(ROE))
AttrShares <- AttrShares[, c(2:4,7,8,10,11,16)]

AttrShares <- knitr::kable(AttrShares, "html") %>% kable_styling()
AttrShares
```

Stock	StockName	Sector	Price	Low52Wk	ROE	ROA
DVA	DaVita Inc.	Health Services	102.100	65.2800	60.00	2.96
MOH	Molina Healthcare Inc	Health Services	302.885	256.1900	28.40	6.98
IQV	IQVIA Holdings, Inc.	Health Services	215.880	165.7500	19.70	4.34
HUM	Humana Inc.	Health Services	484.165	423.2900	19.50	6.16
ELV	Elevance Health, Inc.	Health Services	467.445	412.0000	17.30	6.10
CI	The Cigna Group	Health Services	286.890	240.5000	14.90	4.65
DGX	Quest Diagnostics Incorporated	Health Services	134.830	120.4000	12.50	5.91
UHS	Universal Health Services, Inc.	Health Services	135.670	82.5000	11.60	5.12
CNC	Centene Corporation	Health Services	66.430	61.3400	10.40	3.31
LH	Laboratory Corporation of America Holdings	Health Services	214.060	172.0895	8.31	4.18
HCA	HCA Healthcare, Inc.	Health Services	269.820	178.3200	NA	11.00
UNH	UnitedHealth Group Incorporated	Health Services	503.250	445.6800	NA	8.27

2. Shares have highest ROA within Sector Health Services

```
AttrShares <- ts4 %>% arrange(desc(ROA))
AttrShares <- AttrShares[, c(2:4,7,8,10,11,16)]

AttrShares <- knitr::kable(AttrShares, "html") %>% kable_styling()
AttrShares
```

Stock	StockName	Sector	Price	Low52Wk	ROE	ROA
HCA	HCA Healthcare, Inc.	Health Services	269.820	178.3200	NA	11.00
UNH	UnitedHealth Group Incorporated	Health Services	503.250	445.6800	NA	8.27
MOH	Molina Healthcare Inc	Health Services	302.885	256.1900	28.40	6.98
HUM	Humana Inc.	Health Services	484.165	423.2900	19.50	6.16
ELV	Elevance Health, Inc.	Health Services	467.445	412.0000	17.30	6.10
DGX	Quest Diagnostics Incorporated	Health Services	134.830	120.4000	12.50	5.91
UHS	Universal Health Services, Inc.	Health Services	135.670	82.5000	11.60	5.12

Stock	StockName	Sector	Price	Low52Wk	ROE	ROA
CI	The Cigna Group	Health Services	286.890	240.5000	14.90	4.65
IQV	IQVIA Holdings, Inc.	Health Services	215.880	165.7500	19.70	4.34
LH	Laboratory Corporation of America Holdings	Health Services	214.060	172.0895	8.31	4.18
CNC	Centene Corporation	Health Services	66.430	61.3400	10.40	3.31
DVA	DaVita Inc.	Health Services	102.100	65.2800	60.00	2.96

3. Shares have highest NetMargin within Sector Health Services

```
AttrShares <- ts4 %>% arrange(desc(NetMargin))
AttrShares <- AttrShares[, c(2:4,7,8,10,11,14,16)]

AttrShares <- knitr::kable(AttrShares, "html") %>% kable_styling()
AttrShares
```

Stock	StockName	Sector	Price	Low52Wk	ROE	ROA
HCA	HCA Healthcare, Inc.	Health Services	269.820	178.3200	NA	11.00
DGX	Quest Diagnostics Incorporated	Health Services	134.830	120.4000	12.50	5.91
IQV	IQVIA Holdings, Inc.	Health Services	215.880	165.7500	19.70	4.34
UNH	UnitedHealth Group Incorporated	Health Services	503.250	445.6800	NA	8.27
LH	Laboratory Corporation of America Holdings	Health Services	214.060	172.0895	8.31	4.18
UHS	Universal Health Services, Inc.	Health Services	135.670	82.5000	11.60	5.12
DVA	DaVita Inc.	Health Services	102.100	65.2800	60.00	2.96
ELV	Elevance Health, Inc.	Health Services	467.445	412.0000	17.30	6.10
CI	The Cigna Group	Health Services	286.890	240.5000	14.90	4.65
HUM	Humana Inc.	Health Services	484.165	423.2900	19.50	6.16
MOH	Molina Healthcare Inc	Health Services	302.885	256.1900	28.40	6.98
CNC	Centene Corporation	Health Services	66.430	61.3400	10.40	3.31