Case (2): Real-Estate Sector in the S&P500

Chapter 18, ***Last updated: Jan 07, 2024***

Real Estate Sector in the S&P 500

Set up the data

Load Packages:

```
# Load the required libraries, suppressing annoying startup messages
library(dplyr, quietly = TRUE, warn.conflicts = FALSE) # For data manipulation
library(tibble, quietly = TRUE, warn.conflicts = FALSE) # For data manipulation
library(ggplot2, quietly = TRUE, warn.conflicts = FALSE) # For data visualization
library(ggpubr, quietly = TRUE, warn.conflicts = FALSE) # For data visualization

library(gsheet, quietly = TRUE, warn.conflicts = FALSE) # For Google Sheets
library(rmarkdown, quietly = TRUE, warn.conflicts = FALSE) # For writing
library(knitr, quietly = TRUE, warn.conflicts = FALSE) # For tables
library(kableExtra, quietly = TRUE, warn.conflicts = FALSE) # For tables
library(scales)  # For formatting currency
```

Read the data from a Google Sheet into a tibble:

```
# Read S&P500 stock data present in a Google Sheet.
library(gsheet)
prefix <- "https://docs.google.com/spreadsheets/d/"
sheetID <- "14mUlNNpeuV2RouT9MKaAWKUpvjRijzQu40DdWJgyKPQ"
url500 <- paste(prefix,sheetID) # Form the URL to connect to
sp500Data <- gsheet2tbl(url500) # Read it into a tibble called sp500Data
```

Read GICS classificaiton of S&P 500 stocks:

```
# Read GICS classificaiton of S&P 500 stocks from a Google Sheet.
library(gsheet)
prefix2 <- "https://docs.google.com/spreadsheets/d/"
sheetID2 <- "1WrVA8dPYvQsc_mXVctgTntRLSO2qd7ubzcdAsw03Lgk"
urlgics <- paste(prefix2, sheetID2) # Form the URL to connect to
gics <- gsheet2tbl(urlgics) # Read it into a tibble called gics
```

Join the data:

```
# Merging dataframes
sp500 <- merge(sp500Data,
               gics ,
               id = "Stock")
```

Rename the data columns:

```
# Define a mapping of new column names
new_names <- c(
  "Stock", "Date", "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",
  "Security", "GICSSector", "GICSSubIndustry"
)
# Rename the columns using the new_names vector
colnames(sp500)<-new_names
```

Create new columns.

```
library(dplyr)
sp500 <- sp500 %>%
  mutate(Low52WkPerc = round((Price - Low52Wk) * 100 / Low52Wk, 2),
         High52WkPerc = round((High52Wk - Price) * 100 / High52Wk, 2),
         MarketCapBillions = round(MarketCap / 1e9, 3) # Convert MarketCap to billions
```

```
          )
```

Review the column names:

```
colnames(sp500)
```

```
 [1] "Stock"                "Date"                 "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] "Security"             "GICSSector"           "GICSSubIndustry"
[40] "Low52WkPerc"          "High52WkPerc"         "MarketCapBillions"
```

Format the Prices.

```
library(dplyr)
library(scales)  # For formatting currency

sp500 <- sp500 %>%
  mutate(
    Price = scales::dollar(round(Price, 2)),  # format the Price as a dollar amount
    High52Wk = scales::dollar(round(High52Wk, 2)),  # format the 52 Week High
    Low52Wk = scales::dollar(round(Low52Wk, 2))  # format the 52 Week Low
  )
```

Model the Rating as a `factor()` variable.

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

```
 Factor w/ 5 levels "Buy","Neutral",..: 1 1 3 4 1 3 3 4 2 3 ...
```

```
levels(sp500$Rating)
```

```
[1] "Buy"         "Neutral"     "Sell"        "Strong Buy"  "Strong Sell"
```

```
table(sp500$Rating)
```

```
       Buy     Neutral        Sell  Strong Buy Strong Sell
       192          51         178          58          24
```

Model `GICSSector` as a `factor`.

```
sp500$GICSSector <- as.factor(sp500$GICSSector)
str(sp500$GICSSector)
```

```
 Factor w/ 11 levels "Communication Services",..: 6 7 8 6 2 6 5 8 8 8 ...
```

```
levels(sp500$GICSSector)
```

```
 [1] "Communication Services" "Consumer Discretionary" "Consumer Staples"
 [4] "Energy"                 "Financials"             "Health Care"
 [7] "Industrials"            "Information Technology" "Materials"
[10] "Real Estate"            "Utilities"
```

Role Play?

A prestigious investment fund is ready to channel $1 Million into the US Real Estate sector in the S&P500. For example, Real Estate Investment Trusts, commonly known as REITs, offer a distinctive way to engage with real estate markets without the cumbersome process of directly owning property. Suppose our mission is to allocate `$1 Million` to the "best" REIT(s). Pinpoint the top 1, 2 or 3 REITs that present the most promising short-term trading opportunities.

The Real Estate Sector within the S&P500

We focus on investment opportunities **within the Real Estate sector** of the S&P500. We want to determine the *fundamentally strongest* AND *most reasonably priced* shares for *short-to-medium term* investing. We create a tibble named realestate, filtering the shares that belong to the Real Estate sector.

```
realestate = sp500 %>%
  filter(GICSSector == "Real Estate")
```

We list the stocks in the real estate sector.

```
library(dplyr)
library(kableExtra)

# Select stocks with their Market Cap in billions
real_estate_stocks <- realestate %>%
  arrange(desc(MarketCapBillions)) %>%
  select(Stock, StockName, MarketCapBillions, Price)

# Displaying the data
real_estate_stocks %>%
  kable("html", caption = "Real Estate Sector Stocks, with Market Cap in Billions") %>%
  kable_styling()
```

Table 0.1: Real Estate Sector Stocks, with Market Cap in Billions

Stock	StockName	MarketCapBillions	Price
PLD	Prologis, Inc.	123.424	$130.27
AMT	American Tower Corporation (REIT)	100.440	$214.56
EQIX	Equinix, Inc.	74.626	$794.12
PSA	Public Storage	52.782	$299.22
CCI	Crown Castle Inc.	49.441	$113.51
WELL	Welltower Inc.	49.093	$88.54
SPG	Simon Property Group, Inc.	45.758	$140.40
O	Realty Income Corporation	41.763	$57.57
DLR	Digital Realty Trust, Inc.	39.910	$131.49
CSGP	CoStar Group, Inc.	33.200	$81.30
EXR	Extra Space Storage Inc	33.160	$156.57
VICI	VICI Properties Inc.	33.022	$31.63
SBAC	SBA Communications Corporation	26.960	$248.70
CBRE	CBRE Group Inc	26.505	$86.99

Stock	StockName	MarketCapBillions	Price
AVB	AvalonBay Communities, Inc.	26.074	$182.51
WY	Weyerhaeuser Company	24.521	$33.44
EQR	Equity Residential	23.068	$60.50
ARE	Alexandria Real Estate Equities, Inc.	21.838	$125.89
INVH	Invitation Homes Inc.	20.794	$33.85
VTR	Ventas, Inc.	20.388	$49.15
IRM	Iron Mountain Incorporated (Delaware)	19.435	$66.75
ESS	Essex Property Trust, Inc.	15.648	$242.39
MAA	Mid-America Apartment Communities, Inc.	15.421	$131.05
KIM	Kimco Realty Corporation (HC)	14.034	$20.78
HST	Host Hotels & Resorts, Inc.	13.897	$19.82
UDR	UDR, Inc.	12.453	$37.54
REG	Regency Centers Corporation	12.175	$65.20
BXP	Boston Properties, Inc.	10.867	$69.37
PEAK	Healthpeak Properties, Inc.	10.854	$19.53
CPT	Camden Property Trust	10.443	$97.20
FRT	Federal Realty Investment Trust	8.375	$101.59

Significance of 52-Week Low, High Price

The 52-week low price of a stock is a significant indicator for multiple reasons, especially when considering shares listed on major indices like the S&P 500. Here's why this metric is noteworthy:

1. **Historical Perspective**: The 52-week low offers a snapshot of how low the stock has traded over the past year relative to its current price, providing context about its price journey.
2. **Potential Entry Point**: Some investors view stocks that are near their 52-week low as potential buying opportunities, under the assumption that the stock might be undervalued and could rebound.
3. **Psychological Level**: Stocks approaching their 52-week low can be seen as testing a significant support level. If a stock consistently fails to breach its 52-week low, it might indicate that the market values the stock at that level, and it's resistant to falling below it.
4. **Basis for Technical Analysis**: For technical analysts or traders, the 52-week low serves as a critical reference point. A consistent breach of this level might signify a bearish trend, while a rebound can indicate potential recovery.

5. **Yield Implications for Dividend Stocks**: For dividend-paying stocks, a price near the 52-week low (assuming the dividend hasn't been cut) would imply a higher dividend yield, potentially making it attractive for income-seeking investors.

- **Note of Caution:** While the 52-week low is a valuable reference point, it's essential to interpret it in conjunction with other financial and market indicators. A stock trading near its 52-week low doesn't automatically make it a good buy, just as a stock trading near its 52-week high doesn't automatically make it overvalued. Comprehensive analysis, should inform investment decisions.

We want to analyze stock prices relative to their 52 Week Low and 52 Week High respectively, to understand their relative price attractiveness.

Here, a new column named `Low52WkPerc` is being added. The column contains the percentage change between the current price (`Price`) and its 52-week low (`Low52Wk`). The formula used is:

$$Low52WkPerc = \frac{(CurrentPrice - 52WeekLow) * 100}{52WeekLow}$$

Another column named `High52WkPerc` represents the percentage change between the 52-week high (`High52Wk`) and the current price (`Price`). We round off the data to two decimal places for clarity.

Consider the summary statistics of the Market Capitalization of the real estate stocks within the S&P500

```
realestate %>% summarise(
  N = n(),
  Mean = mean(MarketCapBillions),
  SD = sd(MarketCapBillions),
  Median = median(MarketCapBillions),
  Q1 = quantile(MarketCapBillions, 0.25),
  Q3 = quantile(MarketCapBillions, 0.75),
  Min = min(MarketCapBillions),
  Max = max(MarketCapBillions),
  Sum = sum(MarketCapBillions)
) %>%
  round(2) %>%
  kable("html", caption = "Summary Statistics of Market Capitalizaiton of realestate (Bill
  kable_styling()
```

Table 0.2: Summary Statistics of Market Capitalizaiton of realestate (Billion USD)

N	Mean	SD	Median	Q1	Q3	Min	Max	Sum
31	32.59	26.37	24.52	14.73	40.84	8.38	123.42	1010.37

- As can be seen, the S&P500 consists of 31 real estate stocks.

We want to determine the *fundamentally strongest* AND *most reasonably priced* shares for *short-to-medium term* investing.

Select Specific Coulumns from the filtered dataframe

```
ts3 <- realestate %>%
        select(Date, Stock, StockName, MarketCapBillions, Price, Low52Wk, High52Wk, Low52W
               ROE, ROA,ROIC,GrossMargin, GrossMargin,
               NetMargin, Rating) %>%
    arrange(desc(ROE))

colnames(ts3)
```

```
[1] "Date"              "Stock"             "StockName"
[4] "MarketCapBillions" "Price"             "Low52Wk"
```

```
 [7] "High52Wk"          "Low52WkPerc"       "High52WkPerc"
[10] "ROE"               "ROA"               "ROIC"
[13] "GrossMargin"       "NetMargin"         "Rating"
```

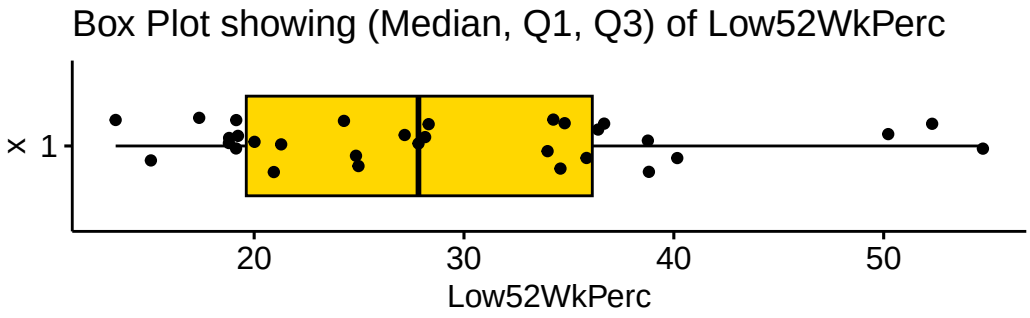
Summary Statistics of Low52WkPerc (Price rel. to 52-Week Low)

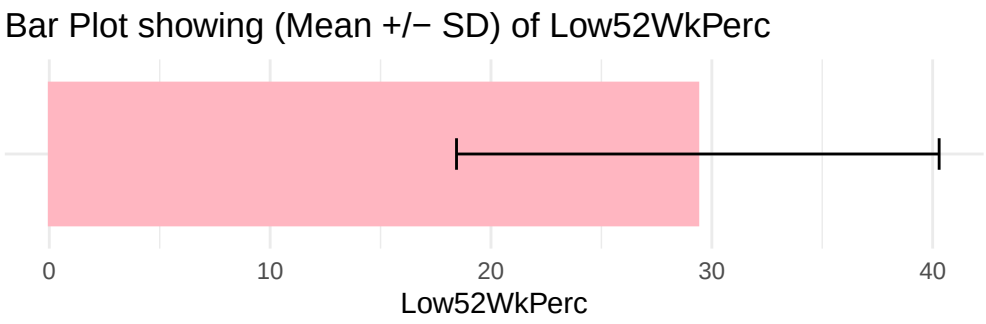
```
summaryStats <- ts3 %>% summarise(
  N = n(),
  Mean = mean(Low52WkPerc),
  SD = sd(Low52WkPerc),
  Median = median(Low52WkPerc),
  Q1 = quantile(Low52WkPerc, 0.25),
  Q3 = quantile(Low52WkPerc, 0.75),
  Min = min(Low52WkPerc),
  Max = max(Low52WkPerc)
)

Low52WkPercQ1 <- summaryStats$Q1 # Save Q1 of Low52WkPerc

summaryStats %>%
  round(2) %>%
  kable("html", caption = "Summary Statistics of Low52WkPerc (Price rel. to 52-Week Low)")
  kable_styling()
```

Table 0.3: Summary Statistics of Low52WkPerc (Price rel. to 52-Week Low)

N	Mean	SD	Median	Q1	Q3	Min	Max
31	29.37	10.93	27.83	19.62	36.12	13.4	54.73

Low52WkPerc for all the realestate Stocks, as shown below





Inexpensive Stocks with Low52WkPerc < Q1(Low52WkPerc)

```
ts3 %>%
  select(Stock, StockName, Price, Low52Wk, Low52WkPerc) %>%
  filter(Low52WkPerc < Low52WkPercQ1) %>%
  arrange(Low52WkPerc)%>%
  kable("html", caption = "Inexpensive Stocks with Low52WkPerc < Q1(Low52WkPerc)") %>%
  kable_styling()
```

Table 0.4: Inexpensive Stocks with Low52WkPerc < Q1(Low52WkPerc)

Stock	StockName	Price	Low52Wk	Low52WkPerc
MAA	Mid-America Apartment Communities, Inc.	$131.05	$115.56	13.40
EQR	Equity Residential	$60.50	$52.57	15.08
CPT	Camden Property Trust	$97.20	$82.81	17.38
VICI	VICI Properties Inc.	$31.63	$26.62	18.80
INVH	Invitation Homes Inc.	$33.85	$28.49	18.81
FRT	Federal Realty Investment Trust	$101.59	$85.27	19.14
REG	Regency Centers Corporation	$65.20	$54.72	19.15
AVB	AvalonBay Communities, Inc.	$182.51	$153.07	19.23

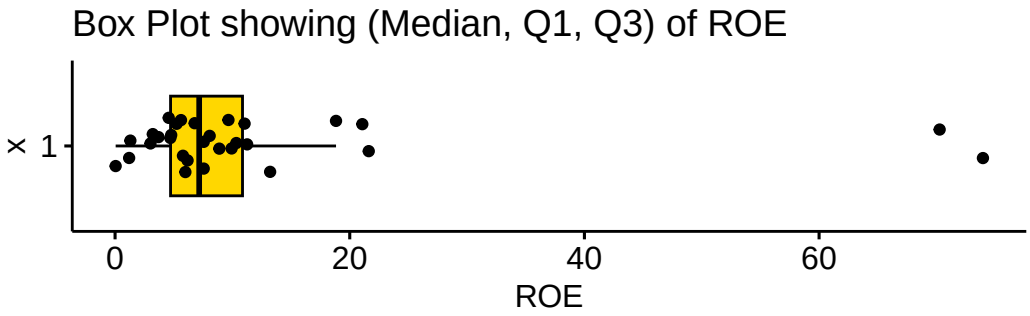
Summary Statistics of Return on Equity (ROE)

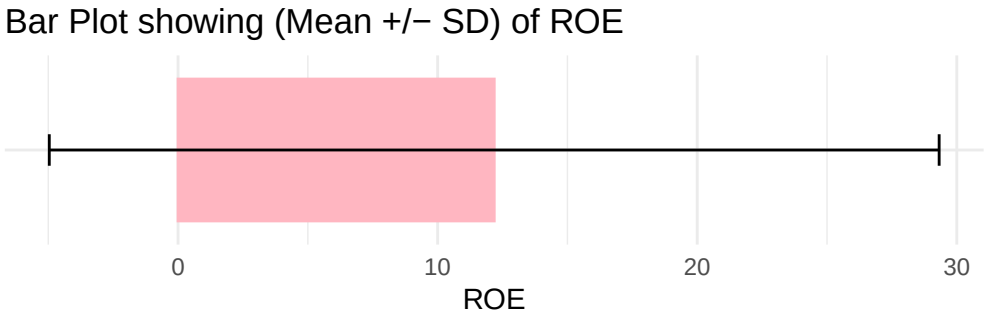
```
summaryStats <- ts3 %>% summarise(
  N = n(),
  Mean = mean(ROE, na.rm = TRUE),
  SD = sd(ROE, na.rm = TRUE),
  Median = median(ROE, na.rm = TRUE),
  Q1 = quantile(ROE, 0.25, na.rm = TRUE),
  Q3 = quantile(ROE, 0.75, na.rm = TRUE),
  Min = min(ROE, na.rm = TRUE),
  Max = max(ROE, na.rm = TRUE)
)

ROE_Q3 <- summaryStats$Q3

summaryStats %>%
  round(2) %>%
  kable("html", caption = "Summary Statistics of Return on Equity (ROE)") %>%
  kable_styling()
```

Table 0.5: Summary Statistics of Return on Equity (ROE)

N	Mean	SD	Median	Q1	Q3	Min	Max
31	12.18	17.14	7.17	4.73	10.86	0.05	73.97

- ROE for all the Stocks in realestate, as shown below





Stocks with ROE > Q3(ROE)

```
ts3 %>%
  select(Stock, StockName, Price, ROA, ROE, Low52Wk, Low52WkPerc) %>%
  filter(ROE > ROE_Q3) %>%
  arrange(desc(ROE)) %>%
  kable("html", caption = "Stocks with ROE > Q3(ROE)") %>%
  kable_styling()
```

Table 0.6: Stocks with ROE > Q3(ROE)

Stock	StockName	Price	ROA	ROE	Low52Wk	Low52WkPerc
SPG	Simon Property Group, Inc.	$140.40	6.719684	73.96502	$100.17	40.16
IRM	Iron Mountain Incorporated (Delaware)	$66.75	1.708173	70.27600	$48.94	36.39
CCI	Crown Castle Inc.	$113.51	3.999484	21.61974	$84.72	33.98
PSA	Public Storage	$299.22	11.366645	21.07189	$233.18	28.32
ESS	Essex Property Trust, Inc.	$242.39	4.184376	18.83040	$195.03	24.28
AMT	American Tower Corporation (REIT)	$214.56	1.081369	13.21486	$154.58	38.81
UDR	UDR, Inc.	$37.54	4.049174	11.25438	$30.95	21.29
HST	Host Hotels & Resorts, Inc.	$19.82	6.173597	11.03640	$14.51	36.68

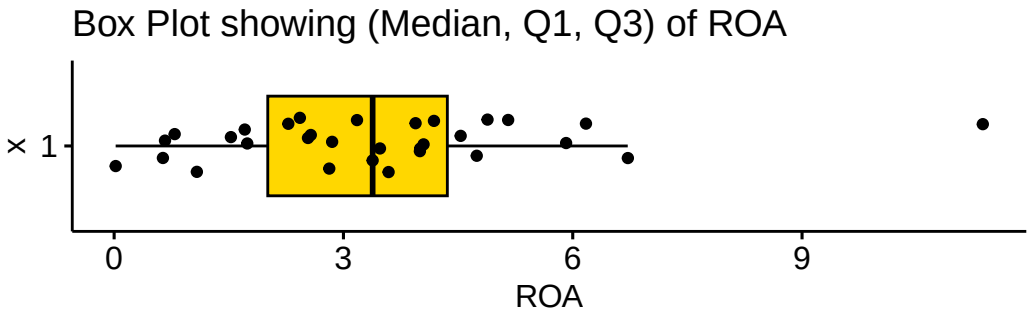
Summary Statistics of Return on Equity (ROA)

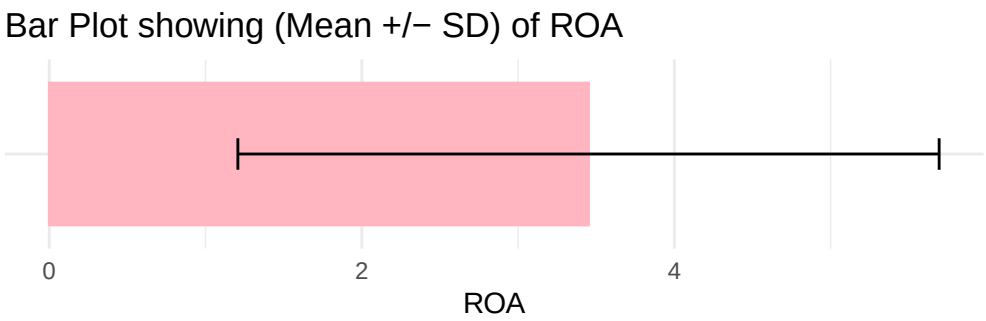
```
summaryStats <- ts3 %>% summarise(
  N = n(),
  Mean = mean(ROA, na.rm = TRUE),
  SD = sd(ROA, na.rm = TRUE),
  Median = median(ROA, na.rm = TRUE),
  Q1 = quantile(ROA, 0.25, na.rm = TRUE),
  Q3 = quantile(ROA, 0.75, na.rm = TRUE),
  Min = min(ROA, na.rm = TRUE),
  Max = max(ROA, na.rm = TRUE)
)

ROA_Q3 <- summaryStats$Q3

summaryStats %>%
  round(2) %>%
  kable("html", caption = "Summary Statistics of Return on Equity (ROA)") %>%
  kable_styling()
```

Table 0.7: Summary Statistics of Return on Equity (ROA)

N	Mean	SD	Median	Q1	Q3	Min	Max
31	3.45	2.24	3.38	2.01	4.36	0.02	11.37

- ROA for all the Stocks in realestate, as shown below





Stocks with ROA > Q3(ROA)

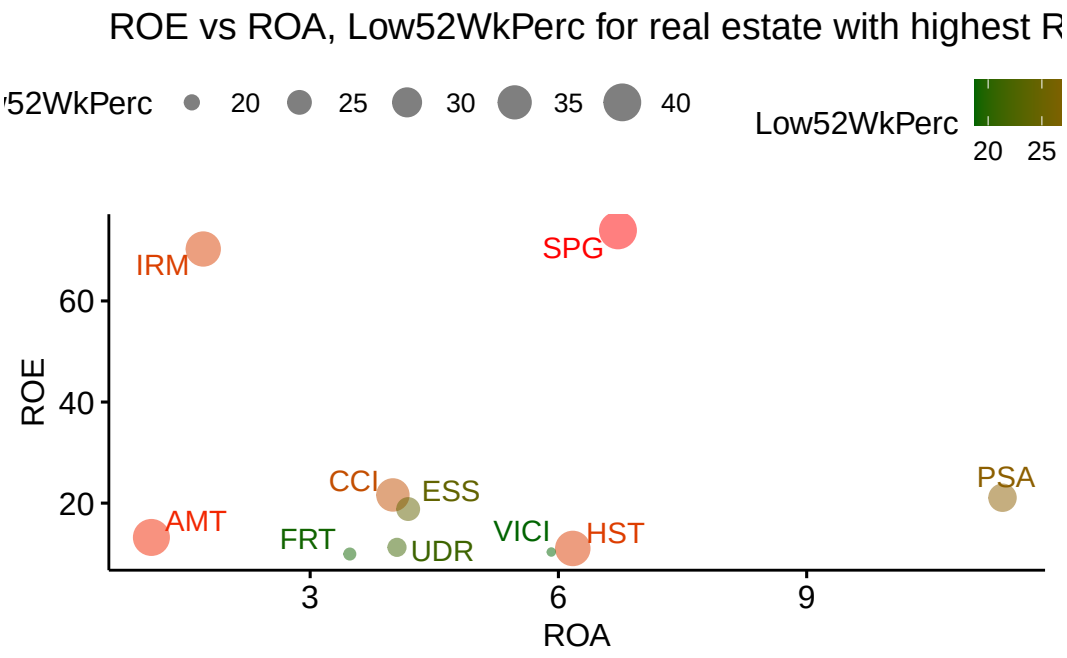
```
ts3 %>%
  select(Stock, StockName, Price, ROA, ROE, Low52Wk, Low52WkPerc) %>%
  filter(ROA > ROA_Q3) %>%
  arrange(desc(ROA)) %>%
  kable("html", caption = "Stocks with ROA > Q3(ROA)") %>%
  kable_styling()
```

Table 0.8: Stocks with ROA > Q3(ROA)

Stock	StockName	Price	ROA	ROE	Low52Wk	Low52W
PSA	Public Storage	$299.22	11.366645	21.071893	$233.18	
SPG	Simon Property Group, Inc.	$140.40	6.719684	73.965022	$100.17	
HST	Host Hotels & Resorts, Inc.	$19.82	6.173597	11.036398	$14.51	
VICI	VICI Properties Inc.	$31.63	5.914200	10.331764	$26.62	
MAA	Mid-America Apartment Communities, Inc.	$131.05	5.155324	9.662317	$115.56	
SBAC	SBA Communications Corporation	$248.70	4.886459	NA	$185.23	
CSGP	CoStar Group, Inc.	$81.30	4.742707	5.785656	$65.12	
AVB	AvalonBay Communities, Inc.	$182.51	4.534148	8.060873	$153.07	

ROE versus ROA and colored by Price rel. to 52 Week Low

```
top10 <-
  ts3 %>%
  select(Stock, Price, Low52Wk, Low52WkPerc, ROA, ROE) %>%
  arrange(desc(ROE))%>%
  slice(1:10)

top10$name <- top10$Stock

ggscatter(top10,
          x = "ROA",
          y = "ROE",
          size = "Low52WkPerc",
          color = "Low52WkPerc",
          alpha = 0.5,
          label = "name",
          repel = TRUE,
          title = "ROE vs ROA, Low52WkPerc for real estate with highest ROE") +
  gradient_color(c("darkgreen",  "red"))
```



Summary Statistics of All key variables in real estate

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

ROESum <- ts3 %>%
  summarise(
    Mean = mean(ROE),
    Stdev = 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)


ROASum <- ts3 %>%
  summarise(
    Mean = mean(ROA),
    Stdev = 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),
    Stdev = 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)
  )
```

```r
ROICSum <- round(ROICSum,2)

GrossMarginSum <- ts3 %>%
  summarise(
    Mean = mean(GrossMargin),
    Stdev = 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),
    Stdev = 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 Stdev Median    Q1    Q3   Min   Max
1         ROE 12.18 17.14   7.17  4.73 10.86  0.05 73.97
2         ROA  3.40  2.27   3.28  1.88  4.15  0.02 11.37
3        ROIC  3.85  2.44   3.75  2.18  4.96  0.02 11.82
4 GrossMargin 38.41 19.22  36.13 25.86 44.47 -1.22 99.20
5   NetMargin 21.48 15.23  20.84  9.07 28.84  0.11 68.69
```