Live Case (2): REITs in the S&P500

Chapter 18, *Last updated: Dec 30, 2023*

Objective

A1) Role Play?

Greetings Data Commandos!

Imagine you're in the bustling hub of the world's most elite consulting firms, revered across the corporate spectrum.

A prestigious investment fund is ready to channel $1 Million into the US finance sector. They've enlisted your expertise to delve into the 29 REITs within the Finance sector of the S&P500.

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.

Your mission? 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. Dive in and make those data-driven decisions!

A2) What are learning objectives for you?

1. Revisit and solidify your knowledge of R programming, acquired or expected to be acquired in earlier courses.
2. Enhance your proficiency in data management and manipulation using the `dplyr` package and other functions in R.
3. Sharpen your skills in data visualization leveraging the `ggplot2`, `ggpubr` and related packages in R.
4. Master the art of addressing a data-centric business challenge while embodying the role of a Consulting Team.
5. Cultivate the capability to compellingly present your solutions to a discerning yet just audience.

Setup S&P 500 REIT Data

1. Load some useful R 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
```

2. Read S&P500 data (to derive REIT data)

```
# Read S&P500 stock data present in a Google Sheet.
library(gsheet)
prefix <- "https://docs.google.com/spreadsheets/d/"
sheetID <- "14mUlNNpeuV2RouT9MKaAWKUpvjRijzQu4ODdWJgyKPQ"
url500 <- paste(prefix,sheetID) # Form the URL to connect to
sp500 <- gsheet2tbl(url500) # Read it into a tibble called sp500
```

3. Rename Columns

```
# 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
colnames(sp500)<-new_names
```

3. Select REIT data

1. The S&P500 shares are divided into multiple Sectors. Each stock belongs to a unique sector. Thus, it makes sense to model Sector as a factor() variable.
2. Set Sector, Rating data columns to be factor data types.

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

C6. The Finance Sector within the S&P500

1. The Finance sector plays a pivotal role in the overall U.S. economy. Its performance is often closely watched by economists and investors alike, given its profound impact on lending, investment, and overall economic growth. Over the years, regulatory changes, monetary policy, and global economic events have significantly influenced this sector, making it a dynamic and critical component of the S&P 500.
2. We focus on investment opportunities **within the Finance sector** of the S&P500.

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

3. **Industry**: The Finance sector includes many industries within it.

For example:

- **Banks**: JPMorgan Chase, Bank of America, and Wells Fargo, among others, represent the significant banking entities.
- **Insurance Companies**: Companies like Berkshire Hathaway, Allstate operate in this sub-sector, offering a range of insurance products from property and casualty insurance to life insurance.

4. We create a tibble named `finStocks`, filtering the shares that belong to the Finance sector.

```r
finStocks = sp500 %>%
  filter(Sector=="Finance")
```

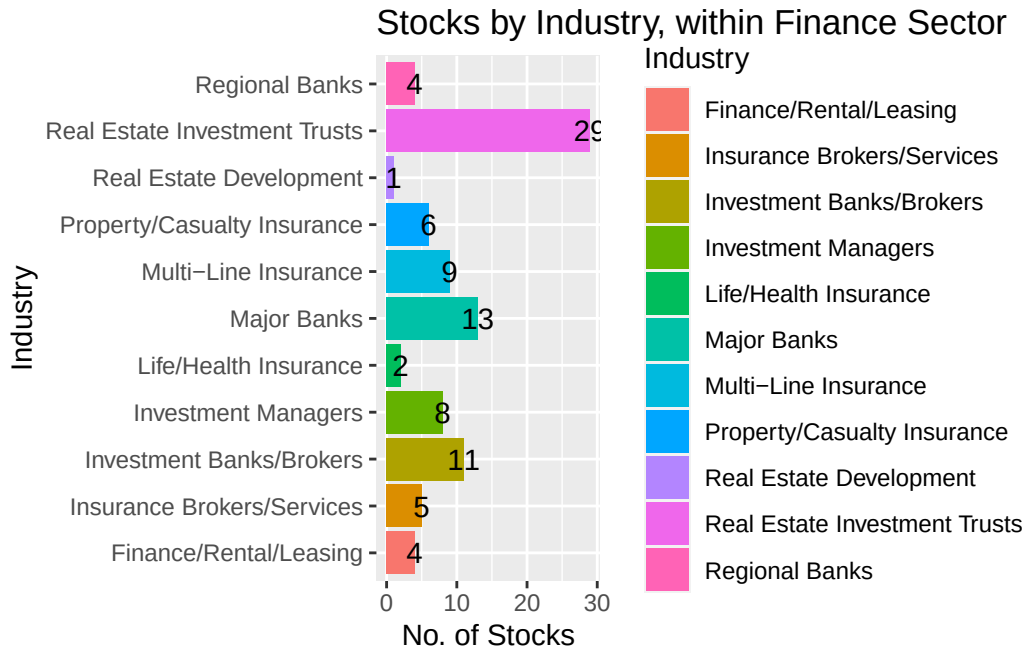
5. Industries within the Finance Sector

- The data shows that the Finance sector consists of a total of 92 companies that belong to different Industries.
- We set the Industry to be factor variable, since they can only assume unique levels.

```r
finStocks$Industry <- as.factor(finStocks$Industry)
```

- The following visualization summarizes the different Industries within the Finance Sector:

```r
ggplot(data = finStocks,
       aes(y = Industry)) +
  geom_bar(aes(fill = Industry)) +
  geom_text(stat='count',
            aes(label=after_stat(count))) +
  labs(title = "Stocks by Industry, within Finance Sector",
       x = "No. of Stocks",
       y = "Industry")
```



- Market Capitalization (Billions of USD) of Industries within the Finance Sector

```
FinanceMarketCap <- finStocks %>%
  mutate(MarketCap_Billions = round(MarketCap/1000000000, 2)) %>%
  group_by(Industry) %>%
  summarise(Market_Cap_BillionUSD = sum(MarketCap_Billions, na.rm = TRUE))  %>%
  arrange(-Market_Cap_BillionUSD)

# Create a summary row
summary_row <- tibble(
  Industry = "Total",
  Market_Cap_BillionUSD = sum(FinanceMarketCap$Market_Cap_BillionUSD)
)
# Append the summary row to the result
FinanceMarketCap <- bind_rows(FinanceMarketCap, summary_row)

# Render the table
FinanceMarketCap %>%
  kable("html", caption = "Market Capitalization (Billions of USD) of Finance Sector") %>%
  kable_styling()
```

Table 0.1: Market Capitalization (Billions of USD) of Finance Sector

Industry	Market_Cap_BillionUSD
Major Banks	1293.69
Real Estate Investment Trusts	962.93
Property/Casualty Insurance	954.96
Investment Banks/Brokers	719.18
Investment Managers	385.34
Multi-Line Insurance	358.41
Insurance Brokers/Services	245.39
Finance/Rental/Leasing	219.78
Regional Banks	175.21
Life/Health Insurance	48.90
Real Estate Development	28.37
Total	5392.16

- We focus on investment opportunities within a particular Industry – **Real Estate Investment Trusts**.

C7. Stock Prices, as of 29Dec2023

1. Stock Prices relative to their 52 Week Low and 52 Week High

- We want to analyze stock prices relative to their 52 Week Low and 52 Week High respectively, to understand their relative price attractiveness.
- For this purpose, we create some additional data columns.

```
finStocks = sp500 %>%
  filter(Sector=="Finance") %>%
  mutate(Low52WkPerc = round((Price - Low52Wk)*100 / Low52Wk,2)) %>%
  mutate(High52WkPerc = round((High52Wk - Price)*100 / Low52Wk,2)) %>%
  mutate(MarketCap_Billions = round(MarketCap/1000000000, 2))
```

- 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.

```
finStocks$Price <- round(finStocks$Price,1)
finStocks$Low52Wk <- round(finStocks$Low52Wk,1)
finStocks$High52Wk <- round(finStocks$High52Wk,1)
```

D. REITs in the S&P500, as of 29Dec2023

1. Real Estate Investment Trusts, commonly known as REITs, stand as a cornerstone for investors seeking diversification in their portfolios. These entities offer a distinctive way to engage with real estate markets without the cumbersome process of directly owning property.
2. In our analysis of the Finance sector, we want to focus attention on a particular Industry within it – **Real Estate Investment Trusts**.
3. Recall: We want to determine the *fundamentally strongest* AND *most reasonably priced*, top 1-3 REITs for *short-to-medium term* investing USD 1 Million.

D1. Key Characteristics of REITs:

1. **Income Distribution**: One of the most touted features of REITs is their consistent income flow. U.S. tax regulations mandate REITs to distribute at least 90% of their taxable income as dividends. While this can be enticing due to potentially higher yields, it also poses a risk. The high dividend mandate leaves REITs with less retained earnings, potentially hindering their growth or making them more dependent on external financing.
2. **Liquidity versus Direct Ownership**: REITs offer a stark contrast to traditional real estate investments in terms of liquidity. While selling a property might entail prolonged durations, hefty transaction costs, and price negotiations, REIT shares can be traded with the agility of stocks. This flexibility, however, comes at the cost of exposure to stock market volatility.
3. **Tax Implications**: The unique tax structure of REITs is a double-edged sword. While they can dodge corporate taxes by abiding by stringent regulations, such as the income distribution clause, shareholders often have to pay higher individual taxes on REIT dividends compared to qualified stock dividends.
4. **Sectoral Diversification**: REITs don't just represent traditional brick-and-mortar assets. From data centers to timberlands, they span diverse sectors, potentially providing portfolio diversification. However, the granularity in sectors necessitates that investors be judicious and knowledgeable about the specific type of real estate exposure they're obtaining.

D2. Major U.S. REITs:

1. **American Tower Corporation (AMT)**: Pioneering the realm of communication infrastructures, AMT emphasizes cell tower operations. While it highlights the evolution

of REITs beyond traditional confines, it also underscores the need for REIT investors to comprehend tech industry dynamics, given its tech infrastructure focus.

2. **Prologis (PLD)**: With a niche in logistics and industrial real estate, Prologis stands out in the age of e-commerce. The company's assets, mainly distribution centers, are strategically situated in prime markets. However, the increasing demand for same-day deliveries and supply chain revamps could challenge Prologis' portfolio.
3. **Simon Property Group (SPG)**: Catering predominantly to retail spaces, SPG faces the arduous task of reinventing malls in an era where brick-and-mortar stores battle online retailers. The company's resilience in nurturing mixed-use spaces might determine its long-term growth trajectory.
4. **Equity Residential (EQR)**: As urbanization continues, EQR's focus on high-density urban areas might seem lucrative. But, with telecommuting trends and urban exodus, it's pivotal to monitor how urban rental landscapes evolve.
5. **Digital Realty Trust (DLR)**: In the digital age, DLR taps into the data economy by majoring in data centers. While the tech boom supports such endeavors, DLR's growth could be contingent on global data regulations and tech infrastructure demands.

References: Please consider looking into the following well-known sources, which regularly publish information about REITs.

- National Association of Real Estate Investment Trusts (NAREIT) – This organization is a representative voice for REITs in the U.S. They frequently release reports, articles, and data on the REIT industry.
- Major Financial News Outlets - Outlets like The Wall Street Journal, Financial Times, and Bloomberg often feature articles on REITs, especially in their real estate or investment sections.
- The Journal of Real Estate Finance and Economics - This academic journal covers a wide range of topics in real estate, including REITs.

D3. REITs in the S&P500:

- We create a tibble named `REIT` from within the Finance sector tibble `finStocks`. Specifically, we filter the shares that belong to the `Real Estate Investment Trusts` Industry, within the Finance sector.

```
REIT <- finStocks %>%
  filter(Industry == 'Real Estate Investment Trusts')
```

- The following table lists REITs within the Finance sector of the S&P500

```
REIT %>%
  select(Stock, StockName, Price, MarketCap_Billions)  %>%
  arrange(desc(MarketCap_Billions)) %>%
  kable("html", caption = "REITs within Finance Sector of S&P500") %>%
  kable_styling()
```

Table 0.2: REITs within Finance Sector of S&P500

Stock	StockName	Price	MarketCap_Billions
PLD	Prologis, Inc.	133.3	126.00
AMT	American Tower Corporation (REIT)	216.0	101.00
EQIX	Equinix, Inc.	805.6	75.61
PSA	Public Storage	305.1	53.63
CCI	Crown Castle Inc.	115.2	49.96
WELL	Welltower Inc.	90.2	49.91
SPG	Simon Property Group, Inc.	142.6	46.53
O	Realty Income Corporation	57.4	41.57
DLR	Digital Realty Trust, Inc.	134.6	40.76
EXR	Extra Space Storage Inc	160.4	33.87
VICI	VICI Properties Inc.	31.9	32.98
SBAC	SBA Communications Corporation	253.8	27.37
AVB	AvalonBay Communities, Inc.	187.2	26.59
WY	Weyerhaeuser Company	34.8	25.38
EQR	Equity Residential	61.1	23.22
ARE	Alexandria Real Estate Equities, Inc.	126.8	22.03
INVH	Invitation Homes Inc.	34.1	20.87
VTR	Ventas, Inc.	49.9	20.63
IRM	Iron Mountain Incorporated (Delaware)	70.0	20.43
ESS	Essex Property Trust, Inc.	247.9	15.91
MAA	Mid-America Apartment Communities, Inc.	134.5	15.69
HST	Host Hotels & Resorts, Inc.	19.5	13.73
KIM	Kimco Realty Corporation (HC)	21.3	13.21
UDR	UDR, Inc.	38.3	12.59
REG	Regency Centers Corporation	67.0	12.44
BXP	Boston Properties, Inc.	70.2	11.01
PEAK	Healthpeak Properties, Inc.	19.8	10.93
CPT	Camden Property Trust	99.3	10.60
FRT	Federal Realty Investment Trust	103.0	8.48

- Consider the summary statistics of the Market Capitalization of the REITs within the S&P500

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

Table 0.3: Summary Statistics of Market Capitalizaiton of REITs (Billion USD)

N	Mean	SD	Median	Q1	Q3	Min	Max	Sum
29	33.2	27.7	23.22	13.73	41.57	8.48	126	962.93

- As can be seen, the S&P500 consists of 29 REITs.

Recall.. A prestigious investment fund is ready to channel $1 Million into the US finance sector. They've enlisted your expertise to delve into the 29 REITs within the Finance sector of the S&P500.

Recall Your mission? Pinpoint the top 1, 2 or 3 REITs that present the most promising short-term trading opportunities. How will you allocate your investment capital of USD 1 Million? Dive in and make those data-driven decisions!

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

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

There are 12 number of of stocks in the Industry REIT

Select the Specific Coulumns from the filtered dataframe ts (Industry REIT)

```
ts2 <- REIT %>%
        select(Date, Stock, StockName, MarketCap_Billions, Price,Low52Wk, High52Wk,
               ROE, ROA,ROIC,GrossMargin, GrossMargin,
               NetMargin, Rating)

colnames(ts2)
```

```
 [1] "Date"               "Stock"              "StockName"
 [4] "MarketCap_Billions" "Price"              "Low52Wk"
 [7] "High52Wk"           "ROE"                "ROA"
[10] "ROIC"               "GrossMargin"        "NetMargin"
[13] "Rating"
```

Arrange the Dataframe by ROE

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

Top 10 Shares in Sector Based on ROE

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

```
# A tibble: 10 x 13
   Date    Stock StockName MarketCap_Billions Price Low52Wk High52Wk   ROE   ROA
   <chr>   <chr> <chr>                  <dbl> <dbl>   <dbl>    <dbl> <dbl> <dbl>
 1 29Dec2~ SPG   Simon Pr~              46.5  143.    100.     147.  74.0   6.72
 2 29Dec2~ IRM   Iron Mou~              20.4   70      48.9     70.7 70.3   1.71
 3 29Dec2~ CCI   Crown Ca~              50.0  115.     84.7    154   21.6   4.00
 4 29Dec2~ PSA   Public S~              53.6  305.    233.     316.  21.1  11.4
 5 29Dec2~ ESS   Essex Pr~              15.9  248.    195      253.  18.8   4.18
 6 29Dec2~ AMT   American~             101    216     155.     236.  13.2   1.08
 7 29Dec2~ UDR   UDR, Inc.              12.6   38.3    31       45.5 11.3   4.05
 8 29Dec2~ HST   Host Hot~              13.7   19.5    14.5     20.2 11.0   6.17
 9 29Dec2~ VICI  VICI Pro~              33.0   31.9    26.6     35.1 10.3   5.91
10 29Dec2~ FRT   Federal ~               8.48 103      85.3    115.   9.93  3.48
# i 4 more variables: ROIC <dbl>, GrossMargin <dbl>, NetMargin <dbl>,
#   Rating <fct>
```

Significance of 52-Week Low 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.

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(1:3,5)],10)
```

```
# A tibble: 10 x 4
   Date      Stock StockName                                Price
   <chr>     <chr> <chr>                                    <dbl>
 1 29Dec2023 SPG   Simon Property Group, Inc.               143.
 2 29Dec2023 IRM   Iron Mountain Incorporated (Delaware)     70
```

```
 3 29Dec2023 CCI   Crown Castle Inc.                    115.
 4 29Dec2023 PSA   Public Storage                      305.
 5 29Dec2023 ESS   Essex Property Trust, Inc.          248.
 6 29Dec2023 AMT   American Tower Corporation (REIT)   216
 7 29Dec2023 UDR   UDR, Inc.                            38.3
 8 29Dec2023 HST   Host Hotels & Resorts, Inc.          19.5
 9 29Dec2023 VICI  VICI Properties Inc.                 31.9
10 29Dec2023 FRT   Federal Realty Investment Trust     103
```

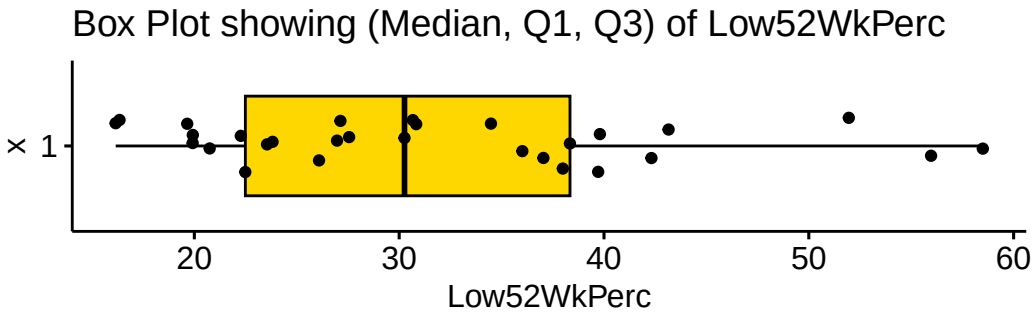
Summary Statistics of Low52WkPerc (Price rel. to 52-Week Low)

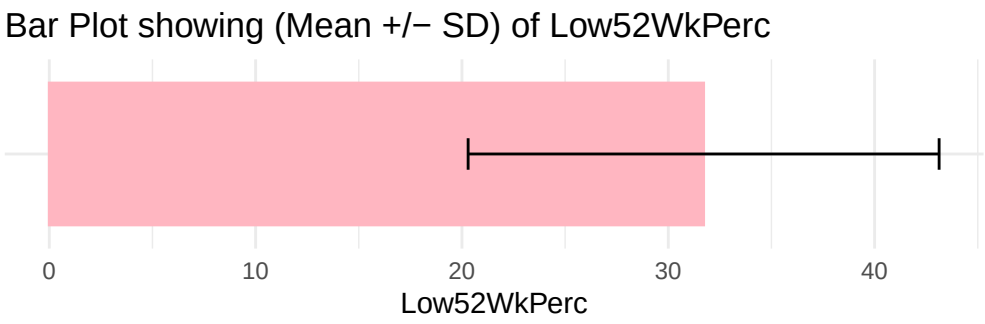
```
summaryStats <- ts4 %>% summarise(
  N = n(),
  Mean = mean(Low52WkPerc),
  SD = sd(Low52WkPerc),
  Median = median(Low52WkPerc),
  Q1 = quantile(Low52WkPerc, 0.25),
  Q3 = quantile(Low52WkPerc, 0.75),
  Min = min(Low52WkPerc),
  Max = max(Low52WkPerc)
)

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

N	Mean	SD	Median	Q1	Q3	Min	Max
29	31.71	11.41	30.26	22.49	38.34	16.16	58.5

Low52WkPerc for all the REIT Stocks, as shown below





Inexpensive Stocks with Low52WkPerc < Q1(Low52WkPerc)

```
ts4 %>%
  select(Stock, StockName, Price, Low52Wk, Low52WkPerc) %>%
  filter(Low52WkPerc < Low52WkPercQ1) %>%
  arrange(Low52WkPerc)%>%
  kable("html", caption = "Inexpensive Stocks with Low52WkPerc < Q1(Low52WkPerc)") %>%
  kable_styling()
```

Table 0.5: Inexpensive Stocks with Low52WkPerc < Q1(Low52WkPerc)

Stock	StockName	Price	Low52Wk	Low52WkPerc
EQR	Equity Residential	61.1	52.6	16.16
MAA	Mid-America Apartment Communities, Inc.	134.5	115.6	16.35
INVH	Invitation Homes Inc.	34.1	28.5	19.65
VICI	VICI Properties Inc.	31.9	26.6	19.92
CPT	Camden Property Trust	99.3	82.8	19.93
FRT	Federal Realty Investment Trust	103.0	85.3	20.75
AVB	AvalonBay Communities, Inc.	187.2	153.1	22.27

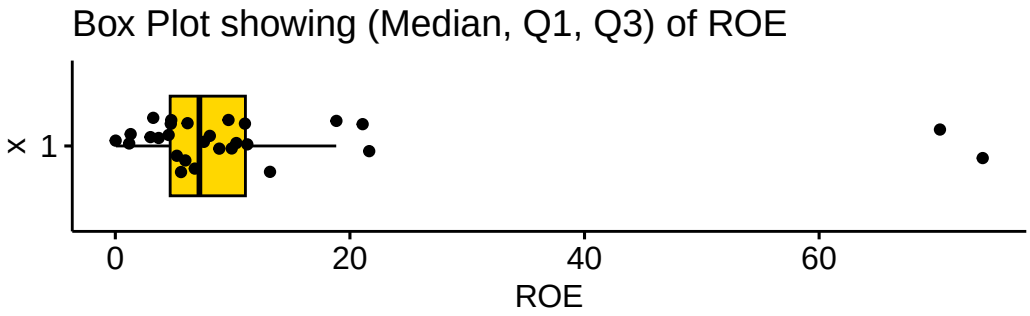
Summary Statistics of Return on Equity (ROE)

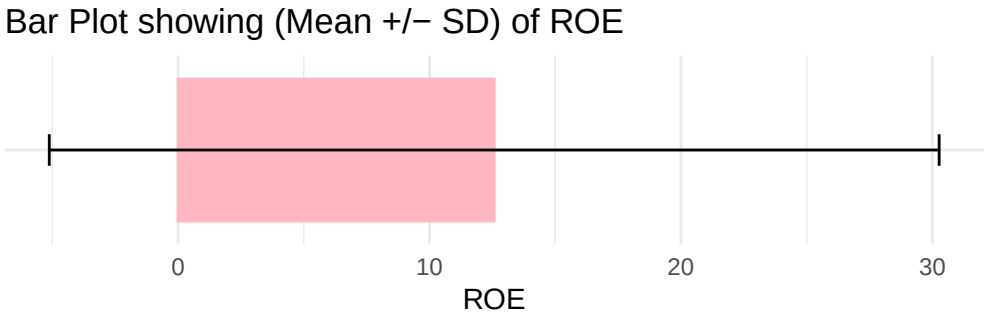
```
summaryStats <- ts4 %>% summarise(
  N = n(),
  Mean = mean(ROE, na.rm = TRUE),
  SD = sd(ROE, na.rm = TRUE),
  Median = median(ROE, na.rm = TRUE),
  Q1 = quantile(ROE, 0.25, na.rm = TRUE),
  Q3 = quantile(ROE, 0.75, na.rm = TRUE),
  Min = min(ROE, na.rm = TRUE),
  Max = max(ROE, na.rm = TRUE)
)

ROE_Q3 <- summaryStats$Q3

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

Table 0.6: Summary Statistics of Return on Equity (ROE)

N	Mean	SD	Median	Q1	Q3	Min	Max
29	12.57	17.69	7.17	4.68	11.09	0.05	73.97

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





Stocks with ROE > Q3(ROE)

```
ts4 %>%
  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 0.7: Stocks with ROE > Q3(ROE)

Stock	StockName	Price	ROA	ROE	Low52Wk	Low52WkPerc
SPG	Simon Property Group, Inc.	142.6	6.719684	73.96502	100.2	42.32
IRM	Iron Mountain Incorporated (Delaware)	70.0	1.708173	70.27600	48.9	43.15
CCI	Crown Castle Inc.	115.2	3.999484	21.61974	84.7	36.01
PSA	Public Storage	305.1	11.366645	21.07189	233.2	30.83
ESS	Essex Property Trust, Inc.	247.9	4.184376	18.83040	195.0	27.13
AMT	American Tower Corporation (REIT)	216.0	1.081369	13.21486	154.6	39.72
UDR	UDR, Inc.	38.3	4.049174	11.25438	31.0	23.55

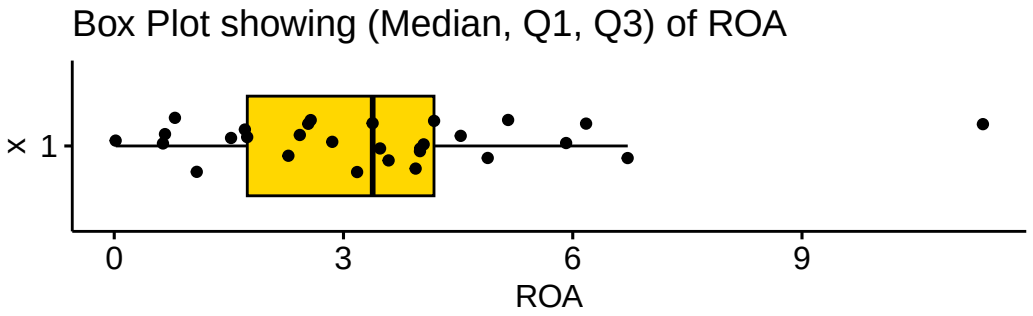
Summary Statistics of Return on Equity (ROA)

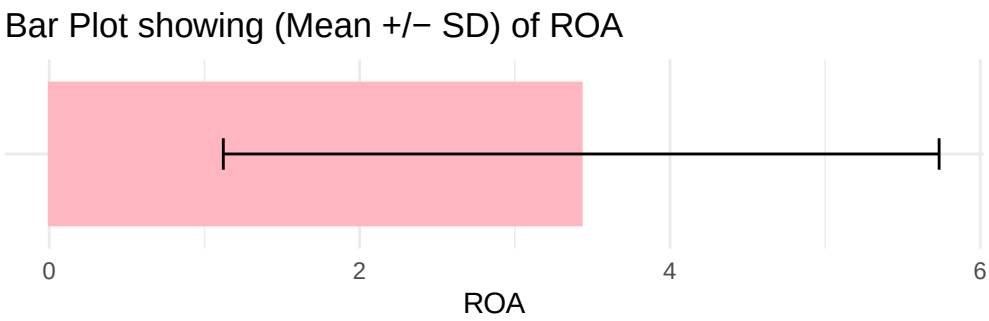
```
summaryStats <- ts4 %>% summarise(
  N = n(),
  Mean = mean(ROA, na.rm = TRUE),
  SD = sd(ROA, na.rm = TRUE),
  Median = median(ROA, na.rm = TRUE),
  Q1 = quantile(ROA, 0.25, na.rm = TRUE),
  Q3 = quantile(ROA, 0.75, na.rm = TRUE),
  Min = min(ROA, na.rm = TRUE),
  Max = max(ROA, na.rm = TRUE)
)

ROA_Q3 <- summaryStats$Q3

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

Table 0.8: Summary Statistics of Return on Equity (ROA)

N	Mean	SD	Median	Q1	Q3	Min	Max
29	3.43	2.31	3.38	1.74	4.18	0.02	11.37

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





Stocks with ROA > Q3(ROA)

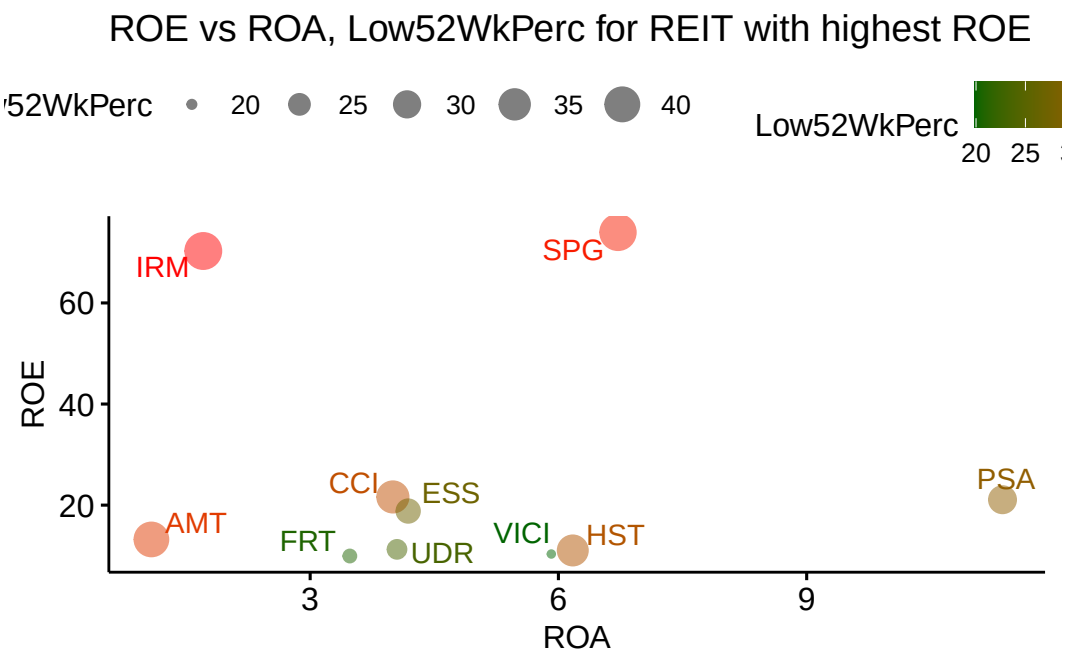
```
ts4 %>%
  select(Stock, StockName, Price, ROA, ROE, Low52Wk, Low52WkPerc) %>%
  filter(ROA > ROA_Q3) %>%
  arrange(desc(ROA)) %>%
  kable("html", caption = "Stocks with ROA > Q3(ROA)") %>%
  kable_styling()
```

Table 0.9: Stocks with ROA > Q3(ROA)

Stock	StockName	Price	ROA	ROE	Low52Wk	Low52WkP
PSA	Public Storage	305.1	11.366645	21.071893	233.2	30
SPG	Simon Property Group, Inc.	142.6	6.719684	73.965022	100.2	42
HST	Host Hotels & Resorts, Inc.	19.5	6.173597	11.036398	14.5	34
VICI	VICI Properties Inc.	31.9	5.914200	10.331764	26.6	19
MAA	Mid-America Apartment Communities, Inc.	134.5	5.155324	9.662317	115.6	16
SBAC	SBA Communications Corporation	253.8	4.886459	NA	185.2	37
AVB	AvalonBay Communities, Inc.	187.2	4.534148	8.060873	153.1	22

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

```
top10 <-
  ts4 %>%
  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 REIT with highest ROE") +
  gradient_color(c("darkgreen",  "red"))
```



Summary Statistics of All key variables in REIT Services

```
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 12.57 17.69   7.17  4.68 11.09  0.05 73.97
2         ROA  3.38  2.33   3.28  1.73  4.08  0.02 11.37
3        ROIC  3.75  2.50   3.48  1.97  4.75  0.02 11.82
4 GrossMargin 37.86 18.01  36.15 27.81 44.50 -1.22 99.17
5   NetMargin 22.35 15.27  22.29 10.32 29.68  0.11 68.69
```