GKBoginyFreyaBank-Julia

February 18, 2023

1 Chapter I: Histogram of Stocks Indices

- source: https://www.investing.com/indices/major-indices

We are going to plot the histogram for the composite index of:

1. Dow Jones Industrial Average

An index to measure the industrial performance of United States' corporations.

2. Shanghai Stock Composite Index

The SSE Composite Index also known as SSE Index is a stock market index of all stocks (A shares and B shares) that are traded at the Shanghai Stock Exchange.

3. Nikkei 225

The Nikkei 225 is a price-weighted equity index, which consists of 225 stocks in the Prime Market of the Tokyo Stock Exchange.

4. NASDAQ

NASDAQ is the second-largest stock exchange in the world for investors looking to buy and sell shares of stock. The index consisting of 3000 companies. Used to measure the growth of technology companies in the United States.

5. RTSI

RTS Index is cap-weighted composite index calculated based on prices of the most liquid Russian stocks of the largest & dynamically developing Russian issuers

6. DAX

German Stock Index DAX 30 was formerly known as Deutscher Aktien IndeX 30. It consists of the 30 major German companies trading on the Frankfurt Stock Market.

7. Jakarta Stock Exchange Composite Index

Used by Indonesia Stock Exchange to measure the performance of Indonesian corporations.

We are going to see :

1. The frequencies of the price of the index that occur the most and the least (monthly data).

2. The frequencies of the change of the index that occur the most and the least (monthly data).

If the histogram looks like Poisson or Normal, it does not mean that it will stays that way, things change even if not in an instant. We took the historical data of all time from what is available at the source site, for example the NASDAQ historical price is from 1980.

For the JKSE / IDX, we are going to plot the usual chart for the price.

1.1 DJIA, SSE, Nikkei 225, NASDAQ

```julia
[98]: using CSV, DataFrames, Plots, Plots.PlotMeasures

filesse = "./csv/Shanghai Composite Historical Data.csv"
filedj = "./csv/Dow Jones Industrial Average Historical Data.csv"
filenasdaq = "./csv/NASDAQ Composite Historical Data.csv"
filenikkei = "./csv/Nikkei 225 Historical Data.csv"

dfsse = CSV.read(filesse, DataFrame)
dfdj = CSV.read(filedj, DataFrame)
dfnasdaq = CSV.read(filenasdaq, DataFrame)
dfnikkei = CSV.read(filenikkei, DataFrame)

dfsse.Price .= parse.(Float64, replace.(dfsse.Price, "," => ""))
dfdj.Price .= parse.(Float64, replace.(dfdj.Price, "," => ""))
dfnasdaq.Price .= parse.(Float64, replace.(dfnasdaq.Price, "," => ""))
dfnikkei.Price .= parse.(Float64, replace.(dfnikkei.Price, "," => ""))

dfsse.Dates = Date.(dfsse.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfsse.Dates)))
DateTick = Dates.format.(tick_years, "y")
xlimssse = extrema([tick_years; dfsse.Dates])

dfdj.Dates = Date.(dfdj.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfdj.Dates)))
DateTick = Dates.format.(tick_years, "y")
xlimsdj = extrema([tick_years; dfdj.Dates])

dfnasdaq.Dates = Date.(dfnasdaq.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfnasdaq.Dates)))
DateTick = Dates.format.(tick_years, "y")
xlimsnasdaq = extrema([tick_years; dfnasdaq.Dates])

dfnikkei.Dates = Date.(dfnikkei.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfnikkei.Dates)))
DateTick = Dates.format.(tick_years, "y")
xlimsnikkei = extrema([tick_years; dfnikkei.Dates])

p1 = plot(dfsse.Dates, dfsse.Price, title="1991 - 2023 Data",
    xticks=(tick_years,DateTick), xlims=xlimssse,
```
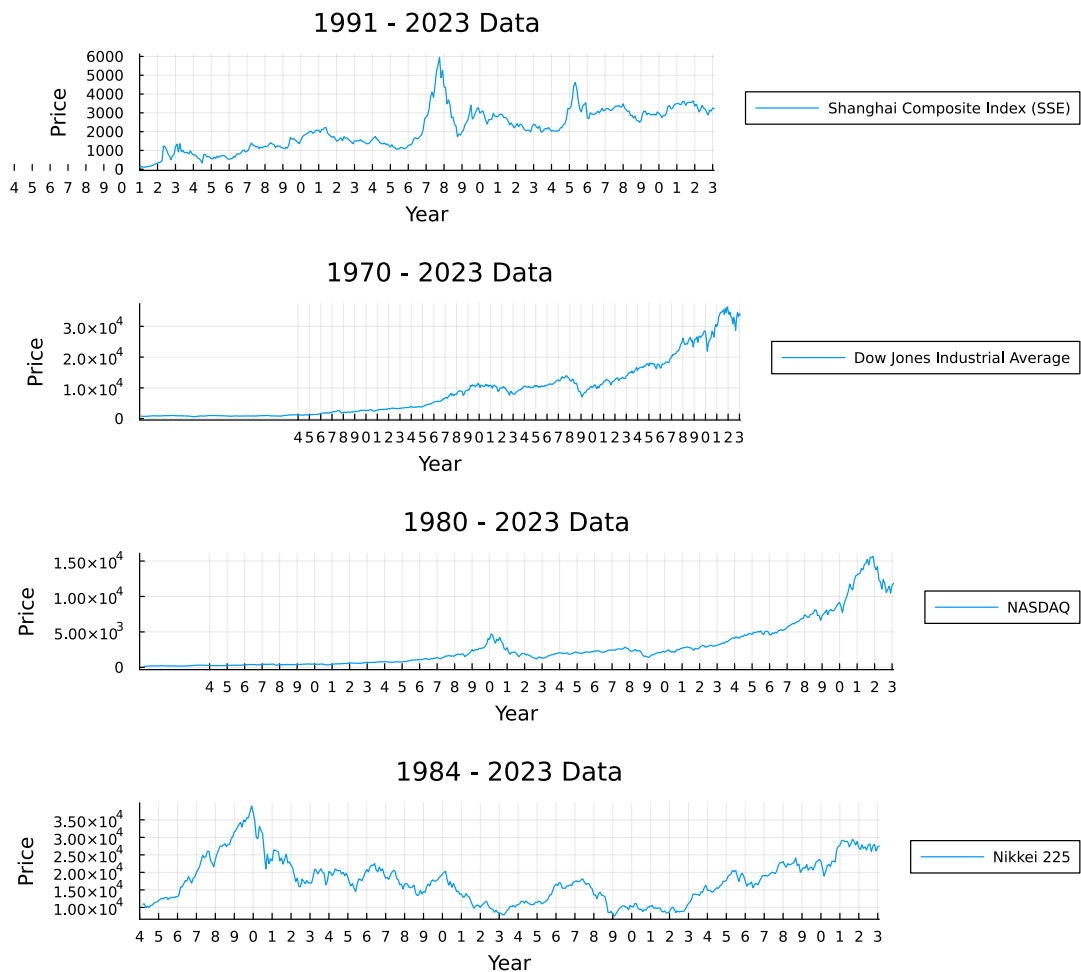
```
        label="Shanghai Composite Index (SSE)", xlabel="", ylabel="")
p2 = plot(dfdj.Dates, dfdj.Price, title="1970 - 2023 Data",
    xticks=(tick_years,DateTick), xlims=xlimsdj,
    label="Dow Jones Industrial Average", xlabel="", ylabel="")
p3 = plot(dfnasdaq.Dates, dfnasdaq.Price, title="1980 - 2023 Data",
    xticks=(tick_years,DateTick), xlims=xlimsnasdaq,
    label="NASDAQ", xlabel="", ylabel="")
p4 = plot(dfnikkei.Dates, dfnikkei.Price, title="1984 - 2023 Data",
    xticks=(tick_years,DateTick), xlims=xlimsnikkei,
    label="Nikkei 225", xlabel="", ylabel="")

plot(p1, p2, p3, p4, size=(900,800), layout = (4, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "Year", yaxis = "Price")
```

[98]:

```
[109]: using CSV, DataFrames, Plots, Plots.PlotMeasures

       filesse = "./csv/Shanghai Composite Historical Data.csv"
       filedj = "./csv/Dow Jones Industrial Average Historical Data.csv"
       filenasdaq = "./csv/NASDAQ Composite Historical Data.csv"
       filenikkei = "./csv/Nikkei 225 Historical Data.csv"

       dfsse = CSV.read(filesse, DataFrame)
       dfdj = CSV.read(filedj, DataFrame)
       dfnasdaq = CSV.read(filenasdaq, DataFrame)
       dfnikkei = CSV.read(filenikkei, DataFrame)

       dfsse.Price .= parse.(Float64, replace.(dfsse.Price, "," => ""))
       dfdj.Price .= parse.(Float64, replace.(dfdj.Price, "," => ""))
       dfnasdaq.Price .= parse.(Float64, replace.(dfnasdaq.Price, "," => ""))
       dfnikkei.Price .= parse.(Float64, replace.(dfnikkei.Price, "," => ""))

       p1 = histogram(dfsse.Price, title="",
           label="Shanghai Composite Index (SSE)", xlabel="", ylabel="")
       p2 = histogram(dfdj.Price, title="",
           label="Dow Jones Industrial Average", xlabel="", ylabel="")
       p3 = histogram(dfnasdaq.Price, title="",
           label="NASDAQ", xlabel="", ylabel="")
       p4 = histogram(dfnikkei.Price, title="",
           label="Nikkei 225", xlabel="", ylabel="")

       plot(p1, p2, p3, p4, size=(900,800), layout = (4, 1),
           legend=:outerright, left_margin=10mm, bottom_margin=5mm,
            xaxis = "Price", yaxis = "Frequencies")
```
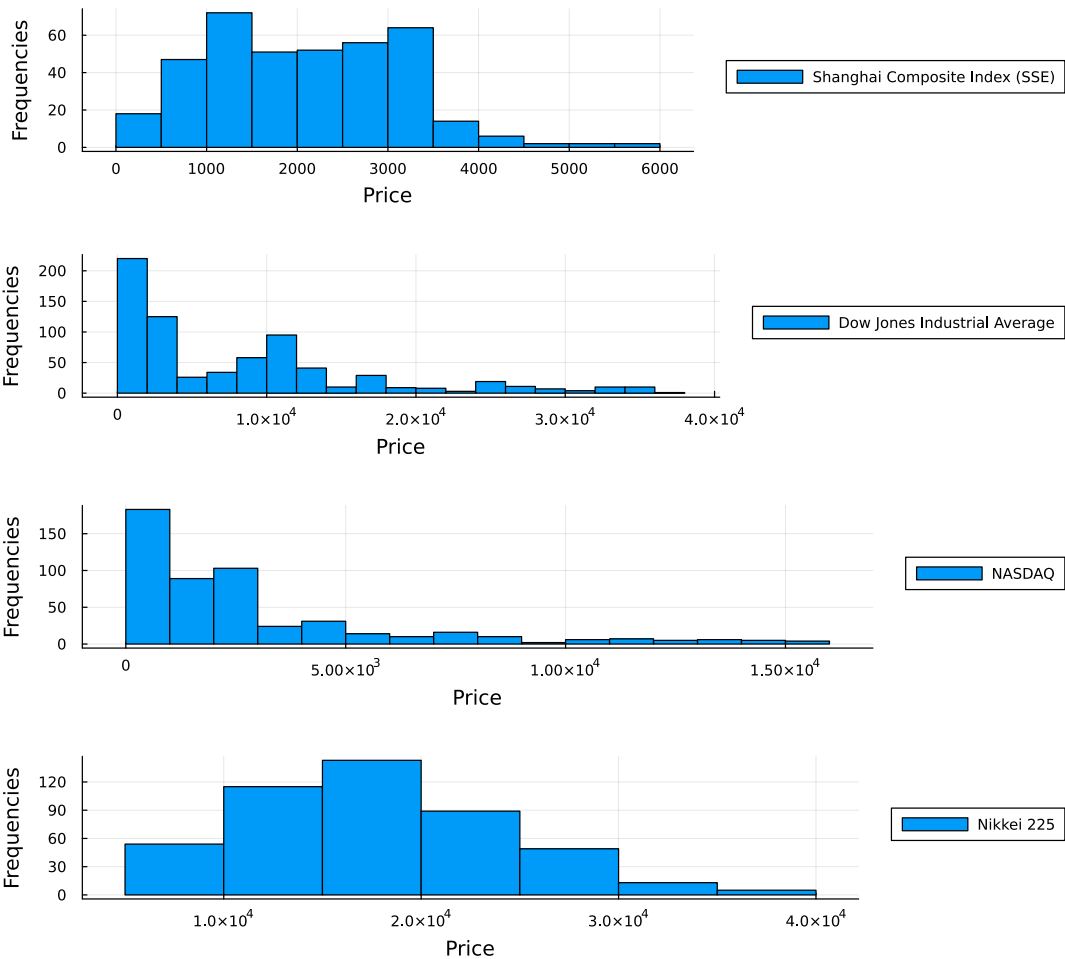
[109]:

```
[108]: using CSV, DataFrames, Plots, Plots.PlotMeasures

filesse = "./csv/Shanghai Composite Historical Data.csv"
filedj = "./csv/Dow Jones Industrial Average Historical Data.csv"
filenasdaq = "./csv/NASDAQ Composite Historical Data.csv"
filenikkei = "./csv/Nikkei 225 Historical Data.csv"

dfsse = CSV.read(filesse, DataFrame)
dfdj = CSV.read(filedj, DataFrame)
dfnasdaq = CSV.read(filenasdaq, DataFrame)
dfnikkei = CSV.read(filenikkei, DataFrame)

dfsse[!,"Change %"] .= parse.(Float64, replace.(dfsse[!,"Change %"], "%" => ""))
dfdj[!,"Change %"] .= parse.(Float64, replace.(dfdj[!,"Change %"], "%" => ""))
dfnasdaq[!,"Change %"] .= parse.(Float64, replace.(dfnasdaq[!,"Change %"], "%"
    => ""))
```

```
dfnikkei[!,"Change %"] .= parse.(Float64, replace.(dfnikkei[!,"Change %"], "%"␣
  ↪=> ""))

p1 = histogram(dfsse[!,"Change %"], title="",
    label="Shanghai Composite Index (SSE)", xlabel="", ylabel="")
p2 = histogram(dfdj[!,"Change %"], title="",
    label="Dow Jones Industrial Average", xlabel="", ylabel="")
p3 = histogram(dfnasdaq[!,"Change %"], title="",
    label="NASDAQ", xlabel="", ylabel="")
p4 = histogram(dfnikkei[!,"Change %"], title="",
    label="Nikkei 225", xlabel="", ylabel="")

plot(p1, p2, p3, p4, size=(900,800), layout = (4, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "Change (in %)", yaxis = "Frequencies")
```

[108]:
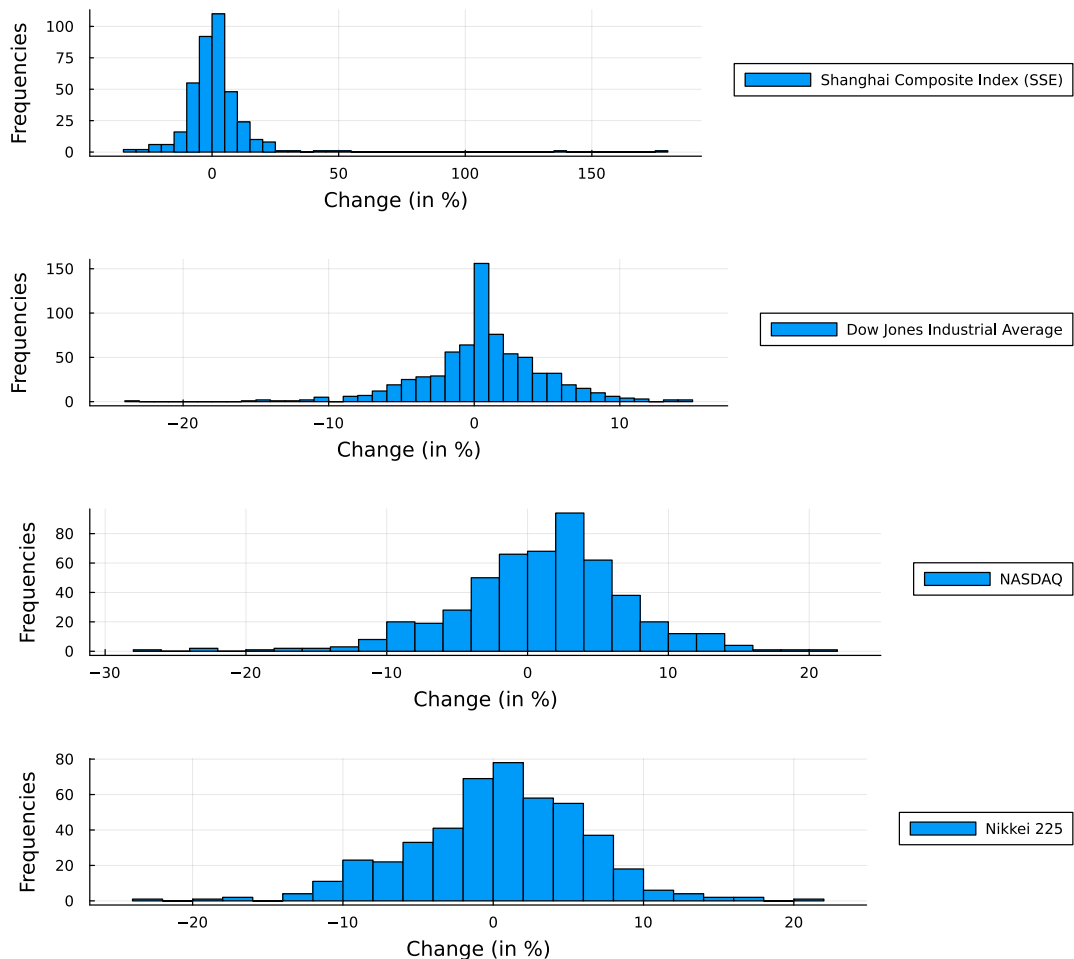
1.2 RTSI (Russia) and DAX (Germany)

```julia
[102]: using CSV, DataFrames, Plots, Plots.PlotMeasures

filedax = "./csv/DAX Historical Data.csv"
filertsi = "./csv/RTSI Historical Data.csv"

dfdax = CSV.read(filedax, DataFrame)
dfrtsi = CSV.read(filertsi, DataFrame)

dfdax.Price .= parse.(Float64, replace.(dfdax.Price, "," => ""))
dfrtsi.Price .= parse.(Float64, replace.(dfrtsi.Price, "," => ""))

dfdax.Dates = Date.(dfdax.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfdax.Dates)))
DateTickdax = Dates.format.(tick_years, "y")
xlimsdax = extrema([tick_years; dfdax.Dates])

dfrtsi.Dates = Date.(dfrtsi.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfrtsi.Dates)))
DateTickrtsi = Dates.format.(tick_years, "yy")
xlimsrtsi = extrema([tick_years; dfrtsi.Dates])

p1 = plot(dfdax.Dates, dfdax.Price, title="1988 - 2023 Data",
    xticks=(tick_years,DateTickdax), xlims=xlimsdax,
    label="DAX (Germany)", xlabel="", ylabel="")
p2 = plot(dfrtsi.Dates, dfrtsi.Price, title="1995 - 2023 Data",
    xticks=(tick_years,DateTickrtsi), xlims=xlimsrtsi,
    label="RTSI (Russia)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "Year", yaxis = "Price")
```
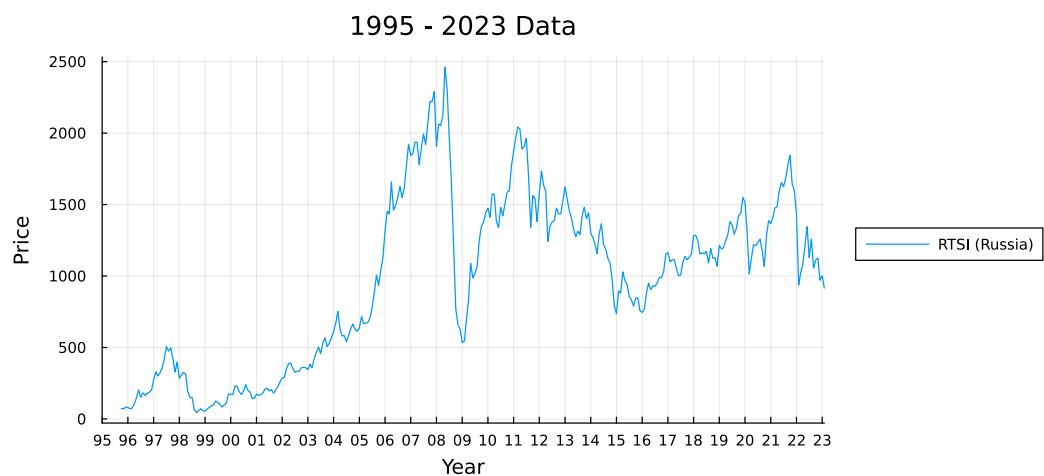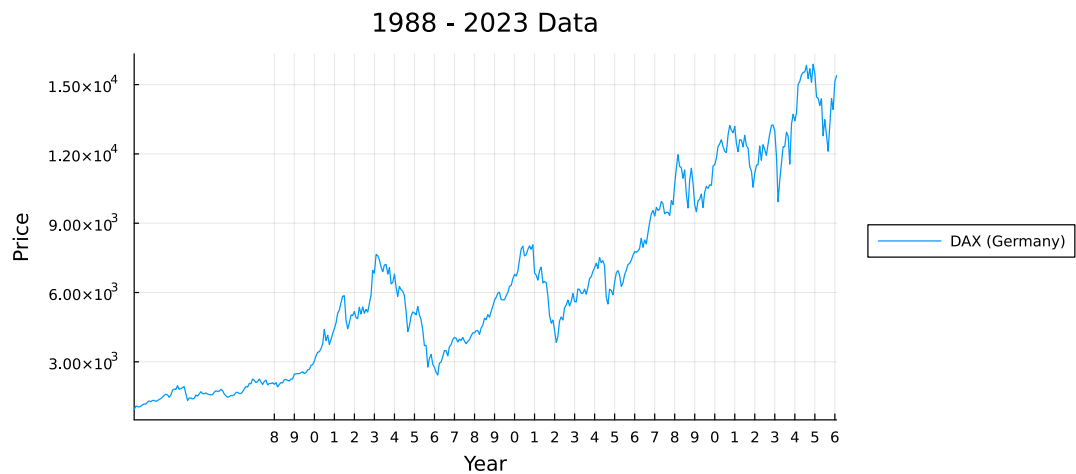
[102]:

1988 - 2023 Data

1995 - 2023 Data


```
[103]: using CSV, DataFrames, Plots, Plots.PlotMeasures

       filedax = "./csv/DAX Historical Data.csv"
       filertsi = "./csv/RTSI Historical Data.csv"

       dfdax = CSV.read(filedax, DataFrame)
       dfrtsi = CSV.read(filertsi, DataFrame)

       dfdax.Price .= parse.(Float64, replace.(dfdax.Price, "," => ""))
       dfrtsi.Price .= parse.(Float64, replace.(dfrtsi.Price, "," => ""))

       p1 = histogram(dfdax.Price, title="",
           label="DAX (Germany)", xlabel="", ylabel="")
       p2 = histogram(dfrtsi.Price, title="",
           label="RTSI (Russia)", xlabel="", ylabel="")
```
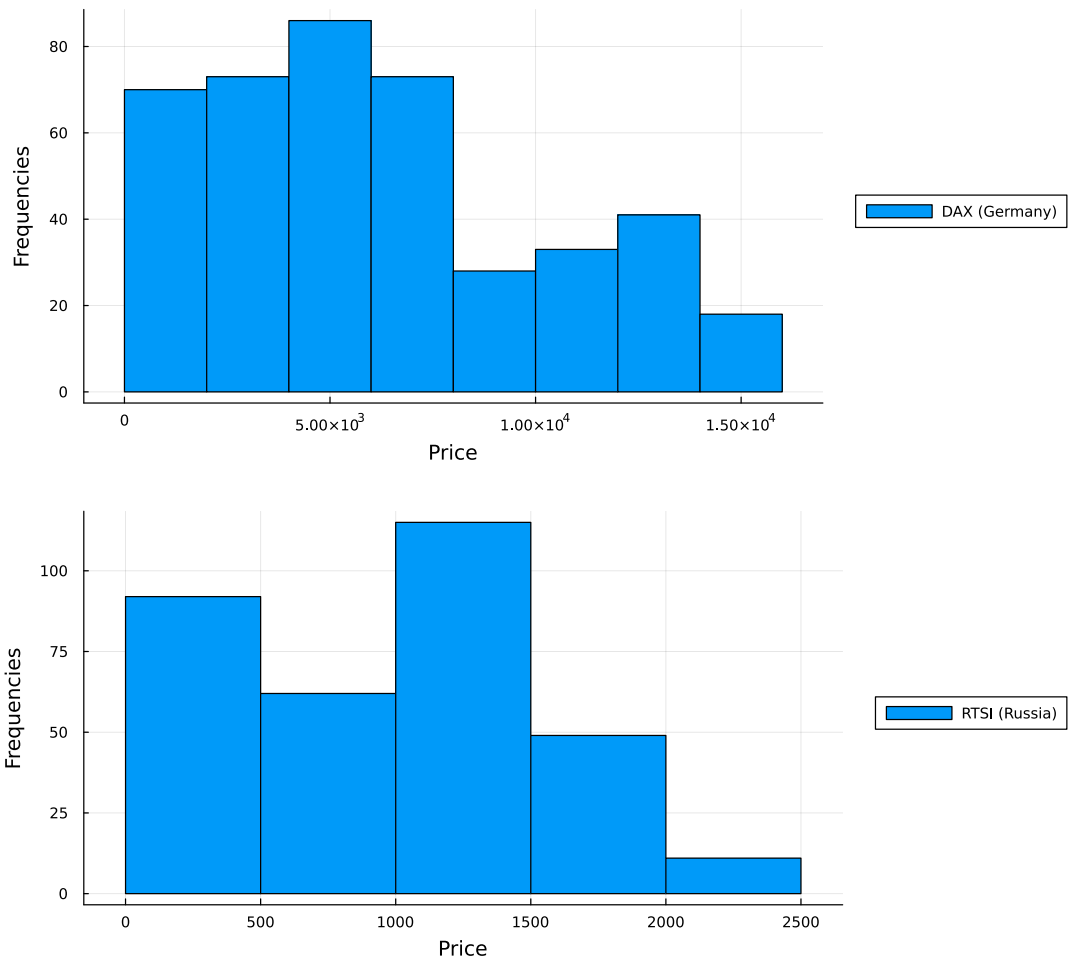
```
plot(p1, p2, size=(900,800), layout = (2, 1),
     legend=:outerright, left_margin=10mm, bottom_margin=5mm,
      xaxis = "Price", yaxis = "Frequencies")
```

[103]:

[104]:
```julia
using CSV, DataFrames, Plots, Plots.PlotMeasures

filedax = "./csv/DAX Historical Data.csv"
filertsi = "./csv/RTSI Historical Data.csv"

dfdax = CSV.read(filedax, DataFrame)
dfrtsi = CSV.read(filertsi, DataFrame)

dfdax[!,"Change %"] .= parse.(Float64, replace.(dfdax[!,"Change %"], "%" => ""))
dfrtsi[!,"Change %"] .= parse.(Float64, replace.(dfrtsi[!,"Change %"], "%" =>␣
 ↪""))
```
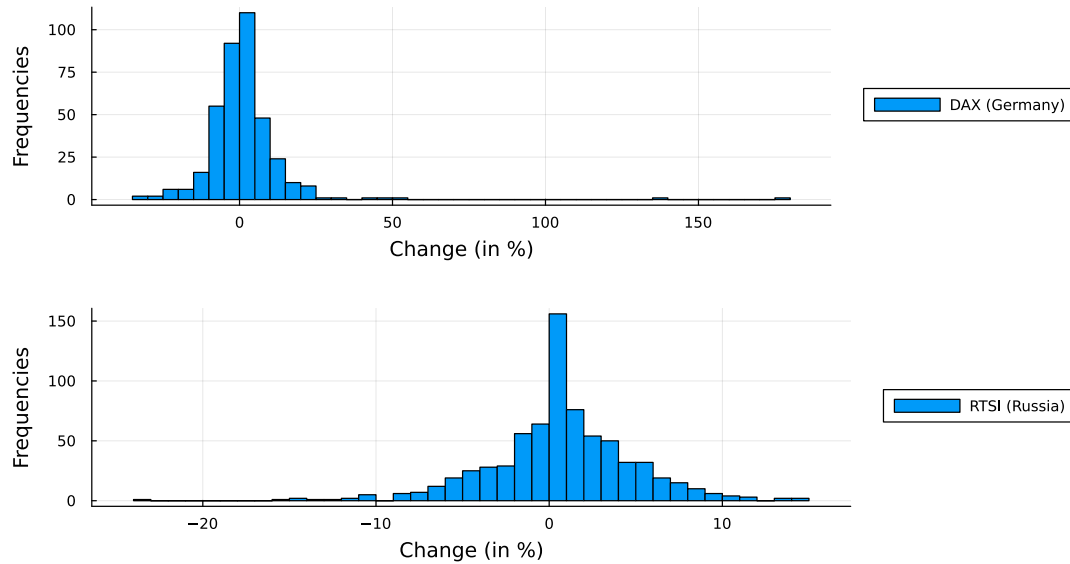
```
p1 = histogram(df[!,"Change %"], title="",
    label="DAX (Germany)", xlabel="", ylabel="")
p2 = histogram(df2[!,"Change %"], title="",
    label="RTSI (Russia)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (4, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "Change (in %)", yaxis = "Frequencies")
```

[104]:

1.3 Indonesia Stock Exchange (JKSE / IDX)

[37]:
```
using CSV, DataFrames, Plots, Plots.PlotMeasures

filejak = "./csv/Jakarta Stock Exchange Composite Index Historical Data.csv"
```
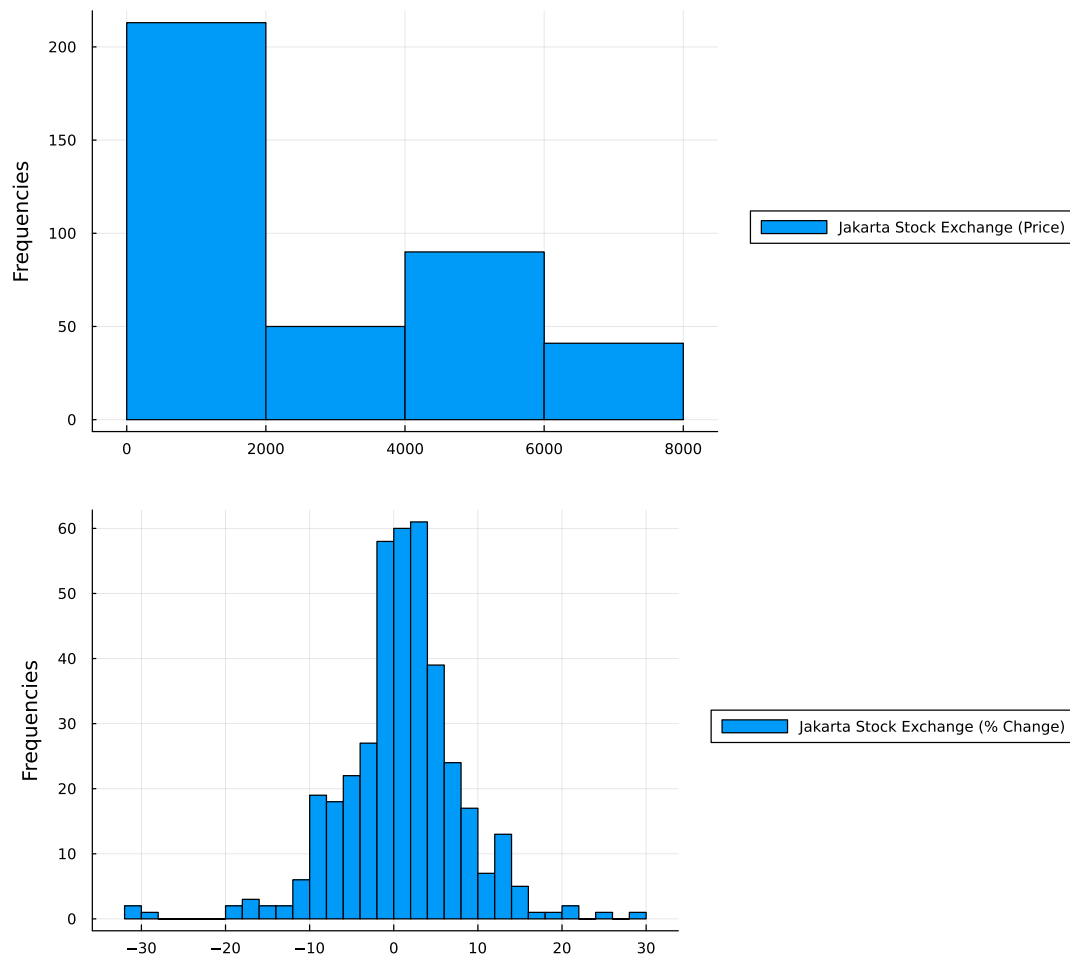
10

```
dfjak = CSV.read(filejak, DataFrame)

dfjak.Price .= parse.(Float64, replace.(dfjak.Price, "," => ""))
dfjak[!,"Change %"] .= parse.(Float64, replace.(dfjak[!,"Change %"], "%" => ""))

p1 = histogram(dfjak.Price, title="",
    label="Jakarta Stock Exchange (Price)", xlabel="", ylabel="")
p2 = histogram(dfjak[!,"Change %"], title="",
    label="Jakarta Stock Exchange (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "Frequencies")
```

[37]:

[39]: ```using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures```

11

```
filejak = "./csv/Jakarta Stock Exchange Composite Index Historical Data.csv"

dfjak = CSV.read(filejak, DataFrame)

dfjak.Price .= parse.(Float64, replace.(dfjak.Price, "," => ""))
dfjak[!,"Change %"] .= parse.(Float64, replace.(dfjak[!,"Change %"], "%" => ""))

dfjak.Dates = Date.(dfjak.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfjak.Dates)))
DateTick = Dates.format.(tick_years, "yy")
xlimsjak = extrema([tick_years; dfjak.Dates])

p1 = plot(dfjak.Dates, dfjak.Price, title="",
    xticks=(tick_years,DateTick), xlims=xlimsjak,
    label="Jakarta Stock Exchange (Price)", xlabel="", ylabel="")
p2 = histogram(dfjak.Date, dfjak[!,"Change %"], title="",
    label="Jakarta Stock Exchange (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(950,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "Frequencies")
```
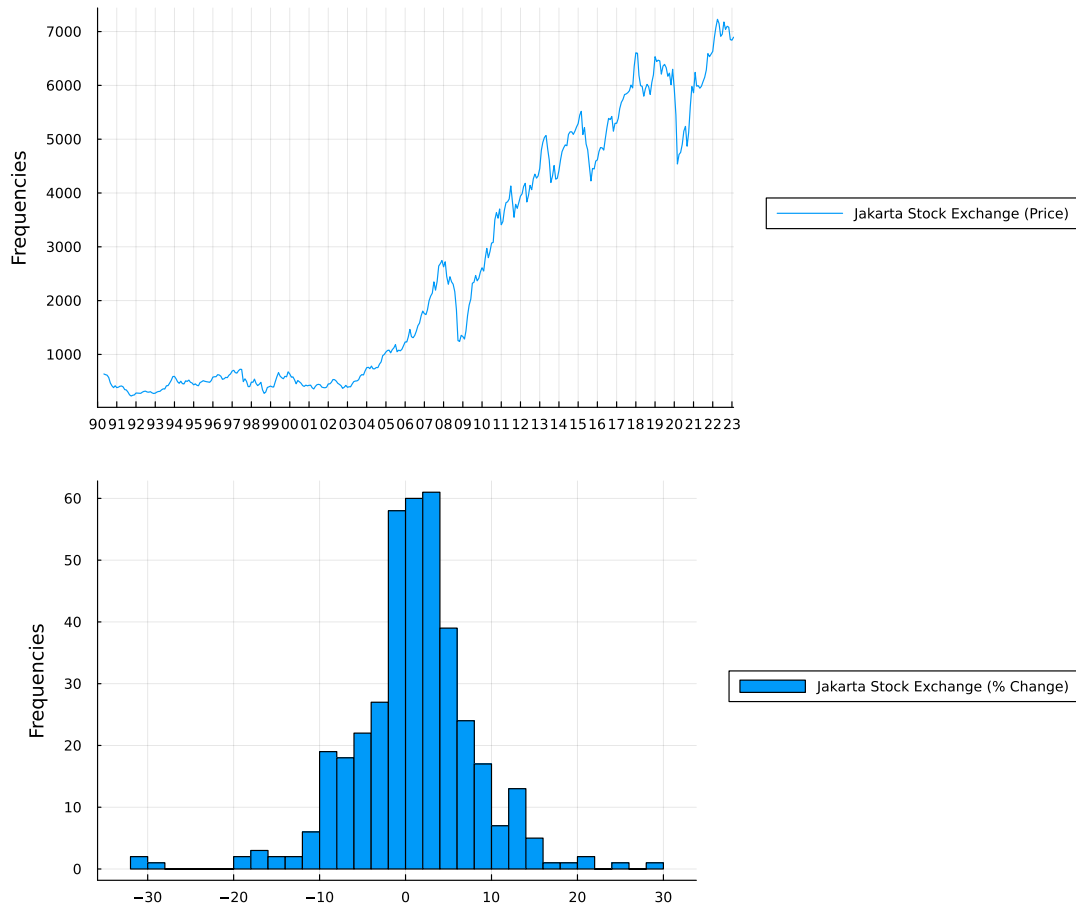
[39]:

Jakarta Stock Exchange (Price)

Jakarta Stock Exchange (% Change)

2 Chapter II: IDX Stocks

Source: https://www.investing.com/indices/idx-composite

We will list few stocks that are on our watchlist along with our estimation to the price we think is good enough, our own book value based on intuition.

1. Barito Pacific (BRPT) -> Petrochemical

- Book Value: 200

2. Energi Mega Persada (ENRG) -> Oil

- Book Value: 500

3. XL Axiata (EXCL)-> Telecommunication

- Book Value: 1000

4. Garuda Indonesia (GIAA) -> State-Owned Airline

- Book Value: 200

5. Gajah Tunggal (GJTL) -> Tires and Rubber

- Book Value: 1000

6. Indika Energy (INDY) -> Coal

- Book Value: 1000

7. Kimia Farma (KAEF) -> Pharmacy

- Book Value: 400

8. Industri Jamu dan Farmasi Sidomuncul (SIDO) -> Traditional medicine and candies

- Book Value: 200

2.1 Barito Pacific

```
[47]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filebrpt = "./csv/IDX-Stocks/BRPT Historical Data.csv"

      dfbrpt = CSV.read(filebrpt, DataFrame)

      dfbrpt.Price .= parse.(Float64, replace.(dfbrpt.Price, "," => ""))
      dfbrpt[!,"Change %"] .= parse.(Float64, replace.(dfbrpt[!,"Change %"], "%" =>␣
       ↪""))

      dfbrpt.Dates = Date.(dfbrpt.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfbrpt.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
      xlimsbrpt = extrema([tick_years; dfbrpt.Dates])

      p1 = plot(dfbrpt.Dates, dfbrpt.Price, title="",
          xticks=(tick_years,DateTick), xlims=xlimsbrpt,
          label="Barito Pacific (Price)", xlabel="", ylabel="")
      p2 = histogram(dfbrpt.Date, dfbrpt[!,"Change %"], title="Frequencies Histogram",
          label="Barito Pacific (% Change)", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")
```
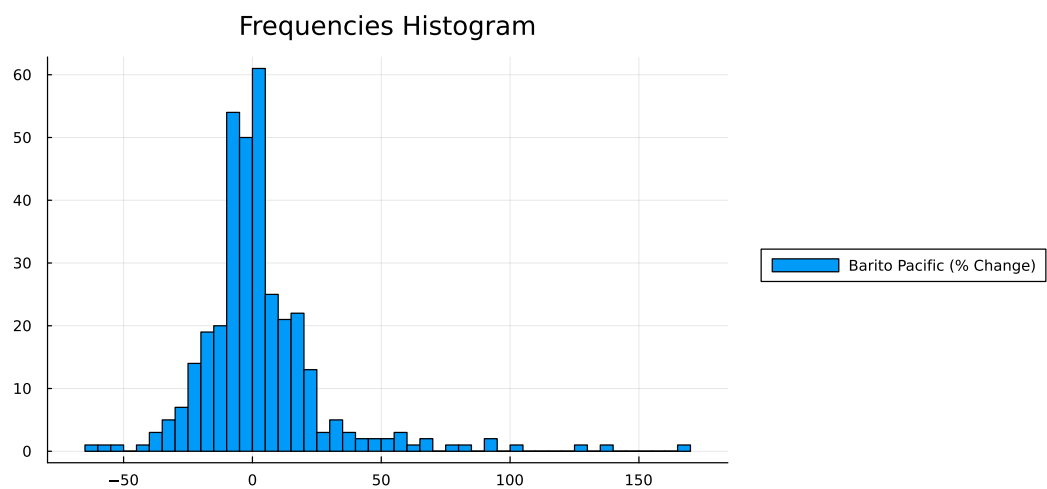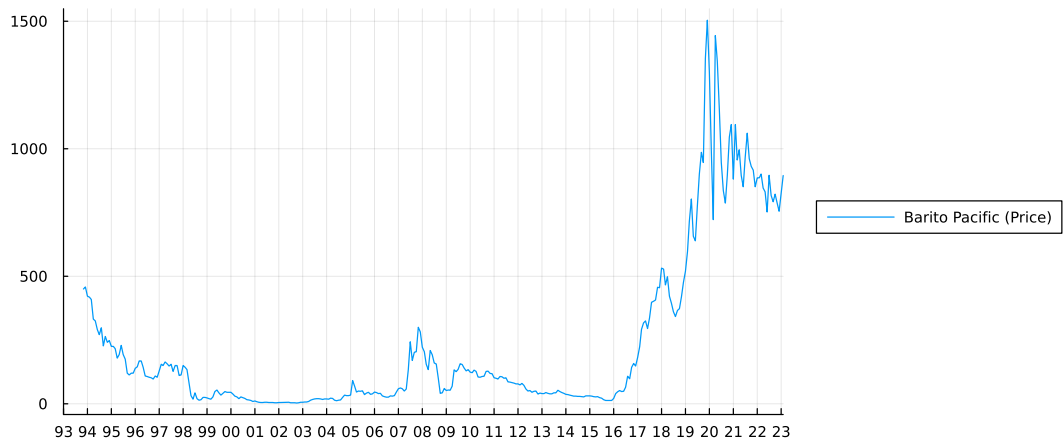
[47]:

Frequencies Histogram

2.2 Energi Mega Persada

```
[46]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      fileenrg = "./csv/IDX-Stocks/ENRG Historical Data.csv"

      dfenrg = CSV.read(fileenrg, DataFrame)

      dfenrg.Price .= parse.(Float64, replace.(dfenrg.Price, "," => ""))
      dfenrg[!,"Change %"] .= parse.(Float64, replace.(dfenrg[!,"Change %"], "%" =>␣
       ↪""))

      dfenrg.Dates = Date.(dfenrg.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfenrg.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
```

```
xlimsenrg = extrema([tick_years; dfenrg.Dates])

p1 = plot(dfenrg.Dates, dfenrg.Price, title="",
    xticks=(tick_years,DateTick), xlims=xlimsenrg,
    label="Energi Mega Persada (Price)", xlabel="", ylabel="")
p2 = histogram(dfenrg.Date, dfenrg[!,"Change %"], title="Frequencies Histogram",
    label="Energi Mega Persada (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```

[46]:
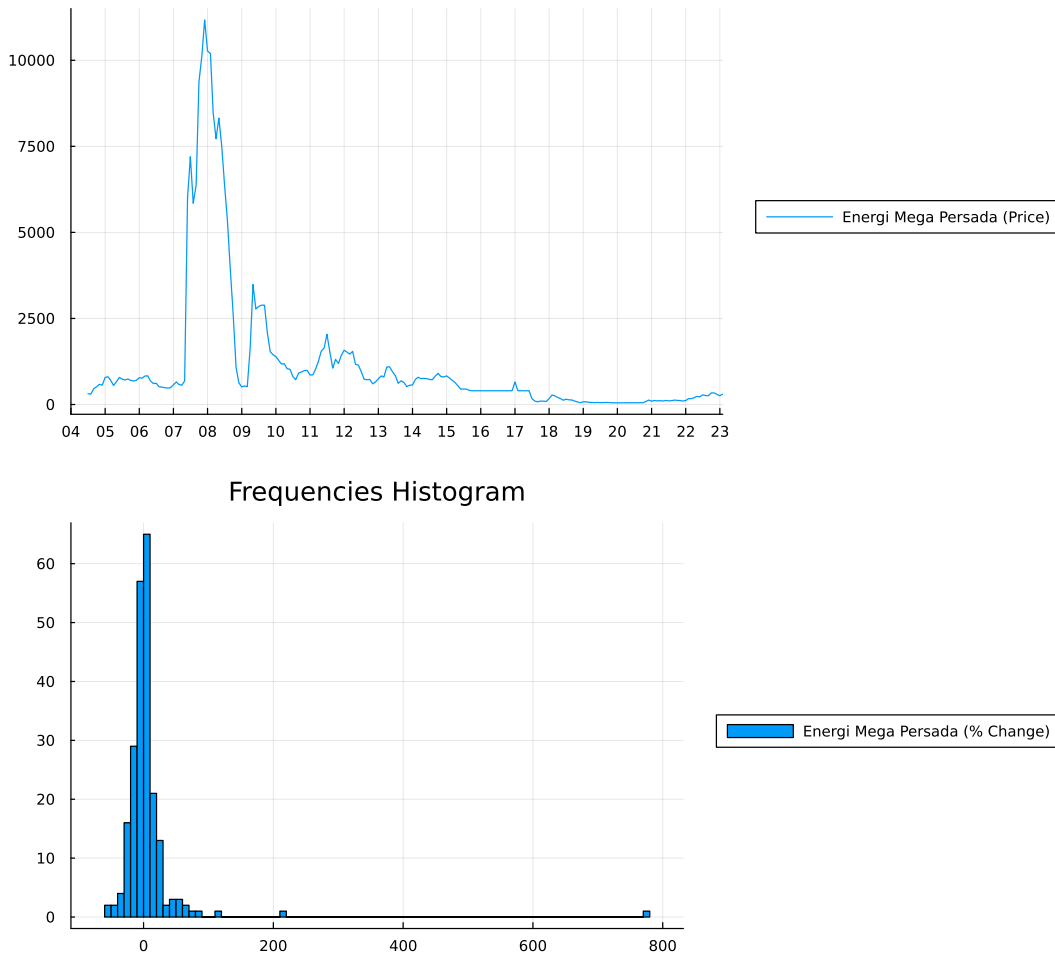
2.3   XL Axiata

```julia
[51]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

fileexcl = "./csv/IDX-Stocks/EXCL Historical Data.csv"

dfexcl = CSV.read(filejak, DataFrame)

dfexcl.Price .= parse.(Float64, replace.(dfexcl.Price, "," => ""))
dfexcl[!,"Change %"] .= parse.(Float64, replace.(dfexcl[!,"Change %"], "%" =>␣
  ↪""))

dfexcl.Dates = Date.(dfexcl.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfexcl.Dates)))
DateTick = Dates.format.(tick_years, "yy")
xlimsexcl = extrema([tick_years; dfexcl.Dates])

p1 = plot(dfexcl.Dates, dfexcl.Price, title="",
    xticks=(tick_years,DateTick), xlims=xlimsexcl,
    label="XL Axiata(Price)", xlabel="", ylabel="")
p2 = histogram(dfexcl.Date, dfexcl[!,"Change %"], title="Frequencies Histogram",
    label="XL Axiata (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```
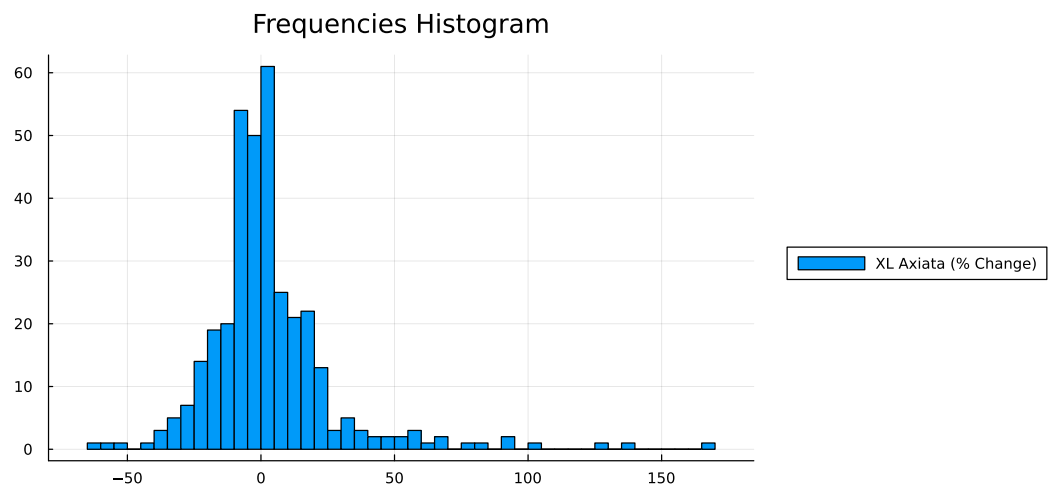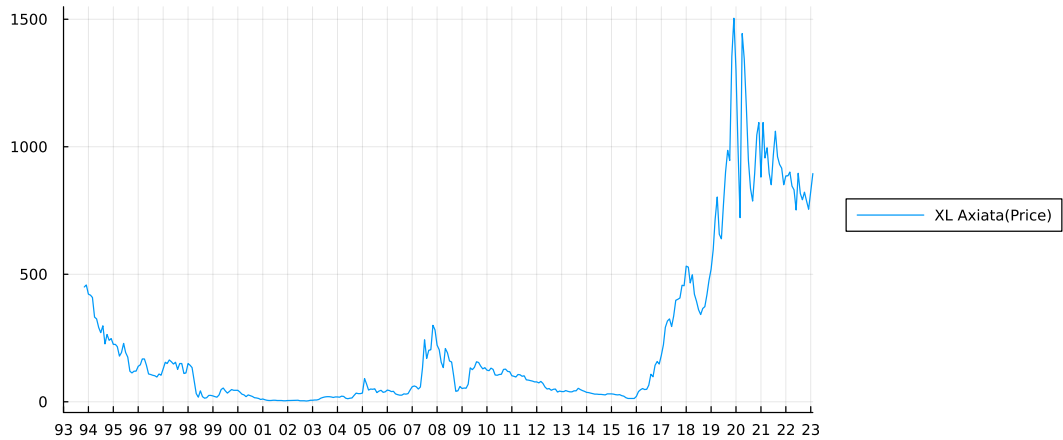
[51]:

Frequencies Histogram

2.4 Garuda Indonesia

```
[62]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filegiaa = "./csv/IDX-Stocks/GIAA Historical Data.csv"

      dfgiaa = CSV.read(filegiaa, DataFrame)

      dfgiaa[!,"Change %"] .= parse.(Float64, replace.(dfgiaa[!,"Change %"], "%" =>␣
       ↪""))

      dfgiaa.Dates = Date.(dfgiaa.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfgiaa.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
      xlimsgiaa = extrema([tick_years; dfgiaa.Dates])
```

```
p1 = plot(dfgiaa.Dates, dfgiaa.Price, title="",
    xticks=(tick_years,DateTick), xlims=xlimsgiaa,
    label="Garuda Indonesia (Price)", xlabel="", ylabel="")
p2 = histogram(dfgiaa.Date, dfgiaa[!,"Change %"], title="Frequencies Histogram",
    label="Garuda Indonesia (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```

[62]:

Frequencies Histogram

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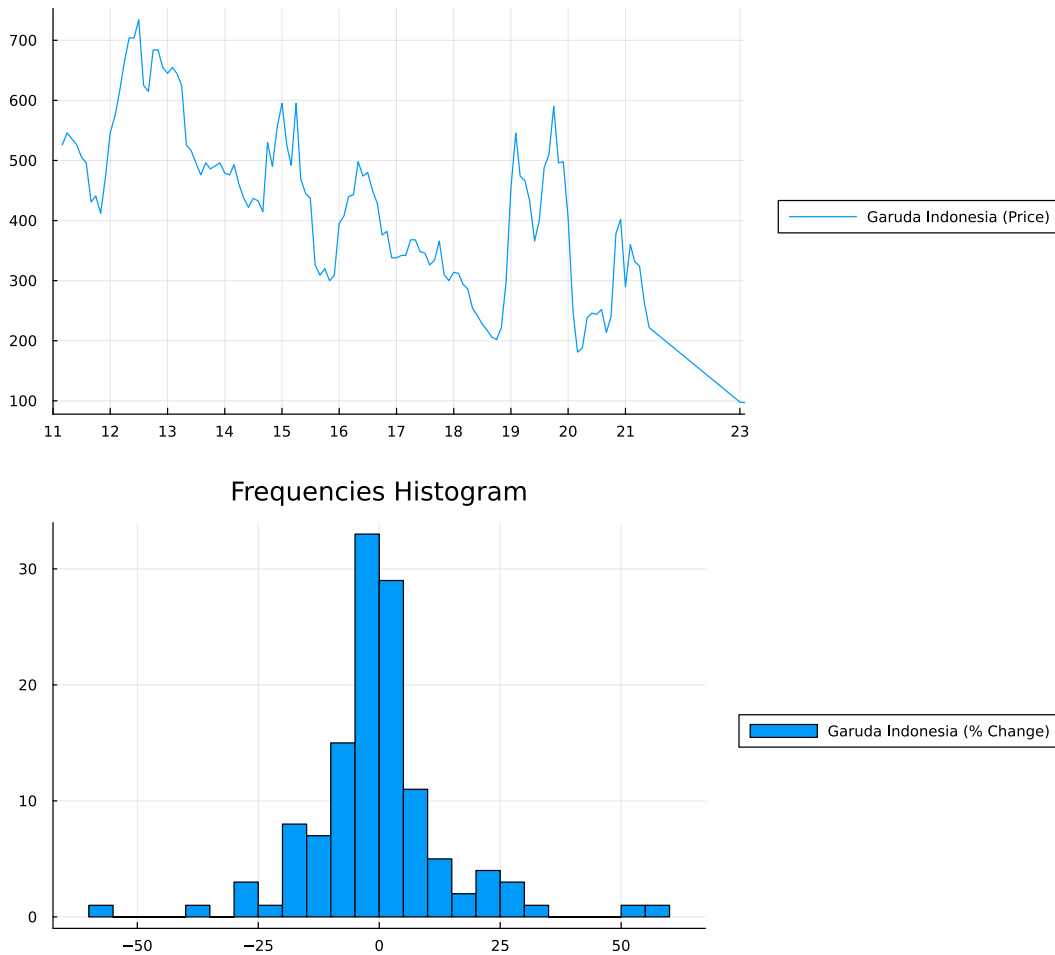
2.5   Gajah Tunggal

```
[61]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filegjtl = "./csv/IDX-Stocks/GJTL Historical Data.csv"

      dfgjtl = CSV.read(filegjtl, DataFrame)

      dfgjtl.Price .= parse.(Float64, replace.(dfgjtl.Price, "," => ""))
      dfgjtl[!,"Change %"] .= parse.(Float64, replace.(dfgjtl[!,"Change %"], "%" =>␣
       ↪""))

      dfgjtl.Dates = Date.(dfgjtl.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfgjtl.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
      xlimsgjtl = extrema([tick_years; dfgjtl.Dates])

      p1 = plot(dfgjtl.Dates, dfgjtl.Price, title="",
          xticks=(tick_years,DateTick), xlims=xlimsgjtl,
          label="Gajah Tunggal (Price)", xlabel="", ylabel="")
      p2 = histogram(dfgjtl.Date, dfgjtl[!,"Change %"], title="Frequencies Histogram",
          label="Gajah Tunggal (% Change)", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")
```
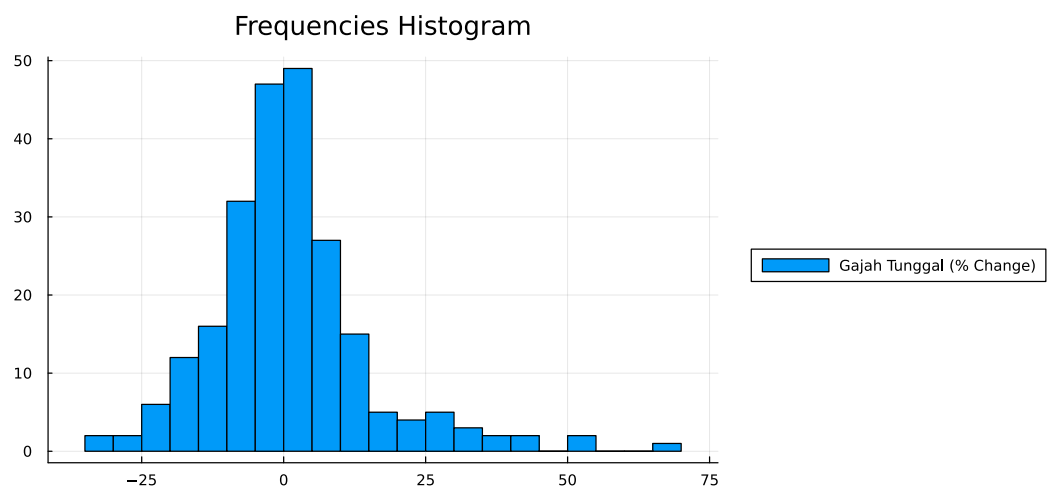
[61]:

Frequencies Histogram

2.6 Indika Energy

```julia
[60]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

fileindy = "./csv/IDX-Stocks/INDY Historical Data.csv"

dfindy = CSV.read(fileindy, DataFrame)

dfindy.Price .= parse.(Float64, replace.(dfindy.Price, "," => ""))
dfindy[!,"Change %"] .= parse.(Float64, replace.(dfindy[!,"Change %"], "%" =>␣
 ↪""))

dfindy.Dates = Date.(dfindy.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfindy.Dates)))
DateTick = Dates.format.(tick_years, "yy")
```

```
xlimsindy = extrema([tick_years; dfindy.Dates])

p1 = plot(dfindy.Dates, dfindy.Price, title="",
    xticks=(tick_years,DateTick), xlims=xlimsindy,
    label="Indika Energy (Price)", xlabel="", ylabel="")
p2 = histogram(dfindy.Date, dfindy[!,"Change %"], title="Frequencies Histogram",
    label="Indika Energy (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```

[60]:
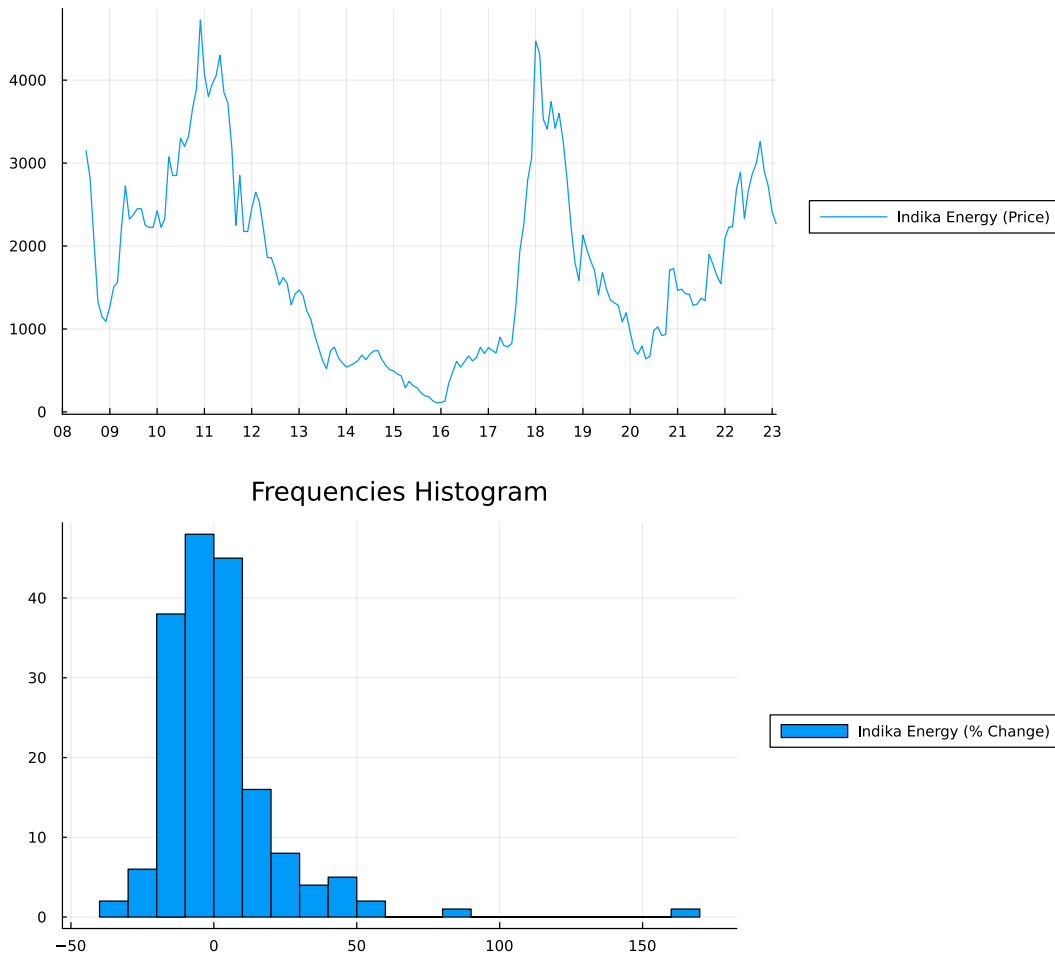
2.7 Kimia Farma

```
[63]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filekaef = "./csv/IDX-Stocks/KAEF Historical Data.csv"

      dfkaef = CSV.read(filekaef, DataFrame)

      dfkaef.Price .= parse.(Float64, replace.(dfkaef.Price, "," => ""))
      dfkaef[!,"Change %"] .= parse.(Float64, replace.(dfkaef[!,"Change %"], "%" =>␣
        ↪""))

      dfkaef.Dates = Date.(dfkaef.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfkaef.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
      xlimskaef = extrema([tick_years; dfkaef.Dates])

      p1 = plot(dfkaef.Dates, dfkaef.Price, title="",
          xticks=(tick_years,DateTick), xlims=xlimskaef,
          label="Kimia Farma (Price)", xlabel="", ylabel="")
      p2 = histogram(dfkaef.Date, dfkaef[!,"Change %"], title="Frequencies Histogram",
          label="Kimia Farma (% Change)", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")
```
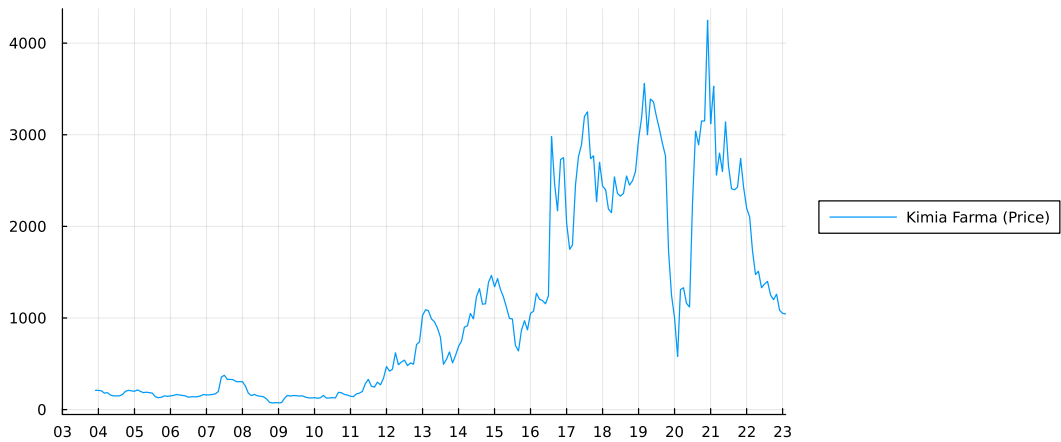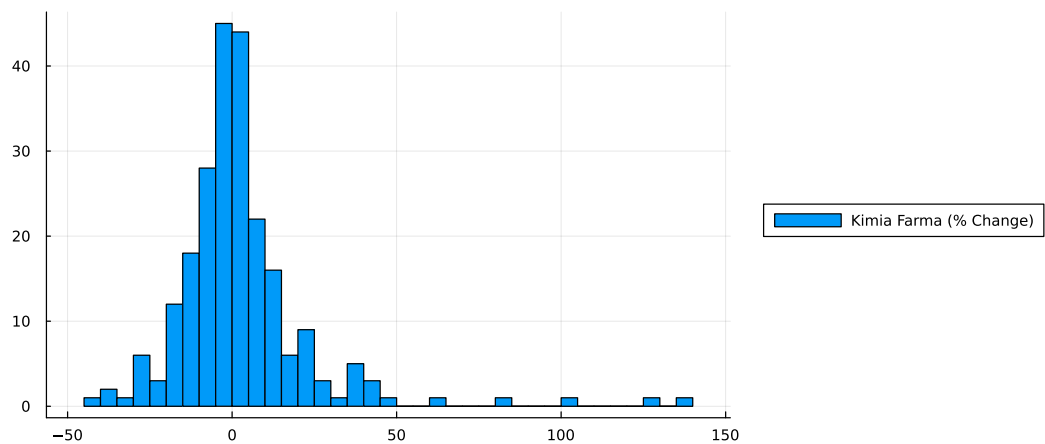
[63]:

Frequencies Histogram

2.8 Industri Jamu dan Farmasi Sidomuncul

```
[64]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filesido = "./csv/IDX-Stocks/SIDO Historical Data.csv"

      dfsido = CSV.read(filesido, DataFrame)

      dfsido.Price .= parse.(Float64, replace.(dfsido.Price, "," => ""))
      dfsido[!,"Change %"] .= parse.(Float64, replace.(dfsido[!,"Change %"], "%" =>␣
       ↪""))

      dfsido.Dates = Date.(dfsido.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfsido.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
```

```
xlimssido = extrema([tick_years; dfsido.Dates])

p1 = plot(dfsido.Dates, dfsido.Price, title="",
    xticks=(tick_years,DateTick), xlims=xlimssido,
    label="Industri Jamu dan Farmasi Sidomuncul (Price)", xlabel="", ylabel="")
p2 = histogram(dfsido.Date, dfsido[!,"Change %"], title="Frequencies Histogram",
    label="Industri Jamu dan Farmasi Sidomuncul (% Change)", xlabel="",␣
  ↪ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```

[64]:
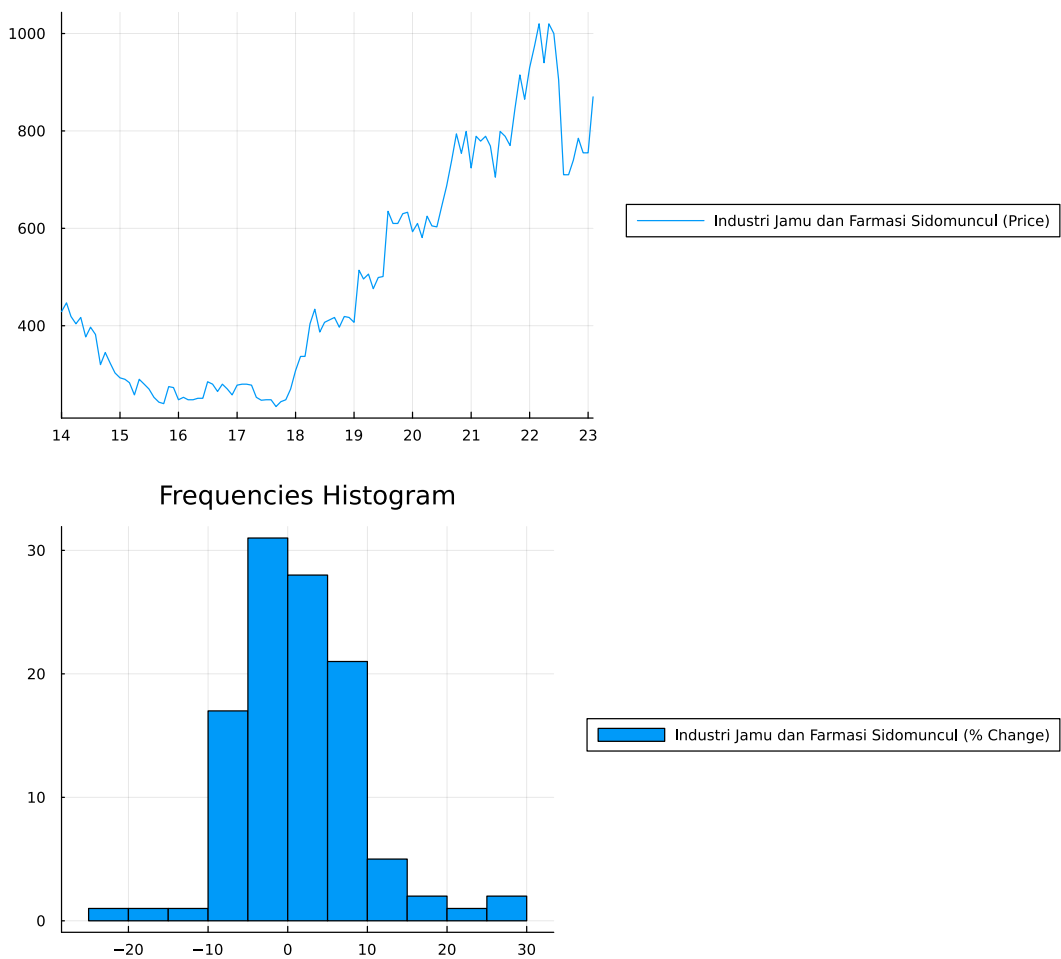
3 Chapter III: Commodities

Commodities are used as raw materials for industry.

We will show the price plot over time and the histogram of the change (in %) for these commodities:

1. Gold

2. Crude Oil WTI

3. Natural Gas

4. US Soybeans

```
[90]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filegold = "./csv/Gold Futures Historical Data.csv"

      dfgold = CSV.read(filegold, DataFrame)

      dfgold.Price .= parse.(Float64, replace.(dfgold.Price, "," => ""))
      dfgold[!,"Change %"] .= parse.(Float64, replace.(dfgold[!,"Change %"], "%" =>␣
       ↪""))

      dfgold.Dates = Date.(dfgold.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfgold.Dates)))
      DateTick = Dates.format.(tick_years, "y")
      xlimsgold = extrema([tick_years; dfgold.Dates])

      p1 = plot(dfgold.Dates, dfgold.Price, title="1975 - 2023 Data",
          xticks=(tick_years,DateTick), xlims=xlimsgold,
          label="Gold (Price)", xlabel="", ylabel="")
      p2 = histogram(dfgold.Date, dfgold[!,"Change %"], title="Frequencies Histogram",
          label="Gold (% Change)", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")
```
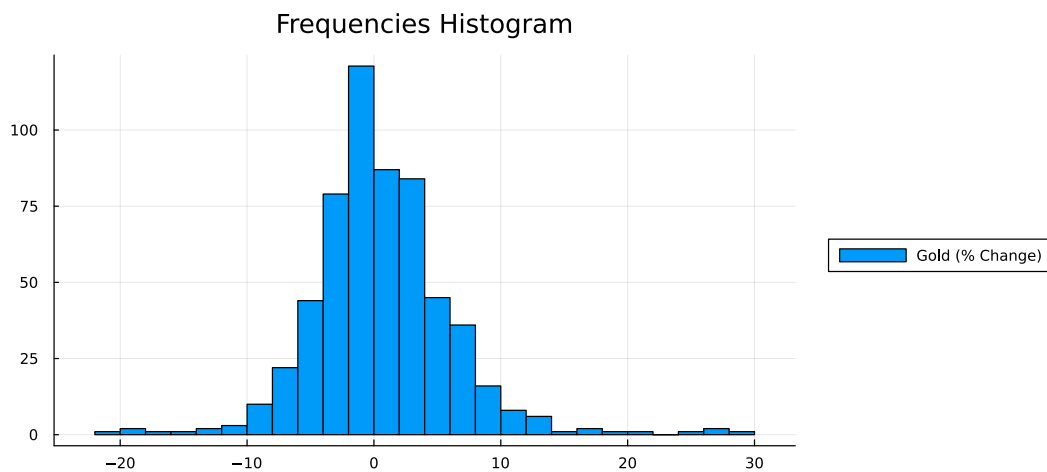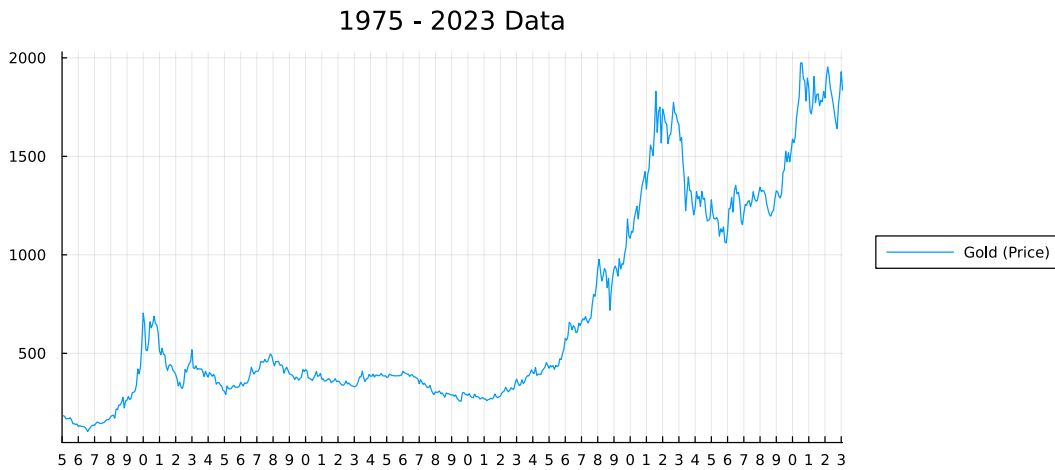
[90]:

1975 - 2023 Data

Frequencies Histogram


```julia
[89]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filecrudeoil = "./csv/Crude Oil WTI Futures Historical Data.csv"

      dfcrudeoil = CSV.read(filecrudeoil, DataFrame)

      dfcrudeoil[!,"Change %"] .= parse.(Float64, replace.(dfcrudeoil[!,"Change %"],␣
       ↪"%" => ""))

      dfcrudeoil.Dates = Date.(dfcrudeoil.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfcrudeoil.Dates)))
      DateTick = Dates.format.(tick_years, "y")
      xlimscrudeoil = extrema([tick_years; dfcrudeoil.Dates])

      p1 = plot(dfcrudeoil.Dates, dfcrudeoil.Price, title="1983 - 2023 Data",
          xticks=(tick_years,DateTick), xlims=xlimscrudeoil,
```
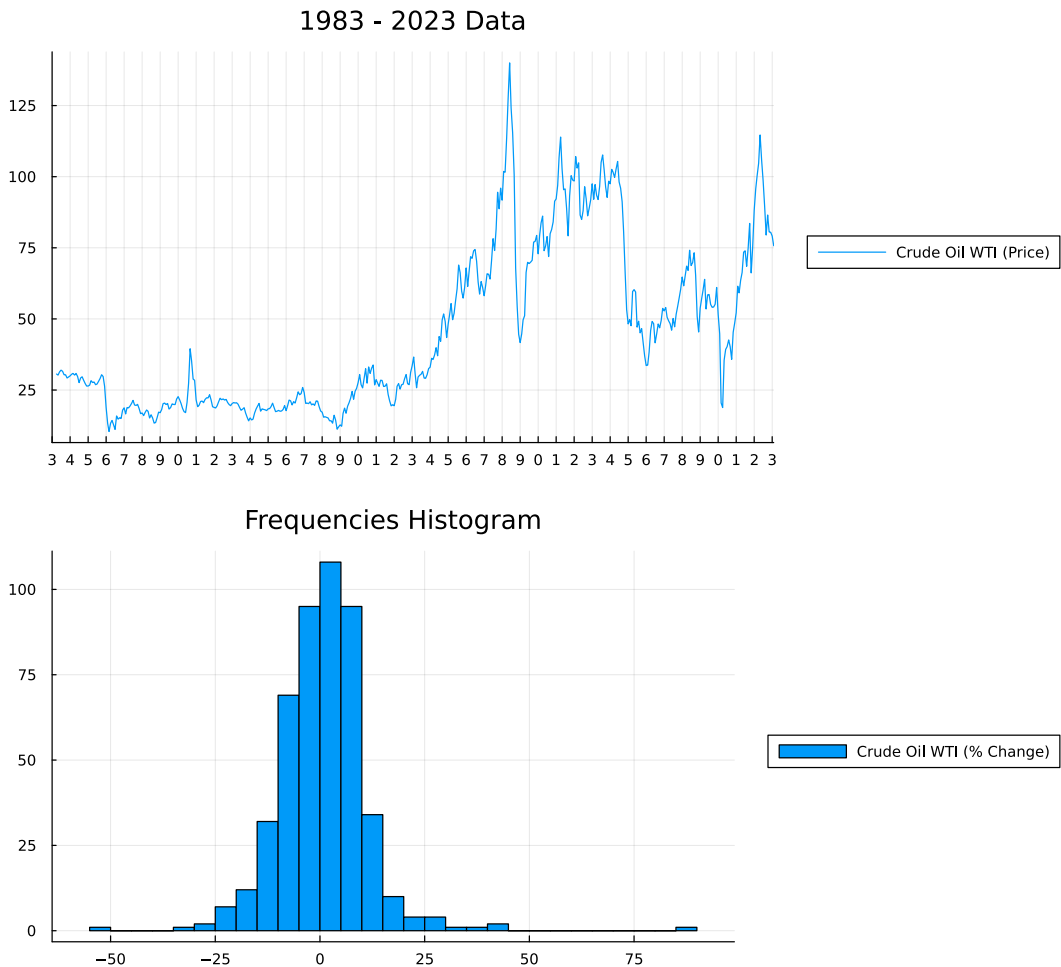
```
        label="Crude Oil WTI (Price)", xlabel="", ylabel="")
p2 = histogram(dfcrudeoil.Date, dfcrudeoil[!,"Change %"], title="Frequencies␣
  ↪Histogram",
        label="Crude Oil WTI (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
      legend=:outerright, left_margin=10mm, bottom_margin=5mm,
       xaxis = "", yaxis = "")
```

[89]:

[91]:
```julia
using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

filegas = "./csv/Natural Gas Futures Historical Data.csv"

dfgas = CSV.read(filegas, DataFrame)

dfgas[!,"Change %"] .= parse.(Float64, replace.(dfgas[!,"Change %"], "%" => ""))
```
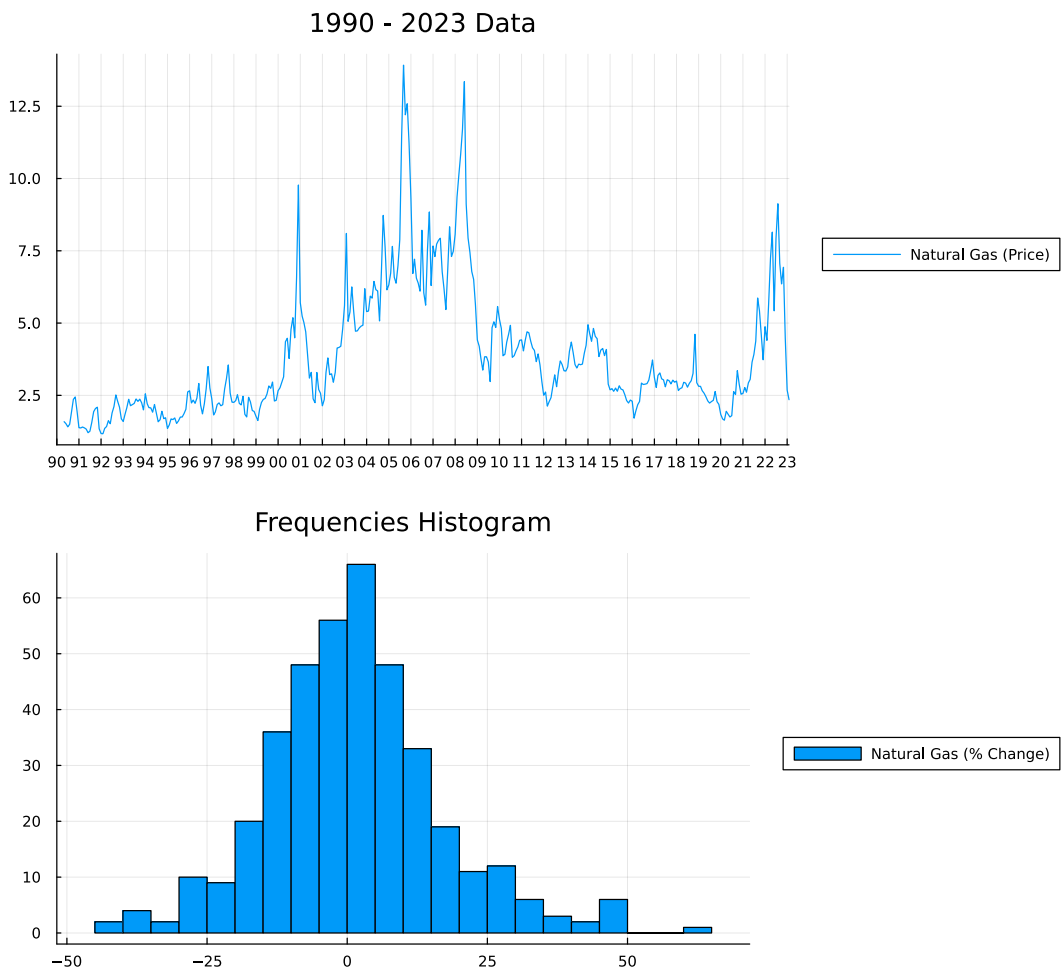
```
dfgas.Dates = Date.(dfgas.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfgas.Dates)))
DateTick = Dates.format.(tick_years, "yy")
xlimsgas = extrema([tick_years; dfgas.Dates])

p1 = plot(dfgas.Dates, dfgas.Price, title="1990 - 2023 Data",
    xticks=(tick_years,DateTick), xlims=xlimsgas,
    label="Natural Gas (Price)", xlabel="", ylabel="")
p2 = histogram(dfgas.Date, dfgas[!,"Change %"], title="Frequencies Histogram",
    label="Natural Gas (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```

[91]:

```
[93]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      fileussoybeans = "./csv/US Soybeans Futures Historical Data.csv"

      dfussoybeans = CSV.read(fileussoybeans, DataFrame)

      dfussoybeans.Price .= parse.(Float64, replace.(dfussoybeans.Price, "," => ""))
      dfussoybeans[!,"Change %"] .= parse.(Float64, replace.(dfussoybeans[!,"Change␣
       ↪%"], "%" => ""))

      dfussoybeans.Dates = Date.(dfussoybeans.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfussoybeans.Dates)))
      DateTick = Dates.format.(tick_years, "yy")
      xlimsussoybeans = extrema([tick_years; dfussoybeans.Dates])

      p1 = plot(dfussoybeans.Dates, dfussoybeans.Price, title="1990 - 2023 Data",
          xticks=(tick_years,DateTick), xlims=xlimsussoybeans,
          label="U.S. Soybeans (Price)", xlabel="", ylabel="")
      p2 = histogram(dfussoybeans.Date, dfussoybeans[!,"Change %"],␣
        ↪title="Frequencies Histogram",
          label="U.S. Soybeans (% Change)", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")

[93]:
```
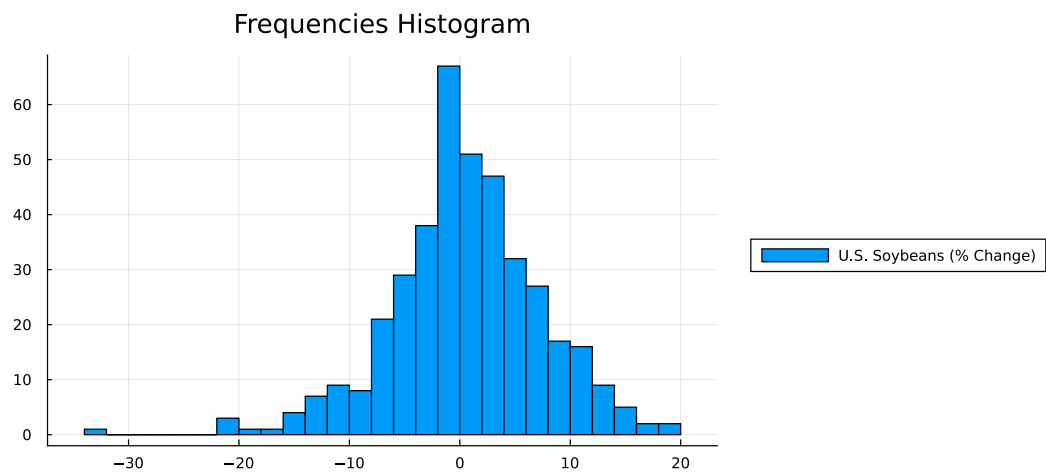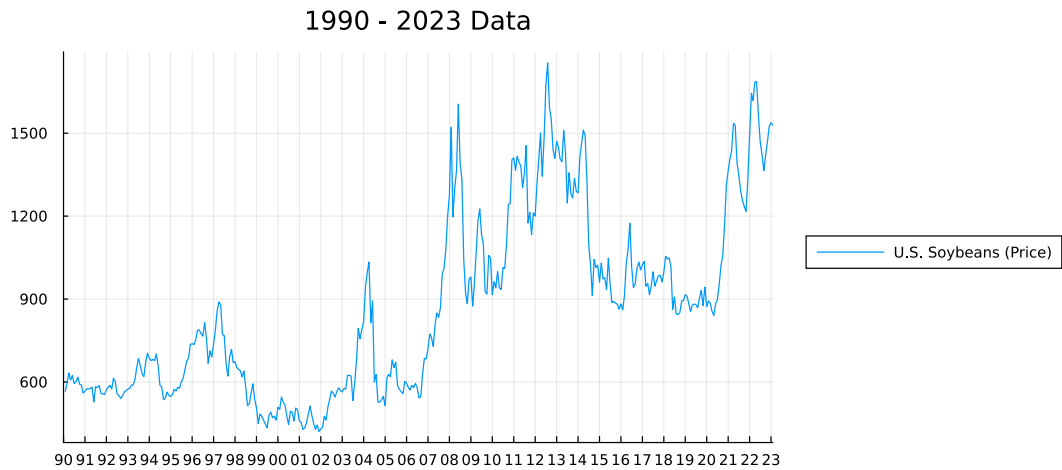
1990 - 2023 Data

U.S. Soybeans (Price)

Frequencies Histogram

U.S. Soybeans (% Change)

4 Chapter IV: Currencies

Currency, is a system of money in general use in a particular country at a specific time. We live in a world with lots of countries that use their own currencies, thus there is this currency rate.

We will show the price plot over time and the histogram of the change (in %) for these currencies rate:

1. EUR/USD
2. GBP/USD
3. USD/JPY
4. USD/IDR

```julia
[83]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      fileeurusd = "./csv/EUR_USD Historical Data.csv"
      filegbpusd = "./csv/GBP_USD Historical Data.csv"

      dfeurusd = CSV.read(fileeurusd, DataFrame)
      dfgbpusd = CSV.read(filegbpusd, DataFrame)

      dfeurusd.Dates = Date.(dfeurusd.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfeurusd.Dates)))
      DateTick = Dates.format.(tick_years, "y")
      xlimseurusd = extrema([tick_years; dfeurusd.Dates])

      dfgbpusd.Dates = Date.(dfgbpusd.Date, "mm/dd/yyyy")
      tick_years = Date.(unique(Dates.year.(dfgbpusd.Dates)))
      DateTick = Dates.format.(tick_years, "y")
      xlimsgbpusd = extrema([tick_years; dfgbpusd.Dates])

      p1 = plot(dfeurusd.Dates, dfeurusd.Price, title="1975-2023 Data",
          xticks=(tick_years,DateTick), xlims = xlimseurusd,
          label="EUR/USD", xlabel="", ylabel="")
      p2 = plot(dfgbpusd.Dates, dfgbpusd.Price, title="1971-2023 Data",
          xticks=(tick_years,DateTick), xlims = xlimsgbpusd,
          label="GBP/USD", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")
```
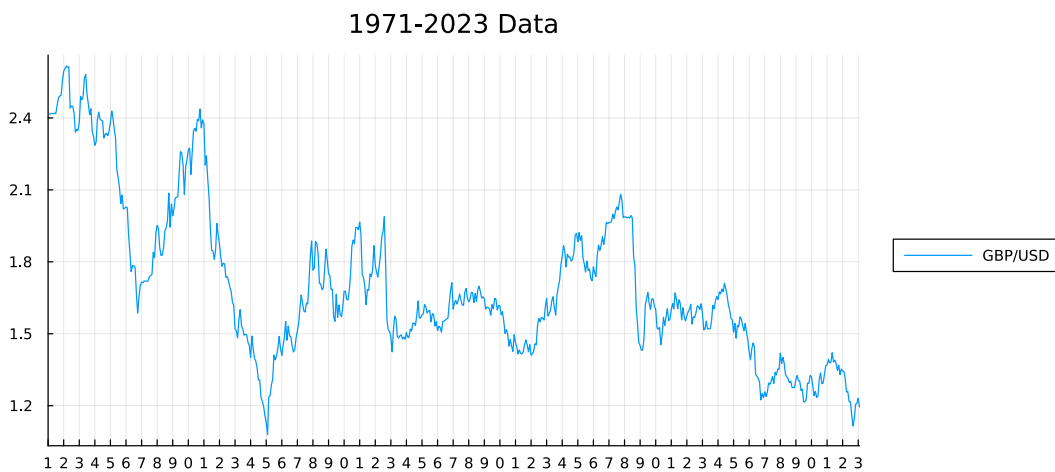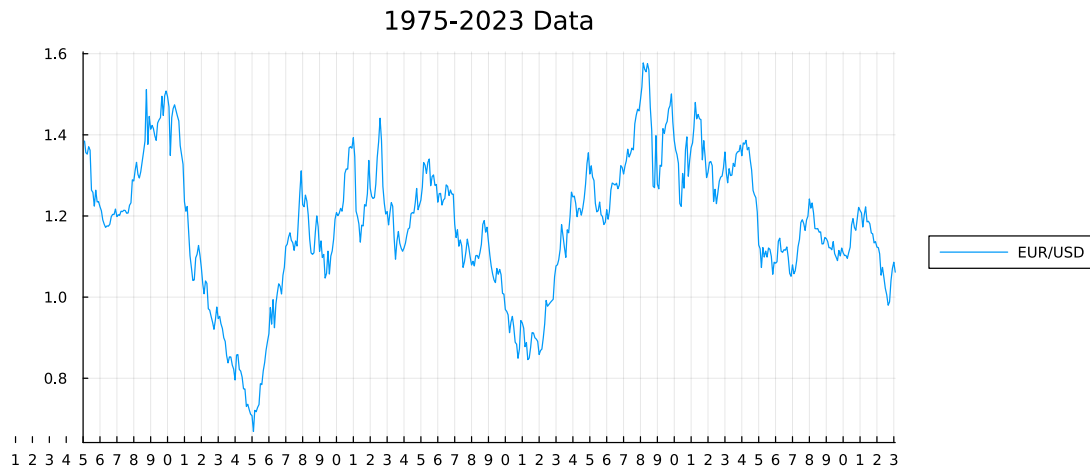
[83]:

1975-2023 Data

1971-2023 Data


```
[74]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      fileeurusd = "./csv/EUR_USD Historical Data.csv"
      filegbpusd = "./csv/GBP_USD Historical Data.csv"

      dfeurusd = CSV.read(fileeurusd, DataFrame)
      dfgbpusd = CSV.read(filegbpusd, DataFrame)

      dfeurusd[!,"Change %"] .= parse.(Float64, replace.(dfeurusd[!,"Change %"], "%"
       ↪=> ""))
      dfgbpusd[!,"Change %"] .= parse.(Float64, replace.(dfgbpusd[!,"Change %"], "%"
       ↪=> ""))

      p1 = histogram(dfeurusd.Date, dfeurusd[!,"Change %"], title="",
          label="EUR/USD (% Change)", xlabel="", ylabel="")
      p2 = histogram(dfgbpusd.Date, dfgbpusd[!,"Change %"], title="",
```
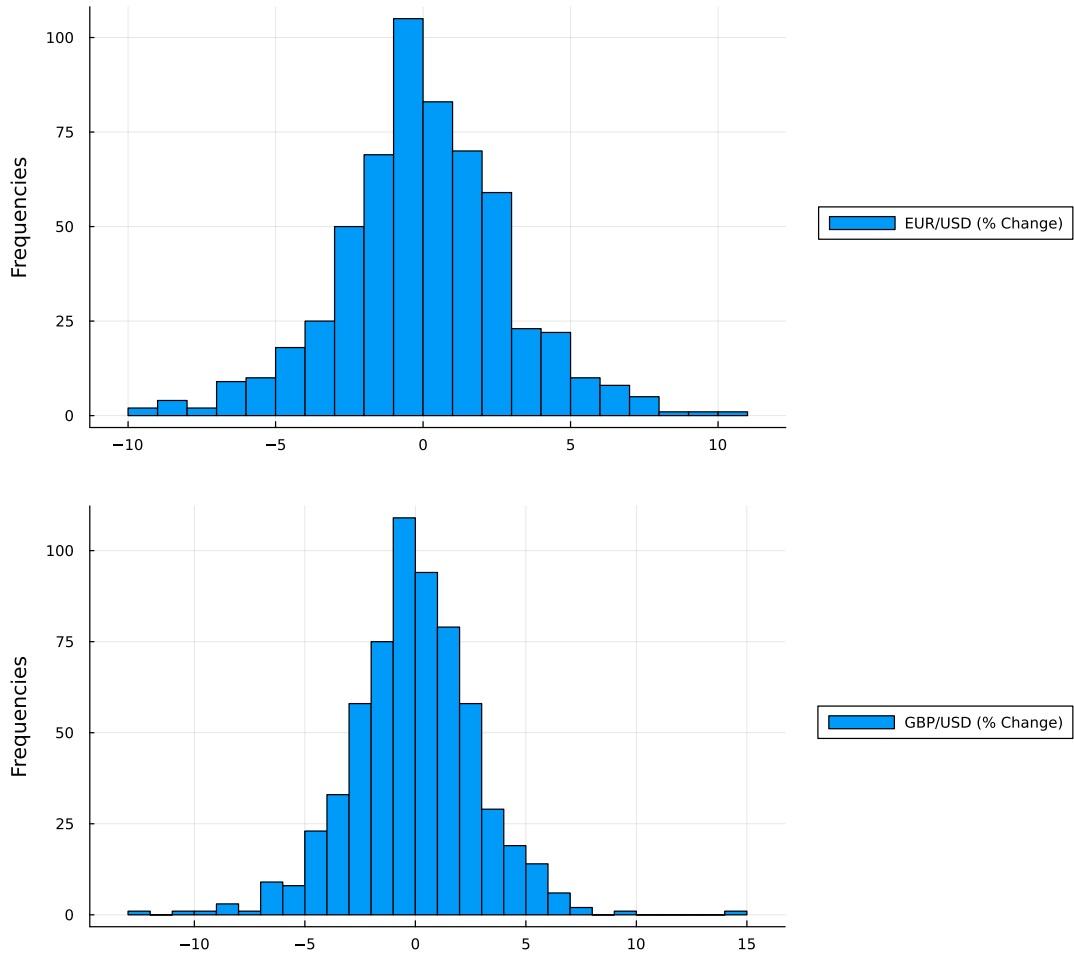
```
      label="GBP/USD (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
     legend=:outerright, left_margin=10mm, bottom_margin=5mm,
      xaxis = "", yaxis = "Frequencies")
```

[74]:

[82]:
```
using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

fileusdjpy = "./csv/USD_JPY Historical Data.csv"
fileusdidr = "./csv/USD_IDR Historical Data.csv"

dfusdjpy = CSV.read(fileusdjpy, DataFrame)
dfusdidr = CSV.read(fileusdidr, DataFrame)

dfusdjpy.Dates = Date.(dfusdjpy.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfusdjpy.Dates)))
```

```
DateTick = Dates.format.(tick_years, "y")
xlimsusdjpy = extrema([tick_years; dfusdjpy.Dates])

dfusdidr.Dates = Date.(dfusdidr.Date, "mm/dd/yyyy")
tick_years = Date.(unique(Dates.year.(dfusdidr.Dates)))
DateTick = Dates.format.(tick_years, "y")
xlimsusdidr = extrema([tick_years; dfusdidr.Dates])

p1 = plot(dfusdjpy.Dates, dfusdjpy.Price, title="1971-2023 Data",
    xticks=(tick_years,DateTick), xlims = xlimsusdjpy,
    label="USD/JPY", xlabel="", ylabel="")
p2 = plot(dfusdidr.Dates, dfusdidr.Price, title="1988-2023 Data",
    xticks=(tick_years,DateTick), xlims = xlimsusdidr,
    label="USD/IDR", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "")
```
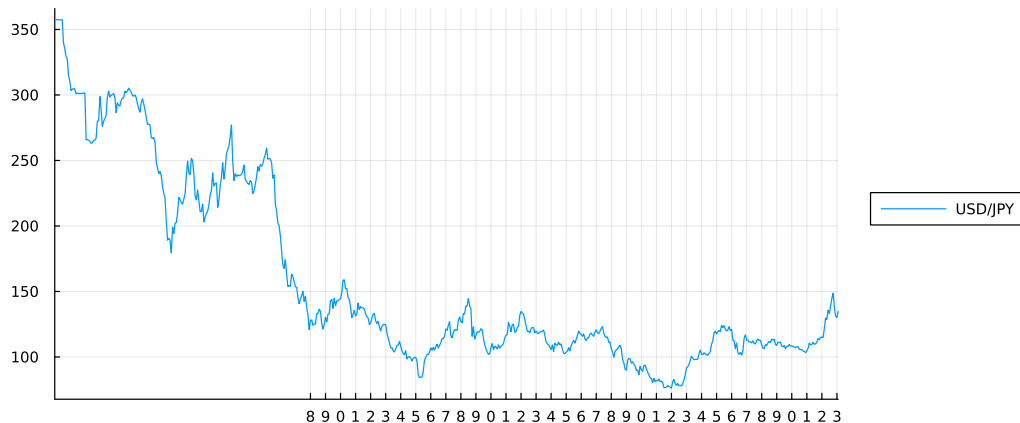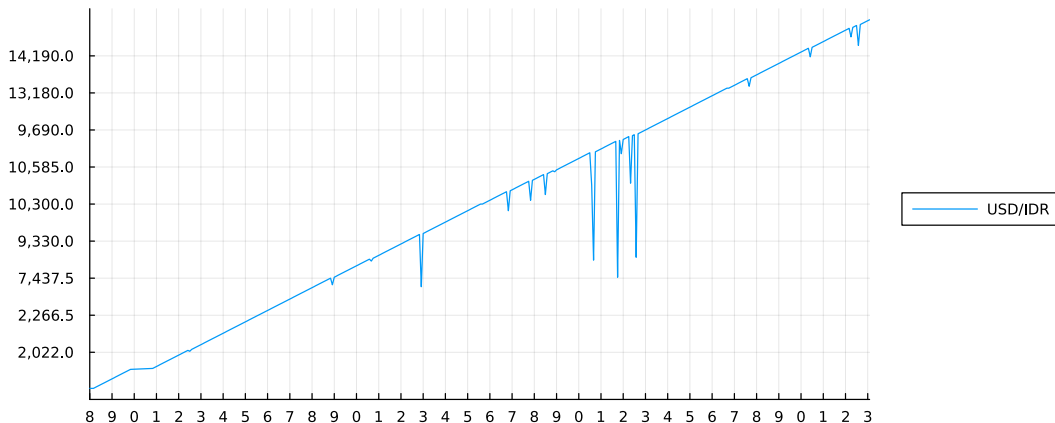
[82]:

35

```
[81]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      fileusdjpy = "./csv/USD_JPY Historical Data.csv"
      fileusdidr = "./csv/USD_IDR Historical Data.csv"

      dfusdjpy = CSV.read(fileusdjpy, DataFrame)
      dfusdidr = CSV.read(fileusdidr, DataFrame)

      dfusdjpy[!,"Change %"] .= parse.(Float64, replace.(dfusdjpy[!,"Change %"], "%"
       ↪=> ""))
      dfusdidr[!,"Change %"] .= parse.(Float64, replace.(dfusdidr[!,"Change %"], "%"
       ↪=> ""))

      p1 = histogram(dfusdjpy.Date, dfusdjpy[!,"Change %"], title="",
          label="USD/JPY (% Change)", xlabel="", ylabel="")
      p2 = histogram(dfusdidr.Date, dfusdidr[!,"Change %"], title="",
          label="USD/IDR (% Change)", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "Frequencies")
```
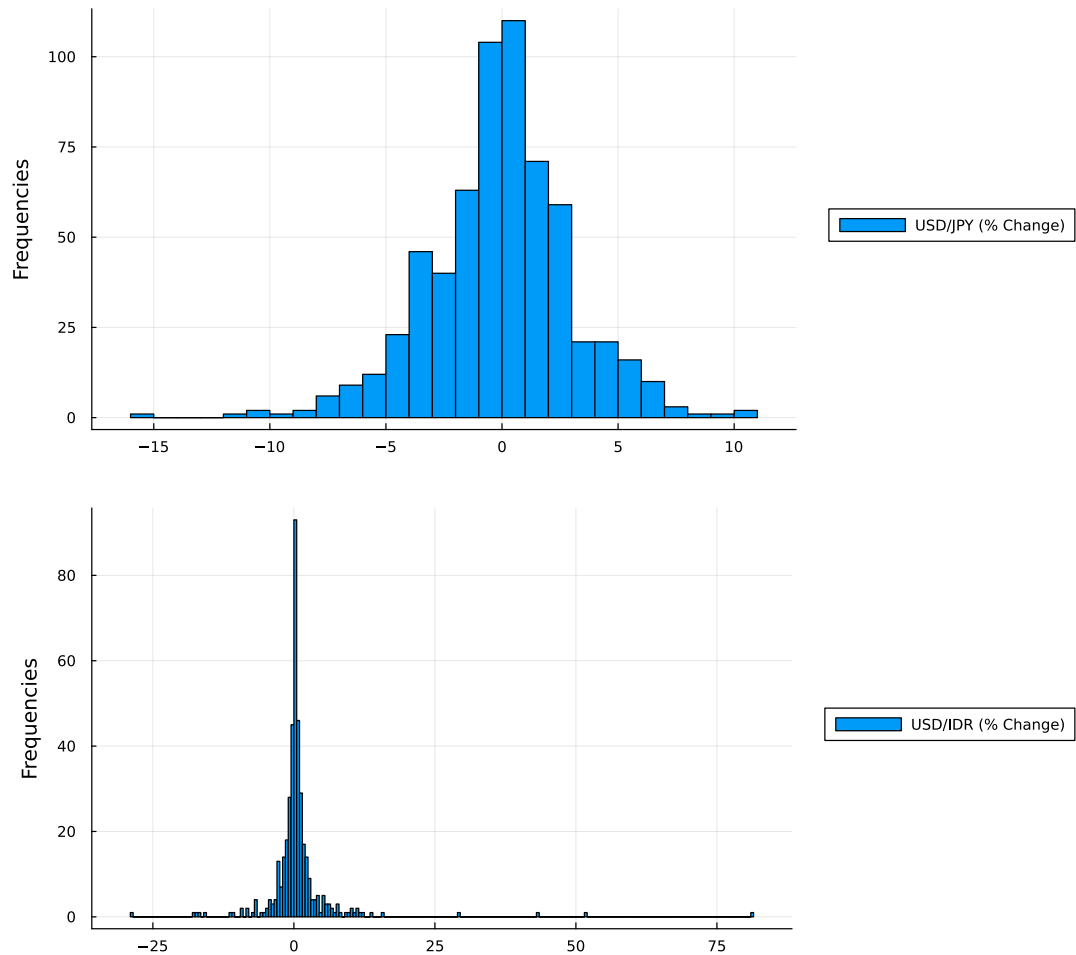
[81]:

5 Chapter V: United States Government Bond

A bond is a fixed-income investment that represents a loan made by an investor to a borrower, ususally corporate or governmental.

We will show the price plot over time and the histogram of the change (in %) for these bonds:

1. U.S. 3-Month Bond Yield

2. U.S. 5-Year Bond Yield

3. U.S. 10-Year Bond Yield

4. U.S. 30-Year Bond Yield

```
[65]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures
```

```
filebond3m = "./csv/United States 3-Month Bond Yield Historical Data.csv"
filebond5y = "./csv/United States 5-Year Bond Yield Historical Data.csv"

dfbond3m = CSV.read(filebond3m, DataFrame)
dfbond5y = CSV.read(filebond5y, DataFrame)

p1 = plot(dfbond3m.Date, dfbond3m.Price, title="",
    label="United States 3-Month Bond Yield", xlabel="", ylabel="")
p2 = plot(dfbond5y.Date, dfbond5y.Price, title="",
    label="United States 5-Year Bond Yield ", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "Yield")
```
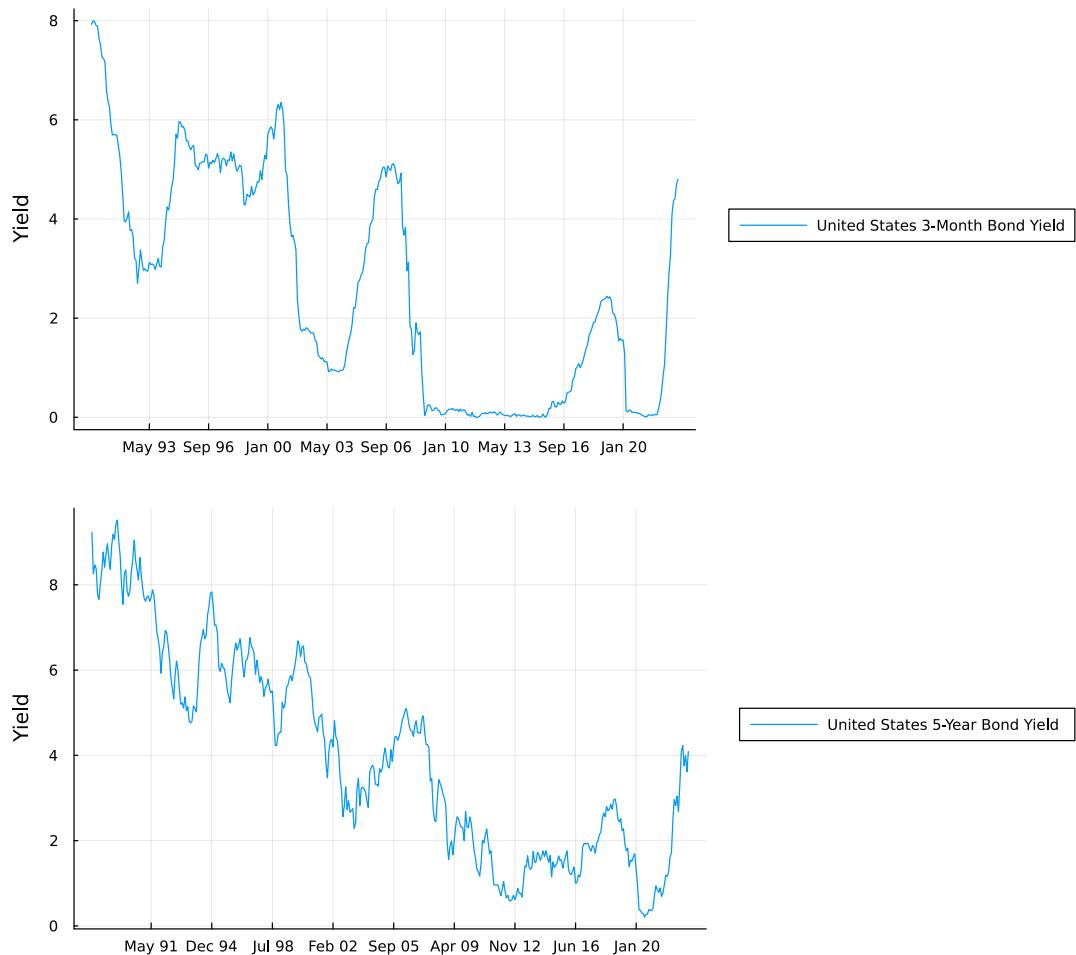
[65]:

```
[68]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

      filebond3m = "./csv/United States 3-Month Bond Yield Historical Data.csv"
      filebond5y = "./csv/United States 5-Year Bond Yield Historical Data.csv"

      dfbond3m = CSV.read(filebond3m, DataFrame)
      dfbond5y = CSV.read(filebond5y, DataFrame)

      dfbond3m[!,"Change %"] .= parse.(Float64, replace.(dfbond3m[!,"Change %"], "%"␣
       ↪=> ""))
      dfbond5y[!,"Change %"] .= parse.(Float64, replace.(dfbond5y[!,"Change %"], "%"␣
       ↪=> ""))

      p2 = histogram(dfbond3m.Date, dfbond3m[!,"Change %"], title="",
          label="United States 3-Month Bond Yield ", xlabel="", ylabel="")
      p2 = histogram(dfbond5y.Date, dfbond5y[!,"Change %"], title="Frequencies␣
       ↪Histogram",
          label="United States 5-Year Bond Yield ", xlabel="", ylabel="")

      plot(p1, p2, size=(900,800), layout = (2, 1),
          legend=:outerright, left_margin=10mm, bottom_margin=5mm,
           xaxis = "", yaxis = "")
```
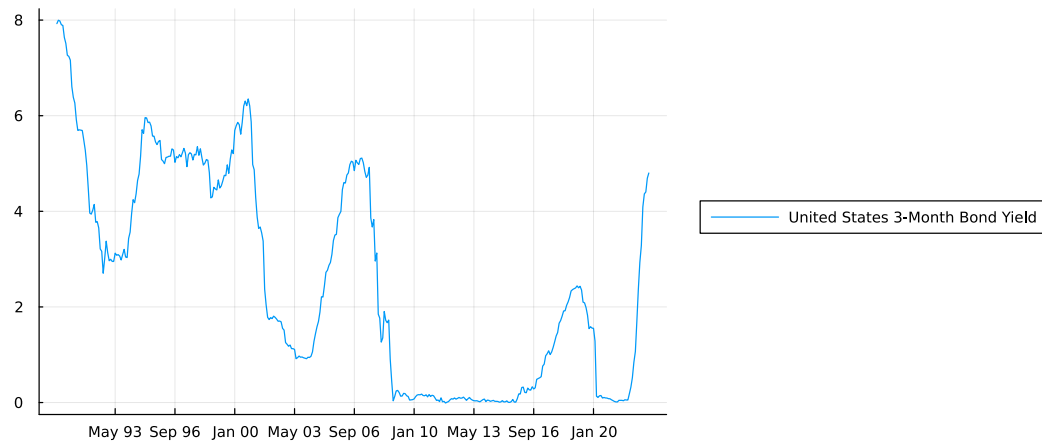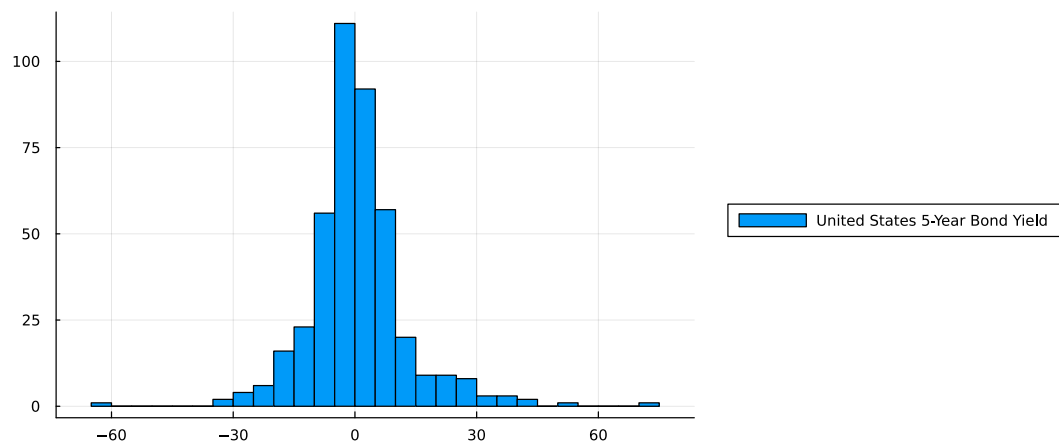
[68]:

Frequencies Histogram


```julia
[69]: using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

filebond10y = "./csv/United States 10-Year Bond Yield Historical Data.csv"
filebond30y = "./csv/United States 30-Year Bond Yield Historical Data.csv"

dfbond10y = CSV.read(filebond10y, DataFrame)
dfbond30y = CSV.read(filebond30y, DataFrame)

p1 = plot(dfbond10y.Date, dfbond10y.Price, title="",
    label="United States 10-Year Bond Yield ", xlabel="", ylabel="")
p2 = plot(dfbond30y.Date, dfbond30y.Price, title="",
    label="United States 30-Year Bond Yield ", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "Yield")
```

[69]:

[70]:
```julia
using CSV, Dates, DataFrames, Plots, Plots.PlotMeasures

filebond10y = "./csv/United States 10-Year Bond Yield Historical Data.csv"
filebond30y = "./csv/United States 30-Year Bond Yield Historical Data.csv"

dfbond10y = CSV.read(filebond10y, DataFrame)
dfbond30y = CSV.read(filebond30y, DataFrame)

dfbond10y[!,"Change %"] .= parse.(Float64, replace.(dfbond10y[!,"Change %"],
 ↪"%" => ""))
dfbond30y[!,"Change %"] .= parse.(Float64, replace.(dfbond30y[!,"Change %"],
 ↪"%" => ""))

p1 = histogram(dfbond10y.Date, dfbond10y[!,"Change %"], title="",
    label="United States 10-Year Bond Yield  (% Change)", xlabel="", ylabel="")
p2 = histogram(dfbond30y.Date, dfbond30y[!,"Change %"], title="",
```
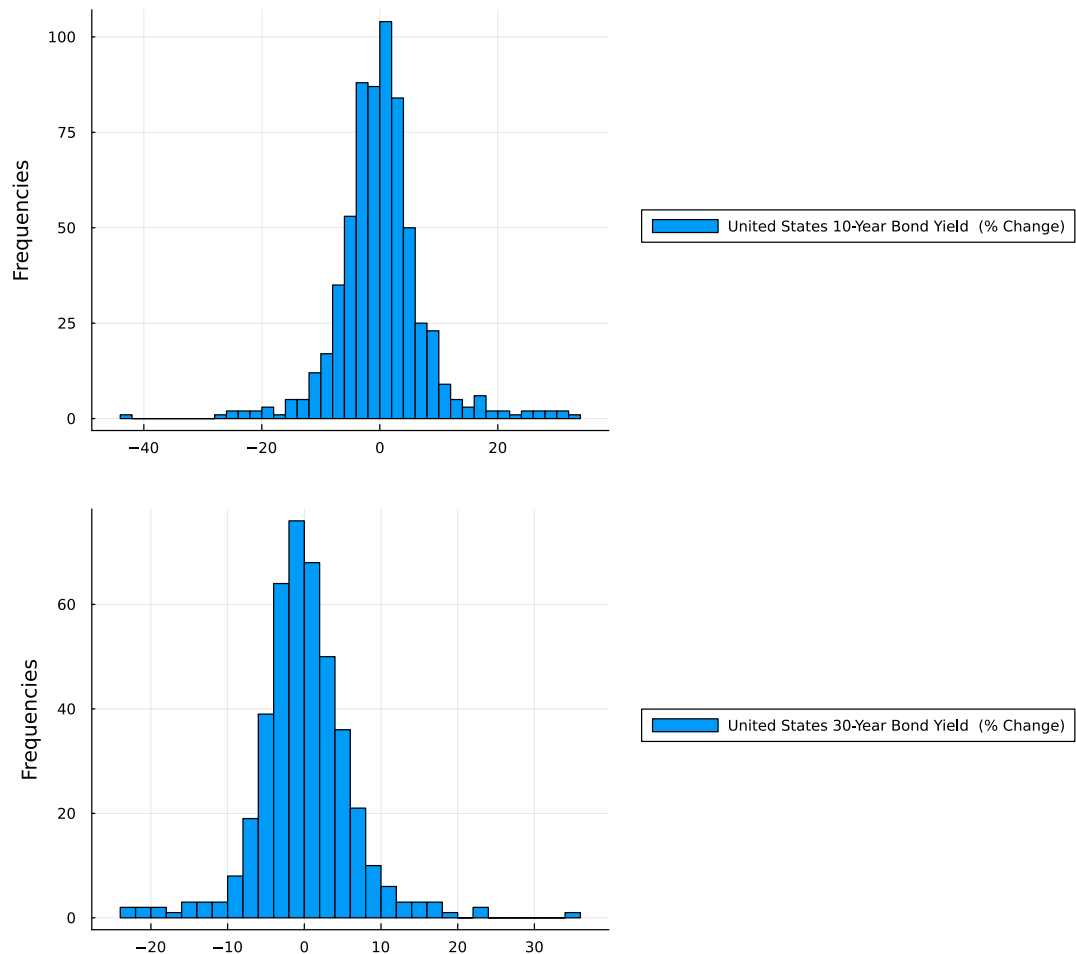
```
        label="United States 30-Year Bond Yield  (% Change)", xlabel="", ylabel="")

plot(p1, p2, size=(900,800), layout = (2, 1),
    legend=:outerright, left_margin=10mm, bottom_margin=5mm,
     xaxis = "", yaxis = "Frequencies")
```

[70]:

6 Appendix

[1]:
```
# To activate project designated for GK BoginyFreya Bank
# Create an empty folder named csv to store the csv files that is in one folder␣
 ↪with this notebook
import Pkg
Pkg.activate(".")
```

```
    Activating project at
`~/LasthrimProjection/JupyterLab/Statistics`
```

```
[ ]: ]st
```

Source of Learning:

1. Julia Discourse

2. StackOverFlow

3. Graham, Benjamin. The Intelligent Investor 4th Edition

```
[ ]:
```