In [69]:
```julia
using Pkg
Pkg.add("DataFrames")
# Pkg.add("ZipFile")
using DataFrames
# using InfoZIP
using ZipFile
using PyCall
using CSV
# Pkg.add("Plots")
using Plots
# Pkg.add("StatsPlots");
using StatsPlots
using Statistics
```

    Resolving package versions...
  No Changes to `C:\Users\hakan\.julia\environments\v1.8\Project.toml`
  No Changes to `C:\Users\hakan\.julia\environments\v1.8\Manifest.toml`

In [6]:
```julia
url = "https://www.borsaistanbul.com/datum/PayEndeksleri.zip"
download(url, "PayEndeksleri.zip")
```

"PayEndeksleri.zip"

In [9]:
```julia
# unzip using python ZipFile
@pyimport zipfile

py"""
import zipfile
with zipfile.ZipFile("PayEndeksleri.zip", "r") as zip_ref:
    zip_ref.extractall("./outputs")
"""
```

In [81]:
```julia
df = CSV.read("outputs/FiyatEndeksleri_PriceIndices.csv", DataFrame)

first(df, 5)
```

5×10 DataFrame

Row	KAYIT SIRA	ENDEKS KODU	ENDEKSLER	ENDEKSLERIN INGILIZCE ISIMLERI	KUR TURU	TARIH	KAPANIS	ACILIS	EN DUSUK
	String7	String15	String	String	String15	String15	String15	String15	String15
1	ORDER	INDEX CODE	INDEX NAMES IN TURKISH	INDICES	CURRENCY TYPE	DATE	CLOSING VALUE	OPEN VALUE	LOWEST VALUE
2	1	XU100	BIST 100	BIST 100	TRY	06/01/2023	5341.96	5120.96	4961.31
3	2	XU100_CFNPTLUS	BIST 100 (ABD DOLARI)	BIST 100 (USD)	USD	06/01/2023	1657.91	1657.91	1657.91
4	3	XU100_CFNPTLER	BIST 100 (EURO)	BIST 100 (EURO)	EUR	06/01/2023	1848.96	1848.96	1848.96
5	4	XU050	BIST 50	BIST 50	TRY	06/01/2023	4735.02	4543.62	4407.23

In [82]:
```julia
# delete first row, which is not data
```

```
delete!(df, 1)

# rename columns to ORDER      INDEX CODE      INDEX NAMES IN TURKISH  INDICES CURRENCY 1
df = rename(df, [:order, :index_code, :index_names_in_turkish, :indices, :currency_type, :
```

216×10 DataFrame   *191 rows omitted*

Row	order	index_code	index_names_in_turkish	indices	currency_type	date	closing_value	ope
	String7	String15	String	String	String15	String15	String15	Stri
1	1	XU100	BIST 100	BIST 100	TRY	06/01/2023	5341.96	512
2	2	XU100_CFNPTLUS	BIST 100 (ABD DOLARI)	BIST 100 (USD)	USD	06/01/2023	1657.91	165
3	3	XU100_CFNPTLER	BIST 100 (EURO)	BIST 100 (EURO)	EUR	06/01/2023	1848.96	184
4	4	XU050	BIST 50	BIST 50	TRY	06/01/2023	4735.02	454
5	5	XU050_CFNPTLUS	BIST 50 (ABD DOLARI)	BIST 50 (USD)	USD	06/01/2023	1469.54	146
6	6	XU050_CFNPTLER	BIST 50 (EURO)	BIST 50 (EURO)	EUR	06/01/2023	1638.88	163
7	7	XU030	BIST 30	BIST 30	TRY	06/01/2023	5799.09	556
8	8	XU030_CFNPTLUS	BIST 30 (ABD DOLARI)	BIST 30 (USD)	USD	06/01/2023	1799.78	179
9	9	XU030_CFNPTLER	BIST 30 (EURO)	BIST 30 (EURO)	EUR	06/01/2023	2007.18	200
10	10	XLBNK	BIST LIKIT BANKA	BIST LIQUID BANKS	TRY	06/01/2023	4234.95	408
11	11	XLBNK_CFNPTLUS	BIST LIKIT BANKA (ABD DOLARI)	BIST LIQUID BANKS (USD)	USD	06/01/2023	1314.34	131
12	12	XLBNK_CFNPTLER	BIST LIKIT BANKA (EURO)	BIST LIQUID BANKS (EURO)	EUR	06/01/2023	1465.8	146
13	13	X10XB	BIST BANKA DISI LIKIT 10	BIST LIQUID 10 EX BANKS	TRY	06/01/2023	7262.47	694
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
205	205	XSKOC	BIST KOCAELI	BIST KOCAELI	TRY	06/01/2023	16394.27	156
206	206	XSKOC_CFNPTLUS	BIST KOCAELI (ABD DOLARI)	BIST KOCAELI (USD)	USD	06/01/2023	5088.05	508
207	207	XSKOC_CFNPTLER	BIST KOCAELI (EURO)	BIST KOCAELI (EURO)	EUR	06/01/2023	5674.38	567
208	208	XSKON	BIST KONYA	BIST KONYA	TRY	06/01/2023	7759.39	754

Row	order	index_code	index_names_in_turkish	indices	currency_type	date	closing_value	ope
	String7	String15	String	String	String15	String15	String15	Stri
209	209	XSKON_CFNPTLUS	BIST KONYA (ABD DOLARI)	BIST KONYA (USD)	USD	06/01/2023	2408.17	240
210	210	XSKON_CFNPTLER	BIST KONYA (EURO)	BIST KONYA (EURO)	EUR	06/01/2023	2685.68	268
211	211	XSMNS	BIST MANISA	BIST MANISA	TRY	06/01/2023	3320	317
212	212	XSMNS_CFNPTLUS	BIST MANISA (ABD DOLARI)	BIST MANISA (USD)	USD	06/01/2023	1030.38	103
213	213	XSMNS_CFNPTLER	BIST MANISA (EURO)	BIST MANISA (EURO)	EUR	06/01/2023	1149.12	114
214	214	XSTKR	BIST TEKIRDAG	BIST TEKIRDAG	TRY	06/01/2023	26783.5	257
215	215	XSTKR_CFNPTLUS	BIST TEKIRDAG (ABD DOLARI)	BIST TEKIRDAG (USD)	USD	06/01/2023	8312.4	831
216	216	XSTKR_CFNPTLER	BIST TEKIRDAG (EURO)	BIST TEKIRDAG (EURO)	EUR	06/01/2023	9270.29	927

In [83]:

```julia
#remove index_names_in_turkish
df = select!(df, Not(:index_names_in_turkish))

# convert closing_value, open_value, lowest_value, highest_value to Float64
convert = [:closing_value, :open_value, :lowest_value, :highest_value]
for i in convert
    df[!, i] = parse.(Float64, df[!, i])
end
```

In [99]:

```julia
# calculate outliers

# calculate mean
br = mean(df.open_value)

# calculate standard deviation
aq = std(df.open_value)

# calculate cut-off
cut_off = aq * 3

# calculate lower and upper bound values

lower, upper = br - cut_off, br + cut_off

# identify outliers
outliers = filter(row -> row.open_value < lower || row.open_value > upper, df)

# remove outliers
df = filter(row -> row.open_value >= lower && row.open_value <= upper, df)
```

```
# put open_values into a boxplot, horizontal

boxplot(df.open_value, title="Open Values", ylabel="Open Value", xlabel="Open Value", orie
```

Open Values