MEDICAL PROPERTIES TRUST

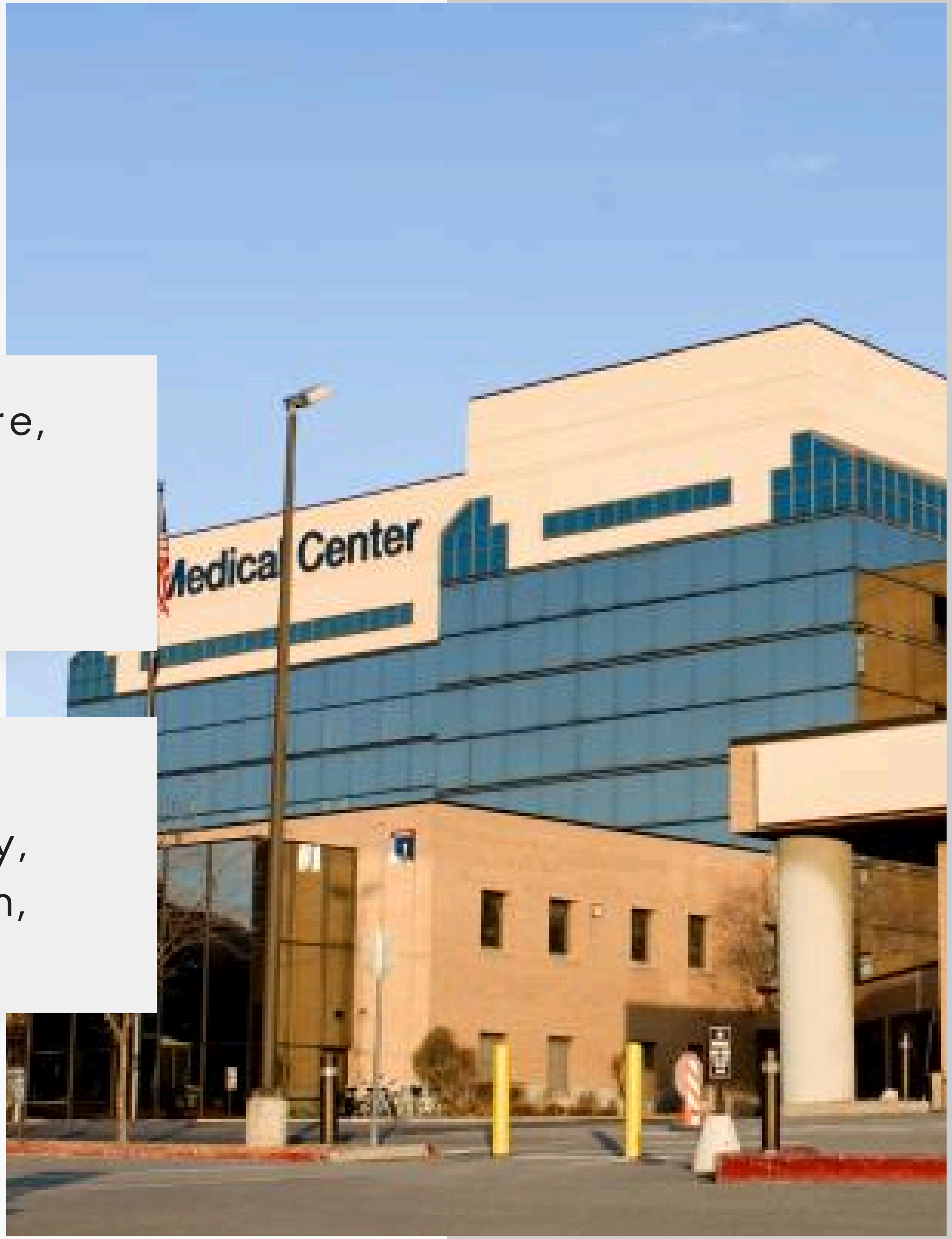
WWW.MEDICALPROPERTIESTRUST.COM

VERONIKA TITARCHUK

ABOUT THE COMPANY

Investing into existing hospitals (accute care, rehabilitation, long term accute care, etc.)
New developments (Construction of new and/or replacement hospitals)

439 Properties, 43,000 Licensed Beds, 9 Countries (Colombia, Finland, Germany, Italy, Portugal, Spain, Switzerland, United Kingdom, United States), 54 Tenant Relationshipd

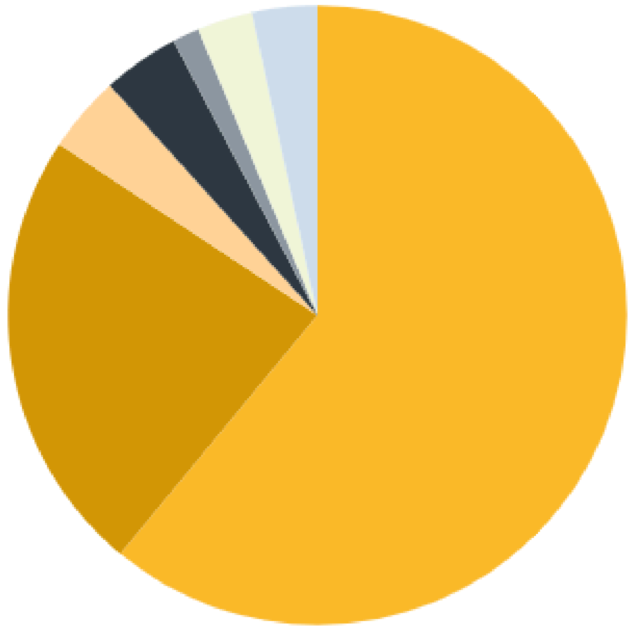


ABOUT THE COMPANY

WHO WE ARE

- 2nd largest non-governmental owner of hospitals in the world
- Experienced in unlocking the value of hospital real estate for growth
- Preferred by top operators around the globe

GLOBAL PORTFOLIO MIX*



61.0%	United States
23.3%	United Kingdom
4.0%	Switzerland
4.0%	Germany
1.4%	Spain
2.9%	Other Countries
3.4%	Other

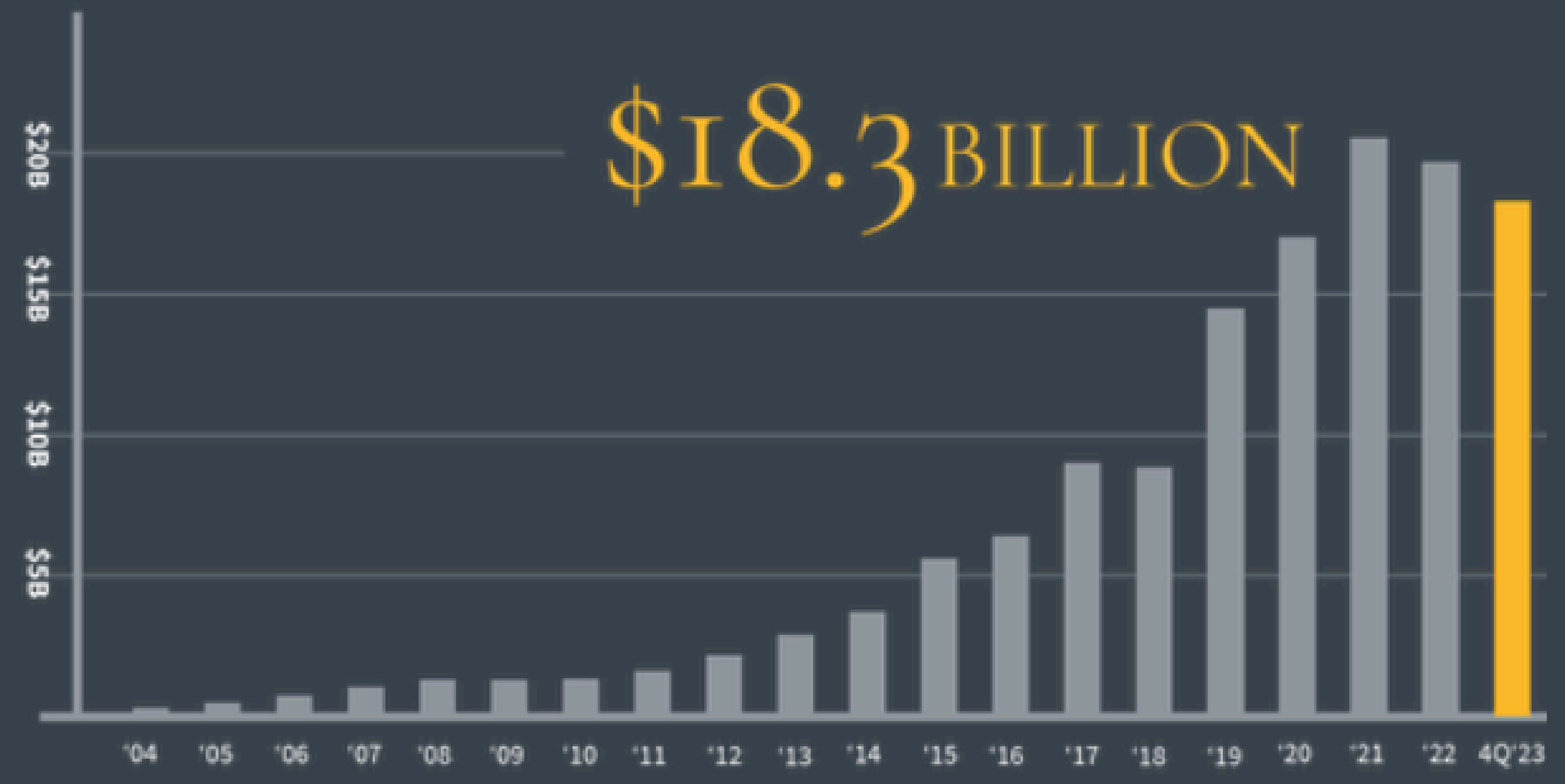
QUICK FACTS

ESTABLISHED
2003

IPO ON NYSE
2005

COMPOUND ANNUAL GROWTH
21% compound annual growth since year end 2012 which coincides with MPT's international expansion

GROWTH SINCE INCEPTION: TOTAL ASSETS (4Q 2023)[1]



01

EXPLORATORY DATA ANALYSIS

Ploting the time series
Decomposing
ACF and PACF plots

02

SATIONARITY

Since the data is not stationary right away, I will apply absic techniques to reach stationarity

03

MODELS

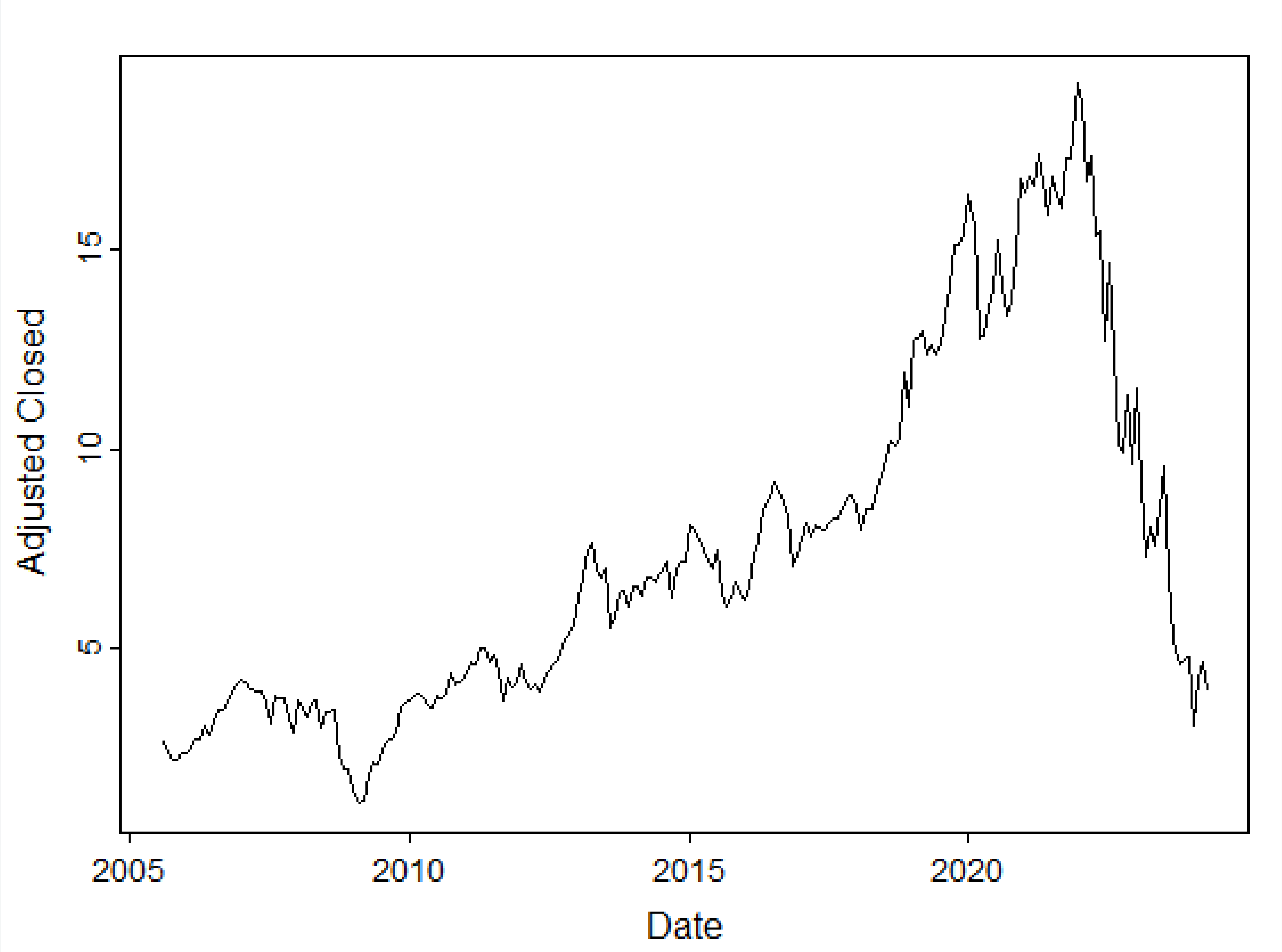
Applying models such as Seasonal ARIMA, GARCH

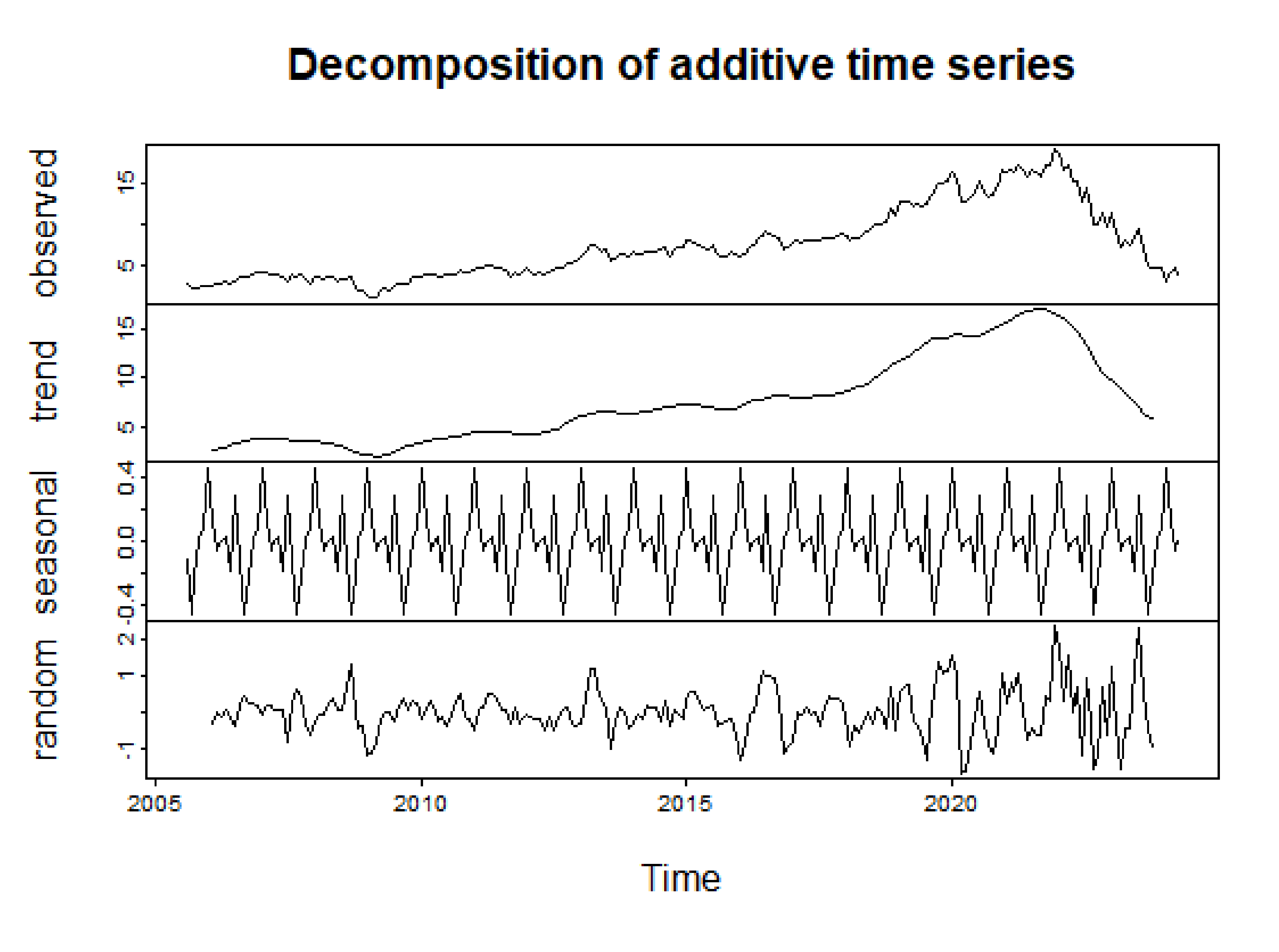
04

PREDICTION

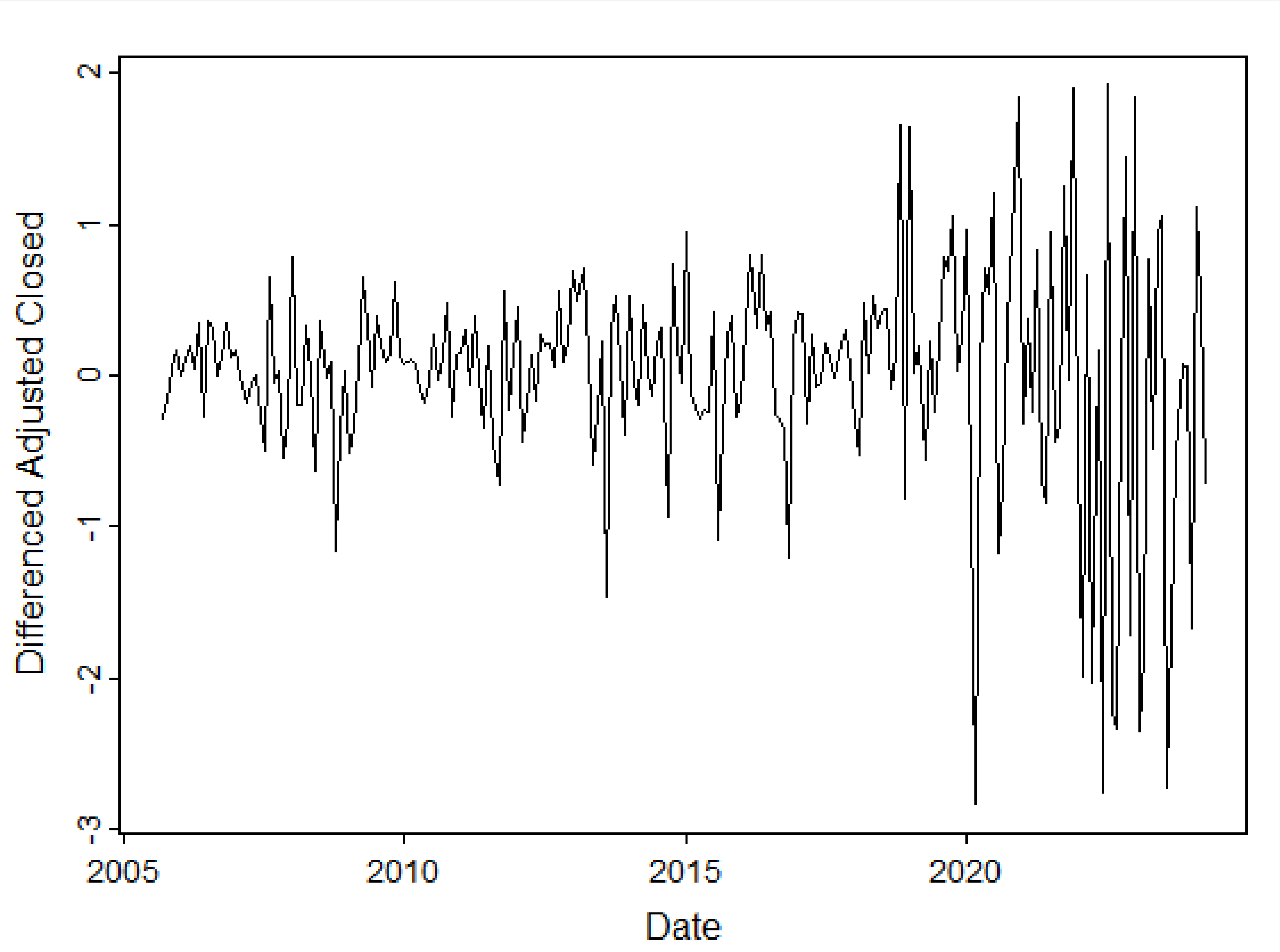
Combining results from different models to create a reasonable predictions

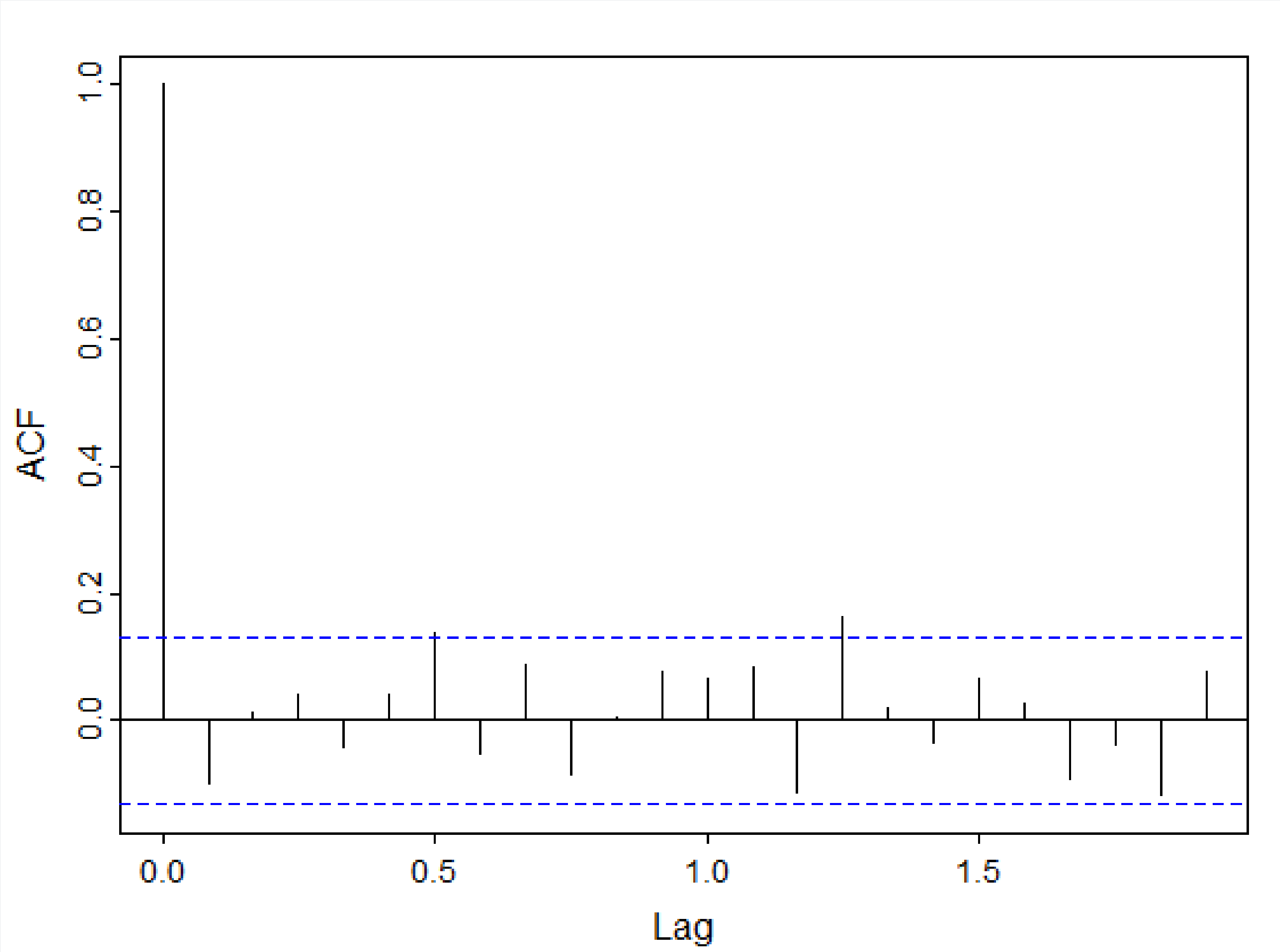
EXPLORATORY DATA ANALYSIS





EXPLORATORY DATA ANALYSIS





STATIONARITY

```
> adf.test(ts_mpw)

        Augmented Dickey-Fuller Test

data:  ts_mpw
Dickey-Fuller = -0.9046, Lag order = 6, p-value = 0.9511
alternative hypothesis: stationary
```

The original series is not stationary

```
> adf.test(diff(ts_mpw))

        Augmented Dickey-Fuller Test

data:  diff(ts_mpw)
Dickey-Fuller = -5.0238, Lag order = 6, p-value = 0.01
alternative hypothesis: stationary
```

The differenced series is stationary

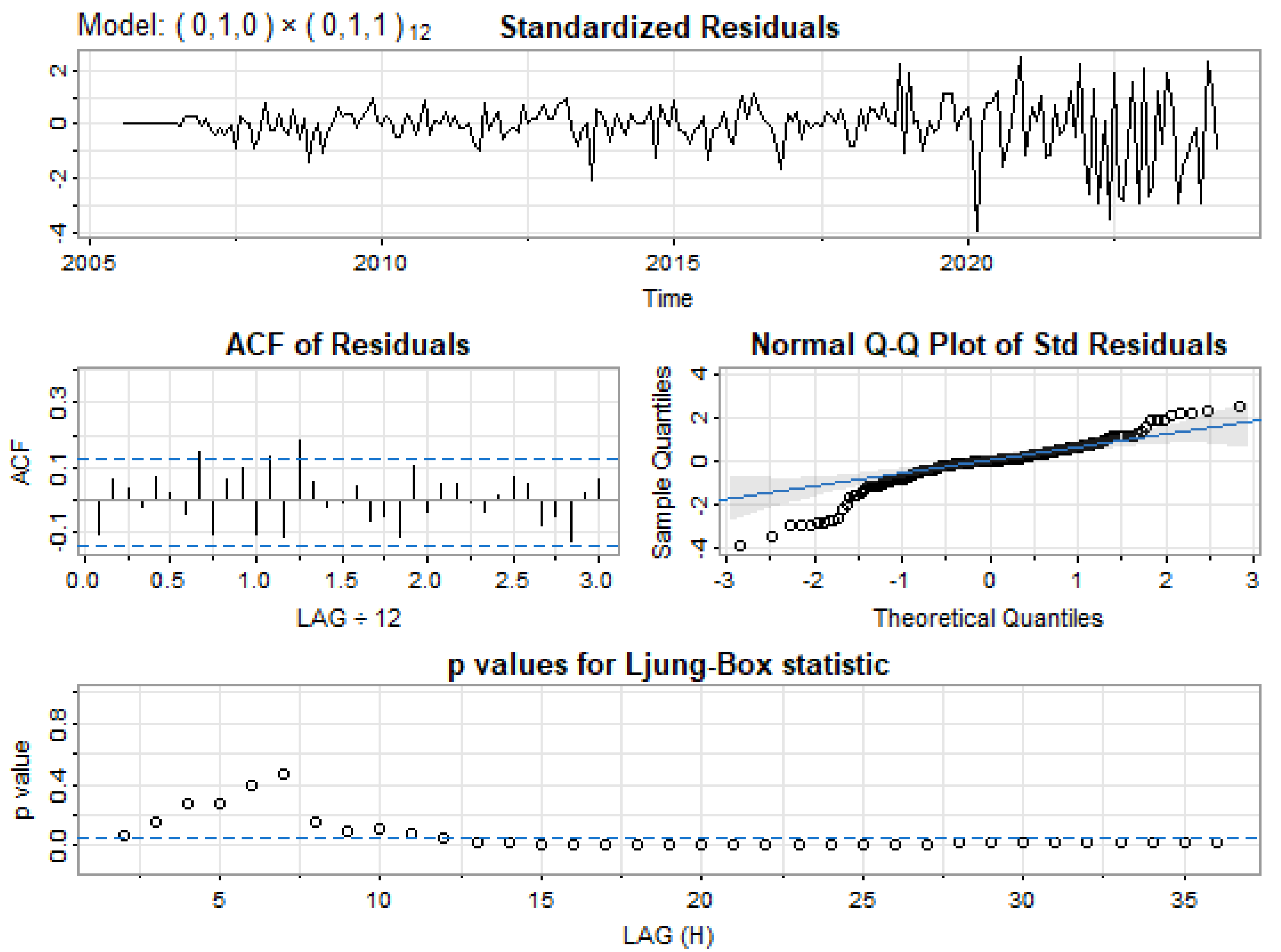
MODEL SELECTION

```
> auto.arima(ts_mpw)
Series: ts_mpw
ARIMA(0,1,0)

sigma^2 = 0.5648:  log likelihood = -253.85
AIC=509.7   AICc=509.72   BIC=513.11
```

We can see that auto.arima function did not give us the desired outcome, since it does not have a seasonal part. So I used the function that we learned from the class, and it gave a better model

```
> get.best.arima(ts_mpw,
+                               maxord=c(2,2,2,2,2,2))
[[1]]
[1] 492.6933

[[2]]

Call:
arima(x = x.ts, order = c(p, d, q), seasonal = list(order = c(P, D, Q), frequency(x.ts)),
    method = "CSS")

Coefficients:
         sma1
      -0.8862
s.e.   0.0404

sigma^2 estimated as 0.5804:  part log likelihood = -243.14

[[3]]
[1] 0 1 0 0 1 1
```

SARIMA FIT

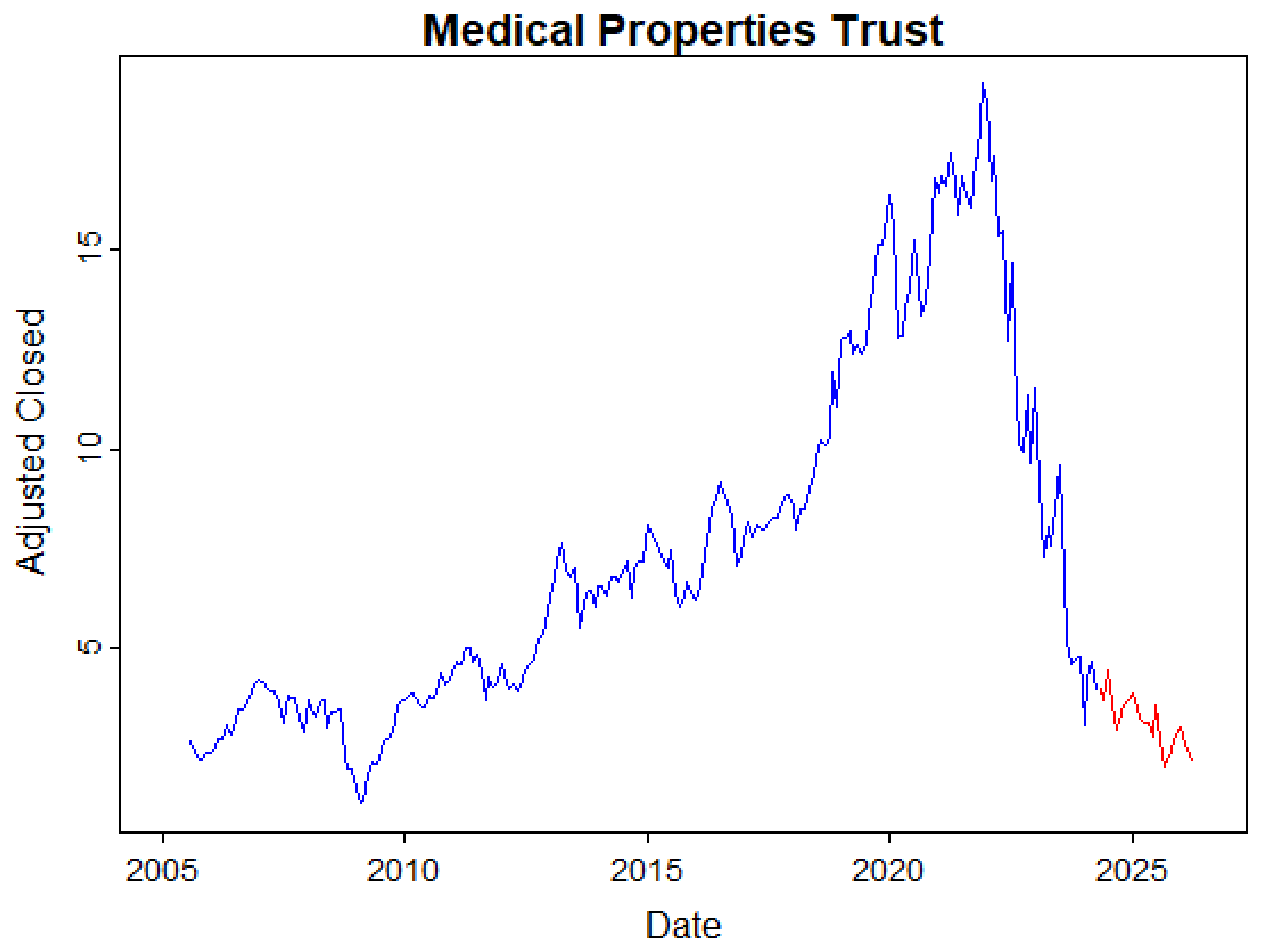


Model: (0,1,0) × (0,1,1) 12
Standardized Residuals
Time
ACF of Residuals
ACF
LAG ÷ 12
Normal Q-Q Plot of Std Residuals
Sample Quantiles
Theoretical Quantiles
p values for Ljung-Box statistic
p value
LAG (H)

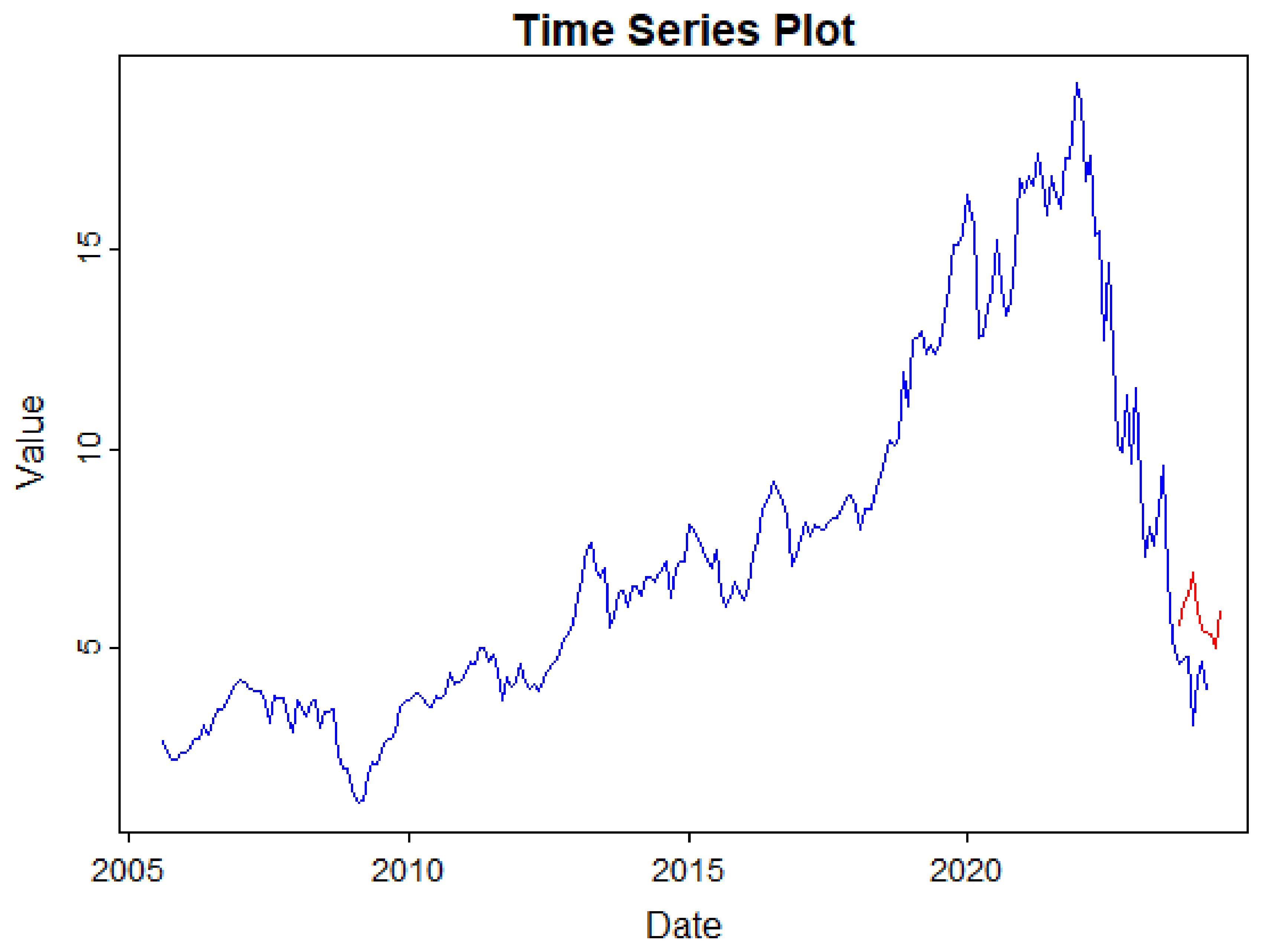
WORKING WITH THE MODEL

```
mpw_arima <- sarima(ts_mpw, p = 0, d = 1, q = 0, P = 0, D = 1, Q = 1, S = 12)
sarima_residuals <- mpw_arima$fit$residuals

#garch
garch_spec <- ugarchspec(variance.model = list(model = "sGARCH", garchOrder = c(1, 1)),
                         mean.model = list(armaOrder = c(0, 0), include.mean = FALSE),
                         distribution.model = "std")
garch_fit <- ugarchfit(data = sarima_residuals, spec = garch_spec)
summary(garch_fit)
```

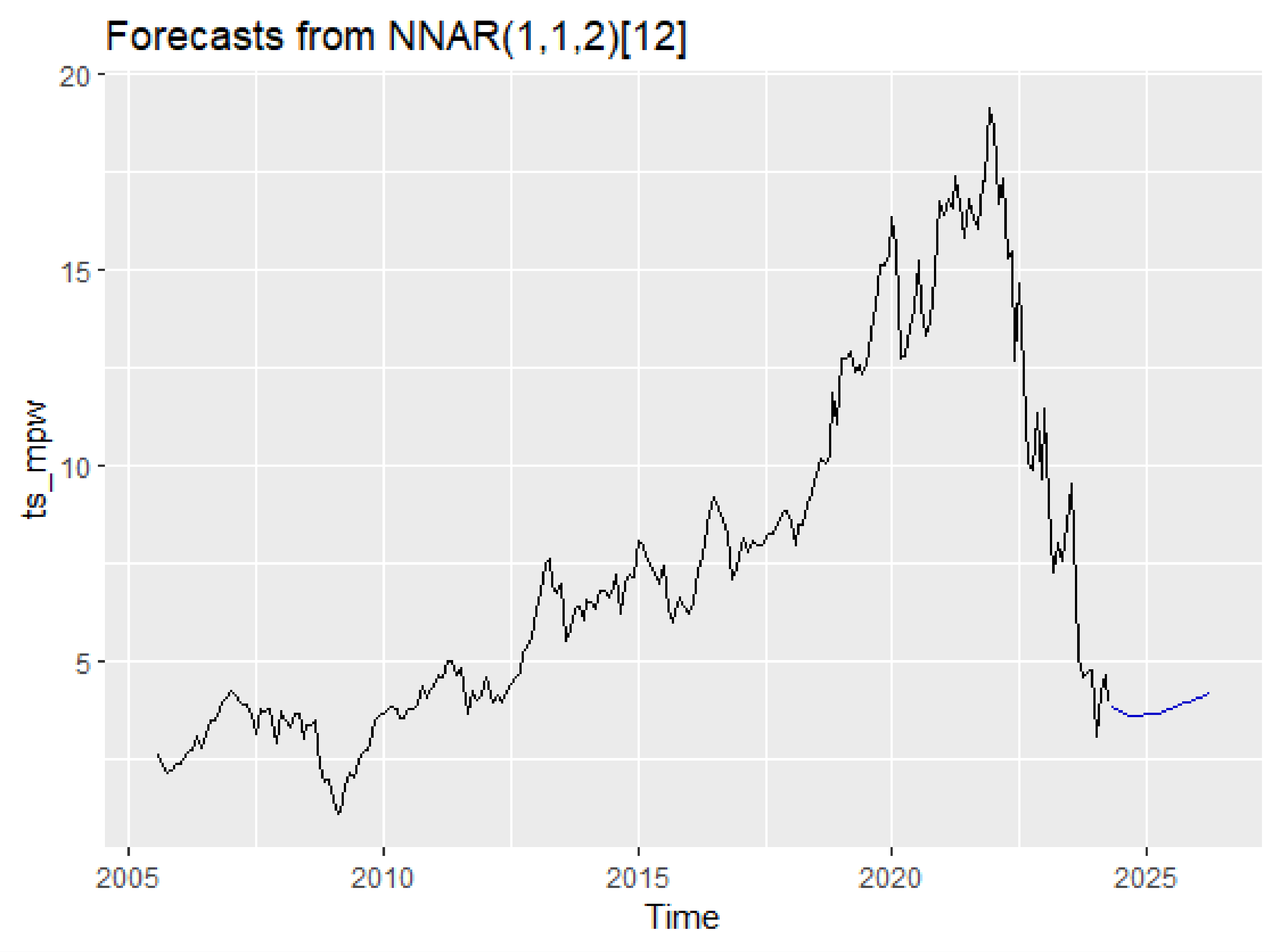
FORECAST

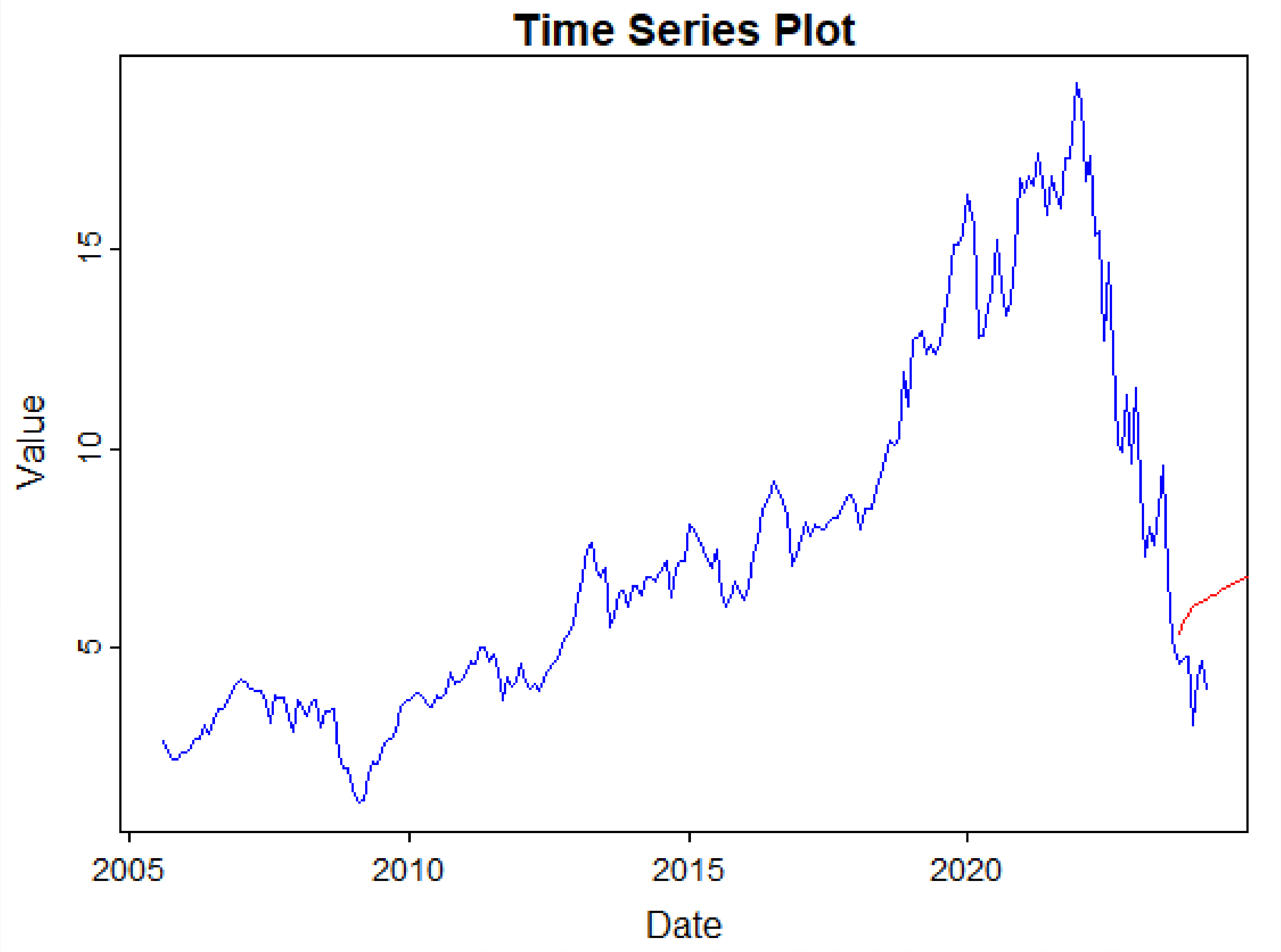

Medical Properties Trust
Adjusted Closed
5
10
15
2005
2010
2015
2020
2025
Date

TESTING OF THE MODEL



NEURAL NETWORK MODELS





THANK YOU!