

stock-time-series-tests

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Libraries

```
library(tidyverse)
library(lubridate)
library(quantmod)
library(tseries)
library(forecast)

library(tsibble)
library(fable)
library(fabletools)
library(feasts)

library(xgboost)
library(caret)

library(rugarch)
```

Function

This code chunk has been hidden.

Test

```
symbols <- c("AAPL", "TSLA", "PLTR", "GME", "EDU", "JPM", "BABA", "TCOM", "NVDA", "NC
LH")

stocks <- forecast_stock_models(
  symbols = symbols,
  start_date = as.Date("2020-01-01"),
  end_date = Sys.Date(),
  train_start = as.Date("2023-03-01"),
  cutoff_date = as.Date("2024-12-31")
)
```

```
## Processing stock: AAPL
```

Data Gathering for stock `AAPL` Done

- ARIMAX for stock `AAPL` Done

- NNETAR for stock `AAPL` Done

- XGBoost for stock `AAPL` Done

- GARCH for stock `AAPL` Done

Processing stock: TSLA

Data Gathering for stock `TSLA` Done

- ARIMAX for stock `TSLA` Done

- NNETAR for stock `TSLA` Done

- XGBoost for stock `TSLA` Done

- GARCH for stock `TSLA` Done

Processing stock: PLTR

Data Gathering for stock `PLTR` Done

- ARIMAX for stock `PLTR` Done

- NNETAR for stock `PLTR` Done

- XGBoost for stock `PLTR` Done

- GARCH for stock `PLTR` Done

Processing stock: GME

Data Gathering for stock `GME` Done

- ARIMAX for stock `GME` Done

- NNETAR for stock `GME` Done

- XGBoost for stock `GME` Done

- GARCH for stock `GME` Done

Processing stock: EDU

Data Gathering for stock `EDU` Done

- ARIMAX for stock `EDU` Done

- NNETAR for stock `EDU` Done

- XGBoost for stock `EDU` Done

- GARCH for stock `EDU` Done

Processing stock: JPM

Data Gathering for stock `JPM` Done

- ARIMAX for stock `JPM` Done

- NNETAR for stock `JPM` Done

- XGBoost for stock `JPM` Done

- GARCH for stock `JPM` Done

Processing stock: BABA

Data Gathering for stock `BABA` Done

- ARIMAX for stock `BABA` Done

- NNETAR for stock `BABA` Done

- XGBoost for stock `BABA` Done

- GARCH for stock `BABA` Done

Processing stock: TCOM

Data Gathering for stock `TCOM` Done

- ARIMAX for stock `TCOM` Done

- NNETAR for stock `TCOM` Done

- XGBoost for stock `TCOM` Done

- GARCH for stock `TCOM` Done

Processing stock: NVDA

Data Gathering for stock `NVDA` Done

- ARIMAX for stock `NVDA` Done

- NNETAR for stock `NVDA` Done

- XGBoost for stock `NVDA` Done

- GARCH for stock `NVDA` Done

Processing stock: NCLH

```
## Data Gathering for stock `NCLH` Done
```

```
## - ARIMAX for stock `NCLH` Done
```

```
## - NNETAR for stock `NCLH` Done
```

```
## - XGBoost for stock `NCLH` Done
```

```
## - GARCH for stock `NCLH` Done
```

```
stocks$performance
```

```
## # A tibble: 10 × 11
##   Symbol ARIMAX_MAPE ARIMAX_MSE NNETAR_MAPE NNETAR_MSE XGBoost_MAPE XGBoost_MSE
##   <chr>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 AAPL         5.65        254.         6.97        355.         4.15        148.
## 2 TSLA        32.2       12843.        31.0       12140.        12.3       1991.
## 3 PLTR         11.0         241.        10.7        208.        14.0        315.
## 4 GME          23.6         40.6        22.5         36.9         6.06         3.58
## 5 EDU          20.6         125.        19.5         115.        13.2         81.7
## 6 JPM           6.13         378.         6.14         362.         6.77        485.
## 7 BABA         25.6        1611.        24.6        1484.        10.7        303.
## 8 TCOM          5.81         20.9         4.71         14.4         4.90         17.4
## 9 NVDA         13.8         380.        17.4         576.         5.35         65.7
## 10 NCLH         12.7         11.3        14.3         15.5         5.38         2.27
## # i 4 more variables: GARCH_MAPE <dbl>, GARCH_MSE <dbl>, COMB_MAPE <dbl>,
## # COMB_MSE <dbl>
```

```

for (symbol in symbols) {

  df_plot <- tibble(
    week      = stocks$forecasts[[symbol]]$ARIMAX$week,
    ARIMAX    = stocks$forecasts[[symbol]]$ARIMAX$forecast,
    NNETAR    = stocks$forecasts[[symbol]]$NNETAR$forecast,
    XGBoost    = stocks$forecasts[[symbol]]$XGBoost$forecast,
    GARCH     = stocks$forecasts[[symbol]]$GARCH$forecast,
    COMB      = stocks$forecasts[[symbol]]$COMB,
    Actual    = stocks$forecasts[[symbol]]$Actual
  )

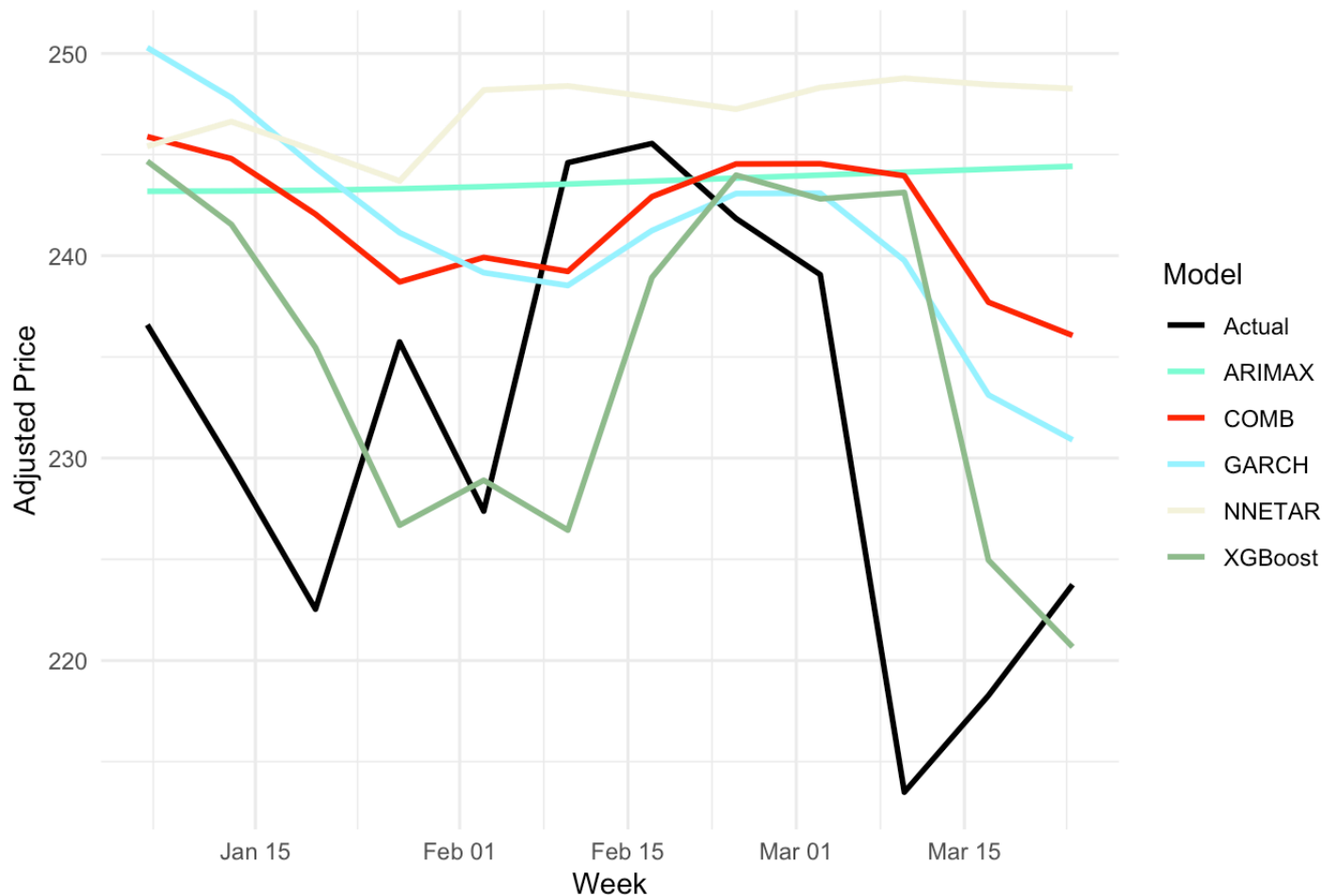
  df_plot_long <- df_plot %>%
    pivot_longer(
      cols = c("ARIMAX", "NNETAR", "XGBoost", "GARCH", "COMB", "Actual"),
      names_to = "Model",
      values_to = "Forecast"
    )

  p <- ggplot(df_plot_long, aes(x = week, y = Forecast, color = Model)) +
    geom_line(linewidth = 1) +
    scale_color_manual(values = c("ARIMAX" = "aquamarine",
                                   "NNETAR" = "beige",
                                   "XGBoost" = "darkseagreen",
                                   "GARCH" = "cadetblue1",
                                   "COMB" = "red",
                                   "Actual" = "black")) +
    labs(title = paste(symbol, "Forecast vs. Actual"),
         x = "Week",
         y = "Adjusted Price") +
    theme_minimal()

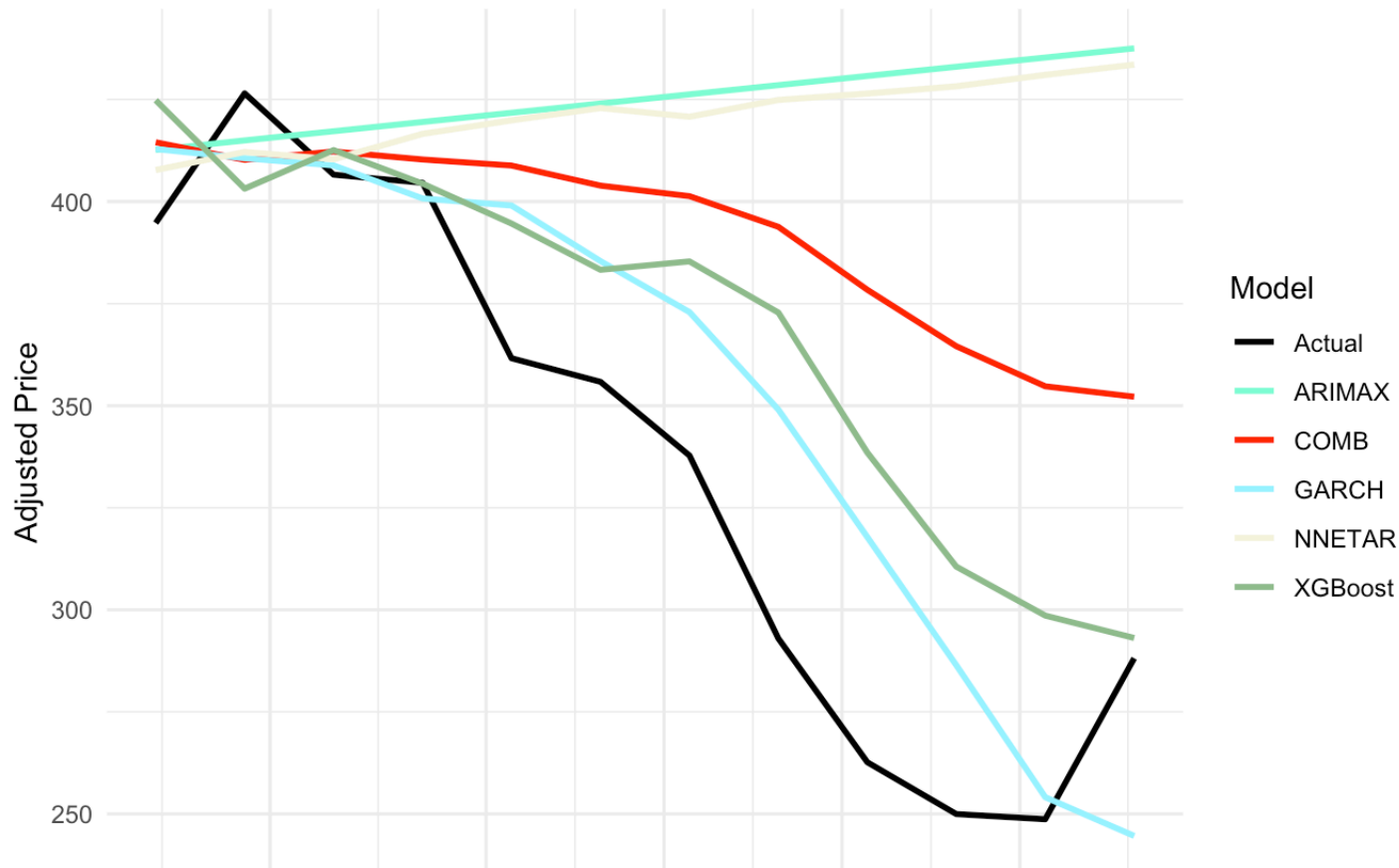
  print(p)
}

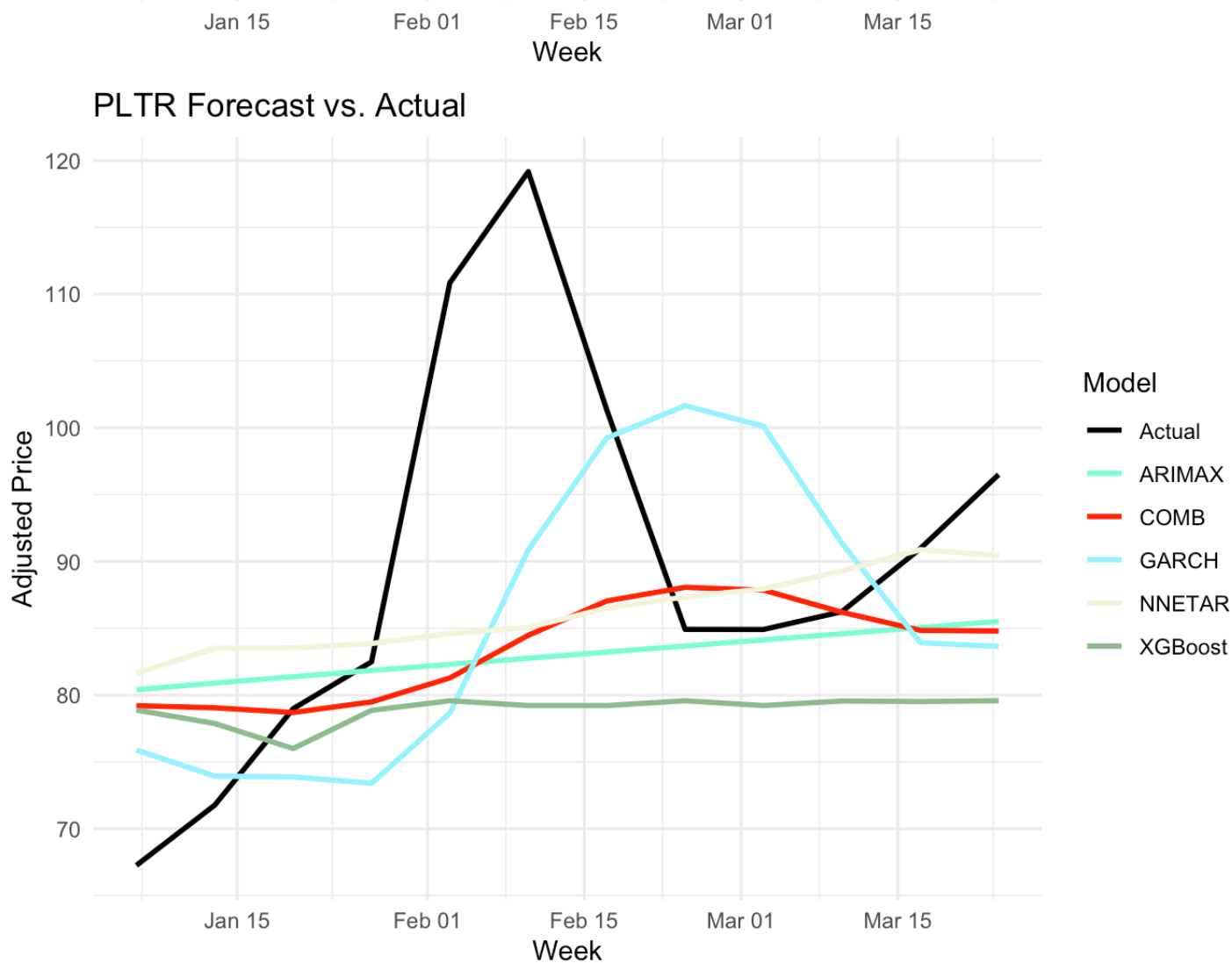
```


AAPL Forecast vs. Actual

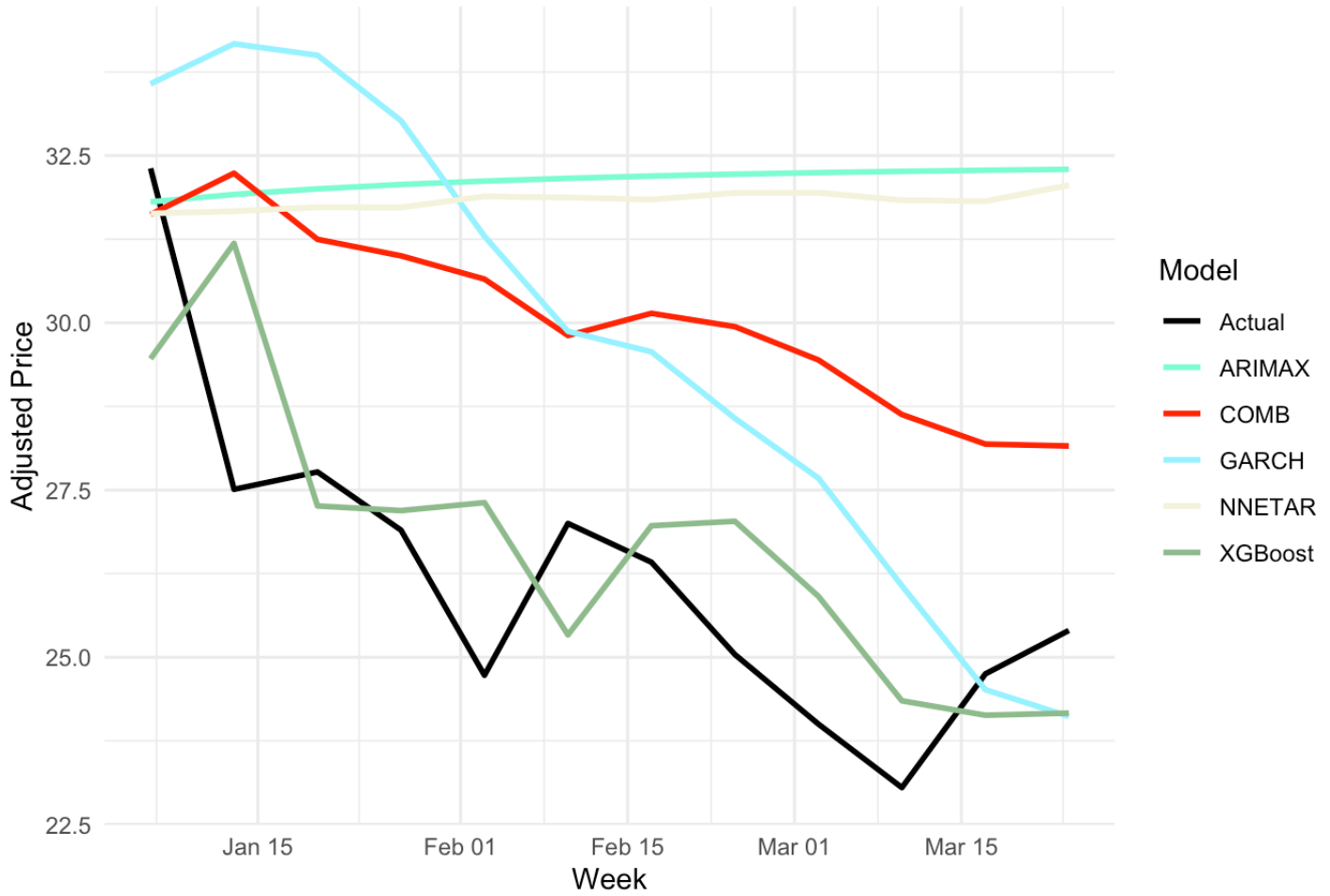


TSLA Forecast vs. Actual

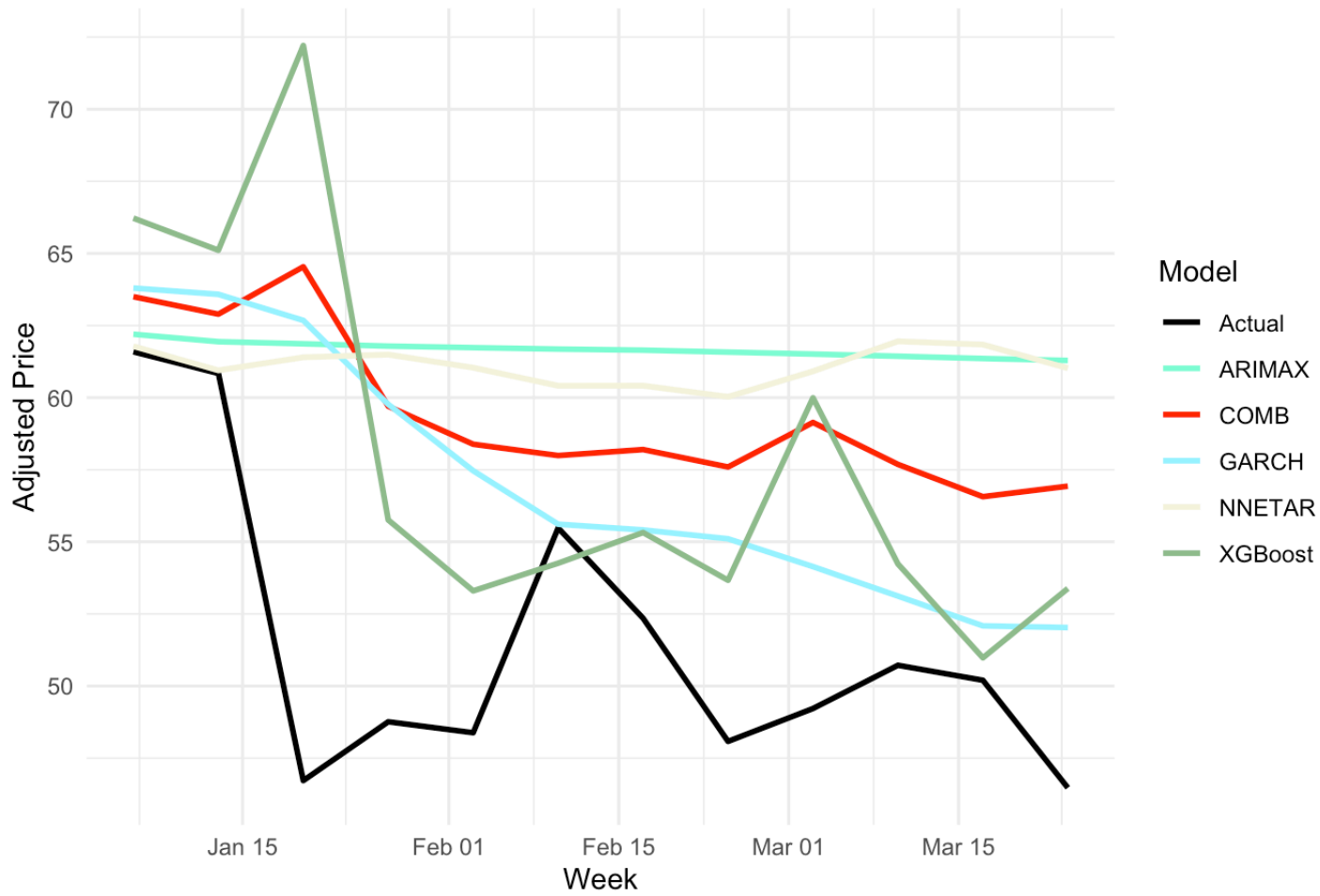




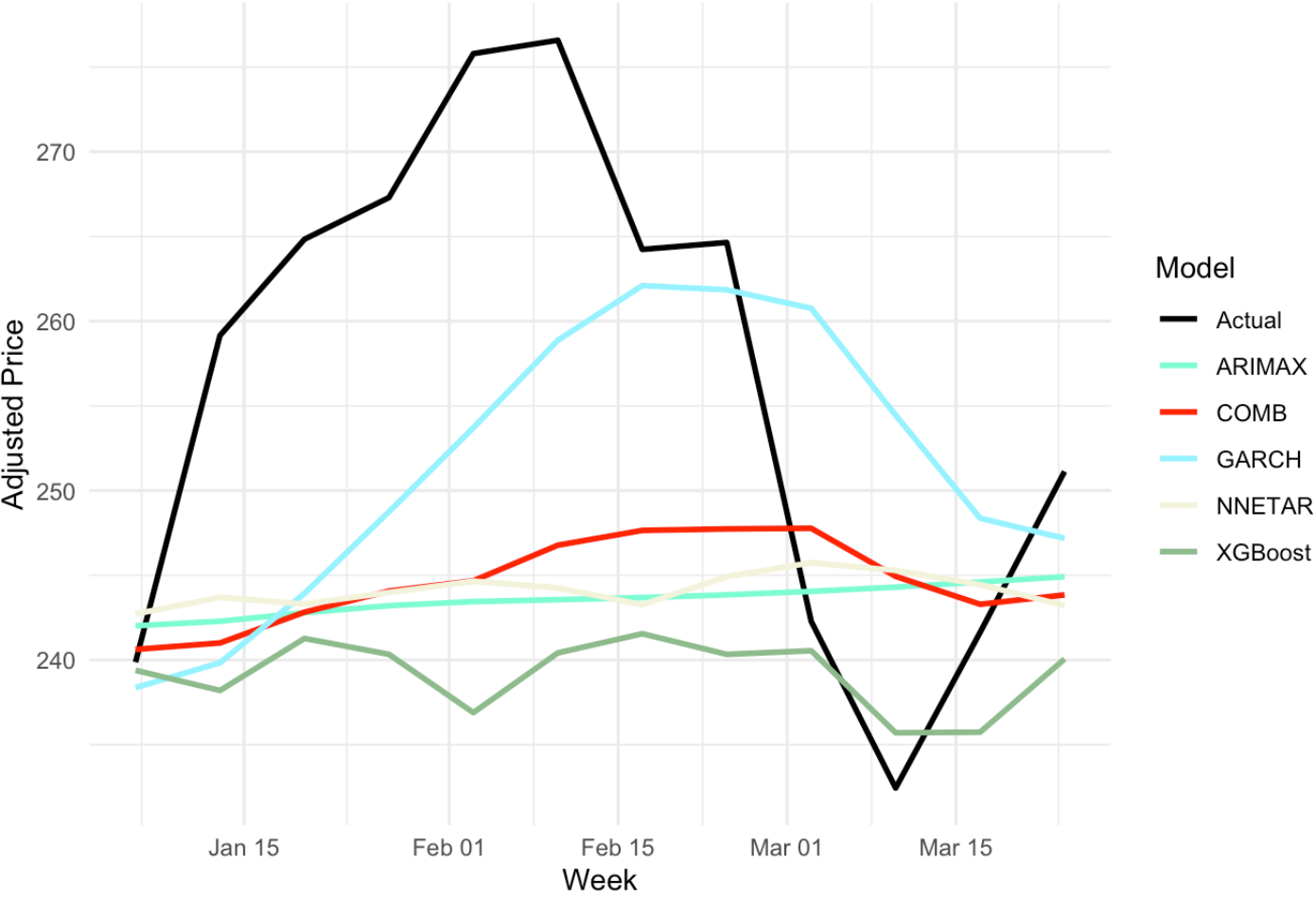
GME Forecast vs. Actual



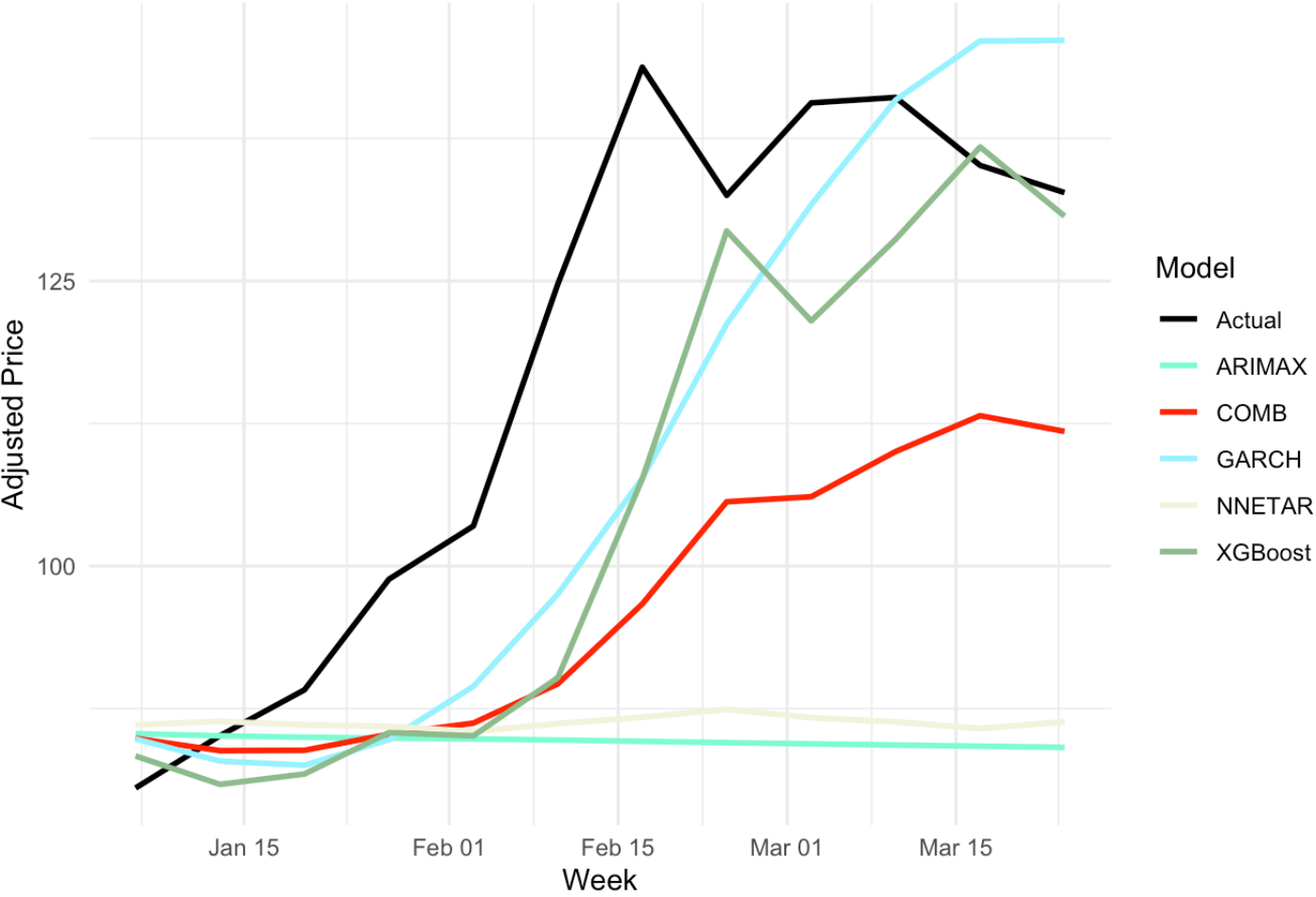
EDU Forecast vs. Actual



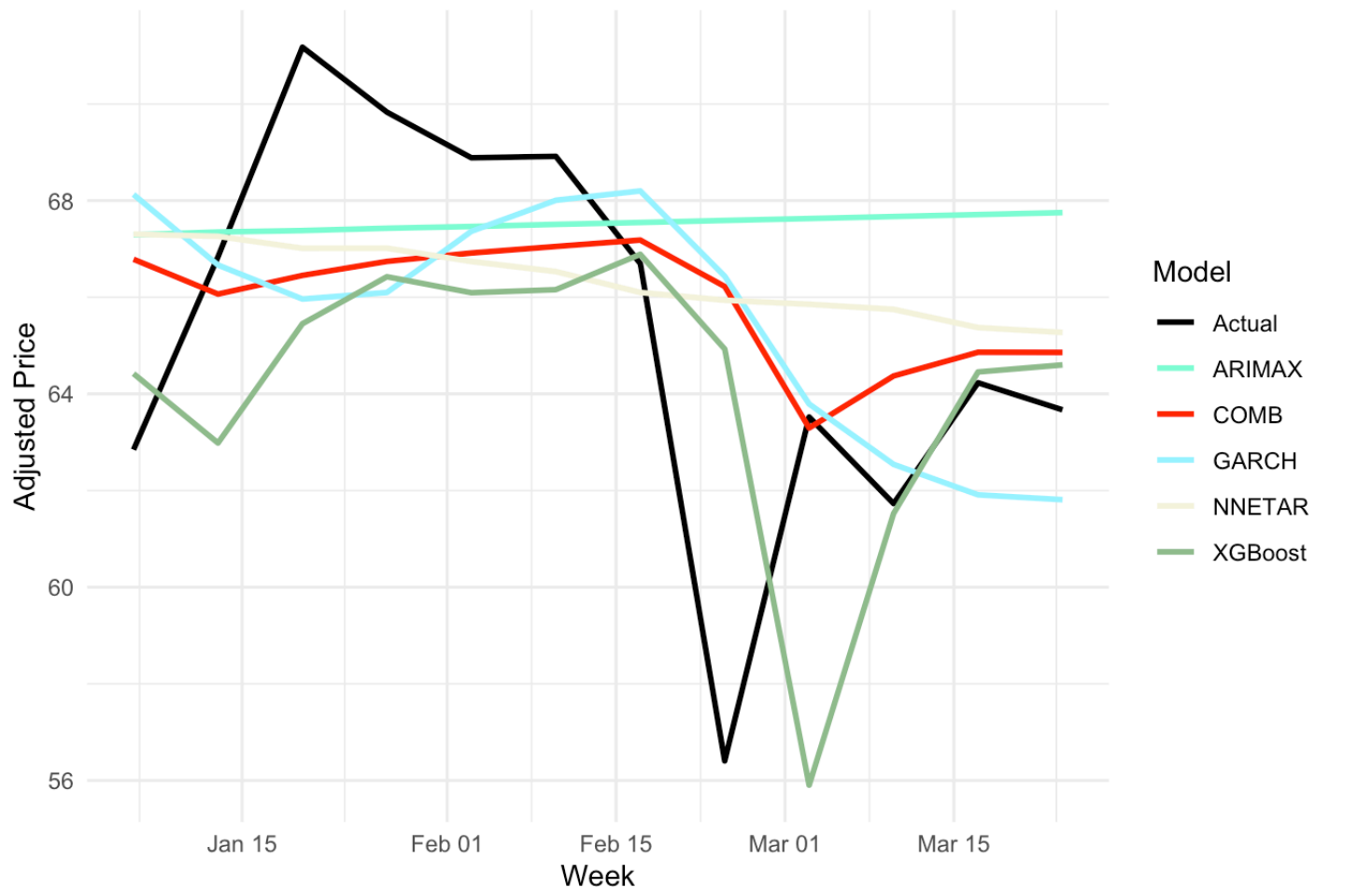
JPM Forecast vs. Actual



BABA Forecast vs. Actual

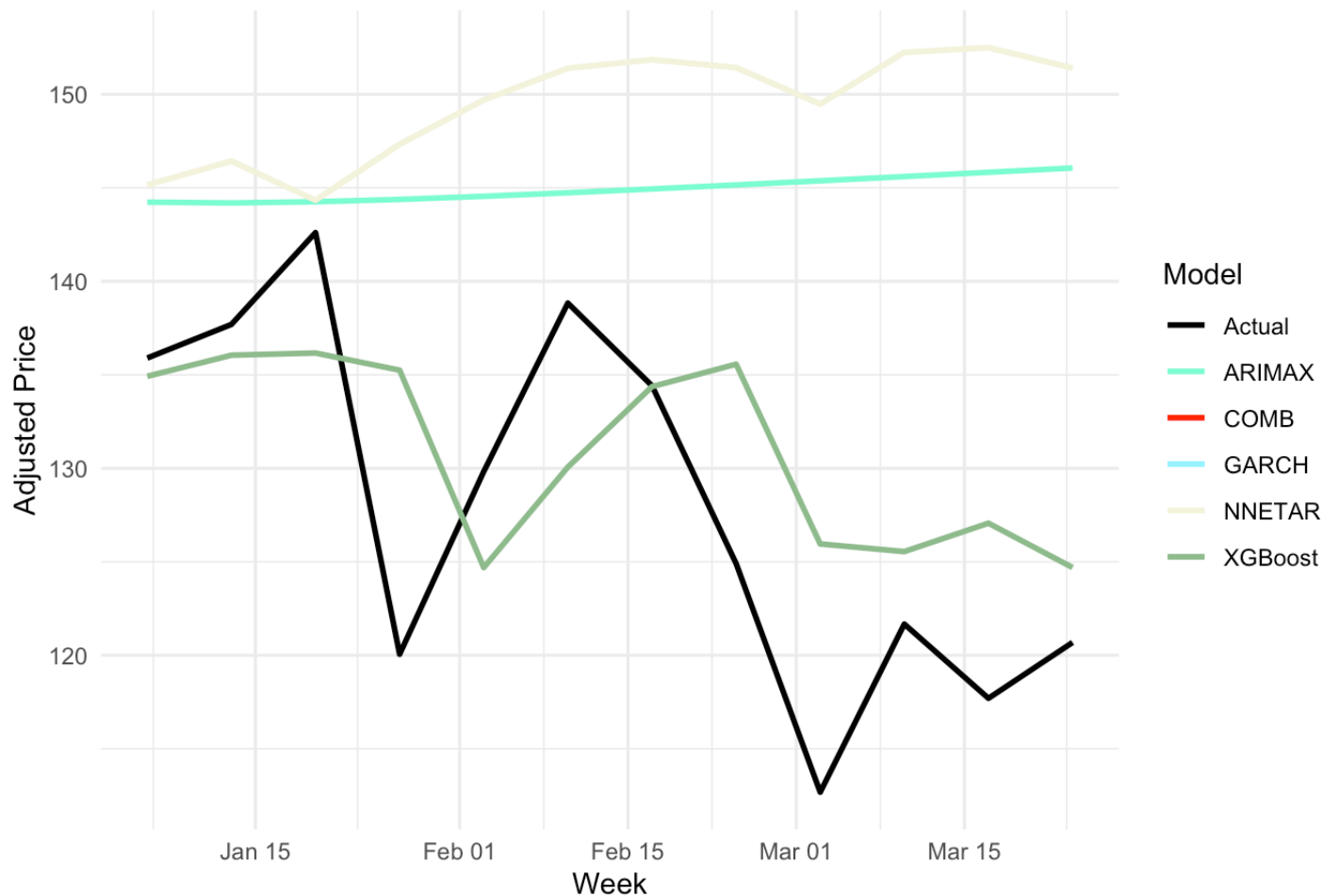


TCOM Forecast vs. Actual

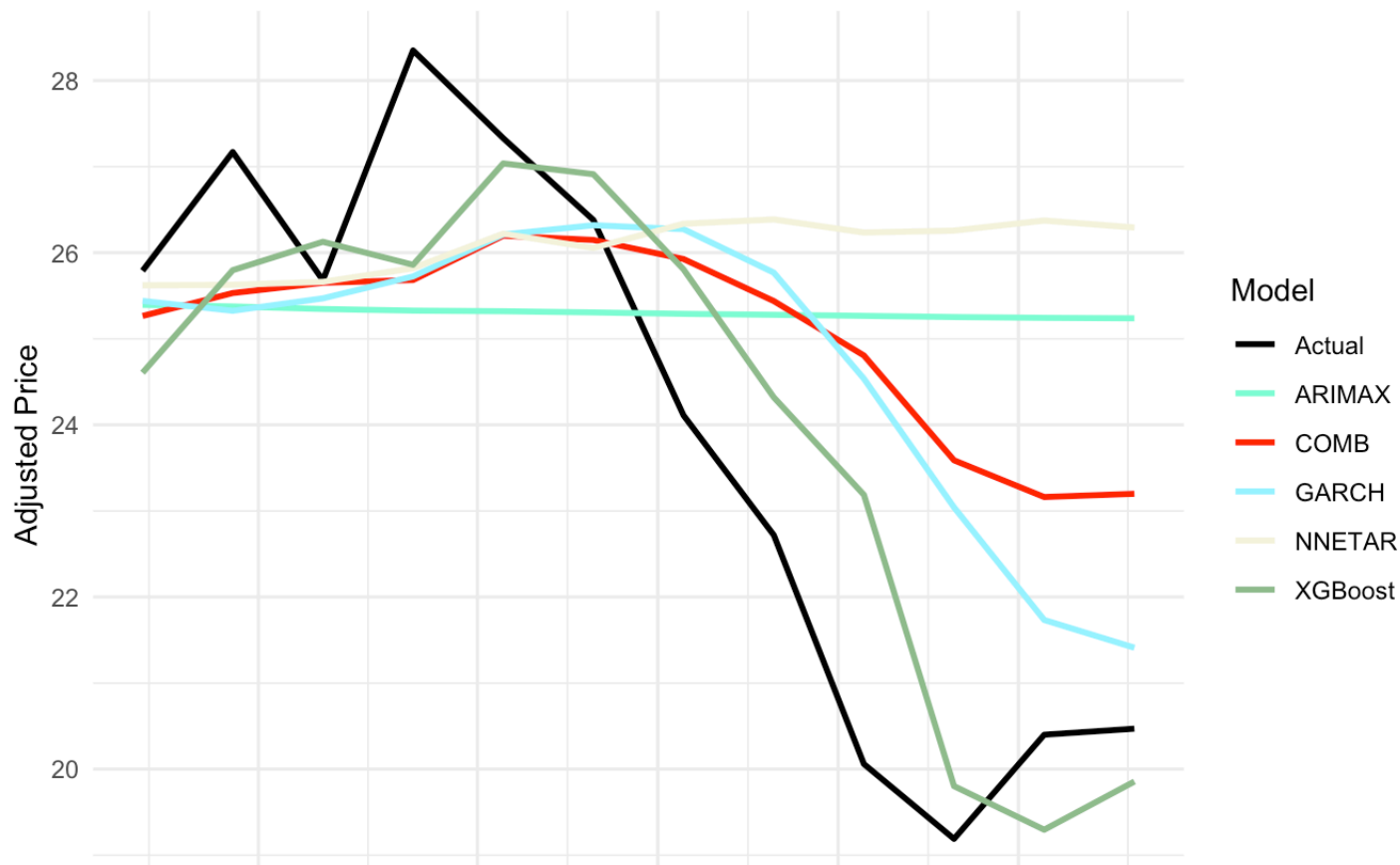


Warning: Removed 24 rows containing missing values (`geom_line()`).

NVDA Forecast vs. Actual



NCLH Forecast vs. Actual



Jan 15

Feb 01

Feb 15

Mar 01

Mar 15

Week

```
# Pivot the performance data to long format
```

```
perf_long <- stocks$performance %>%
```

```
  pivot_longer(
```

```
    cols = -Symbol,
```

```
    names_to = c("Model", "Metric"),
```

```
    names_sep = "_",
```

```
    values_to = "Value"
```

```
)
```

```
# Separate plots for MAPE and MSE
```

```
perf_long %>%
```

```
  filter(Metric == "MAPE") %>%
```

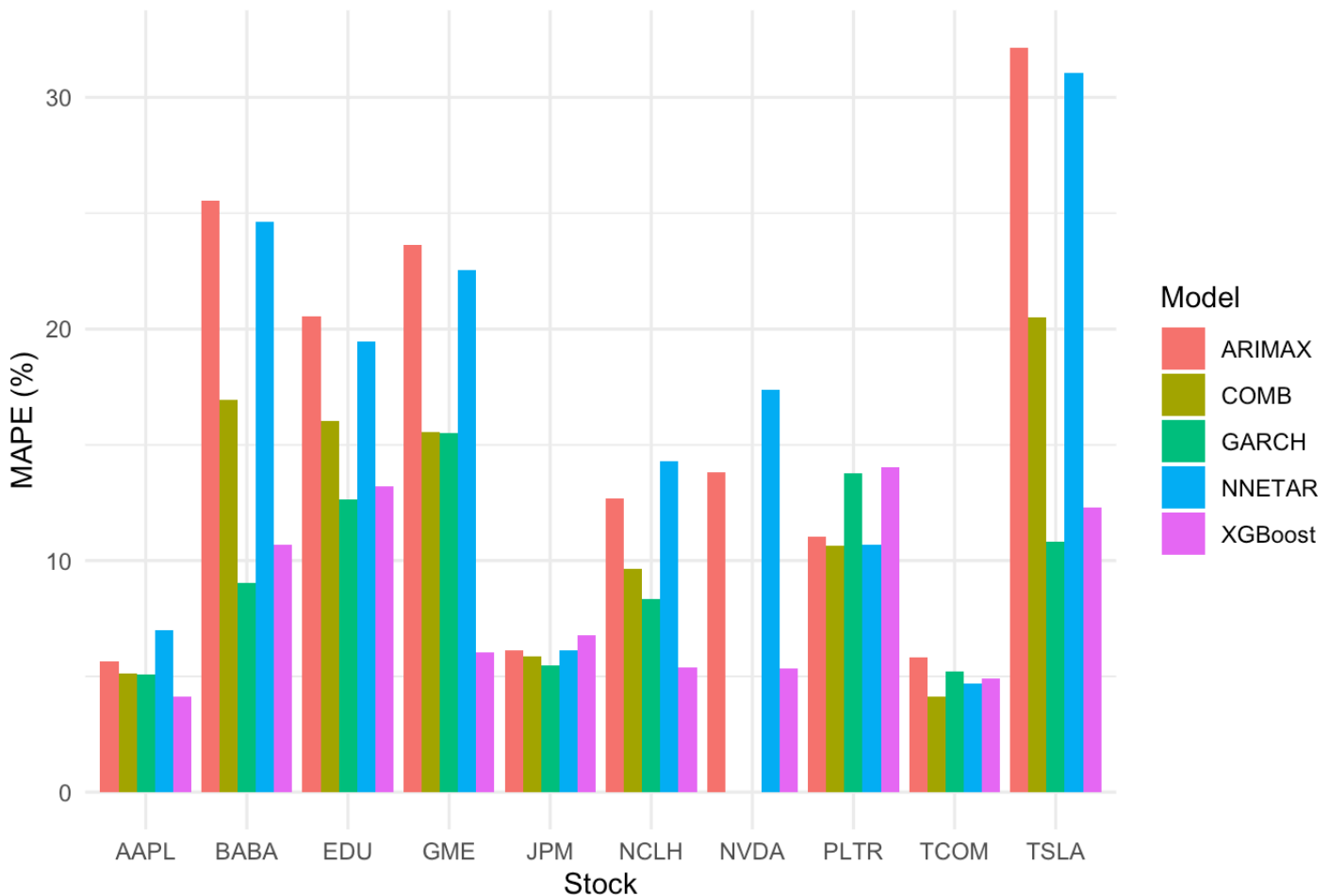
```
  ggplot(aes(x = Symbol, y = Value, fill = Model)) +
```

```
  geom_bar(stat = "identity", position = "dodge") +
```

```
  labs(title = "MAPE by Model and Stock", y = "MAPE (%)", x = "Stock") +
```

```
  theme_minimal()
```

MAPE by Model and Stock




```
perf_long %>%
  filter(Metric == "MSE") %>%
  ggplot(aes(x = Symbol, y = Value, fill = Model)) +
  geom_bar(stat = "identity", position = "dodge") +
  labs(title = "MSE by Model and Stock", y = "MSE", x = "Stock") +
  theme_minimal()
```

MSE by Model and Stock

