

Stocks and Dividends

Data Computing

Computing project

Stocks and Dividends

Many companies are publicly traded. This means that the company issues stock certificates which can be bought and sold on an exchange. Investors buy stock certificates mainly because they can sell them in the future, perhaps making a profit, and because companies pay dividends, a share of the company's profit, to each shareholder.

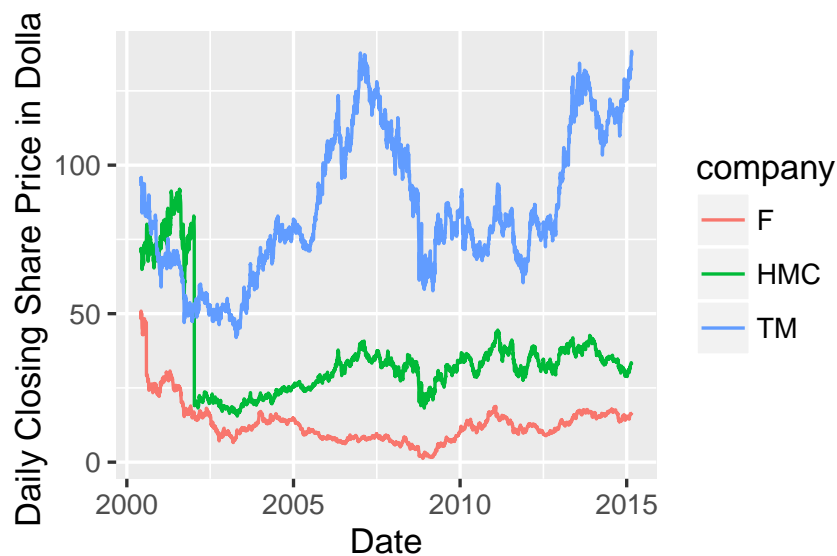


Figure 1: Stock prices for Ford, Honda, and Toyota

Figures ?? and ?? show the scale of price fluctuations and of accumulated dividends.

Task

Compare the income (or loss) that comes from buying and selling a stock certificate to the income that comes from dividends over the same period. Answer these questions:

- Which source of income is bigger?
- Is there any correlation between the income from dividends and the income (or loss) from buying and selling?

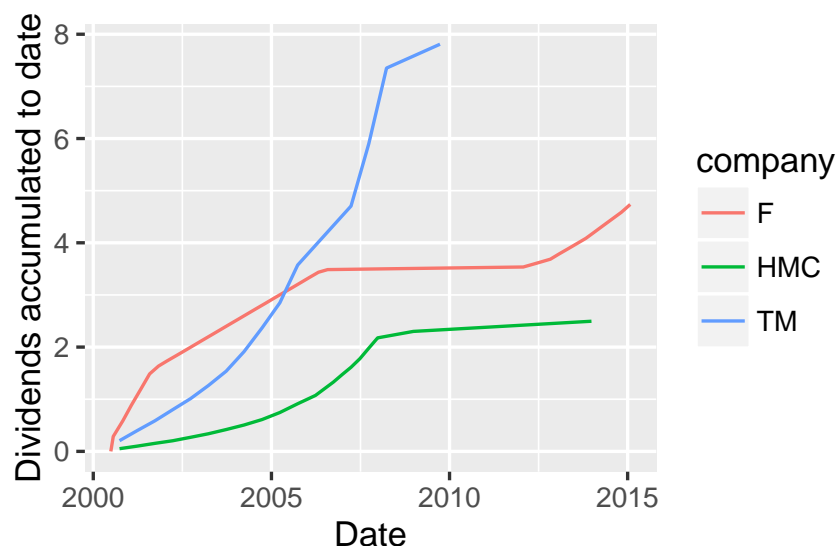


Figure 2: Accumulated dividends (per share) paid by Ford, Honda, and Toyota

Getting Price Data

Sites such as `finance.yahoo.com` collect and distribute information about individual companies. You can use the `readStockPrices()` function (in the `DataComputing` package) to read such data directly from Yahoo into R.

For example, here are some automotive stocks and their daily prices from 2010 to 2015.

```
companies <- c("F", "TM", "HMC")
Prices <- read_stock_prices(companies, what = "daily",
  start_year = 2000, end_year = 2015)
```

- Choose a few companies of interest to you. You can find stock company symbols at `finance.yahoo.com`. (Suggestion: pick a sector of the economy, e.g. energy, high-tech, consumer products, etc. and use companies from that sector.)
- Plot out the “closing price” (Close) versus date to get a graphic like Figure ??.

Buy/Sell Profit

```
## Joining, by = "date"
```

Pick a buy date and a sell date. You can use a command like this to create a Table like that shown in Table ??.

```
Actions <- data.frame(action = c("buy", "sell"),
  date = ymd(c("2006-01-03", "2014-12-30")))
```

```
##   action      date
## 1   buy 2006-01-03
## 2   sell 2014-12-30
```

Combine Prices and Actions to produce a table like SalesDifference in Table ??:

```
##   company  buy  sell
## 1      F   7.83 15.50
## 2     HMC 29.36 29.60
## 3      TM 106.85 125.91
```

Hints: (1) What kind of join should you use so that you get only those cases that match one of the dates in the Actions table? (2) The wide-vs-long techniques in Chapter ?? will be useful.

From the data table with buy and sell prices, calculate the dollar amount of profit (or loss) and the percentage change, as in Table ??.

```
##   company  profit percent
## 1      F  7.670000  98.000
## 2     HMC  0.239999   0.817
## 3      TM 19.060006  17.800
```

Indexing Prices

Since stock prices vary markedly from one company to another, a common practice is to “index” the price to a particular date as in Figure ??. (Question: In the graph, roughly which date was used for the reference?)

- Pick a single date of your choice and extract the stock price information for each company on that date. In the result, there should be one case for each company. Select just the date, company, and close variables, renaming close as standard. Call the resulting data frame Reference.

```
ref_date <- ymd("2005-01-03")
Reference <- Prices %>% filter(date == ref_date) %>%
  select(company, standard = close)

## Joining, by = "company"
```

- You now need to combine the Reference with each day’s price data for that company. You’ll find the standardized price on each day by creating a new variable which is the ratio of the day-to-day price (use Close) to the standard for that company. Before

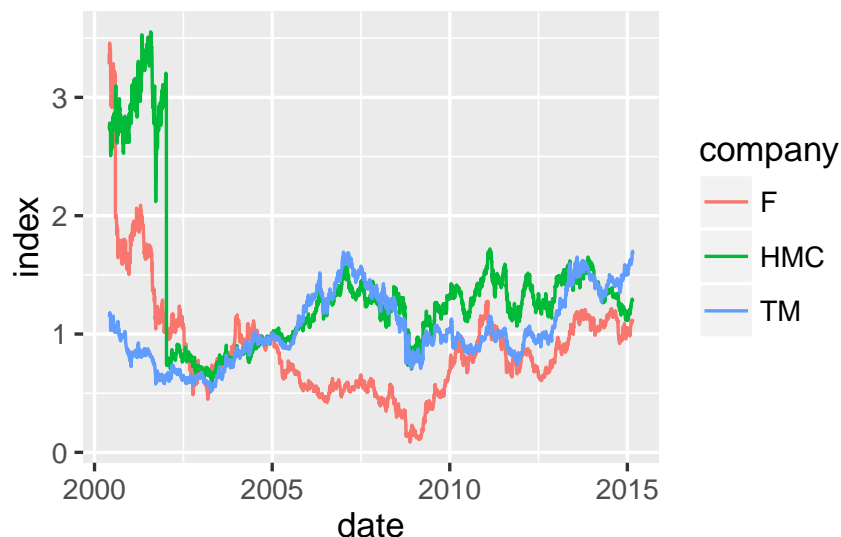


Figure 3: Indexed stock prices for Ford, Honda, and Toyota

you can do this, you'll need to combine the Prices and Reference data tables. You'll use a *join* verb to do this. In order to check your results, sketch out what you think the result *should* be before you do the join.

Dividends

You can read in dividend data like this:

```
Dividends <- read_stock_prices(companies, what = "dividends")
```

Once you have the dividend data, extract out the dividends for all dates between your buy and sell dates. (Hint: Join Dividends to Actions using company to match. The result will have two. When)

- The dividend amount is actually a rate: the dividend paid (in dollars) divided by the stock price. Find the dollar amount of each dividend payment for one *share* of stock rather than one *dollar* of stock. This involves multiplying the dividend rate by the stock price on that date.
- Find the total amount of dividends for each company during the period of interest. Compare this amount to the profit (or loss) from buying and selling the stock certificates. For the car companies, the result for the period 2005-01-01 though 2014-12-31 is shown in Table ??.

```
## Joining, by = c("company", "date")
```

```
## # A tibble: 3 × 2
##   company total_dividend
##   <chr>         <dbl>
## 1      F         1.750
## 2     HMC         1.885
## 3     TM         5.440
```