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1. Terminologies

Commission: A commission is a service charge assessed by a broker or investment advisor for providing investment advice or handling purchases and sales of securities for a client.

Short-Selling: A position is opened by borrowing shares of a stock or other asset that the investor believes will decrease in value by a set future date—the expiration date. The investor then sells these borrowed shares to buyers willing to pay the market price. Before the borrowed shares must be returned, the trader is betting that the price will continue to decline and they can purchase them at a lower cost. The risk of loss on a short sale is **theoretically unlimited** since the price of any asset can climb to infinity.

Example (Successful Short-Seeling)**.**
The Big Short *The financial crisis of 2007–2008, also known as the global financial crisis (GFC), was a severe worldwide financial crisis. In 2005, eccentric hedge fund manager Michael Burry discovers that the United States housing market, based on high-risk subprime loans, is extremely unstable. Anticipating the market's collapse in the second quarter of 2007, as interest rates would rise from adjustable-rate mortgages, he proposes to create a credit default swap market, allowing him to bet against market-based mortgage-backed securities, for profit.*

Figure 1. Michael Burry

His long-term bet, exceeding $1 billion, is accepted by major investment and commercial banks but requires paying substantial monthly premiums. This sparks his main client, Lawrence Fields, to accuse him of "wasting" capital while many clients demand that he reverse and sell, but Burry refuses. Under pressure, he eventually restricts withdrawals, angering investors, and Lawrence sues Burry. Eventually, the market collapses and his fund's value increases by 489% with an overall

profit (even allowing for the massive premiums) of over $2.69 billion, with Lawrence receiving $489 million alone.

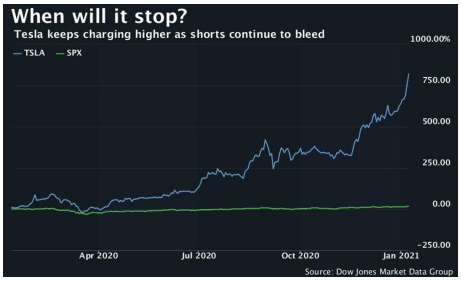
Example (Painful Short-Seeling)**.**

Tesla Short Sellers *Tesla short sellers lost $40 billion in 2020. The $40 billion in losses by investors shorting Tesla stocks were unlike the losses weathered by any other companies' short investors – last year or ever – according to Ihor Dusaniwsky, managing director at S3 and an expert in the subject.*

In fact, the losses endured by Tesla shorts were more than the short losses for the next nine companies – combined. Losses on No. 2 Apple (AAPL) in 2020 came to $6.7 billion, which is only slightly more than Tesla shorts lost in the month of December alone. Amazon (AMZN) cost the shorts $5.8 billion, according to S3.

Example (Ongoing Short-Seeling)**.**

'Big Short' investor says his big Tesla short is getting 'bigger and bigger' *It's been ugly for Burry and the rest of the shorts since then, with the Tesla shares up more than 44% in the past month. Over the past year, the stock has exploded for a gain of 820%, making CEO Elon Musk the richest man in the world. On Friday, Tesla stretched its record winning streak to 11 sessions in a row, closing at another record.*



Burry, however, doesn't seem to be budging.
"Well, my last Big Short got bigger and bigger and BIGGER too," Burry said Thursday in a now-deleted tweet. "Enjoy it while it lasts."
And enjoy it they did, with the stock rallying 8% on that day alone.

Question (1.6)**.** *Suppose you short-sell 300 shares of XYZ stock at $30.19 with a commission charge of 0.5%. Supposing you pay commission charges for purchasing the security to cover the short-sale, how much profit have you made if you close the short-sale at a price of $29.87?*

Solution. In the beginning, you short-sell 300 shares of XYZ stock at \$30.19, this gives you

(Earned) $$300 \times \$30.19 = \$9,057.$$

Hence, the commission will be

(Commission) $$\$9,057 \times 0.5\% = \$45.285.$$

If you close the short-sale at a price of \$29.87, which means that you need to buy 300 shares of XYZ stock back and return it to the broker, then we have

(Spent) $$300 \times \$29.87 = \$8,961.$$

The commission for buying the shares back will be

(Commission) $$\$8,961 \times 0.5\% = \$44.805.$$

In conclusion, your profit will be the amount of money you earned minus both of the amount of money you spent and the commissions. Thus,

(Profit) $$\$9,057 - \$8,961 - \$45.285 - \$44.805 = \$96 - \$90.09 = \$5.91.$$

□

Remark. *As a trader, no matter you are a stock buyer or short-seller, if you don't have a considerable profit, then commissions will take a big chunk of your profit. Also, this example tells you that if you trade often, your commissions will be huge.*

Question (1.7)**.** *Suppose you desire to short-sell 400 shares of JKI stock, which has a bid price of \$25.12 and an ask price of \$25.31. You cover the short position 180 days later when the bid price is \$22.87 and the ask price is \$23.06.*

a. *Taking into account only the bid and ask prices (ignoring commissions and interest), what profit did you earn?*

b. *Suppose that there is a 0.3% commission to engage in the short-sale (this is the commission to sell the stock) and a 0.3% commission to close the short-sale (this is the commission to buy the stock back). How do these commissions change the profit in the previous answer?*

c. *Suppose the 6-month interest rate is 3% and that you are paid nothing on the short-sale proceeds. How much interest do you lose during the 6 months in which you have the short position?*

Solution.

a. First, let's assume we use market order to sell and to buy shares of JKI stock.

In the beginning, you short-sell 400 shares of JKI stock using market order, which will be filled at the bid price \$25.12, this gives you

(Earned) $$400 \times \$25.12 = \$10,048.$$

If you close the short-sale using market order, which will be filled at the ask price of \$23.06, which means that you need to buy 400 shares of JKI stock back and return it to the broker, then we have

(Spent) $$400 \times \$23.06 = \$9,224.$$

In conclusion, your profit will be the amount of money you earned minus the amount of money you spent. Thus,

(Profit) $$\$10,048 - \$9,224 = \$824.$$

b. The commission when you short sell will be

$$\text{(Commission)} \qquad \$10,048 \times 0.3\% = \$30.144.$$

The commission when you close the short position will be

$$\text{(Commission)} \qquad \$9,224 \times 0.3\% = \$27.672.$$

Hence the adjusted profit will be

$$\$824 - \$30.144 - \$27.672 = \$766.184.$$

c. Suppose the 6-month interest rate is 3%, 6-month is roughly 180 days, so the interest will be

$$\text{(Interest)} \qquad \$10,048 \times 3\% = \$301.44.$$

□

Remark. *Different from a stock buyer, a short-seller also needs to consider interest. If you keep your short position for a long time, then the interest will become unignorable. This is the reason why we call it "short"-selling, cause we don't want to keep the position long.*

References

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