Futures

Econ 235

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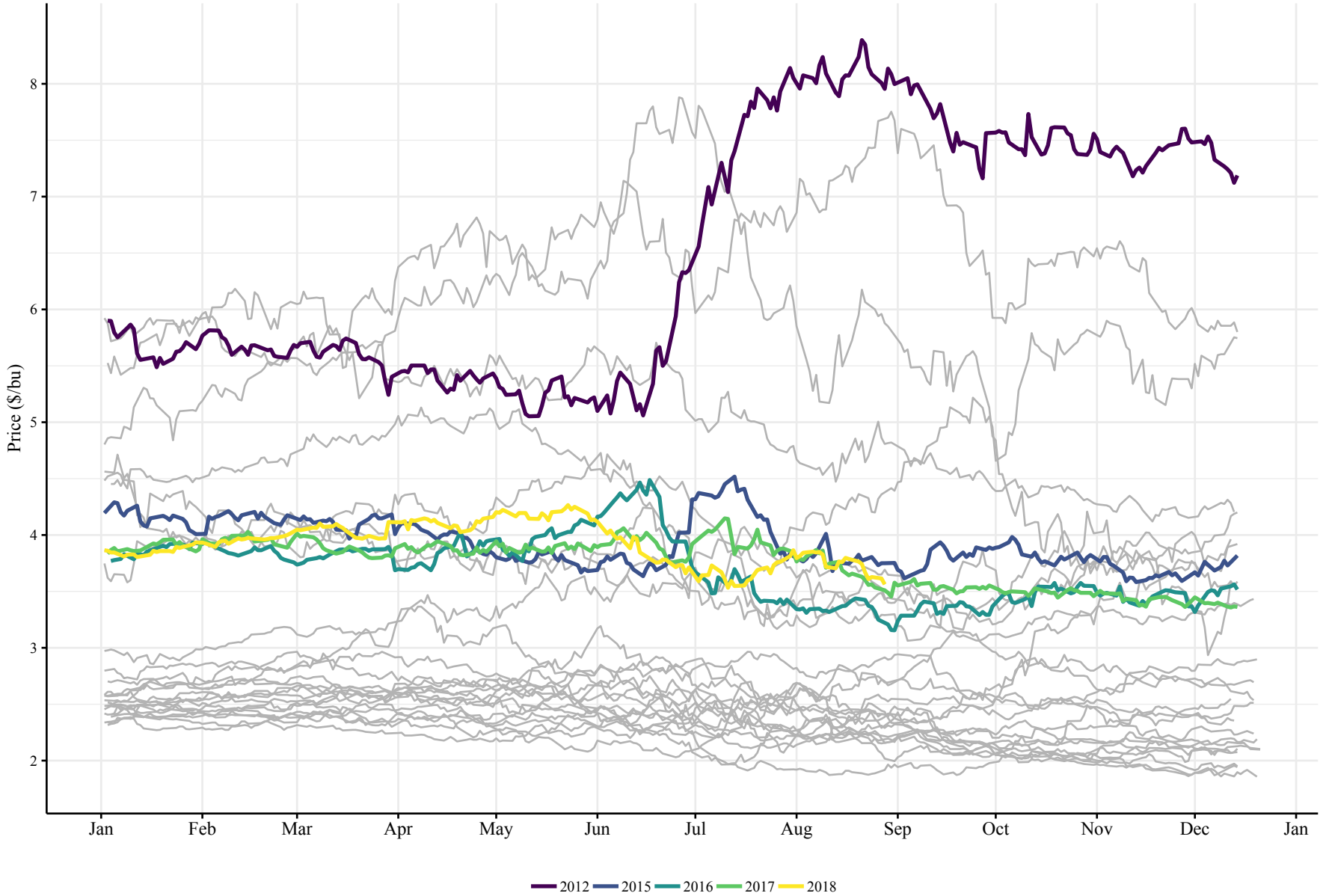
Definitions

- In the *spot market* (cash market), buyers and sellers meet and transactions occur immediately (e.g. auction).
- A *forward contract* specifies the price and time for the delivery of an item or a service.

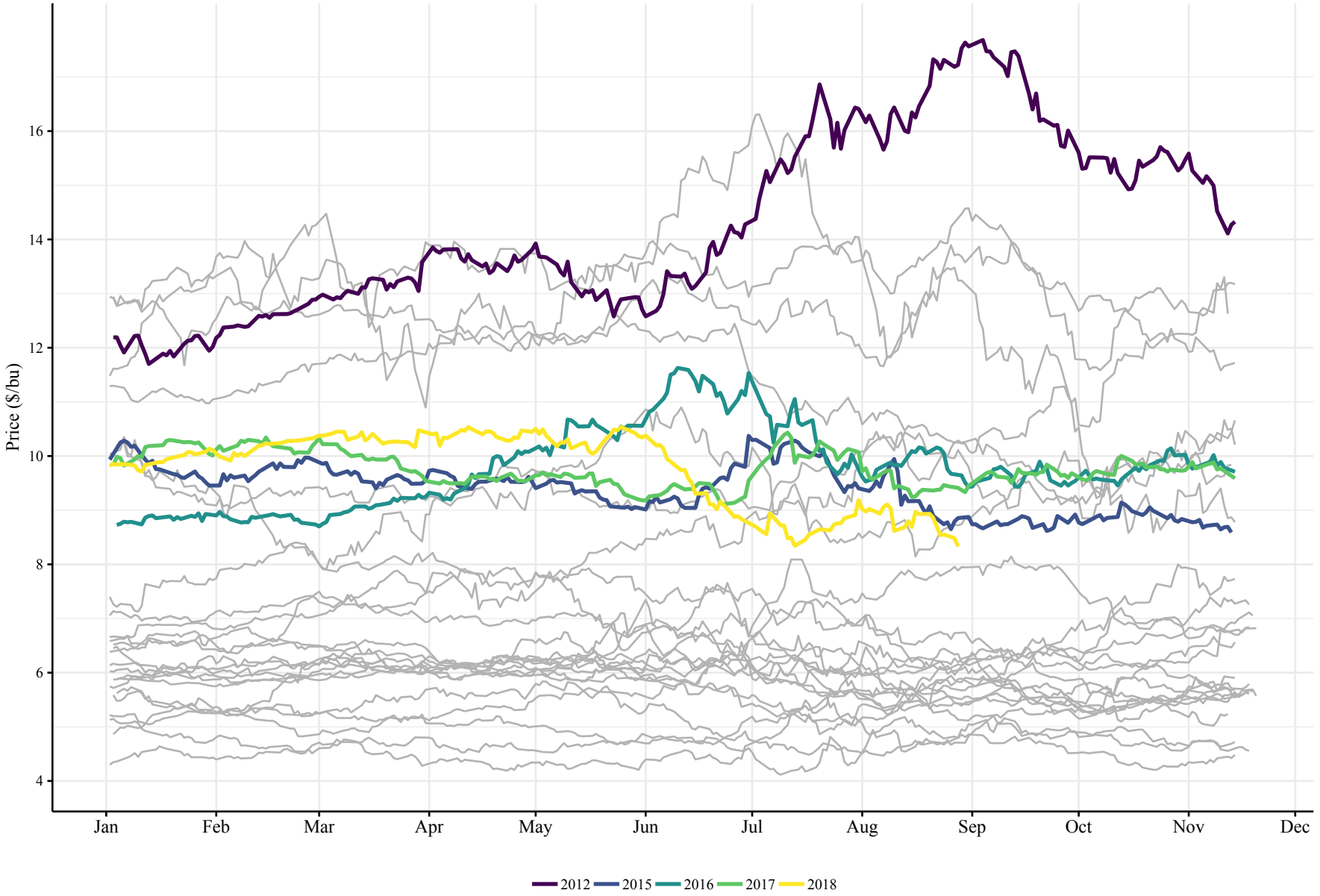
Definitions

- *Futures* are similar to forward contracts as they both call for the delivery of an item or service at a specific time.
- However, the price of a futures contract is determined by the intersection of the demand and the supply for that contract and varies over time.
- Futures are traded in organized exchanges and are therefore standardized with respect to quantities, delivery location and time, product definition and quality.
- To read:
  1. A Trader's Guide to Futures, available online and on Canvas.
  2. Marketing Guide by Kevin Mcnew, old but still accurate, available on Canvas.

Price of December corn from 1990 to 2018



Price of November soybeans from 1990 to 2018



Origin of futures

- Futures, as we know them today, originated in the 19th century.
- In the United States, the Chicago Board of Trade was the first to organize futures trading.
- Chicago was the grain marketing center of the United States.
- Two factors motivated the development of futures contract:
  1. Provide incentives to store grain;
  2. Correct large seasonal cash price changes.

Futures exchanges

- Trade of futures contracts occurs in privately own exchanges.
- Most trades now occur through electronic trading.
- Federal (US Commodities Futures Trade Commission) and private regulations define the rules under which futures are traded.
- Historically, in the United States, futures have been traded at the *Chicago Mercantile Exchange* (CME), the *Chicago Board of Trade* (CBOT) and the New York Mercantile Exchange (NYME).
- In 2007, CME and CBOT merged to form CME Group Inc.
- CME Group Inc. bought NYME in 2008.

What type of goods?

- Futures contract were first created for wheat and corn. Other storable agricultural commodities were later added.
- Futures for onions are illegal since the *Onion Futures Act* of 1955 (price manipulation).
- Commodity exchanges added nonstorable agricultural commodities in the 1960s.
- Nonagricultural commodities (e.g. lumber and metals) were introduced in the 1970s.
- Financial futures (e.g. exchange rate, financial indices) were added in the 1980s.

Price discovery

- One function of futures is to discover prices.
- The price of futures is determined by the intersection of demand and supply. It therefore summarizes all current market information and expectations.
- The cash price is linked to futures price through the basis. We will cover this in another section.

Specifications of futures contracts

- Exchanges define the parameters of futures contract.

Table: Some specifications of futures contracts for corn

Contract size	5,000 bushels
Deliverable grades	#2 yellow at contract price #1 yellow at 1.5 cent/bushel premium #3 yellow at 1.5 cent/bushel discount
Price unit	Cents per bushel
Tick size	1/4 of one cent per bushel ($12.50 per contract)
Contract months/symbols	March (H), May (K), July (N), September (U) and December (Z)
Last trade date	The business day prior to the 15th calendar day of the contract month.
Last Delivery Date	Second business day following the last trading day of the delivery month.

Source: CME.

Specifications of futures contracts

Table: Some specifications of futures contracts for soybeans

Contract size	5,000 bushels
Deliverable grades	#2 yellow at contract price #1 yellow at 6 cent/bushel premium #3 yellow at 6 cent/bushel discount
Price unit	Cents per bushel
Tick size	1/4 of one cent per bushel ($12.50 per contract)
Contract months/symbols	January (F), March (H), May (K), July (N), August (Q), September (U) and November (X)
Last trade date	The business day prior to the 15th calendar day of the contract month.
Last Delivery Date	Second business day following the last trading day of the delivery month.

Source: CME.

Specifications of futures contracts

Table: Some specifications of futures contracts for live cattle

Contract size	40,000 pounds
Deliverable grades	55% Choice, 45% Select, Yield Grade 3 live steers
Price unit	Cents per pound
Tick size	\$.00025 per pound (=\$10 per contract)
Contract months/symbols	February (G), April (J), June (M), August (Q), October (V), December (Z)
Last trade date	Last business day of the contract month, 12:00 p.m.
Last Delivery Date	

Source: CME.

Who trades futures?

- Trading futures requires a *broker*, who is a person or a firm that handles futures trades for a commission.
- *Hedgers* are buyers or sellers of the commodity that use futures to protect against price risk. We will cover hedging with futures in another section.
- *Speculators*:
  - These market participants trade futures because they foresee profits.
  - Assume price risk from hedgers.
  - Did Hillary Clinton make one hundred thousand dollars from an initial $1,000 investment by trading cattle futures in 1978-79?

Who trades futures?

- *Arbitrageurs*:
  - Exploit short-term discrepancy in price relationship to gain profit.
  - Speculators and arbitrageurs contribute to make markets efficient.

Position: definitions

- A trader is *long in the cash market* if it has the capacity to deliver a commodity
  - Gain if the price of the commodity *increases*.
  - For example, a farmer that has already planted corn is long in the cash market for corn.
- A trader is *short in the cash market* if it has needs for a commodity.
  - Gain if the price of the commodity *decreases*.
  - For example, a cattle feedlot that needs corn as a feed.

Position: definitions

- A **long** position in the futures market means that a trader has bought futures contracts:
  - A buyer of a futures contract agrees to accept delivery of the asset in the future.
  - Gain if the futures price *increases*.
  - Grain elevators or food producers may want to take a long position in the futures market to protect their costs of procurement against increase in the price of commodities.
- A **short** position in the futures means that a trader has sold futures contracts:
  - A seller of a futures contract agrees to deliver the asset in the future.
  - Gain if the futures price *decreases*.
  - Farmers may take a short position in the futures market to protect against decline in the price.

Definitions

- For most futures contracts, the product is never delivered as participants buy or sell offsetting positions.
- *Open interest* is the number of open futures contract for which a trader remains obligated.
- Typically, traders offset their position before expiration.
  - A trader that has a long position sells futures contract to offset his position.
  - A trader that has a short position buys futures contract to offset his position.

Definitions

- *Maturity* is the expiration date of a contract.
- *Nearby* is the nearest active trading month of a futures.

Clearinghouse

- The clearinghouse is a corporation separated but associated with the exchange.
- The clearinghouse is responsible for recording each transaction, reconciling all trades and ensuring the integrity of each transaction.
- All trades must be cleared by the clearinghouse at the end of each day.
- The clearinghouse balances the books and manages the margin.

Purchasing and selling futures

- Trading futures requires having an account with a broker.
- Must first pass screening.
- A transaction on the futures market does not involve a direct exchange of money:
  - The buyer of a contract does not pay any money to the seller;
  - The seller of a contract does not receive any money from the buyer.
- The assumption is that buyers and sellers can offset their position by selling or buying futures contract. Thus, all that matters is that buyers and sellers have the money to cover losses in the event of unfavorable price changes.
- Provides leverage!

Initial margin

- For futures, gains and losses are realized every day.
- The only transfer of money that occurs is for daily gains or losses.
- Thus, it requires a margin where money can be removed or deposited to cover losses and realize gains.
- The value of the margins are set by the exchange and is determined in function of the futures prices and their variability.
- The *initial margin* is the amount that must be deposited at the purchase or the sale of futures contracts.
- The initial margin equals 110% of the value of the maintenance margin (http://www.cmegroup.com/clearing/margins/).

Maintenance margin and margin call

- The *maintenance margin* is the minimum value that the margin account can take before money must be added to the margin account.
- If the amount of money in the account falls below the maintenance margin, then a *margin call* is required to replenish the margin.
- In practice, it might not be easy to replenish your account margin. Do you have enough cash available? Is the bank willing to lend you money?

Initial margin and maintenance margin

Table 4: Maintenance margins for selected agricultural commodities

Product	Contract size	Maintenance margin
Corn	5,000 bushels	$850
Soybean	5,000 bushels	$2,350
Wheat	5,000 bushels	$1,550
Live cattle	40,000 pounds	$1,500
Lean hogs	40,000 pounds	$1,200

The margins change over time. These were the margins at the end of August 2017 and may have changed since. Source: http://www.cmegroup.com/clearing/margins.

Example: long position

- Suppose that you go long on two corn futures contracts for which the price is ¢400 per bushel on October 9.
- A futures contract is 5,000 bushels, with a current value of $40,000 for two contracts.
- *You do not pay $40,000 unless you accept delivery of corn under your futures contract.*
- Suppose that the maintenance margin is $1,400.
- The initial margin is $1,540 ($1,400 $\times$ 110%) for one futures contract of corn.
- The total amount of money required to buy two futures contract is therefore $3,080 (2 $\times$ $1,540).
- For the two corn futures contracts, the maintenance margin is $2,800 (2 $\times$ $1,400).

Example: long position

- Changes in the margin covers changes in the value of the futures contracts.
- Suppose that on October 10 that the price of the futures contract is ¢398 per bushel.
- This means that the total value of the contracts declines to $39,800.
- The clearinghouse will remove $200 to cover your loss and pay that amount to the owner of the short position on the contract.
- There is no margin call as the margin remains above $2,800.

Example: long position

Table: Account for two units of corn futures - long position

Date	Price (¢/bushel)	Value ($)	Margin ($)	Daily gain or loss ($)	Cumulative gain ($)	Margin call ($)
October 9	400	40,000	3,080	0	0	0
October 10	398	39,800	2,880	-200	-200	0
October 11						
October 12						
October 13						

Example: long position

- Suppose that on October 11 that the price of the futures contract increase to ¢402 per bushel.
- The margin increases by $400 to $3,280.

Example: long position

- On October 12, the price of the futures contract declines to ¢395 per bushel.
- At that price, the margin falls below $2,800 at $2,580.
- Thus, it requires a margin call of $500 to restore the margin at $3,080.

Example: long position

Table: Account for two units of corn futures - long position

Date	Price (¢/bushel)	Value ($)	Margin ($)	Daily gain or loss ($)	Cumulative gain ($)	Margin call ($)
October 9	400	40,000	3,080	0	0	0
October 10	398	39,800	2,880	-200	-200	0
October 11	402	40,200	3,280	400	200	0
October 12	395	39,500	3,080	-700	-500	500
October 13	396	39,600	3,180	100	-400	0

Example: short position

- Let's now assume instead that on October 9 you take a short position on three corn futures contracts.
- The required initial margin for the three contracts is \$4,620 (3 $\times$ \$1,400 $\times$ 110%).
- The maintenance margin for the three contracts is \$4,200 (3 $\times$ \$1,400).
- With the short position, a margin call is not required because you gain from the decline in the price.
- Notice that the gains on the long position per unit of contract exactly equal the losses per contract on the short position.

Example: short position

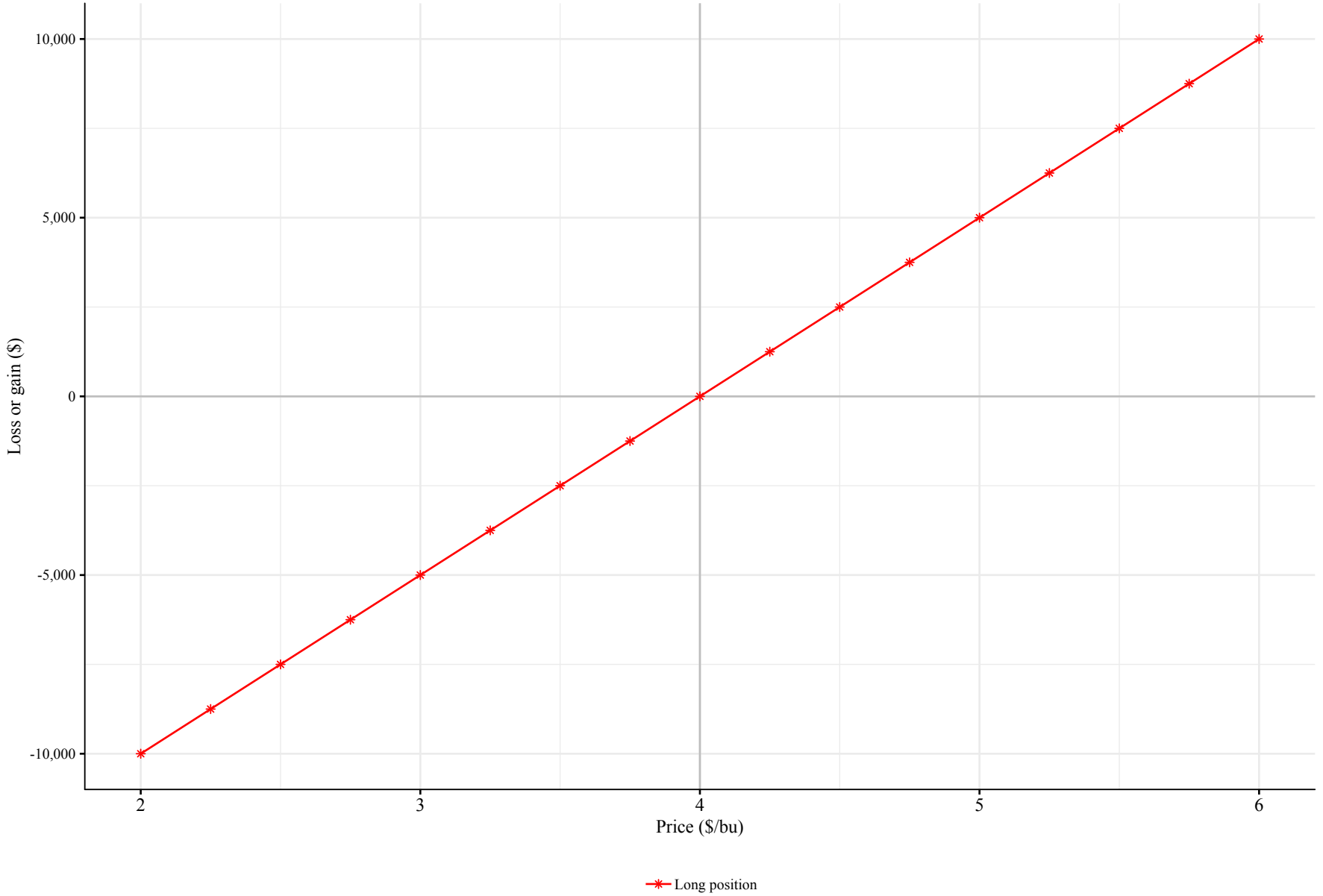
Table: Account for three units of corn futures - short position

Date	Price (¢/bushel)	Value ($)	Margin ($)	Daily gain or loss ($)	Cumulative gain ($)	Margin call ($)
October 9	400	60,000	4,620	0	0	0
October 10	398	59,700	4,920	300	300	0
October 11	402	60,300	4,320	-600	-300	0
October 12	395	59,250	5,370	1,050	750	0
October 13	396	59,400	5,220	-150	600	0

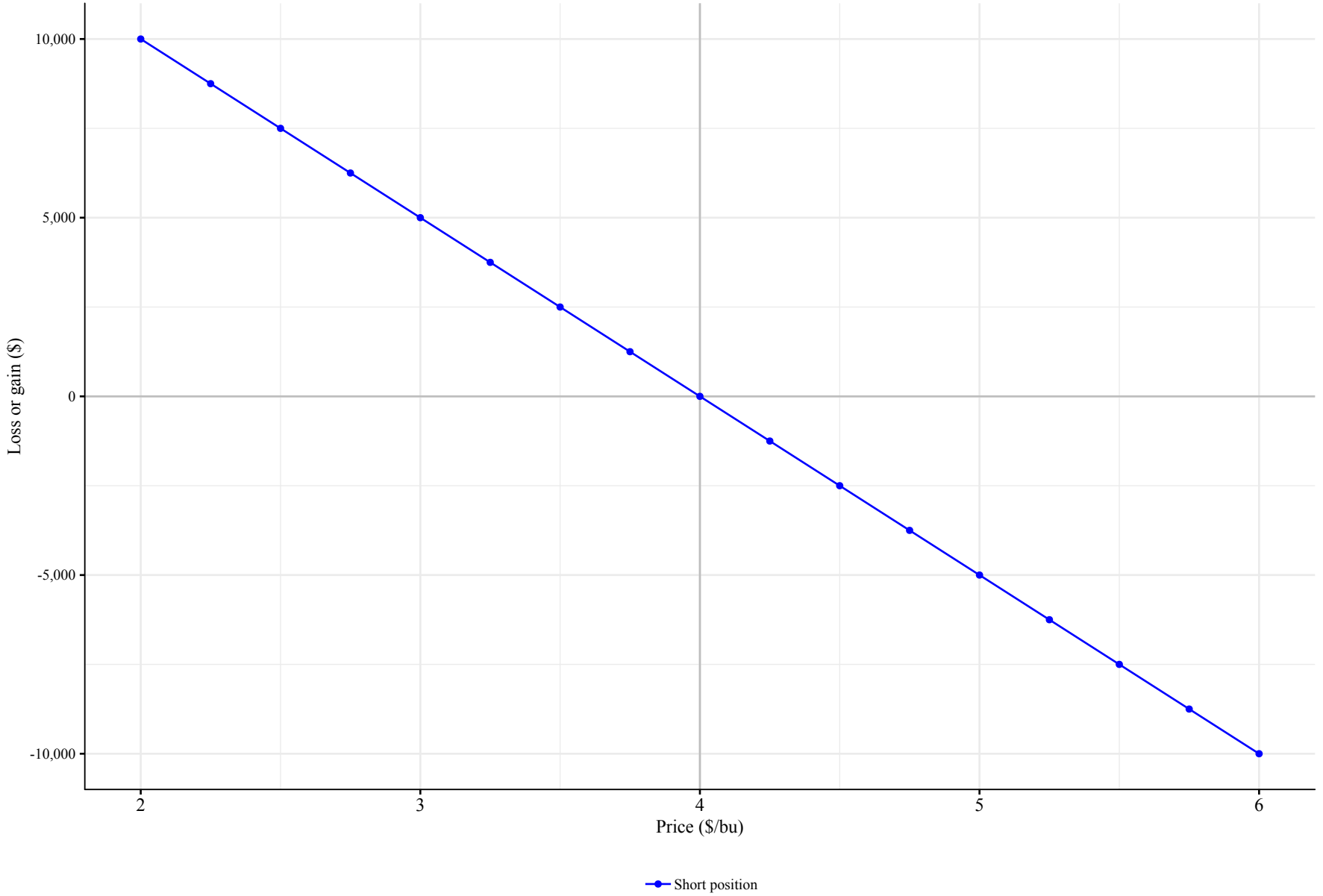
Payoffs diagram

- A *payoff diagram* shows gains and losses in function of futures price.
- The following payoff diagrams for one futures contract assumes that traders enter their position at \$4.00 per bushel.

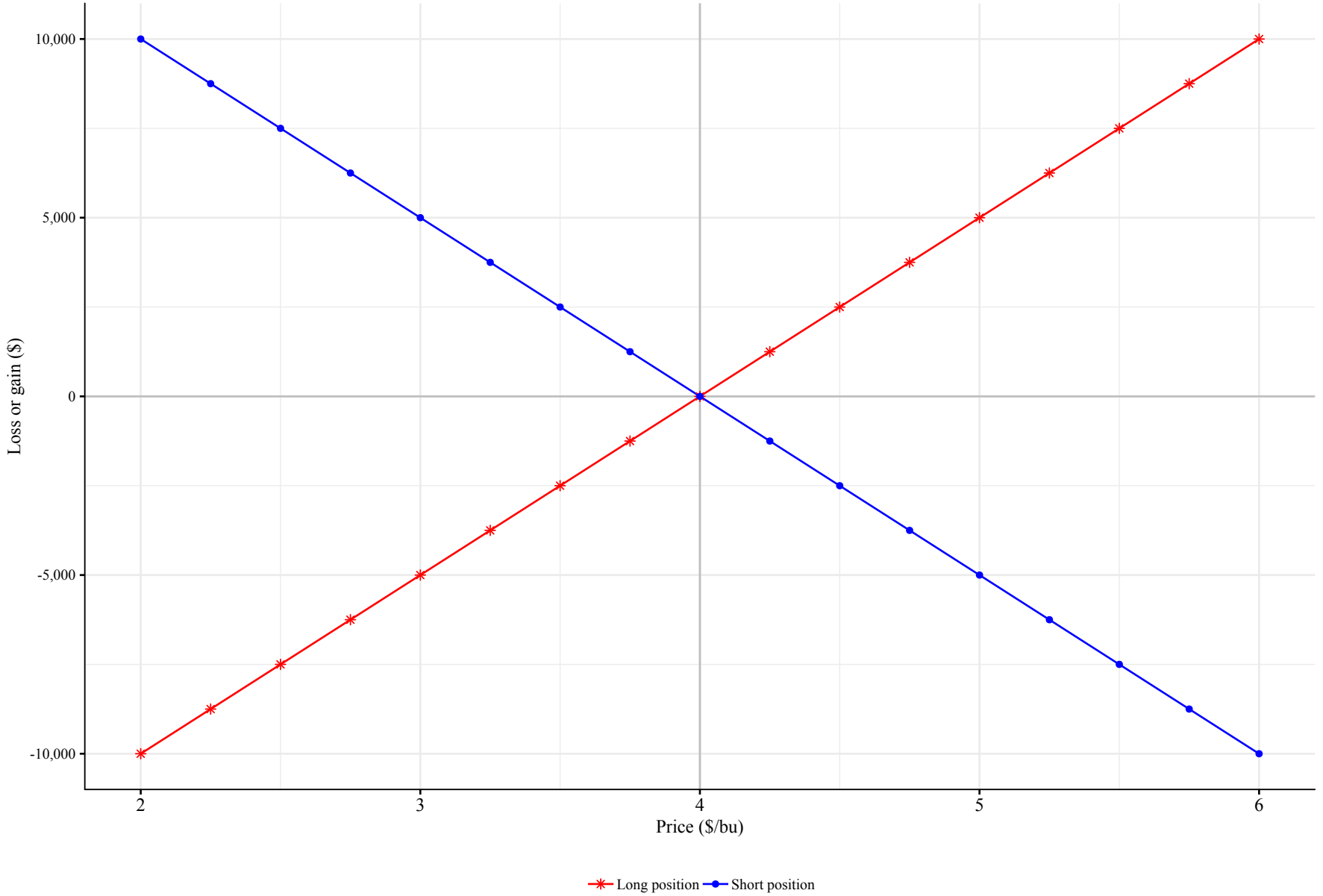
Payoffs diagram: long position



Payoffs diagram: short position



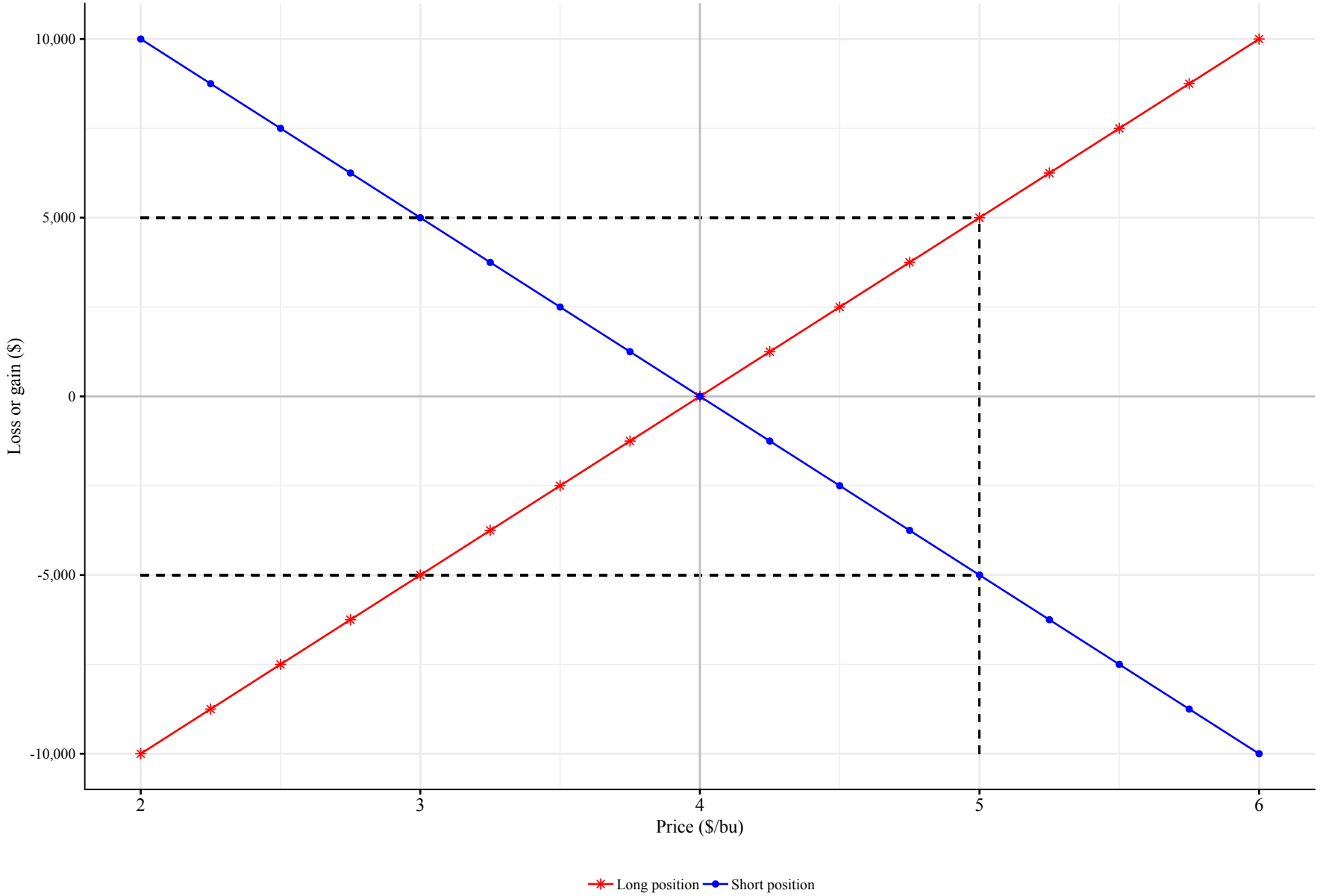
Payoffs diagram



Gains and losses

- On a per contract basis, gains on one position are losses on the opposite position.
- It is a zero sum game!
- For example, consider that the price of the futures contract equals 5.

Gains and losses



CME trading hours (CBOT)

- On weekdays, for corn, soybeans and other agricultural commodities, electronic trading occurs between between 19:00 and 7:45 and between 8:30 and 13:20, central time.
  - Info on trading hours available at http://www.cmegroup.com/trading_hours/commodities-hours.html.

Broker fees (commission)

- Trading futures is not free.
- A broker generally asks for a small fee per transaction.
- The size of the fee varies depending on whether the broker offers some form of assistance such as market analysis.
- Your local grain elevator/coop may offer some brokerage services.

Example of broker fees

Futures Pricing Comparison

	TradeStation	E-Trade[1]	Fidelity[2]	optionsXpress[3]	Schwab[4]	TD Ameritrade[5]
Electronically Traded U.S. Futures (Including E-minis) *Traded through the TradeStation Platform*	**25¢ - $1.20** per side per contract	**$2.99** per side per contract	**Futures Trading Not Offered**	**$6.99** per side per contract	**Futures Trading Not Offered**	**$3.50** per side per contract
	+ exchange, regulatory, and overnight fees	+ exchange and NFA fees	N/A	+ exchange, NFA and transaction fees	N/A	Inclusive of exchange fees

Figure 1: An old example of broker fees

- The page for the example of broker fees is no longer available.
- You can see examples of broker fees at this page: https://www.nerdwallet.com/blog/investing/best-online-brokers-futures-trading-commodities/.

Price limits

- To limit price volatility, exchanges set each day limits between which price for futures contract may vary.
- The parameters to set the limits are re-assessed quarterly.
- You can find details about trading limits here: http://www.cmegroup.com/trading/equity-index/price-limit-guide.html.

Price limits: examples

- Price limits at the CME for agricultural commodities are available at https://www.cmegroup.com/trading/Price-Limit-Update.html.
- Corn:$0.25 per bushel expandable to $0.50 when the market closes at limit bid or limit offer.
- Soybean: $0.75 per bushel expandable to $1.50 when the market closes at limit bid or limit offer.

Definition: normal market

- In a *normal market*, prices of futures contracts increase with their maturities.
- This holds in particular within a crop season.
- The increase in the price of futures contracts reflects the cost of storage and other costs of holding the commodity.

Definition: inverted market

- In an *inverted market*, the prices of futures contracts decline with their maturities.
- This type of price pattern reflects conditions of the demand and supply for the commodity.

How are current markets?

- Futures contract price patterns reflect market's perception of future demand and supply.
- For agricultural commodities with seasonal patterns, markets will tend to be normal and inverted at the same time depending on the crop year.
  - Corn (Barchart);
  - Soybeans (Barchart);
  - Wheat (Barchart).
- For commodities with less of a seasonal pattern, then the relationship between a futures contract price and its maturity will tend to be smoother.
  - Live cattle (Barchart);
  - Lean hogs (Barchart);
  - Crude oil (Barchart);
  - US dollar (Barchart).